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APPLICATION OF SANTANA, MADEIRA TO BIOSPHERE RESERVE

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Application of Santana, Madeira to Biosphere Reserve

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PART I: SUMMARY

1. PROPOSED NAME OF THE BIOSPHERE RESERVE

Santana Biosphere Reserve, Madeira

2. COUNTRY

Portugal, Autonomous Region of Madeira (**Figure 1**~~**Figure 1**~~**Figure 1**).

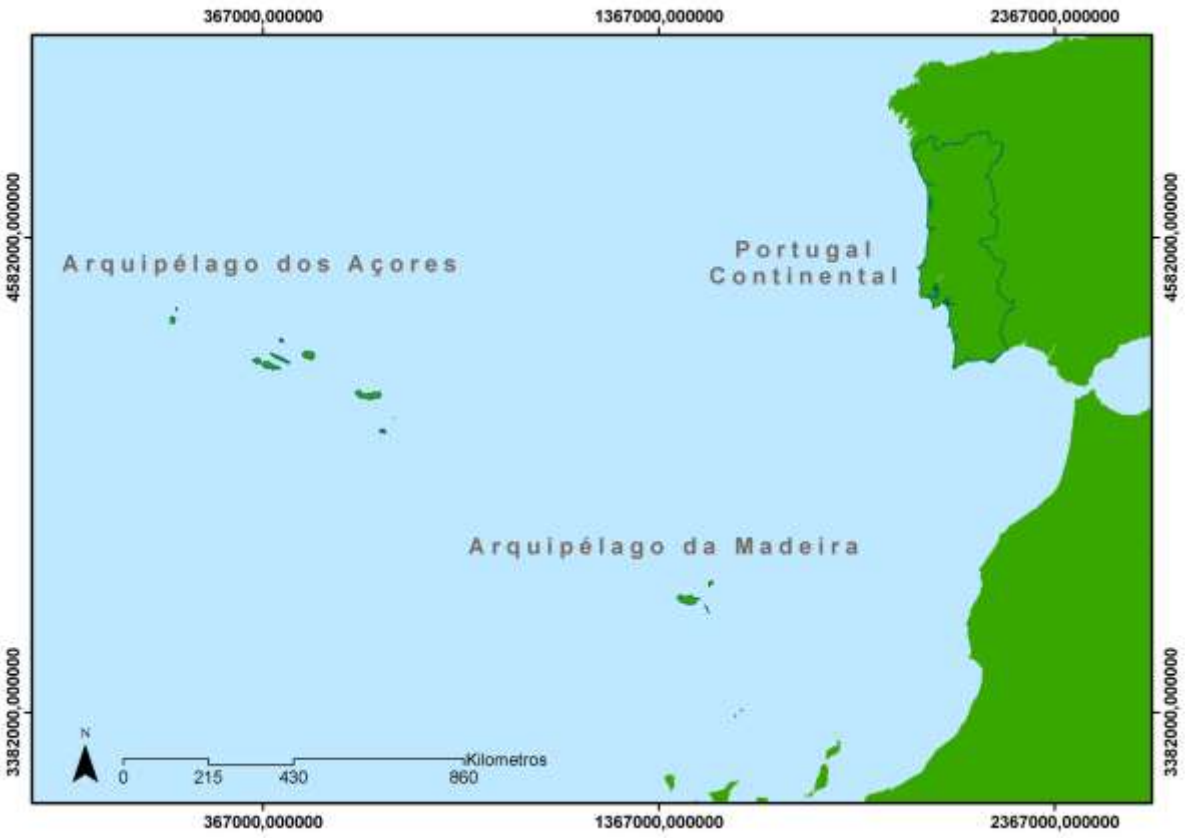

Figure 1. Localization of Mainland Portugal and its Autonomous Regions of Madeira and Azores.

3. FULFILLMENT OF THE THREE FUNCTIONS OF BIOSPHERE RESERVES

3.1. CONSERVATION

The proposed Biosphere Reserve, Santana, is located and matches to the municipality with the same name, north of Madeira, Autonomous Region of Madeira, with head office in the city and parish of Santana. This reserve includes a land component, corresponding to the entire emerged surface of the municipality and also a marine component, containing in the aggregate a wide variety of natural and human values, scenic, natural and cultural environment of local, regional, national and international interest. The natural diversity is manifested by a rich fauna and flora that incorporates a high degree of endemism and an integral representation of the most relevant ecological units of Madeira, from the marine and coastal ecosystems to the high altitude vegetation, through the laurel forest, World Natural Heritage of UNESCO.

A significant percentage of the municipal area is classified in terms of protection, and these areas - Natural Reserve of Rocha do Navio (Marine Protected Area and Site of the Natura 2000), the Central Highlands (Natura 2000 site), laurel forest (Site of the Natura 2000 and UNESCO World Natural Heritage), correspond to the core areas of the proposed reserve, strengthening itself with the Biosphere Reserve's contribution to the conservation and sustainable use of these species and natural ecosystems.

Figura 2. Panoramic view of São Jorge parish

The terrestrial component of the proposed Biosphere Reserve incorporates several macaronesian coastal habitats, evergreen forests and high altitude vegetation, which comprise 11 natural habitats listed in Annex I of the Habitats Directive, of which four are priority, integrating a wide range of plant communities. The Municipality of Santana has a precious floristic richness, encompassing 189 Macaronesian endemics, of which 132 are unique to the archipelago. The invertebrate fauna includes 30 species of terrestrial mollusks endemic to Madeira and 288 endemic species of arthropods of which 262 are exclusive to Madeira.

In the proposed biosphere reserve occur 20 species of land birds and 5 species of sea birds, among which are 6 species included in Annex I and 6 in Annex II of the Birds Directive, highlighting the high international importance of this area, given the uniqueness and susceptibility of species occurring in it, especially since three species and five subspecies are exclusive to Madeira, one species and seven subspecies are endemic Macaronesia and one species is endemic to Macaronesia and simultaneously a Madeiran subspecies.

As for the mamofauna, three species of bats occur, including a species endemic to Macaronesia and another subspecies endemic to the island of Madeira, all included in

Annex IV of the Habitats Directive. The herpetofauna includes one endemic species to Madeira archipelago that is listed in Annex IV of the Habitats Directive.

With regard to marine fauna and flora, sixteen species of fishes occur, of which four are endemic to Macaronesia, one reptile species included in Annex II and priority species in the Habitats Directive and two marine mammal species listed in Annex II of which a cetacean and pinniped, the latter, priority species of the Habitats Directive. Regarding the marine flora, although any endemic species are present, the marine component of the reserve comprises a set of species of high interest, typical of marine waters with high hydrodynamism, especially algae.

Figure 3. Common tern (*Sterna hirundo*)

3.2. DEVELOPMENT

The municipality of Santana currently comprises 6 parishes: Arco de São Jorge, São Jorge, Ilha, Santana, Faial and São Roque do Faial. Together they offer the resident and the visitor scenic and shimmering landscapes reflecting a harmonious combination between natural and human biophysical elements. Each parish reports and stores in its own way, the most significant ethnographic and folklore traces in the memory of their histories, traditions and customs, as is a county strongly rooted in ties of this nature.

Santana is essentially, and yet, a rural municipality where agriculture dominates but with some tourism development in a segment that has successfully maintained the

tradition and landscape. This is an exciting challenge that may allow a change of the socio-economic development model, without losing local identity and character of Santana's citizens and without compromising the natural values that Santana has. The trend of population decline that has been verifying due to population displacement to more urbanized areas in the Autonomous Region of Madeira, has brought the City Council and People's Houses, in agreement with the Regional Government, decided to devote a significant effort in implementing a model of restructuration and revitalization of the County, which intends to implement in terms of land management, the activities to be developed, especially in this context several key instruments: the Municipal Master Plan (PDM), the Plan of Territorial Management of the Autonomous Region of Madeira, Plan of Economic and Social Development of the Autonomous Region of Madeira for 2007-2013 and Plan of Tourism Management of the Autonomous Region of Madeira.

Figure 4. Panoramic view of Arco de São Jorge parish

The Biosphere Reserve as a tool and catalyst for motivating activities based on the conservation and sustainable use of natural and cultural heritage, is perceived by the municipality and its citizens, as a reinforcement of the opportunities for diversification

and renewal of local and regional development and may help to identify and promote initiatives to renew and revitalize the local economy and social development. The Santana Biosphere Reserve intends to become a space of confluence of different local and regional players, generating opportunities for promotion initiatives for the conservation and enrichment of natural and cultural heritage, and mechanisms to highlight this option for sustainable development that the municipality of Santana assumed.

The Municipality of Santana is characterized not only by its natural heritage, with its beautiful landscape and forest wealth, but also by the valuable and extensive cultural heritage. In the built patrimony heritage, the buildings classified as "County Value" should be noted, as the Penha Chapel (Parish of Faial) the Faial fort (Parish of Faial), the Bridge of Faial (Parish of Faial), the fountain of Santa Ana, (Parish of Santana), Church of S. Jorge (Parish of São Jorge) and the Achadinha Sawmill (Parish of São Jorge).

Other buildings of cultural interest mark and contribute to the harmony of the landscape of the municipality of Santana, such as traditional houses, in their various types, including most importantly those with thatched coverage and two-storey buildings of carved stone, with coverage of Marseille tile or cement and also the water mills that played a key role in the domestic economy of the county. We highlight, for example, the Achadinha water mill, recovered under the guidance of the Regional Directorate of Cultural Affairs (DRAC), which remains in operation, serving the population in the grinding of their grain for domestic use, chiefly wheat and corn.

There are also the county a set of ethnographic objects, previously used in economic and domestic activities, such as looms, used in fabrics manufacture for domestic clothing and household items, such as towels, among others.

Furthermore, the municipality of Santana is one of the regions locals, where information can be gathered about the customs and traditions such as traditional medicine, novels, festivals, music and traditional instruments, etc., that are present in its full authenticity.

Figure 5. Arco São Jorge Church

The Municipality of Santana is geographically, the second largest municipality in the Autonomous Region of Madeira and therefore has a strong representation of the important elements of Madeira's biodiversity, at species and ecosystems level.

Santana, being a municipality that stretches from sea to the highest peaks of Madeira, comprises a considerable extension of Mountains, Valleys, Plateaus, Achadas (flattened hills) and Fajãs (land slide deposits), which includes the highest point on the island of Madeira, Pico Ruivo (1861 meters).

The Municipality of Santana is one of the municipalities that best illustrates the preparation of typical dishes from the Madeira Islands. Some factors contributing to this reality, including the knowledge and traditions that pass from generation to generation: the care and affection of Santana's populace preparing food, good and high agricultural productivity throughout the year, always providing fresh foods, many of these cultivated by organic methods. The eateries where the delicacies can be tasted vary greatly and are distributed all over the county.

In fact, the existence of a unique environmental and ecological wealth of high importance for biodiversity conservation, not only regionally but also globally, together with the existence of a reduced population density that divulges their culture and customs across borders, makes the Municipality of Santana an appropriate place to

promote human and economic development in a sustainable way – having always the basic principle of protection and conservation of the biodiversity that characterizes it.

The people of Santana has eversince retained its inherent culture, their customs and traditions that we see reflected in the numerous cultural activities and events that enliven the County, some of which are among Madeira's main touristic events, including traditional popular festivals and the internationally well-known tourist event - "48 hours dancing." It is a festival that celebrates the traditions of the Municipality of Santana, in which men and women appear with the costumes used in previous centuries and which are currently used by elements of folklore groups - in this festival multiple folkloric groups dance continuously for 48 hours.

Figure 6. Grupo Folclórico em actuação no "48 Horas a Bailar"

Folklore is a genre of culture of popular origin, consisting of popular customs and traditions passed down from generation to generation through music and dance. The Charter of National Folklore, for example, in line with the definitions of UNESCO declares that folklore is synonymous with popular culture and represents the social identity of a community through their cultural creations, collective or individual, and is also an essential part of culture of each nation.

The existing folkloric groups follow the aphorism: "We have the obligation to save what is still likely to be saved, so that our grandchildren while living in a different Portugal from ours, can maintain as Portuguese as ourselves and able to maintain their cultural roots steeped in the social inheritance that the past has left us." (Jorge Dias).

To this cultural event various folkloric groups are invited, not only from Madeira, as well as from mainland Portugal, among others.

Preserve and enhance the Cultural and Natural Heritage of the proposed Santana Biosphere Reserve, will not only renew the local economy, but also its social development.

The status of Santana Biosphere Reserve, Madeira, will increase a number of initiatives for the conversion of activities of improvement of natural and cultural heritage.

3.3. LOGISTIC SUPPORT

The Municipality of Santana, due to its location, natural and socio-cultural features has been the venue for the conduct of scientific work covering different specialties, ranging from agricultural sciences to marine and terrestrial ecology, nature conservation, culture and ethnography, as well as is a place where regular conservation and natural resource management projects are developed, with particular emphasis on the endemic biodiversity of Madeira and the Macaronesian biogeographical region.

In recent years, as a consequence of Madeira island resident scientific community growth and with the support of local structures (public laboratories, universities and research centers) some projects and initiatives have developed, which contribute to the recognition of Santana as a true natural laboratory, outstanding above all restocking projects and *in situ* conservation of endemic flora species (e.g. *Goodyera macrophylla*), conservation of germplasm of local cultivars or initiatives such as the completion of the I Macaronesian Environmental Education Meeting which prompted the creation of the Macaronesia Network of Education and Environmental Information Centers (Madeira,

Azores and Canary Islands), on which belongs the Ribeiro Frio Center for Environmental Education and Information.

The number and variety of research projects and activities, conservation and dissemination of knowledge in various areas and also the excellent local dynamics is highlighted when concerning the public participation level, through non-governmental organizations adjusted towards supporting young and older people, local development, culture and traditions preservation. Also the oral tradition theme stands out, since it has a significant expression in Santana, where research, including collecting and recording traditional oral literature is very dynamic.

Figure 7. Ribeiro Frio Center for Environmental Education and Information

As the municipality of Santana is one of the locals in Madeira with better access to higher areas of the island, astronomy studies and observations based on Achada do Teixeira are also common, and therefore, this area is a reference site for the attainment of scientific studies in that field. Also the altitude geological formations located between

Achada do Teixeira and Pico Ruivo have deserved attention from the scientific community and local authorities with a perspective on its future classification as geological monuments.

As shown, the Santana Biosphere Reserve, Madeira, is indeed a site with excellent facilities for logistical support to the development of research projects in different scientific areas, and the classification as a Biosphere Reserve, other than promoting such activities, shall constitute an additional opportunity to promote interdisciplinarity between the different interventions. The existence of a Biosphere Reserve will also extend the scope and interest of research, education and information at an international level and participation of Santana and Madeira Island in international cooperation networks, for example, REDBIOS.

4. CRITERIA FOR DESIGNATION AS A BIOSPHERE RESERVE

4.1. ENCOMPASS A MOSAIC OF ECOLOGICAL SYSTEMS REPRESENTATIVE OF MAJOR BIOGEOGRAPHIC REGIONS, INCLUDING A GRADATION OF HUMAN INTERVENTION

The island of Madeira, with an emerged area of 737 km2 and maximum altitude of 1861 meters, is the largest and highest island in the archipelago of Madeira. The terrain is very steep, with an average inclination of 25% in about 65% of the area of the island and only about 10% of its area is below 500 meters of altitude. The island has in the center of its longitudinal axis a mountain massif that occupies an area of approximately 6224 hectares and divides the island into two distinct slopes. In the eastern part of the mountain massif lie the higher altitude peaks, the most relevant are Pico Ruivo de Santana (1861m), Pico das Torres (1851m) and Pico do Areeiro (1818m). In the western fraction of the central mountain massif, with an average altitude of approximately 1550 meters above sea level, lies the Paúl da Serra plateau, where we highlight the Pico Ruivo do Paúl (1640m) and the area of Bica da Cana (1620m). As a result of the high annual rainfall that occurs on the plateau, either through atmospheric condensation or phytogenic condensation of mist, numerous temporary ponds are formed which are of

supreme hydrological importance, constituting the main impounding, storage and recharge of drainage basins and of most surface water lines and groundwater flows in the island. Watercourses departing radially from the Paúl da Serra plateau are the source of the beautiful lush green valleys and mountains on both sides of the western half of the island, as well as of the stunning water cascades of precious landscape value as the Risco waterfall located at the base of the plateau, in Rabaçal.

Figure 8. Mountainous area in Santana

The municipality of Santana extends from the island's highest point, Pico Ruivo de Santana, to its coastal cliffs and islets, encompassing all habitats on the island of Madeira and listed in the Habitats Directive, in a representing mosaic of the phytosociological formations of the Macaronesian biogeographical region, harmoniously integrated with rural areas, slightly humanized located between the laurel forest and the urban center. The land portions devoted to agriculture are mostly located in basaltic rock terraces that were built by hand for centuries, following the original terrain orography and in which a diverse range of cultures, with emphasis on the vine, corn, potatoes, sweet potatoes,

beans and other vegetables and some fruit cultivars are grown. The goats, sheep and cattle are kept in small traditional stone barns or in small corrals.

The large coastal and marine area included in the proposed Santana Biosphere Reserve, is very rich in habitats typical of macaronesian cliffs and coasts, well represented on the Ilhéu da Viúva and Ilhéu da Rocha das Vinhas islets. These islets, in consequence of the low disturbance that are subject and the absence of predators, are also privileged nesting sites to some pelagic and coastal seabird species. This whole area of high natural value, has high touristic potential, such as walking the paths that exist in the coastal cliffs, where visitors can observe the predominant macaronesian xerophytic vegetation which includes several endemic species such as the emblematic pride of madeira (*Echium nervosum*), the giant sow-thistle (*Sonchus ustulatus*), the Narrow-leaved Rock Mustard (*Sinapidendron angustifolium*), the Saucer plant (*Aeonium glandulosum*), the Fish-stunning Spurge (*Euphorbia piscatoria*), the Madeira Sea Stock (*Matthiola maderensis*), besides a very rare tree species, the Juniper (*Juniperus turbinata* ssp. *canariensis*), endemism whose specimens reach extraordinary sizes in this area. These tours can be combined with marine touristic activities such as the observation of whales & dolphins, sea turtles, monk seals and several species of seabirds.

Figure 9. Pilot-whales (*Globicephala macrorhynchus*)

4.2. BE OF SIGNIFICANCE FOR BIOLOGICAL DIVERSITY CONSERVATION

Madeira is, in terms of biological diversity, the second richest of Macaronesian archipelagos, with the island of Tenerife housing the largest overall number of species and endemisms. However, considering the number of *taxa* per unit area, Madeira takes the top spot in Macaronesia, with an overall index higher than the island of Tenerife. This high species richness in unique life forms, is a reflection of the high variability of ecological conditions on the island that are derived from its location in relation to the continents of Africa and Europe and also its topography. The high biological importance of Madeira is recognized internationally.

The Municipality of Santana hosts various habitats in excellent conservation conditions, providing a refuge for some biological communities which are habitats to many unique species. In the marine and coastal areas of Santana county, several Macaronesian habitats occur, which are of paramount importance to the life cycle of species like the monk seal (*Monachus monachus*) and the common turtle (*Caretta caretta*) listed as priority species in Habitats Directive and populations of Cory's shearwaters (*Calonectris diomedea borealis*), Common tern (*Sterna hirundo*), Bulwer's petrel (*Bulweria bulwerii*) and Madeiran storm petrel (*Oceanodroma castro*), all listed in Annex I of Birds Directive.

Figure 10. The monk seal, priority species in Habitats Directive

Equally important are the habitats that occur in the laurel forest and mountainous areas of the central mountainous massif, with particular emphasis on the endemic Macaronesian heaths, Macaronesian laurel forests, Mediterranean temporary ponds, priority habitats of community interest listed in Habitats Directive Annex I , Habitats of important species as the long-toed pigeon (*Columba trocaz*) and Madeira pipistrelle (*Pipistrellus maderensis*).

Figure 11. Madeira pipistrelle (*Pipistrellus maderensis*)

Santana is the county with the largest number of organic farmers, an activity which reaches its climax on the outskirts of the laurel forest forest in the parish of Ilha, allowing a healthy coexistence between agriculture and biodiversity, a symbiosis between sustainable cultural practices and sanity of the cultures, maintained by the ecological balance provided by the various species that inhabit the adjacent laurel forest. The remaining agricultural mosaic, although including some more modern agricultural farms, is largely made up of small parcels where commercial agricultural production coexists

with subsistence agriculture, motivated for the variety of cultivars grown, in a production model that is beneficial for maintaining soil and water quality, as well as biological diversity.

The classification of the area proposed as Biosphere Reserve will be a decisive impulse to the maintenance and conservation of ancestral farming techniques still in use as are the associations between several crops and crop rotations, as well as an increase of more sustainable agricultural methods, such as organic farming, promoting the return to remote farming techniques and indigenous varieties that were traditionally used by the ancient inhabitants of the county, now abandoned in favor of modern varieties and most profitable methods, using mono-cultural practices and pesticides, which have a profound impact on biodiversity, soil and water.

The marine area will promote the conservation of marine resources, especially species of commercial interest which are explored by local inhabitants, given the importance that these species have in the increase of their income and in their life quality. The maintenance of the populations of limpets (*Patella piperata*, *Patella aspera* and *Patella candei*), toothed winkles (*Monodonta atrata* and *Gibbula* spp.) and some species of fish such as the Dusky grouper (*Epinephelus marginatus*), Island grouper (*Mycteroperca fusca*) and the Red Hogfish (*Pseudolepidaplous scrofa*) and other coastal species such as White bream (*Diplodus sargus*), the Zebra bream (*Diplodus cervinus*), Parrotfish (*Sparissoma cretensis*), Turkish wrasses (*Thalassoma pavo*) and Bluefin damselfish (*Abudefduf luridus*) and Azores chromis (Chromis limbata) in the marine area of the proposed Biosphere Reserve, will maintain a flow of these species to adjacent marine areas, providing local populations, sustainable marine resources.

The fishing methods which are commonly used are the fishing rod or the fishing line, either from shore or small boats, fishing techniques that can be reconciled with the preservation of the actual stocks of exploited species.

Figure 12. Red dogfish, bluefin damselfish and Turkish wrasses in Rocha do Navio

4.3. PROVIDE NA OPPORTUNITY TO EXPLORE AND DEMONSTRATE APPROACHES TO SUSTAINABLE DEVELOPMENT ON A REGIONAL SCALE

Santana has a dimension and a set of natural, historical, social and economic features which offer the possibility to develop concerted and innovative actions whose results are potentially achievable in short time scales, demonstrating its character towards the practice of sustainable development.

Nature conservation, farming activities and techniques, tourism and leisure are sectors of excellence for the development of initiatives and projects whose range, beyond demonstration, can contribute in a significant and visible way to the sustainability of the Municipality itself and its inhabitants.

In a certain way, the Biosphere Reserve cements a valid set of sectoral initiatives which are intended to further develop and the results of which we believe will converge in consolidation with local dynamics around the sustainability of the county and the Autonomous Region of Madeira. The Biosphere Reserve will work as a catalyst to bring together not only infrastructures but also human resources around the historical, social, natural and economic values, generating opportunities for activities, goods, products and

services that the Municipality of Santana has to offer. As a result, the visibility and effects of Santana Biosphere Reserve and the results of its practices will reflect in the global dynamics of Madeira Region, and will not be restricted to the Municipality of Santana.

Figure 13. Roof straw thatching in a Santana typical house

4.4. HAVE AN APPROPRIATE SIZE TO SERVE THE THREE FUNCTIONS OF BIOSPHERE RESERVES

The proposed area for Biosphere Reserve includes the entire emersed area of the municipality of Santana and a relevant marine area, in a total of 5664.06 hectares. The diversity of habitats and species of endemic flora and fauna present in the county, some listed in Annex I of the Birds and Habitats Directives, led to recognition of its local, regional, national, community and international importance by the European Union through their classification as Sites of Community Interest of Natura 2000 ecological network.

The marine area covered by the proposed Biosphere Reserve covers 56.64 km2, and will allow integrating in a sustainable mode the interdependent management of coastal and marine environments and their natural resources, producing many benefits for wildlife and local people.

Figure 14. "Marmulano" subhumid inframediterranic vegetation of

The simple territorial structure of the proposed Santana Biosphere Reserve will permit to achieve the three intrinsic functions of a biosphere Reserve more efficiently, particularly considering the advantages and synergies that can be created by integrating the management of their natural values, with the management plans defined for the laurel forest, central mountainous massif and Rocha do Navio Natura 2000 sites, core areas of the proposed Biosphere Reserve. The resulting effect of its simple zonation will allow for high administrative functionality in the preservation of natural and socio-cultural values and encourage sustainable development of local communities in the long term through the promotion of appropriate practices in the assorted economic, cultural and environmental activities developed within the Reserve area.

The core areas, land component with 4175.96 hectares (41.76 km2) and marine component with 1708.45 hectares (17.1 km2), total 5884.05 hectares (58.84 km2), correspond to 38.66% of the total area of the proposed Biosphere Reserve. Given the characteristics of their natural values, both core areas are adequate to ensure the conservation of terrestrial and marine natural resources and Santana's and Madeira's native biological richness.

The area sized for Buffer Zones totaling 707.67 hectares (70.1 km2), representing approximately 4.65% of total area of the proposed Biosphere Reserve, ensures the

protection of fundamental natural values of the core areas and simultaneously reconciles the development of some sustainable anthropogenic activities on transition zones nearby.

	Area (ha)	Percentage of Area (%)
Core Areas	5884,05	38,66
Buffer Zones	707,67	4,65
Transition Areas	8626,32	56,68
Total	**15218,04**	**100**

4.5. THROUGH APPROPRIATE ZONATION

a) A legally constituted core area or areas devoted to long term protection, acording to the conservation objectives of the biosphere reserve, and of suficient size to meet these objectives

The two core areas included in the proposed Santana Biosphere Reserve correspond to areas classified under various regimes of protection and which are subject to various measures of protection and conservation.

- **"Sítio da Rocha do Navio" Natural Reserve**

The Rocha do Navio site has a total area of 1822 hectares, comprising the entire area defined between the maximum high tide line and 100 meters bathymetric, bounded on the east and west by the Ponta dos Clérigos and the ponta de São Jorge, respectively, and includes the islets Ilhéu da Viúva and Ilhéu de São Jorge, which resulted from the coastline recoil caused by marine abrasion on the various volcanic materials.

Figure 15. Panoramic view of sítio da Rocha do Navio marine core area

The Ilhéu da Viúva Islet has a maximum altitude of 94 meters and about 1.4 hectares in area and stands in the intertidal zone, being isolated only when the high tide occurs. The ilhéu de São Jorge Islet is about 140 meters from shore, near the mouth of the Ribeira de São Jorge stream and has a total area of approximately 0.6 hectares, with about 80 meters in length and 45 meters at its widest. Both islets distance from each other about 3100 meters. The site encompasses a wide diversity of natural habitats, especially the vegetated sea cliffs with endemic flora of the Macaronesian coasts , lower formations of Euphorbia close to cliffs and submerged or partially submerged sea caves. The xerophytic vegetation, predominantly herbs and shrubs, includes several Macaronesian and Madeira endemics, with particular emphasis on a Juniper population (*Juniperus turbinata* ssp. *canariensis*).

Figure 16. Flora endémica das costas macaronésicas

The Sítio da Rocha do Navio Nature Reserve was established, by request of Santana's inhabitants, by the Regional Legislative Decree No. 11/97/M, of 30th June and classified as a Site of Community Interest (SCI) of the European Union Natura 2000 network, areas classified under the Habitats Directive, Directive No. 92/43/EEC on the conservation of natural habitats and wild fauna and flora, through the Regional Legislative Decree No 5/2006/M, of 2nd of March.

The 1822 hectares of land area within the marine core area, comprises about 2 hectares of area of the islets "Ilhéu da Viúva" and "Ilhéu de São Jorge", while the remaining 1820 hectares of marine area corresponding to the core area.

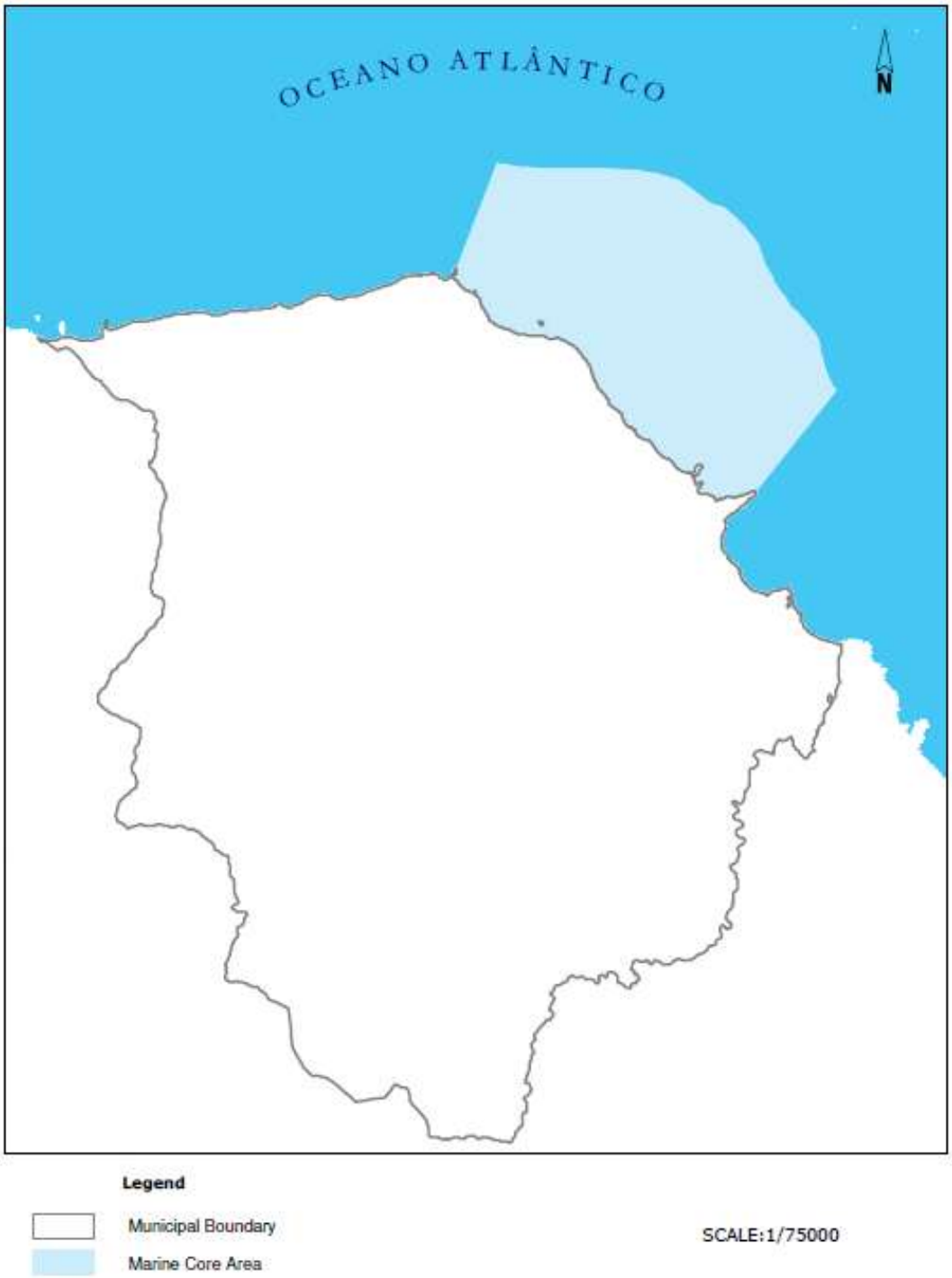

Figure 17. Santana Biosphere Reserve marine core area

- **Laurel Forest and Central Mountainous Massif**

The terrestrial core area includes areas of native laurel forest and areas of the central mountainous massif, two sites of Community importance (SCI) for the European ecological network Natura 2000. The laurel forest, which covers most of the land core area, is an evergreen forest that occupies an approximate area of 14,953 hectares in the island of Madeira, located between 200 and 1600 meters of altitude, mainly in the northern slopes, inaccessible to most activities and human installation. It is characterized by a set of phytosociological indigenous communities, which as a whole, make up this forest type.

Figure 18. Panoramic view of Laurel forest and Central Mountainous Massif in Fajã da Nogueira valley

In Santana, laurel forests occupy the entire forest perimeter of the county, with a total area of 307.400 hectares (3074 km2). Plays a key role in the hydrological balance of the island, since it is the main responsible for the collection, retention of water from rainfall and fogs, charging almost constantly this invaluable resource for human livelihood, as well as for agricultural and gardens irrigation and also providing water to supply hydroelectric powerplants. The channels of capture and transport of water –

levadas - located mostly in laurel forest areas, have an immense landscape value and are the major tourist attraction on the island.

Figure 19. Levada, a major touristic attraction

The area covered by laurel forest houses 39 macaronesia endemics and 76 Madeira endemic taxa, 27 of which are listed in European Union Habitats Directive, including the brissimoret's stonecrop (*Sedum brissemoretii*), Madeira bindweed (*Convolvulus massonii*) Wallaston's musschia (Musschia wollastonii) and the wood fern (*Polystichum drepanum*) that are considered priority species. This area includes four types of habitats of community interest listed in the aforementioned Directive, with particular emphasis on the endemic Macaronesian heaths and Macaronesian laurel forest, priority habitats.

The first areas of laurel forest classified under conservation and protection measures were established by the Regional Decree 14/82/M of 11 October of 1982, which created the Madeira Natural Park. In this decree, vast areas of laurel forest were classified under different regimes of protection, including, most importantly for the current application, the areas of Integral Natural Reserves of Caldeirão verde and Ribeira Seca / Fajã da Nogueira, belonging to the municipality of Santana which are integrated in the land core area of the proposed Biosphere Reserve.

Figure 20. Laurel forest biological diversity

In 1992, this forest was classified as a Biogenetic Reserve by the Council of Europe and in 1999 as World Natural Heritage by UNESCO. The biological importance of the laurel forest, was highlighted by its classification as a Site of Community Importance (SCI) and Special Protection Area (SPA) of European Union Natura 2000 ecological network, areas classified under the Habitats Directive, Directive No. 92/43/EEC and Birds Directive, Directive No. 79/409/EEC, through the Regional Legislative Decree No 5/2006/M, of 2nd of March of 2006.

The importance of this forest for birds, especially considering some of the unique species that it harbors, such as the Madeira firecrest (*Regulus madeirensis*), the long-toed pigeon (*Columba trocaz*), the Plain Swift (*Apus unicolor*) and the Madeira Chaffinch (*Fringilla coelebs maderensis*), was internationally recognized by Birdlife International qualifying it as an IBA (Important Bird Area). The land core area comprises 4175.06 hectares.

Figure 21. Berthelot's pipit (*Anthus berthelotti madeirensis*)

The vast natural heritage that characterizes the entire area of the Central Mountainous Massif, especially the high rate of endemicity existing at the altitude flora and arthropod fauna, as well as bryophytes, is representative of the importance that this area has for conservation of indigenous biodiversity. In the Central Mountainous Massif are present 67 macaronesia endemic taxa, of which 17 are shared with other Macaronesian archipelagos and 50 are endemic to the archipelagos of Madeira and salvage islands. A total of 38 endemic *taxa* to Madeira and salvage archipelagos are listed in Annexes B and B-II-IV of the Habitats Directive, of which 12 are present in the Central Mountainous Massif. The Annex I of the Bern Convention includes 32 taxa endemic to Madeira and Salvage archipelagos, 7 of which are present in the Central Mountainous Massif. Concerning bryophytes, in this area 123 taxa are listed, comprising 87 mosses and 36 liverworts, with a percentage of 5.6% of Macaronesian endemic taxa, as for example the rare moss *Bryoxiphium madeirense*. Some species that occur above 1300m altitude are restricted only to the higher peaks, such as *Anacolosa webbii*, *Andreae alpestris*, *Antitrichia californica* mosses and *Gymnocolea inflata*, *Marsupella adusta*, *Porella cordaeana* liverworths.

The Central Mountainous Massif is shelters six habitats of community interest listed in the Habitats Directive, of which the Mediterranean temporary ponds, the Endemic forests with Juniperus spp. and the endemic Macaronesian heaths, are priority habitats. Beyond all the richness that characterizes this area as a whole, the eastern part of the Massif is evidenced as the only place in the world where Madeira petrel (Pterodroma madeira), the most endangered seabird in the world, nests. Since 1969, when this presumedly extinct seabird was rediscovery, this area has been object of much interest from local and foreign ornithologists, intensifying the actions towards the conservation of this species since 1986, mostly driven by funding through the LIFE program.

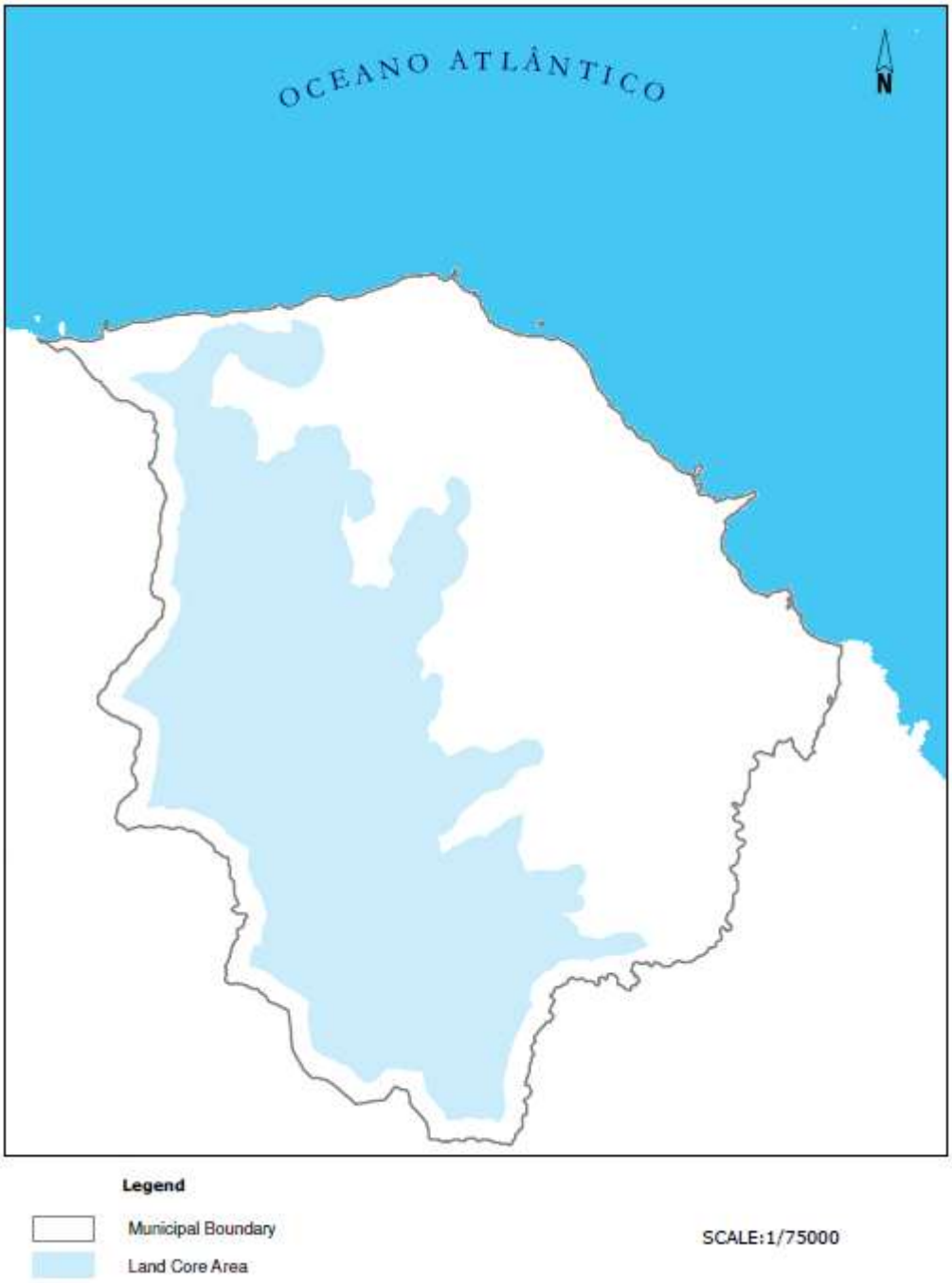

Figure 22. Land core area of Santana Biosphere Reserve

b) A buffer zone or zones clearly identified and surrounding or contiguous to the core area or areas where only activities compatible with the conservation objectives can take place

Buffer zones surrounding the land core area and marine core area of Rocha do Navio, which comprise in their majority public areas, totaling 707.67 ha. These areas were determined objectively in order to enhance sustainable human activities contributing to the restoration of ecological balance and preservation of natural landscape. The planning and management of these areas, considering the interests and needs of its users, contributes to the maintenance and conservation of habitats and species in the core and adjacent areas.

- **Rocha do Navio**

The buffer zone of Rocha do Navio with an area of 109.68 hectares comprises a small coastal land area and a larger marine area. Given the high environmental quality of the buffer zone of Rocha do Navio, as a result of insignificant human activities developed in the area, this buffer zone will stand out by promoting its natural resources and awareness of local population on the importance of its exploration in a sustainable manner. In the land portion of this buffer zone, the vegetated slopes and sea cliffs stand out by its characteristic endemic flora of the Macaronesian coasts.

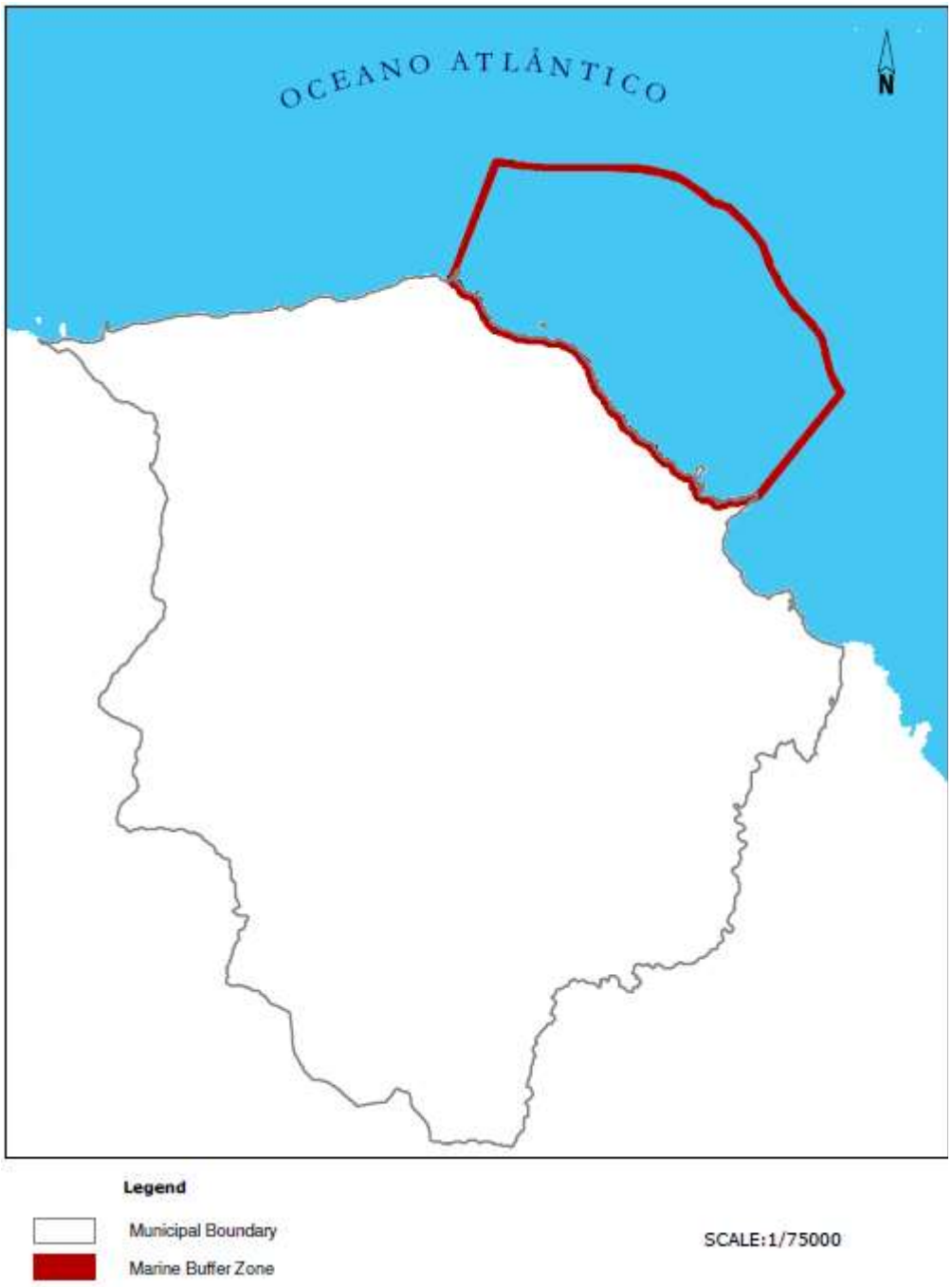

Figure 23. Santana Biosphere Reserve marine buffer zone

Figure 24. Pride of Madeira plants (*Echium nervosum*) in a cliff

- **Land area**

The land buffer zone comprises 597.99 ha of forest land consisting of various plant communities, including exotic species, Lauraceous and ericaceous plants and some small agriculture parcels, mostly with fruit crops. It is an area which includes infrastructures to support many recreational activities, which due to imposed regulation, supervision and classification, prevent any adverse effects.

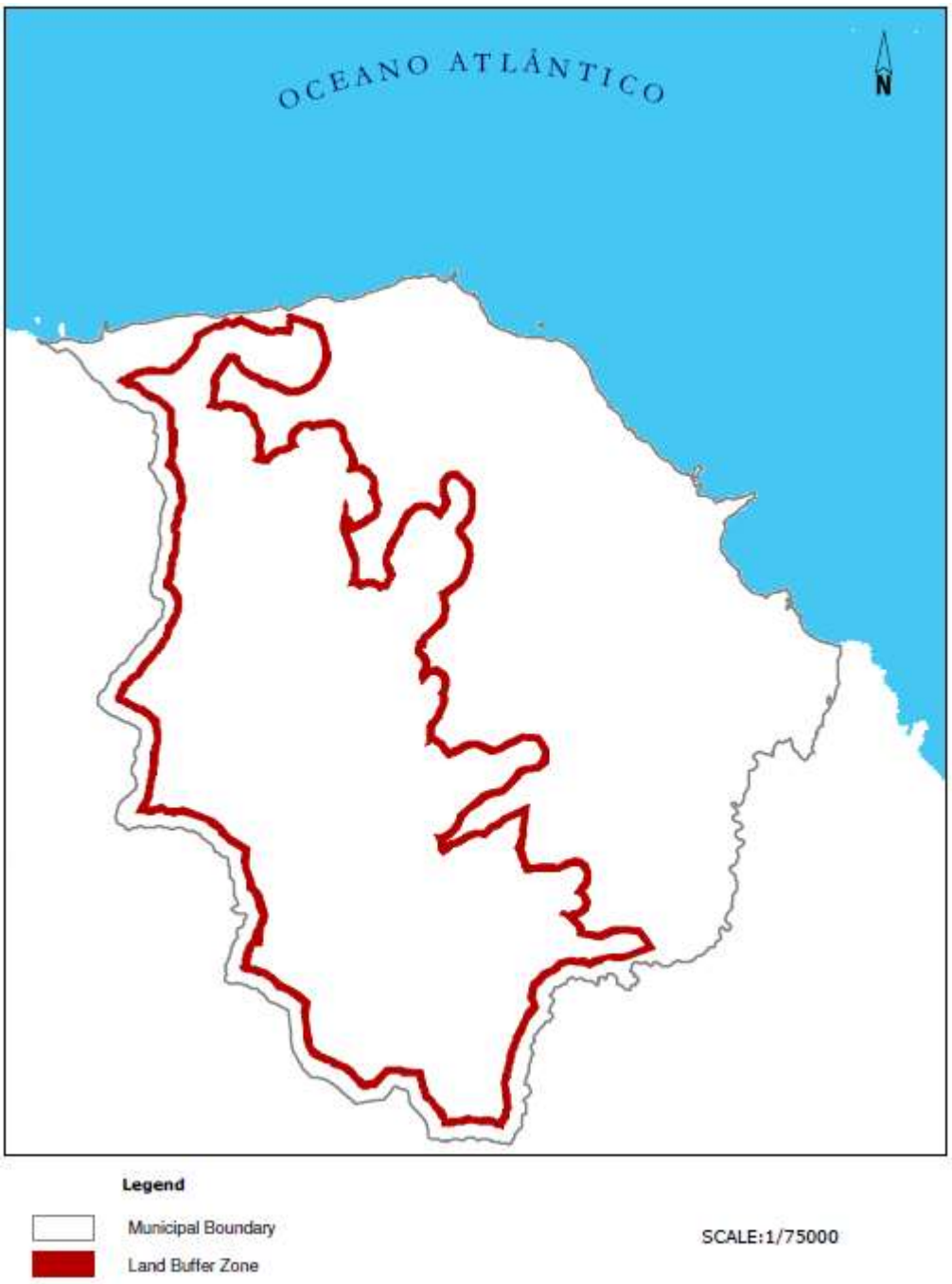

Figure 25. Santana Biosphere Reserve land buffer zone

c) An outer transition area where sustainable resource management practices are promoted and developed

The transition zones include marine and land areas of public and private tenure totaling 8626.32 hectares, accounting for 56.68% of the total reserve area. The marine transition area corresponds to 44.58% of the transition area with a total of 3845.93 ha, while the land portion of the transition area covers 4780.39 ha. It is an area of strong rural expression with several rural-urban centers mainly arranged along the main roads and that include the town of Santana, urban center that is characterized by its sparse settlement, typical of rural areas. The transition zone includes areas of exotic woods, including eucalyptus and pine trees as well as some forsaken terraces, due to the abandonment of agricultural activity that occurred during times of emigration. The main economic activities of agriculture, livestock production, agro-industrial and forestry develop this area, one of the most important in the region within these economic segments.

Figure 26. Panoramic view of transition area from the land core area

Considering the increase of agricultural area under organic production system and environmental education initiatives in which includes the program ecoschools and even the recent adhesion of local schools to the network of UNESCO associated schools and through the momentum created by this Biosphere Reserve application, which covers all schools in the proposed Biosphere Reserve, there is a large commitment from the local population to carry out sustainable activities, valorization and conservation of natural heritage. The potential for growth of environmentally sustainable activities is enormous, given the excellent work done by several organizations in educating new generations in sustainable development and conservation of natural resources of their homeland. The classification and management of these areas, considering the interests and needs of the resident population, contribute to the upkeep and maintenance of cultural values and development of associated economic sustainable activities.

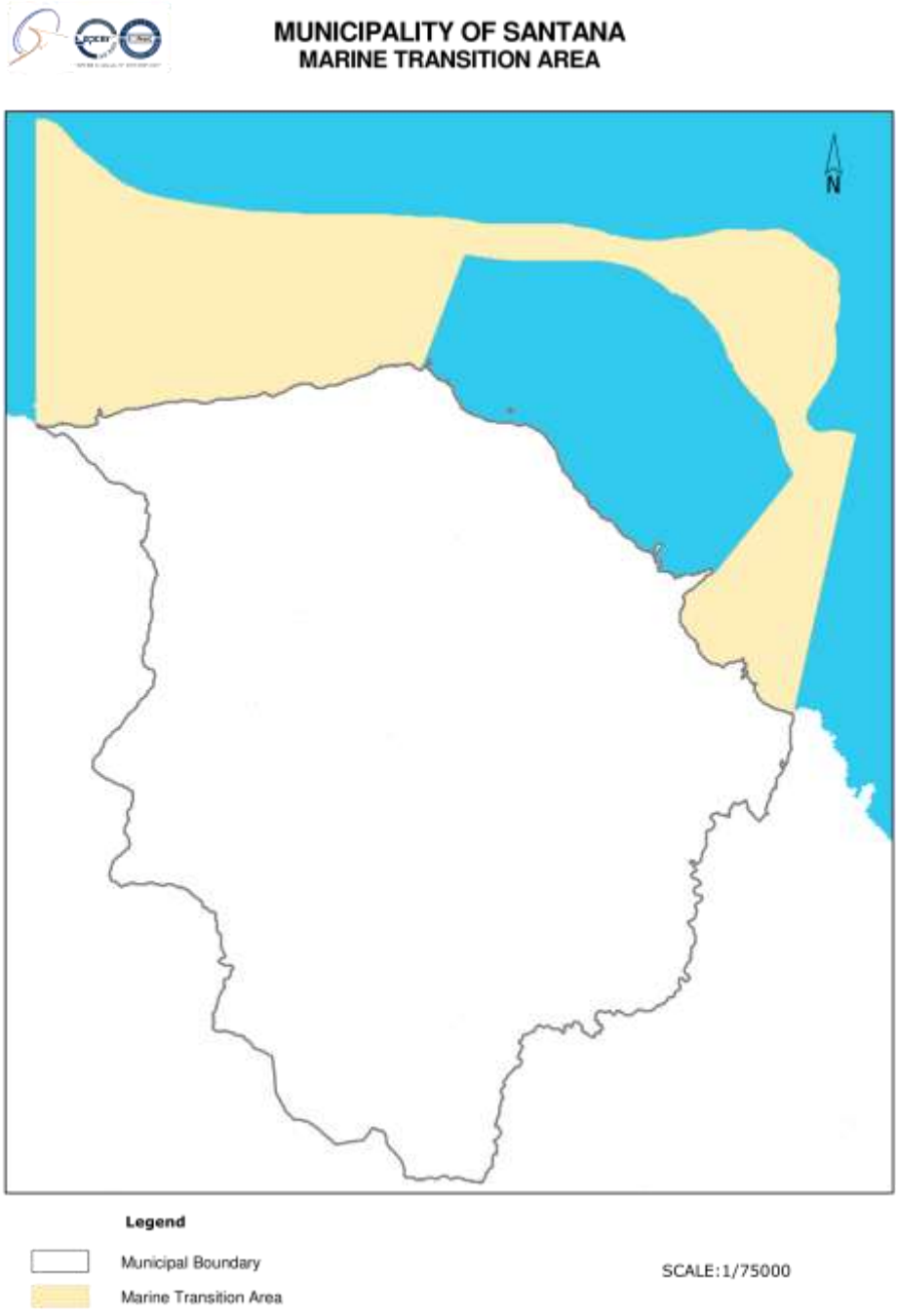

Figure 27. Santana Biosphere Reserve marine transition area

The marine transition area encompasses most of the marine area of the biosphere reserve proposal, and much of the coastline of the municipality of Santana. The main human activities developed are connected with the use bathing, underwater fishing and angling from the shore. Seasonal activities are mostly conducted in summer and insignificant, considering the small number of them Practitioner. The submarine hunting and fishing to the shoreline activities are carried out sustainably, regulated and inspected by several entities, without negative impacts to the balance of species and local habitats. The coastline is home in the areas of cliff plant communities of great natural beauty and importance.

Figura 28. Dark winged sea gulls (*Larus fuscus graellsii*)

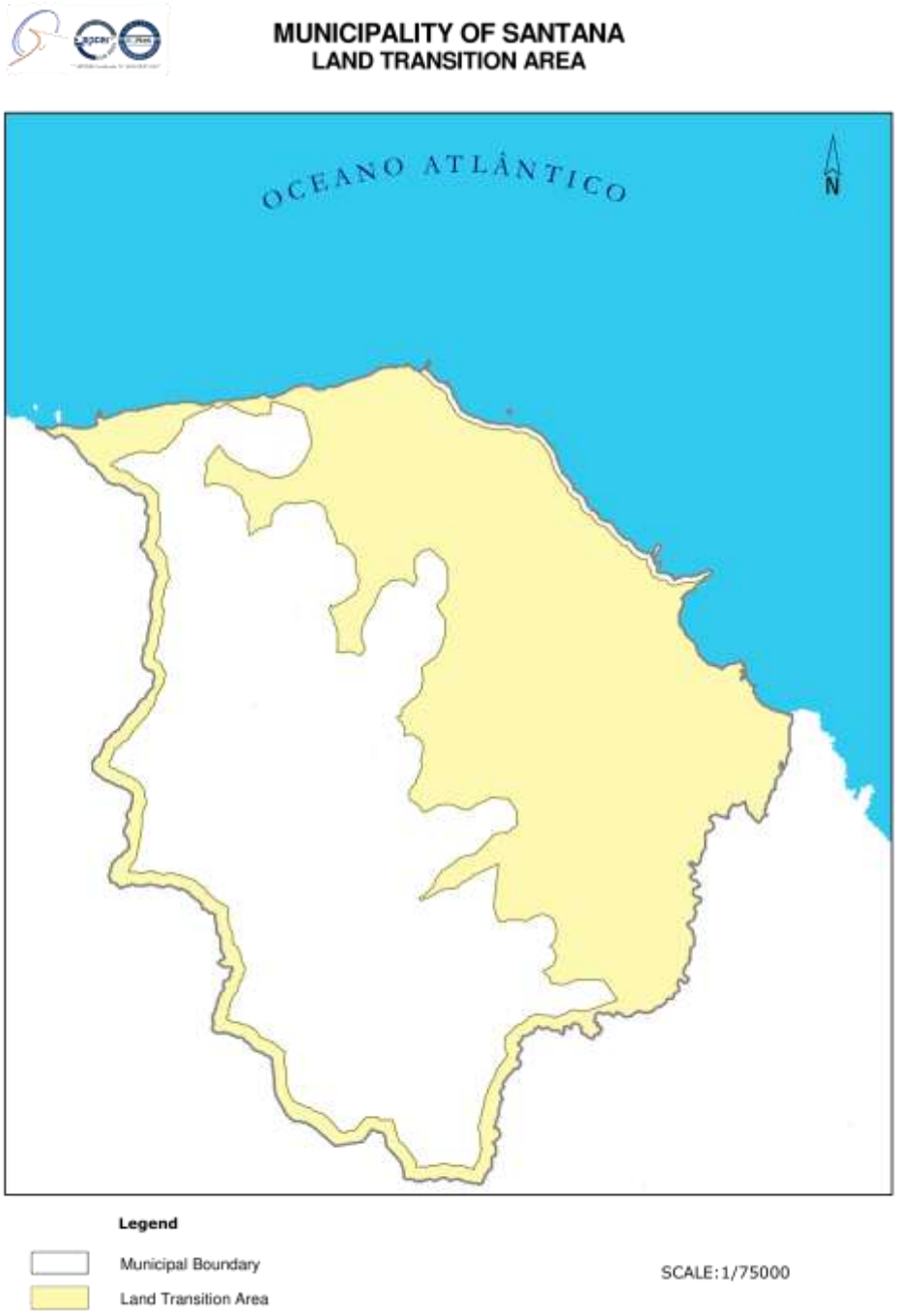

Figure 29. Santana Biosphere Reserve terrestrial transition area

4.6. ORGANIZATIONAL ARRANGEMENTS SHOULD BE PROVIDED FOR THE INVOLVEMENT AND PARTICIPATION OF A SUITABLE RANGE OF *INTER ALIA* PUBLIC AUTHORITIES, LOCAL COMMUNITIES AND PRIVATE INTERESTS IN THE DESIGN AND THE CARRYING OUT OF THE FUNCTIONS OF A BIOSPHERE RESERVE

During the drafting process of the application several dissemination and participation initiatives were developed, which included conferences, public debates and on-line public consultation of the project application. On the other hand, activities involving schools in the county were stimulated, which resulted in the adhesion of two schools of Santana to the network of UNESCO schools. The main public events were used for the dissemination of the Santana Biosphere Reserve draft and for this purpose promotion stands were mounted and advertising material distributed. The drafting process of the application dossier was also a process involving local and regional public and private authorities. Of the public authorities, beyond the municipality, there is the involvement of regional offices linked to geographic information and land management, forestry, environment, management of protected areas, cultural affairs, among others. The Santana municipality Biosphere Reserve plans to create a consultative body comprising representatives of local and regional interests, who participate in the management of the proposed Biosphere Reserve.

Taking advantage of Santan's urban settlement typology, where the population is concentrated mainly in small urban centers, the direct contact with the local population is facilitated by mobilizing and encouraging the active participation of the majority of local population in the Biosphere Reserve affairs.

4.7. MECHANISMS FOR IMPLEMENTATION

a) Mechanisms to manage human use and activities in the buffer zone or zones

There are several mechanisms for managing activities in the land buffer area, as the Laurel forest Management Plan, as part of the management plans for Natura 2000 areas, the Tourism Management Plan of the Autonomous Region of Madeira (POT) and Municipal Master Plan of Santana.

For the marine core area, management mechanisms will be based on the Program of Measures for the Management and Conservation of Natura 2000 site of Ilhéu da Viúva and management measures to Sítio da Rocha do Navio established by the Madeira Natural Park.

b) A management plan or policy for the area as a biosphere reserve

The lines of action adopted by the various plans and programs designed as guidelines for the socio-economic development of the proposed Biosphere Reserve area, including the Santana Municipal Master Plan, the Tourism Management Plan of the Autonomous Region of Madeira (POT), Costline Management Plan (POOC) and Plans for the Management of laurel forest, the Central Mountainous Massif and Ilhéu da Viúva, areas integrated in the European ecological network Natura 2000, will be the executive support to the management policy of the Biosphere Reserve area.

If accepted the nomination of Santana as a Biosphere Reserve, a specific management plan will be outlined, enhancing the integration of the local community in sustainable development of the municipality, according to the guidelines defined for Biosphere Reserves. It is also believed that the very designation of the Biosphere Reserve will be an important stimulus for the promotion of sectoral plans, since the Biosphere Reserve will be a factor of common interest to them.

c) A designated authority or mechanism to implement this policy or plan

The several planning and management mechanisms that the area is subject, are combined around the key objectives of the reserve itself, by which the municipality of Santana through the Municipal public company Terra Cidade, in an early stage of development and installation of the Santana Biosphere Reserve, will assume the role of executive manager, regarding the different institutional contributions, public and private, around the sustainable development of Santana and the Autonomous Region of Madeira. It will also be assigned a permanent Advisory Council which will include the various public and private stakeholders representing the forces of Santana municipality and the Autonomous Region of Madeira.

The major Plans and Programs that will constitute the mechanisms for the Biosphere Reserve implementation are: Plan for Economic and Social Development of the Autonomous Region of Madeira, the Plan of Territorial Management, the Municipal Master Plan, the Tourism Management Plan, Management Plans of Protected Areas – Central Mountainous Massif, Laurel forest and Rocha do Navio Management Plan - and the Natural Park of Madeira Management Plan itself. Special emphasis will be given to the Rural Development Plan, particularly with regard to areas that make up the Transition area.

The Municipality of Santana, through the Municipal Company Terra Cidade will also seek to establish conditions for effective participation of other local entities, private and public, especially among private associations, local development organizations and schools (in particular, those who formalized its adherence to School Network of UNESCO during the current application process).

d) Programmes for research, monitoring, education and training

i. Research

At the level of research, the Biosphere Reserve of Santana intends to further diversify and enhance the initiatives that the various institutions have already held in the Autonomous Region of Madeira, also trying to link research to training and higher education in various fields ranging from agriculture, floriculture, biology and ecology, habitat restoration, geology, coastal management, fisheries, climate and weather and also in various areas of social sciences and humanities. The University of Madeira, the regional public health laboratories (Fisheries, Agriculture, Livestock, Environment, Water, Marine Biology), will find support in the Biosphere Reserve of Santana in order to develop their activities, also in the logic of using the biosphere reserve as laboratory for the study of different specialties and the implementation of integrated management models oriented on a sustainable development perspective.

ii. Monitoring

In terms of monitoring, the Biosphere Reserve aims to establish mechanisms to monitor the results of management measures that may be implemented and will also contribute in supporting the implementation of the various sectoral plans that converge to the development of the Biosphere Reserve itself, mainly the management plans of protected areas, species and habitats. Within the scope of logistical possibilities, it is predicted that the Biosphere Reserve will support different research teams both in the development of field work and through the assignment of spaces for installation of laboratories to support field work campaigns.

iii. Education and training

Santana was the promoter of the first regional meeting on environmental education and also the meeting of the Madeira, Azores and Canary Islands network of

environmental education and information centers, and thus the Biosphere Reserve will continue to devote special attention to this sector. Under the bid process of the application itself, it was possible to stimulate and support the adhesion of two local schools to the UNESCO School Network, and these were the first schools in the entire region of Madeira to join this network.

The Ribeiro Frio Environmental Education Center will be a base of ongoing cooperation between the Biosphere Reserve and the Regional Directorate of Environment at the level of education and environmental information activities and the very promotion of Santana Biosphere Reserve, Madeira. Conditions to hold exhibitions and workshops of activities related to dissemination of natural and cultural heritage will be given, whether developed by the Biosphere Reserve or by other local, regional, national and international institutions.

Figure 30. Children attending environmental education activities at Ribeiro Frio Environmental Education Center

Special attention will be devoted to REDBIOS, to which the Santana Biosphere Reserve will join from the inception and in which the reserve intends to develop joint universal promotion and dissemination programs and projects about the MAB Programme and the regional Biosphere Reserves network.

5. ENDORSEMENTS

5.1. SIGNED BY THE AUTHORITY/AUTHORITIES IN CHARGE OF THE MANAGEMENT OF THE CORE AREA(S)

Full name: Paulo Jorge dos Santos Gomes Oliveira

Title: Director of the Natural Park of Madeira

Date: _____

5.2. SIGNED BY THE AUTHORITY/AUTHORITIES IN CHARGE OF THE MANAGEMENT OF THE BUFFER ZONE(S)

Full name: Paulo Jorge dos Santos Gomes Oliveira
Title: Director of the Natural Park of Madeira
Date: _____

5.3. SIGNED AS APPROPRIATE BY THE NATIONAL (OR STATE OR PROVINCIAL) ADMINISTRATION RESPONSIBLE FOR THE MANAGEMENT OF THE CORE AREA(S) AND THE BUFFER ZONE

Full name: José Miguel Silva Branco

Title: Chief of Cabinet of Regional Sec. for Environment and Natural Resources

Date: _____

5.4. SIGNED BY THE AUTHORITY/AUTHORITIES, ELECTED LOCAL GOVERNEMENT RECOGNIZED AUTHORITY OR SPOKESPERSON REPRESENTATIVE OF THE COMMUNITIES LOCATED IN THE TRANSITION AREA

Full name: Rui Moisés Fernandes Ascensão

Title: Mayor of Santana Municipality

Date: _____

5.5. SIGNED ON BEHALF OF THE MAB NATIONAL COMMITTEE OR FOCAL POINT

Full name: Pedro Castro Henriques

Title: Coordinator of Portuguese MAB Commission

Date: _____

*** See attached letters of endorsement**

PART II: DESCRIPTION

6. LOCATION (LATITUDE AND LONGITUDE)

Latitude: 32º 46' N

Longitude: 16º 54' W

Northern boundary: 32º 50' N

Southern boundary: 32º 42' N

Western boundary: 16º 58' W

Eastern boundary: 16º 50' W

7. AREA

The total area of the proposed Biosphere Reserve is 15.218,04 hectares

7.1. SIZE OF CORE AREA(S)

Size of terrestrial core area: 1708, 45 ha

Size of marine core area: 4175, 60 ha

7.2. SIZE OF BUFFER ZONE(S)

Size of terrestrial buffer zone: 597, 99 ha

Size of marine buffer zone: 109, 68 ha

7.3. APPROXIMATE SIZE OF TRANSITION AREA(S)

The approximated size of the terrestrial transition area: 4.780,39 hectares

The approximated size of the marine transition area: 3.845,93 hectares

7.4. BRIEF RATIONALE OF THIS ZONATION

The delineation of core areas, buffer and transition of the proposed Biosphere Reserve, were determined and selected according to their characteristics, natural values and existing management plans for the land area, as well as for the marine area.

The proposed zonation includes areas as core areas with high protection status, both included on the list of Sites of Community Interest (SCI) of the European ecological network Natura 2000. The requirements proposed by the Seville Strategy, that the core areas must be sites properly protected for ecosystems conservation and monitoring with a minimum of disturbance, which adjust entirely into the mechanisms defined in the management plans of the SCI's and present valid legislation on nature reserves managed by the Madeira Natural Park.

The buffer zones were determined, as defined in the Seville Strategy, in order to preserve the core areas. In the buffer zones, managed by different legal mechanisms, the establishment of activities compatible will be promoted with conservation objectives to stimulate sustainable development.

The remaining area of the Municipality of Santana, and a substantial part of the surrounding marine area, form the transition area, which, in order to ensure the management and sustainable development of its resources, has several planning and tools.

8. BIOGEOGRAPHICAL REGION

The Madeira archipelago, including the Salvage Islands, integrates the biogeographical region of Macaronesia, which also includes the Canary Islands, Azores, Cape Verde and even an area located in the northwest African mainland. Although there is some controversy at the taxonomic level, to consider it in biogeographic terms, since the floristic similarity between these islands is higher than the fauna, which lead some

authors to consider the Macaronesia a sub-biogeographic region, it is certain that the biodiversity similarity of these islands is close enough in their origin and composition to justify its consideration as a valid distinct biogeographic unit. One feature of Macaronesia is the volcanic origin of all its islands, which by geographic and reproductive isolation, resulted in the existence of a high degree of biodiversity endemicity, considering both specific and ecosystem level.

The archipelago comprises the islands of Madeira, Porto Santo, Desert Islands and also the Salvage Islands. The Madeira is located about 700 km from the African continent and around 900 km of European coasts. Madeira is of oceanic volcanic origin and paleontological evidence date the island birth between 10 and 15 Million Years.

The climate of Madeira is determined by its position and its insular nature, topography and altitude, being the northeastern trade winds determinant. Thus, in Madeira we find a much more humid atmosphere than in the Canaries and Cape Verde, with temperatures slightly below those of the Canary Islands (1 or 2 ºC).

Figura 31. Laurissilva, macaronesian typical habitat

9. LAND USE HISTORY

The overall settlement and occupation of the territory in the municipality of Santana followed the same principles and practices of the rest of Madeira's territory. However,

since early times Santana acquired an agricultural character. According to Elucidário Madeirense, "Lopo Fernandes Pinto, who died in 1500, "had a land grant, says Dr. Rodrigues de Azevedo, much of the parish of Santana, and the lands called the island, where they formed two heirs ... "Among the old settlers are known Jerónimo Cordeiro, Guterres Teixeira, Cristovão Gomes, Manuel Gil, João Dias, Simão Álvares, who gave name to a location, etc. .. Gaspar Frutuoso referring to this parish in 1590, says, "are good farming lands, much bread and creations, has a lot of chestnut and walnut, and lots of water and fruits of all sorts."

With the exception of the highest parts of the city dominated by forest and high altitude vegetation, which held livestock activity, agriculture has always been the predominant activity in Santana. Only in 1835, Santana won the category of municipality having been elevated to city in 2000. In recent years, and as a result of investments in accessibility and infrastructure and social facilities, the small townships of this county have attended the installation of services (health centers, schools, trade) and the increase in tourism especially in terms of catering and small hotels are prepared for rural and nature tourism, benefiting from access to forest, mountain and coastal landscapes that offer high scenic value.

10. HUMAN POPULATION OF PROPOSED BIOSPHERE RESERVE

10.1. CORE AREA(S)

Without population.

10.2. BUFFER ZONE(S)

Mostly non-resident population, using sporadically few and scattered private houses. Estimated at 86 inhabitants, about 1% of the population of the Biosphere Reserve proposal.

10.3. Transition Area(s)

Approximate population of 8505 inhabitants, representing about 99% of all 8591 inhabitants of the Municipality of Santana.

10.4. Brief description of local communities living within or near the proposed Biosphere Reserve

In terms of population, Santana is a small municipality on the island of Madeira, Autonomous Region of Madeira, with head administration in the homonymous city and parish. It has 93.1 km ² and 8491 inhabitants (2004), spread over six parishes: Arco de São Jorge, Faial, Ilha, Santana, São Jorge and São Roque do Faial.

Evolution of inhabitants between 1811 and 2001 (last censuses)

Parishes	Year							
	1811	1842	1878	1923	1950	1970	1991	2001
Santana	1983	3450	3242	3200	4953	4375	3892	3439
S. Jorge	1983	3025	2456	2214	3810	3130	2010	1610
Arco S. J.	514	645	576	700	889	975	645	509
Faial	2560	4263	3485	3085	4041	3160	2264	1961
S. Roque F.			683	903	1490	1210	1011	927
Ilha							480	358
Total	7040	11383	10442	10102	15183	12850	10302	8804

In ethnic terms, no data of the genealogy of the people of Santana exists. The destruction of the document archive of the county by a fire hampers the determination of family and ethnic origins of its inhabitants. However, considering the influences that other people had in the genetic heritage of Madeira, it is possible to extrapolate it to the municipality of Santana.

From Portugal, the origins are varied, from north to south and also from the Azores, the latter responsible for the introduction of maize in the region. The Portuguese overseas empire, brought upon to Madeira, slaves from different places, but mainly from the Cape Verde archipelago, North Africa, mainly from Safim, currently located in Morocco and also from Portuguese India.

The importance that the island of Madeira acquired in the sixteenth, seventeenth and eighteenth centuries as a commercial port by exporting products and valuable raw materials like sugar, wine, native timber and grain, caused the influx of many immigrants from other parts of Europe, attracted by business opportunities that existed then in the island. Of people who migrated to the Island, the Flemish, British, Germans, Hungarians and Genovese are highlighted. Additionally, several generations of descendants of other European ethnic groups also came to Madeira as is the case of French Bettencourt, the Berenguer of Catalan origin and Cro descendants of Irish Crawford's, which was derived by shortening the name phonetically.

Over generations, crossings occurred between the various ethnicities, creating a genetic complex. However, given that a large percentage of the population was of Portuguese origin, this will certainly be the largest contributor to the genetic heritage of the region.

10.5. NAME OF NEAREST MAJOR TOWN

Santana, head of the county is also the only town. The nearest town to the Municipality of Santana is Machico located in the municipality of Machico.

10.6. CULTURAL SIGNIFICANCE

Madeira was discovered, according to some authors rediscovered, in 1419. The area that falls within the municipality of Santana, was then given by D. João I to Tristão Vaz Teixeira, one of the first two administrative captains of Madeira. Despite uncertainties about the beginning of its settlement, it is thought that Santana was inhabited from the last quarter of the XV century. At the beginning of colonization, their land allocated for possession of land grant to the nobles and bourgeois, were cleared and cultivated and built housing for settlers and shelters for livestock.

Given its mild topographic profile, fertile soils, climate and abundant water, agricultural activities have had a quick and strong growth in the county, mainly in cropping wheat, corn, rye, cane sugar, wine, linen and creating cattle.

Figure 32. Weat crop in Santana

In each parish, after the harvests people gathered in religious festivals to celebrate and give thanks to his God, the holy men and women for the blessings granted. It was in these meetings, that local folklore was born and spread, that although influenced by the

roots of the early settlers, acquired tunes, songs and dances of their own, reflecting the daily life of an entire population that shared a way of life.

The main celebrations held in the county are the "Cantar dos Reis", the "Varrer dos armários" and the feasts of popular Saints and S. Martinho. In addition to these celebrations of religious nature, some festivities have strong popular participation from all parishes, is the "Festa dos Compadres" held in Santana, and several activities related to grape harvesting, wine making or related with the typical fruits of each parish such as "Festa do Limão" dedicated to lemon crop in the parish of Ilha or "Festa da Anona" dedicated to the large crop of custard apples in the parish of Faial.

Figure 33. Popular festivity in the urban center of Santana

The lands of the municipality of Santana were largely agricultural and sparsely populated since its origins. The meager built heritage, mostly serving the spiritual needs of a population strongly linked to Catholicism, and emerging socio-economic activities linked to agricultural production of the resident population of settlers. Thus, the majority of buildings that are classified as cultural heritage are churches and chapels, where people seeked divine comfort, and also agro-industrial archaic facilities. Of these, watermills where used to grind the grain, essential to make bread, located in the area

where today is the proposed Biosphere Reserve, were fundamental to the economy of the county and are at present mostly abandoned. The exception is the Achadinha Mill, in the parish of São Jorge, currently in operation, afetr having been recovered.

Figure 34. Recovered watermill

Another type of agroindustrial structure that assumed particular importance for the local economy was the sugar mills, where sugarcane was grinded to extract the sugar and molasses. A large part of sugar mills in the proposed Biosphere Reserve area, which were built as a result of the revitalization of the sugarcane culture and marketing ocurred in the nineteenth and early twentieth centuries, are also in ruins. None of the sugar mills, now in ruins, was recovered. Of these, the only one that remains in a reasonable state of repair is located in the village of Arco de São Jorge.

No less important were the water sawmills, which have proliferated since the beginning of settlement and which were essential for the supply of timber for the entire archipelago. Today, just one of the water sawmills remains functional after recent recovery. Located in the parish of São Jorge, this historic building with high historic value, is the only example in the archipelago. The role of these forest-industrial buildings was cutting logs to obtain wood planks and beams, assential to the construction industry, maintenance and repair of houses and barns, but also to till and prepare native woods

from the indigenous forest as are the Madeira mahogany (*Persea indica*), the Picconia (*Picconia excelsa*) and Madeira laurel (*Ocotea foetens*) then exported to the European continent, where they were highly prized in the manufacture of furniture. The water sawmills were responsible for supplying coal to lime kilns and sugar cane mills, which was obtained from the remains of tree trunks worked in this type of industrial structure.

The frugality of the built heritage doesn't diminish its importance, since it is a faithful representation of a rural community in the sixteenth century and all its cultural identity, a time when available resources were managed sparingly. Of these heritage buildings, the ones which are classified as "Valor Municipal" ("Municipal Value") stand out:

"Capela da Penha" Chapel

Located in the parish of Faial, the Capela da Penha chapel, is a small chapel with a single nave carved in a block red volcanic tuff, built in the seventeenth century, in the year 1685. Of religious, popular and mannerist's architecture, its main typological traits are the fitting of the side walls (north and south), rear (West), ground and the chapel nave in a large boulder of reddish volcanic tuff. The main facade is cut by a perfect circular arched portico in red tuff stone masonry, with wooden doors. The bell tower also with perfect circular arched incise red volcanic tuff, fits the same level of this facade, which is a bronze gilded bell. The vaulted interioris formed by the rock of the boulder where it was excavated. Has a small red tuff manneirist altar. It had earlier cult use in the center of the fief. Currently, the Capela da Penha chapel is home to an annual pilgrimage, which occurs on the third Sunday of October.

Figure 35. Penha chapel

"Fontenário de Santa Ana" Fountain

Set in the twentieth century, in 1955, the fountain is located in the parish of Santana, near the rectory. It is a representative structure of the times when there was no public system of drinking water, which was obtained by the population in the fountains that existed in the municipality. Built in regional trachytic rock, the fountain's main typological features are a broken arch and bowl in stonework and at the background, a mosaic with the image of Santa Ana (Saint Ann).

"Ponte do Faial" Bridge

Built in the early twentieth century to unite the two sides of the parish of Faial separated by the Faial watercourse was inaugurated in 1904. Typologically, the bridge is characterized by its basaltic stone arches. Popularly known as the "Bridge of the seven

mouths," for its seven arches, the bridge was the longest bridge in Madeira with a total length of 130 meters. In May 1st of 1984, a storm has destroyed four of the seven arches that formed the bridge of Faial, remaing the rest of the structure as an historical landmark of the parish and the county.

"Serragem da Achadinha " water Sawmill

The Achadinha sawmill, located at the site of Achadinha in the parish of São Jorge, is the only functional water sawmill still existing in the archipelago of Madeira. It features a wooden building which houses within it, the sawing mechanism and space for rest and meal of sawyers who remained there.
This building is a chance to live part of the county's cultural past, allowing to observe how the timber exploited from the native forest was processed in the past.

"Igreja Matriz de São Jorge" Mother Church

Undoubtedly the *ex-libris* of the built heritage of the county, the mother church of São Jorge parish, of religious baroque architectural style, houses in its interior, particularly in its main altar, a beautiful Baroque carving, which falls on its walls a nice set of paintings. The main facade is cut by a square punch above the portal and fenestration unique regionally, because the portal has three windows and in the tympanum appears another window flanked by pilasters that support the straight cornice. The forecourt, walled, is paved in Madeira cobblestone. The set of associated buildings, facilities and parish house, bell tower are all in regional trachytic stone masonry.

Figure 36. Mother Church São Jorge

"Fortim do Faial" fortification

Since it is not a real fort, the Fortim do Faial was built in XVIII century as local garrison against potential invaders. Located in a strategic place with a comprehensive view of the coast of Faial, the fort was armed with small English cannons, which are currently used in the festivities of Nossa Senhora da natividade (Our Lady of the Nativity).

Figure 37. Panoramic view of Faial's coastline from Fortim do Faial

In addition to the historical buildings classified above, there are some restored buildings, which are representative of the local life in far gone days, which although not classified as "Valor Municipal" (Municipal value) have high cultural and ethnological interest:

" Casas de Fio e meio Fio" thatched houses

Yarn house, when the thatch reaches the ground, and half yarn house, when the lower limit of the thatch coverage is above ground level, are commonly known as thatched houses, one of *ex-libris* in the island of Madeira. The popular name of thatched houses atributed by local inhabitants is due to the fact that the coverage of these buildings is made with bundles of tied wheat and rye straw, popularly called "Colmo" (Thatch). These are wooden buildings with three panel roofs, with a floor at ground level and an attic. The outer wall has a front door and two windows at ground level and an acess gateway to the higher level. The family housing units were made up of a set of thatched houses, with each unit serving a different purpose. These households were made up of a thatched bedroom house, a thatched kitchen house where there was invariably a wood burning oven for making homemade bread, and a thatched barn and an outhouse toilet. At the site of Pinheirinho, there is a perfect example of these household cores, recently restored by the Regional Directorate of Cultural Affairs (DRAC). The municipality of Santana typical thatched houses, are particularly common in the parishes of Santana and Arco de São Jorge, and although less common, you can also find some exemplars in the parish of São Jorge.

Figure 38. Thatched houses in Santana parish

"Casas Redondas" Round thatched houses

These houses, so named because of the angles of its coverage of four panel rounded thatched roof, predominate today in the parish of São Jorge and are therefore also known as houses of São Jorge. They feature exterior wooden walls, set on rocks, to allow air circulation under the floor. At angles, the walls are attached by pins to the stones, giving them stability, particularly in times when the trade winds blow with greater intensity and regularity. The windows have sliding doors in wood and only with the popularisation of the use of glass, some houses adopted sliding double doors, one glass and one wooden, and in other cases made a glass peephole in the wooden door. The interior walls, made of crossed wooden planks, defined the four communicating interior rooms. The height of these walls did not reach the ceiling inside, getting to the height of the outer walls. Depending on the location of the kitchen, side or rear, the facade had an access door and one window, while the façade that didn't communicate with the kitchen had two windows. With the introduction of the tile, the roofs of these houses have been replaced by this material, of easy installation and long duration, but also by the growing scarcity of wheat and rye straw due to the abandonment of agriculture as a result of migration outbreaks, while the other typological characteristics were maintained.

"Casas de pedra aparelhada" Stone masonry houses

These houses are built on fitted basaltic masonry stone, usually two story with roof covering in Marseille tile. Access between the floors was made by stone steps, usually located on the outside, in one of the side walls. Unlike yarn, half-yarn and round thatched houses, the stone masonry houses include in the same building housing, kitchen and toilets. Typically, in the ground floor was located the kitchen, lounge, restrooms and a small warehouse, where the residents kept the barrels of wine, pork and tuna in brine and the products collected from agricultural labors as potatoes, beans and fava droughts and onion, as well as seeds for the next sowing. Rooms were located upstairs. Subsequently, many of these homes, walls and exterior stairs were cemented and painted with lime, retaining the other original features.

Figure 39. Traditional stone masonry house in Arco de São Jorge parish

"Moinhos de água" Watermills

The great importance that cereals, especially wheat and rye, detained for the economy of Madeira at the beginning of the colonization, that were even exported, continued even after the rise of sugar, were mainly cultivated in the highlands and in municipalities of north of the island. Its importance was not limited to obtaining the grain

for food, including bread, but also as raw material for the cover of the thatched houses, mattresses filling and for feeding livestock. The intensive cultivation of cereals has resulted in the proliferation of water mills for grinding grain, most of whom are today voted to abandon.

These mills have two millstones: one to grind wheat and the other for grinding corn, introduced in the county in the nineteenth century by settlers from the Azores and, thereafter, assumed such importance, that it has expanded to other municipalities of the island.

"Calhau de São Jorge" Pebble

The Calhau de São Jorge, for its commercial and industrial importance between the mid-sixteenth century until the mid-twentieth century, is a relevant historic core, home to several buildings of historical and cultural interest related to the production and distribution of goods and merchandise from the Ponta Gorda pier. Of the built heritage in the Calhau de São Jorge peeble historic core, we highlight the various trails used for the transportation and distribution of goods, the ruins of the old sugarmill, the warehouse, the fountain and the bridge over Ribeira de São Jorge stream, built in the sixteenth century.

Figure 40. Bridge over Ribeira de São Jorge stream

11. PHYSICAL CHARACTERISTICS

11.1. GENERAL DESCRIPTION OF SITE CHARACTHERISTICS AND TOPOGRAPHY OF AREA

Madeira Island is characterized by its mountainous relief with steep slopes. The coastal area is almost entirely composed of steep sea cliffs and some Fajãs as a result of the retreat of the coastline in result of oceanic abrasion. In the center of the island there is a mountainous massif composed by several mountains with altitudes above 1600 m, incised by numerous basaltic (*sensu lato*) dykes and veins. In the eastern part of the massif, there is the extensive Paúl da Serra plateau, with an average altitude of 1550 meters. The link between coastal and central mountain massif is made up of several hills and deep valleys, resulting from hydric weathering of bedrock, consequential from the discharge of huge amount of water captured by the hydrogeological massif complex. This geomorphological complexity results in a huge set of heterogeneous bio-climatic characteristics that create conditions for the existence of a wide diversity of native climatofilous vegetation and natural habitats found here.

The area circumscribed by the municipality of Santana includes part of the of the island's northeast coast and the central mountainous massif, comprising the peak Pico Ruivo de Santana, the highest peak in the archipelago with 1861 meters of altitude, makes it a very rich area in terms of landscape and biodiversity, encompassing several unique habitats, with emphasis on Mediterranean Barbusano laurel forest, the temperate Madeira Mahogany laurel forest and high-altitude heaths. The coastal sea cliffs and valleys of the large Faial and São Jorge streams contain numerous flora and scenic values, where the endemic flora of the Macaronesian coasts is a supreme.

11.2.1. Highest elevation above sea level

The highest elevation above sea level is 1861 meters.

11.2.2. Lowest elevation above sea level

The lowest elevation above sea level is 0 meters.

11.2.3. For coastal/ marine areas, maximum depth below mean sea level

The maximum depth below mean sea level within the area is 200 meters.

11.3. CLIMATE

11.3.1. Average temperature of the warmest month

The average temperature of the warmest month (August) is 22ºC.

11.3.2. Average temperatrure of the coldest month

The average temperature of the coldest month (February) is 13,2 ºC

11.3.3. Mean anual precipitation

The average annual rainfall is 1716 mm.

11.3.4. If a meteorological station is in or near the proposed Biosphere reserve, indicate the year since when climatic data have been recorded

The Regional Laboratory of Civil Engineering has an automatic meteorological station (AMS) located in the Forest park of Pico das Pedras and fully functioning since April 2010. The National Institute of Meteorology has a automatic meteorologic station located on São Jorge Lighthouse and running since 1992.

11.4. GEOLOGY, GEOMORPHOLOGY, SOILS

The genesis of the archipelago is related with the opening and expansion of the Atlantic Ocean, which begun at 200 million years (m.y.) ago in the Triassic period, which still continues to the west and east of the Mid-Atlantic Ridge, at an average of 1.2 cm per year. The Madeira is located on the African tectonic plate on a substrate whose oceanic crust has an estimated age of 115 m.y.. Madeira is the latest expression of volcanism of the "hot spot" responsible for the genesis of the Madeira volcanic chain, which comprises the islands of Madeira, Deserts, Porto Santo and the Dragon, Lion, Josephine, Ashton, Seine, Ormonde and Tore submarine elevations. Taken together, the Madeira-Tore oceanic ridge, of NE-SW orientation, extends for 1400 kilometers to the meeting line between the African and Eurasian plates, constituting its SW extreme the Madeira island, aged approximately 5 m.y. and its NE extreme the submarine mountain Tore aged approximately 95 ma. The model of the geological evolution of the islands is in itself demonstrative of the trail of activity of the Madeira "hot spot", whereas the volcanological age of Porto Santo Island is 14 m.y., while the island of Madeira located 40km SW of Porto Santo, is only about 5 m.y.. Despite the last records of volcanic activity in the archipelago have occurred about 6000 years during the recent volcanic episodes, characterized by Strombolian eruptions located in Funchal, Porto Moniz and Paúl da Serra, during the construction of the tunnel between the Rosário and Serra de Água, carbogas spring waters were found at about 75 °C. These secondary volcanic events show that the volcanic activity on Madeira is undergoing a period of dormancy and isn't extinct.

Figure 41. Volcanic landscape in the Central Mountainous Massif

According Schmincke (1982), the island of Madeira is an oceanic mountain with a volume of about 9.2x103 km^3, including emerged and immersed parts, of which only 0.4x103 Km^3 correspond to the submerged part, this constituting about 4.2 % of total volume of the island. Lithologically the submerged part of this volcanic mountain consists essentially on quartz poor melanocratic effusive rocks of aphanitic texture or pyroclastic type rocks resulting from explosive volcanic activity. Most lava spilling flows is composed by rocks of the basaltic series, comprising basalts, basanites, trachy-basalts. The lithological wealth is magnified by rock types present in discordant geological forms such as veins and dykes, where melanocratic, mesocratic and leucocratic microfaneritic or aphanitic rocks can be found, such as trachyandesite, trachytes, tephrite and other rarer types of porphyritic texture with olivine, augite, hornblende and andesine-labradorite phenocrysts as benmoreits, hawaiites and mugearits. Regarding the pyroclastic rock types, in the more consolidated pyroclastic deposits tuffs, lapilli tuffs, pyroclastic breccias and agglomerates can be found, while in areas where recent Strombolian volcanic phenomena occurred, scarcely consolidated clastic lava deposits dominate, which depending on their size include ash, lapilli, locally known as Areão and volcanic bombs and blocks.

The geological importance of the municipality of Santana, is expressed by the diversity of eruptive volcanic episodes occurring over approximately 17 m.y. from the

Miocene until the Pleistocene, which led to its geological, geomorphological and hydrogeological features which are directly linked to its landscape, ecological and high agricultural value.

According to Brandão & Carvalho (1990), Santana and his landscapes are the result of volcanic activity occurred in four chronologically demarcated periods, individualized in four major volcanic complexes:

The **base or old volcanic complex**, comprises the volcanic activity occurred in the myo-Pliocene period between 18 m.y. and 5.2 m.y. ago and which formed the submerged portion of the island and the base of the emersed portion, including some volcanic units in the central part of the island, which includes the Pico do Areeiro peak and Pico Ruivo peak. Despite occupying about 25% of the area of the county, including nearly all the arc corresponding to the administrative border with the neighboring municipalities of São Vicente and Machico in the north and in the south with Funchal and Câmara de Lobos, and the coastal zone between Ponta do Clérigo and the boundary of the county at the base of Penha d'Águia rock, which is originated in a later volcanic complex. This complex is mainly composed of pyroclastic materials with some lava flows intercalated in a high meteorization state and densely incised by a network of basaltic veins. The geological structures of interest in this complex include:

"Diques e filões" Dykes and Veins

The base volcanic complex is densely incised by a network of veins and dykes. The lithological nature of these dykes range from basalts, hawaiites, mugearits, trachytes and trachy-andesytes. These structures have a high scenic, geomorphological and touristic value by combining colors, textures and shapes between distinct lava flows, volcanic breccias and volcanic tuffs that are incised by the dykes and veins.

"Homem em Pé" Dyke

This popular geomonument is a dyke geological formation with towering basalt blocks, which resulted from its higher erosion resistance in relation to the pyroclastic

type materials that surround it. Its unusual shape of the hominoid type, gave rise to its name. It is a geomonument with a high scenic, geomorphological, ethnographic and touristic value, very well known and is considered one of the geological *ex-libris* landscapes of altitude in the municipality of Santana.

"Pico Ruivo e Picos do Maciço Montanhoso Central" Peaks

Of high landscape and touristic value, Pico Ruivo is the highest point of the island, from which one can observe the peaks that make up the central mountainous massif. The different viewpoints located on the tracks crossing the mountain ranges, provide the visitor a magnificent view of the various volcanic apparatus, dikes and veins that originated the massif, of rare and enormous geological beauty.

Figure 42. Basaltic dykes and veins in the mountains of the Central Massif

The **Peripheral Volcanic Complex** is located largely in the periphery of the island and comprises the post-Miocene volcanic episodes, which started about 5 m.y. ago during the Pliocene up to 0.7 m.y. in the Pleistocene. It consists of pyroclastic layers alternating with lava flows. The lavas have a predominant character, usually with high

inclination. The effusive rocks range from basalt to the hawaiite and mugearit terms. In Santana, represents much of the area of the county and includes some features that deserve mention:

"Escoada basáltica em disjunção prismástica" Basalt prismatic disjunction flow

Located on the west bank of the Ribeira do Faial stream, presents vertical basaltic prisms with about 50 meters tall. Geomorphological formation of interest.

"Escoada basáltica em disjunção lamelar" Basaltic planar disjunction flow

Located at the mouth of the Ribeira Jorge stream, this lava flow presents subhorizontal basalt plates with a few inches thick, with about 20 meters high.

"O maciço rochoso da Penha d'Águia" Rock

Located on the east bank of the Ribeira do Faial stream, this massive volcanic complex which is embedded in the base volcanic complex, rises of up to an altitude of 589 meters above sea level, 349 meters above the ancient geological formations of the base complex. It consists of several layers of basaltic lava flows. It is undoubtedly one of the geological and landscape *ex-libris* of the municipality of Santana, widely referenced in books and postcards depicting the island of Madeira. Has high geological, scenic and touristic interest.

"Formação rochosa A cara" Rock

This geological formation is located in the adjacent area of the Penha D'Águia Rock, and is a result of weathering by the natural elements, presenting face like morphology. Has touristic and etnogeomorphologic interest.

"Afloramento fitofossilífero de São Jorge" Fossils

Located in the volcanic tuff of the Valley of the Ribeira de São Jorge stream, on which occur beautiful plant fossils and also lignite fragments, is one of the geological sites of interest of Madeira, by its uniqueness. Fossils are a record of important species of flora that have existed for about 2 m.y., which were preserved by the accumulation of volcanic ash on vegetation then existing, during eruptive episodes of the peripheral volcanic complex. In the fossils collected and studied, about 30 plant species were identified.

The **Lombadas Superiores Volcanic Complex**, comprises generally interfluvial ridges separating the valleys of drained basins, known locally as "Lombos" and "lombadas" that gave this complex the name. The geological formations of this volcanic complex were originated from eruptions that occurred between 0.8 m.y. and 0.6 m.y. ago in the Pleistocene. In the municipality of Santana, it lies above 500 meters of altitude, between the parish of Arco de São Jorge and Achada do Teixeira on the west and on the east between the Achada do Teixeira and the town of Santana, including Lombo de Cima in the parish of São Roque do Faial. It is formed by alternating lava flows and thin pyroclastic layers, being lithologically similar to the peripheral volcanic complex. Its interest is mainly as geological landscape.

The **Paúl da Serra Volcanic Complex** is the most recent complex of volcanoes in Madeira. Of post-Miocene genesis and essentially effusive, basaltic lavas originated slightly inclined and sub-horizontal benches, interspersed with a few thin layers of pyroclastics. The lava flows of this complex are mostly the result of fissure eruptions which occupy a vast area, with its maximum extension occuring in the area that gave its name, the plateau of Paúl da Serra. In Santana, the Achada do Teixeira is the pinnacle of of this complex activity, whose plateau profile is a faithful representation of its effusive nature.

These complexes contain a series of volcanic geological formations of high scenic, scientific and touristic value, both by its geomorphological, lithological or ethnological characteristics.

Beyond the various lava emmiting centers of this volcanic complex, there are still in Santana some forms associated with secondary volcanic activity. Of these, Pico Redondo Peak located east of Arco de São Jorge and Pico da Boneca, a volcanic cinder cone located between the Ponta do Clérigo and Ilhéu da Viúva Islet, in the vicinity of the coastline are the best examples.

After the large eruptive events, the weathering of effusive materials and pyroclastic formations gave rise to other geomorphological of sedimentary character such as slope and alluvial deposits, present beaches and Fajãs, of which the Faja da Penha de Águia, born in February 1992 as a result of the collapse of a portion of the rock mass of the cliff that gave its name, is the most recent case.

The characteristics in terms of geology, geomorphology and soils of Santana correspond to its full extent to Madeira's island geological aspects. Santana's territory extends from the sea to the highest peaks of Madeira and therefore, corresponds entirely to a representation of the orographic, climate and geological features of Madeira Island.

The maximum elevation of Madeira corresponds to Pico Ruivo of Santana peak whose summit is located 1861 meters above sea level. The relief is generally hilly, with an asymmetry between the northern and southern parts of the Island resulting from the recoil of the sea cliffs of the north coast, most exposed to the oceanic hydrodynamic regime and the prevailing NE trade winds. Another defining characteristic for the relief of the island is its high average elevation, which combined with strong rainfall, is responsible for the occurrence of many deep valleys with torrential characteristics.

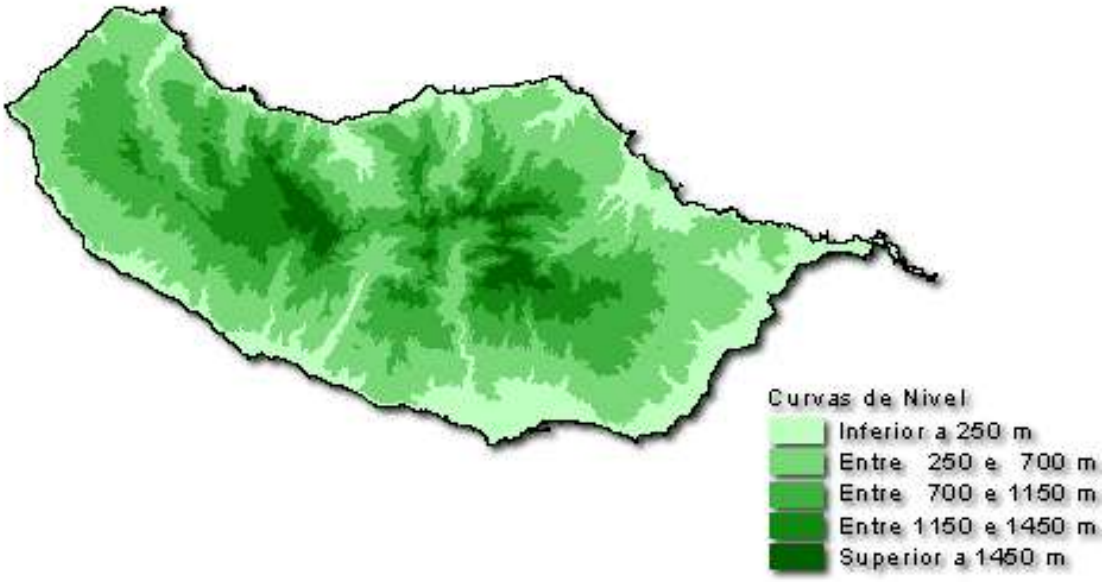

Figure 43. Level curves – *in* Atlas do Ambiente; Instituto do Ambiente (1991)

The coastal cliffs are generally high and steep and the coastline sand accumulations are rare. Other forms of accumulation are embayed beaches, formed by stony banks, usually associated to the mouth of coves, resulting from the gravitational instability of the cliffs and sea abrasion, which are combined generating landslides of large quantities of material being deposited to surface or under coastal waters (IH, 2003).

Figure 44. Sea cliffs in Santana's shoreline

As for the submarine relief, Madeira Island is characterized by the existence of a narrow island platform, which on the southern side, has a slight slope to a depth of 100m (IH, 2003). The bathymetry shows a roughly parallel relation to the coastline and the submarine areas with 100 meters depth do not distance more than 3 km from the coastline, with exception of the island's westernmost sector, where this distance reaches 9 km (IH, 2003). The island platform on the south coast of Madeira Island corresponds roughly to a depth of 100 m succeeded after by a slope towards the abyssal depth that surrounds the island (Fig. 5.3).

The soils of the Madeira Islands were featured in the production of the Charter of Soils of Madeira, work completed in 1992. This work included the participation of various entities, such as the Center for the Study of Pedology, Instituto Superior de Agronomia, Pedology Center of the Technical University of Lisbon and the Regional Agriculture Directorate of Madeira.

According to this letter, the most common soils on the island of Madeira are dystric rough terrain and the dystric rocky terrain, which are associated with particular types of terrain, and the umbric andosols.

The dystric rough terrains are characterized by having rock protrusion and / or high proportions of stoniness surface and present usually a high slope. Besides being typical in sloping areas, these soils are represented in areas with moisty or super-moist climates, where runoff water is big and erosion sturdy. By their nature, these are poor soils in assimilable chemical elements, with strong acidic reaction and poor structural quality.

The umbric andosols are characterized by containing organic and Umbrian horizons, with a greasy consistency and sandy-loam or finer and relatively high stoniness proportions. These soils are highly acidic and poor in assimilable nutrients. In short, they are soils with low chemical fertility and despite being in possession of a high mineral reserve and favorable physical characteristics are not relevant agricultural soils.

The dystric rocky terrain is characterized by containing areas with some continuity, predominantly occupied by basaltic lava benches' protrusion. Between the protuberances another type of soils can be found, although in small proportions, which are the Leptosols. In these soils the degree of saturation is below 50%.

12. BIOLOGICAL CHARACTERISTICS

12.1. TERRESTRIAL AREA

The native forests of Madeira, laurel forests, occupied almost the entire surface of Madeira, from the highest mountains to the sea. Being a reliquial forest relic, whose origin dates back to the Tertiary, it occupied vast areas in southern mainland Europe and the Mediterranean basin. The advancement of polar ice sheets from the North, and increasing aridity from the south, led to its extinction in higher latitudes, allowing, however, its survival in the islands included in the biogeographic region known as Macaronesia, comprising the archipelago of the Azores, Madeira, Canary and Cape Verde. The laurel forest gives shelter to numerous shrub and herbaceous endemisms, being also important to highlight the great diversity and density of bryophytes and lichens communities, especially epiphytic forms. Approximately 76 Madeira and salvage archipelagos endemic *taxa* occur in the north shore.

Figura 45. Isoplexis, Laurissilva's endemism

In the Laurel forest 39 of the 74 Macaronesia exclusive endemic *taxa* occur and 76 of the 154 Madeira and Salvage archipelagos exclusive endemisms. In the Habitats Directive Annexes a total of 54 species are listed, of which the Madeira Pittosporum (*Pittosporum coriaceum*), bindweed (*Convolvulus massonii*), Madeira moneywort (*Sibthorpia peregrina*), Madeira Jasmine (*Jasminum azoricum*) Black parsley (*Melanoselinium decipiens*), Madeira Crane's Bill (*Geranium maderensis*) and the pteridophyte Wood fern (*Polystichum drepanum*) are priority species. In the Bern Convention 15 *taxa* were listed.

Figure 46. Epiphytic bryophytes in the Laurel forest

The laurel forest includes four types of habitats of Community interest listed as priority in the Habitats Directive, with particular emphasis on the endemic Macaronesian heaths and Macaronesian laurel forests.

In the fauna domain, we find above all, a great diversity of invertebrates, with the presence of numerous endemic insects and mollusks. Special attention deserves the avifauna with 20 species present in this forest, which the Sparrowhawk (*Accipiter nisus granti*), the Kestrel (*Falco tinnunculus canariensis*), the Blackbird (*Turdus merula cabrerae*) the blackcap (*Sylvia atricapilla heinecken*) and the Canary (*Serinus canaria canaria*) are endemic to Macaronesia, the buzzard (*Buteo buteo harterti*), Grey Wagtail (*Motacilla cinerea schmitzi*), Madeira chaffinch (*Fringilla coelebs madeirensis*) are endemic subspecies of the archipelago. However, the highlight is the endemic species, with emphasis the endemic long-toed pigeon (*Columba trocaz*), the laurel forest emblematic bird. Other endemics to be found in this forest are the Madeira Firecrest (*Regulus maderensis*), one of the smaller birds from Europe and the Plain swift (*Apus unicolor*). Considering the number of local and Macaronesian endemics, this area was recognized as an IBA (Important Bird Area) by Birdlife International.

Figure 47. Male canary (*Serinus canaria canaria*) a macaronesia endemism

Also in vertebrates, the three species of bats that inhabit the laurel forest are highlighted, which are the only native mammals to the archipelago of Madeira. The bat symbolic species of the Island is the Madeira bat (*Pipistrellus maderensis*), which is endemic to Macaronesia and also distributed in the archipelagos of the Canaries and the Azores, while the Madeira leisler's bat (*Nyctalus leisleri verrucosus*) is a Madeira Island endemic subspecies and the grey-long-eared-bat (*Plecotus austriacus*) is a Palearctic species, but the Island population constitutes the southern extreme of the distribution of this species.

Besides the native laurel forests, also the Central Mountainous Massif, hosts a high biological diversity of distinct characteristics from other areas that comprise the terrestrial area. Given its ecological importance, the Central Mountainous Massif is classified as a Site of Community Interest within Natura 2000. The vast natural heritage that characterizes the entire area of the Central Mountainous Massif, especially the high rate of endemism of the altitude vegetation communities, but also of the arthropod fauna, which has been monitored since 2001, through study and comparison of epigeal insect fauna of the different habitat types.

Figure 48. Endemic macaronesian heath in the Central mountainous massif

Beyond all the richness that characterizes the area as a whole, the eastern part of the Massif is evidenced as the only place in the world where Madeira's petrel (*Pterodroma madeira*) nests. Since 1969, when the rediscovery of this bird occured, this area has attracted much interest from local and foreign ornithologists, being intensified actions to conserve the species since 1986. Another endemic bird species that can be observed in the central mountainous massif is the Berthelot's Pipit (*Anthus berthelotti maderensis*), an endemic species to Madeira, Salvage and the Canary Islands and a Madeira endemic subspecies.

Figure 49. The Central mountainous massif harbors high biological diversity

Approximately 27 Madeira Island endemic *taxa* occur or are restricted to the Central Mountainous Massif. Other *taxons*, although not endemic also occur preferentially in the Central Mountainous Massif, including the Besom heath (*Erica arborea*) and Wilow-leaved Hare's ear (*Bupleurum salicifolium subsp. salicifolium*). However, there are other species which show a wide distribution range in altitude due to the high ecological plasticity. In the Central Mountainous Massif 67 Macaronesian endemic taxa are present, of which 17 are shared with other Macaronesian archipelagos and 50 are endemic to the archipelagos of Madeira and Salvage islands. Annexes B and B-II-IV of the Habitats Directive include a total of 38 Madeira and salvage islands endemic *taxa*, of which 12 are present in the Central Mountainous Massif. In Annex I of the Bern Convention 32 Madeira and salvage islands endemic *taxa* were listed, 7 of which are present in the Central Mountainous Massif.

The Central Mountainous Massif encompasses 14 plant communities, of which 9 have one or more taxa listed in Annex B-II or B-IV of the Habitats Directive or in the Annex I of the Bern Convention. All 14 plant communities are included in the habitats of Community interest of the Habitats Directive present in the Massif.

The non-vascular flora composed by bryophytes, is less rich in species diversity that the

vascular flora, however these plants densely cover large areas and play important ecological roles in colonization, soil stability and ecosystems dynamics. Within the bryophytes, 123 taxa are recorded for this area, comprising 87 mosses and 36 liverworts, with a percentage of Macaronesian endemic *taxa* of 5.6%, as for example the rare moss *Bryoxiphium madeirense*. Some species occur exclusively above 1300m altitude are thus restricted only to the higher peaks, such as mosses *Anacolia webbii*, *Andreaea alpestris*, *Antitrichia californica* and the liverworts *Gymnocolea inflata*, *Marsupella adusta* and *Porella cordaeana*.

12.1.1. Characteristic species

i) Laurel forest

* Priority species

Pteridophyts

Arachniodes webbiana
Dryopteris aitoniana
Polystichum setiferum
*Polystichum drepanum**
Hymenophyllum maderense

Spermatophyts

Juniperus cedrus subsp. *maderensis*
Peucedanum lowei
Ilex perado subsp. *perado*
Asparagus umbellatus subsp. *lowei*
Argyranthemum pinnatifidum subsp. *pinnatifidum*

Carduus squarrosus
Cirsium latifolium
Crepis andryaloides
Sonchus ustulatus subsp. *maderensis*
Sonchus pinnatus
Echium candicans
Sinapidendron angustifolium
*Musschia wollastonii**
Sambucus lanceolata
Clethra arbórea
*Convolvulus massonii**
Vaccinium padifolium
Teline maderensis
Geranium palmatum
Bystropogon maderensis
Dactylorhiza foliosa
Goodyera macrophylla
Plantago malato-belizii
Ranunculus cortusifolius
Sinapidendron rupestre
Teucrium abutiloides
Pittosporum coriaceum
Normania triphylla

ii) Central Mountainous Massif

Pteridophyts

Polystichum falcinellum

Spermatophyts

Anthyllis lemanniana
Agrostis obtusissima
Anthoxanthum maderense
Argyranthemum pinnatifidium subsp. *montanum*
Berberis maderensis
Bunium brevifolium
Cerastium vagans
Deschampsia maderensis
Echium candicans
Erica maderensis
Melanoselinum decipiens
Micromeria thymoides subsp. *cacuminicolae*
Armeria maderensis
Odontites holliana
Orchis scophulorum
Plantago malato-belizii
Ranunculus cortusifolius subsp. *major*
Rumex bucephalophorus subsp. *fruticescens*
Sideritis candicans
Thymus micans
Viola paradoxa
Saxifraga pickeringii
Sinapidendron frutescens subsp. *frutescens*
Sedum farinosum
Teucrium francoi
Koeleria loweana (=*Parafestuca albida*)

12.1.2. Important Natural Processes

The area of the Central Mountainous Massif, because of its soil, climate and orographic characteristics, is a highly dynamic area, where soils are thin and poor organic fraction, growing solely small herbaceous plants, mosses and lichens in most exposed areas. The high slope of the mountains, often vertically suspended by basalt and trachyte dikes, which leads to a higher expression of the weathering phenomenon in their morphology, causing frequent lithological material landslides. These erosive processes form deposits exposed to sunlight, which are extremely important in the ecological succession of the vegetation series of which depend on some endemic species.

Groundwater is the main source of water supply on the island of Madeira. The importance of the mountainous areas of the island have in the recharge of aquifers, due not only to the geology and topography of these areas and the high levels of precipitation exceeding 2000 mm / year, but also, to the existence of plants present in these natural habitats, which play an important role in the uptake of water from fog through the condensation of water on the leaf surface. The water captured in the mountains, that is responsible for the existence of numerous water courses, generates conditions for the existence of edapho-hygrophilous vegetation in the bottom of the valleys, but also in the walls of inner cliffs, which by the extrusion of mountains infiltrated water, creates conditions for the development of several characteristics species of these biotopes and surrounding areas.

In areas where the laurel forest is in climax or near climax state, the high density of trees with large canopies, leads to a simplification of the plant communities, by the loss of lower strata as a result of sunlight absence. The opening of clearings in the forest either as a result of old trees collapse or large rock detachment from adjacent cliffs, creates conditions for the germination of seeds of herbaceous plants, which when complete their life cycles, deposit new seeds in the soil, safeguarding the natural seeds bank. During this process, these plants will naturally be succeeded by shrub and tree species that by spatial and temporal ecological adjustment of each species' life cycles, results in balance of biota over time. This process is one of the most important in the sustainability of the balance of the various organizational levels of vegetation

communities and by association, of all species ecologically connected.

Figure 50. Native herbaceous and shrub vegetaion in Laurisilva forest

12.1.3. Main Human Impacts

The impacts present and future come from stress factors such as increased touristic load and harvest of plant material, habitat degradation and destruction caused by herbivory through introduced species such as rabbits, rats and mice. These stress factors are common to all native species, but will have a larger negative impact on species that are threatened with extinction, and may affect the recovery of their natural populations and survival of the species in the medium and long term. It is essential to carry out continuous monitoring in order to assess the evolution of natural populations of all these species and the degree of influence of all threat factors have, in order to evaluate the need to implement additional specific measures to each species on the verge of extinction.

The installation of equipment for energy production from renewable sources has been increasing on Madeira Island. Accordingly, whenever possible the instalation of renewable energy sources in the existing and future infrastructures, should be

encouraged, which can cause some impacts. These impacts are greatest in the case of wind turbines, which due to their proportions require the operation of heavy equipment to proceed with the installation.

Another visible impact in the terrestrial areas, regardless of vegetation, soil and climatic conditions, is the wide dispersion and density of exotic naturalized species with invasive carachteristics, which threaten native vegetation and biotopes' natural regeneration capacity by preventing natural ecological succession of native plant communities.

12.1.4. Relevant Management Practices

The conservation of seeds of various species in the seed bank is as fundamental measure for their long-term survival. The survival of many species depends on the combination of seed conservation with control and eradication programs of the Invasive species within the boundaries of classified and adjoining areas.

The increased touristic load demands the implementation of appropriate management regulations for the Central Mountainous Massif and laurel forest public use and, in particular scenic footpaths with greater influx of tourists.

12.2. Coastal and Marine Area

The coastal and marine component of the proposed Santana Biosphere Reserve corresponds to the protected area of the Ilhéu da Viúva islet, Site of Community Interest of Natura 2000 and adjacent marine area. The Ilhéu da Viúva islet Site (Santana's Biosphere Reserve marine Core area) has a total area of 1822 hectares and is bounded on the west by Ponta de São Jorge and on east by Ponta dos Clérigos, and the line

defined between the high tide and 100 meters bathymetric line, including the islets of Ilhéu da Viúva and Ilhéu de São Jorge.

Predominant winds blow from the northern quadrant, which have a direct action on the persistence of humid air masses, also determining the frequency and energy of the wave that is felt on the north coast of the island. The sea is frequently rough and wave direction is commonly from the northeast quadrant followed by north. Consequently, the Ilhéu da Viúva islet adjacent coast is abrupt, high and continuous. The retreat of the coastline composes projections, related to increased resistance of basaltic rocks, when isolated by the sea, form islets. The Ilhéu da Viúva islet has a maximum altitude of 94 meters and a flattened area of approximately 1.4 hectares and is located very near the coast, being only isolated with high tide seas.

Figure 51. Ilhéu da Viúva

The Reserve's seafloor is basaltic, where abundant algae grow, typically species of high hydrodynamic waters.

The site encompasses a wide diversity of natural habitats, especially the vegetated sea cliffs with endemic flora of the Macaronesian coasts (1250), lower formations of Euphorbia close to cliffs (5320) and submerged or partially submerged sea caves (8330).

The Ilhéu da Viúva islet has a natural characteristic floristic heritage of the Madeira coast, which show various species of unique plants to the archipelago of Madeira, namely: Pride of Madeira (*Echium nervosum*), the Fish Stunning Spurge (*Euphorbia piscatoria*), the Madeira Sea Stock (*Matthiola maderensis*), Sinapidendron (*Sinapidendron angustifolium*), the Burnt Sow Thistle (*Sonchus ustulatus*) and the Saucer Plant (*Aeonium glandulosum*), in addition to the Juniper (*Juniperus turbinata* ssp. *canariensis*) - very rare endemic Macaronesia tree, that is this islet reached one of the biggest sizes known. This vegetation comprises predominantly xerophytic grasses and shrubs, well adapted to high salinity of this habitat, with several Madeira and Macaronesia endemic species.

Although not very diverse, the marine flora is abundant,. In the intertidal and upper subtidal the green alga *Codium adhaerens* and brown seaweed *Halopteris filicina* forms mats over the rocks. With increasing depth and decreasing light, the green algae are replaced by brown *Lobophora variegata* and red *Asparagopsis armata* algae. Less frequent species of *Corallina* sp. *Dictyota* sp., and *Jania* sp. and some incrustant algae species can also be observed.

From the ornithological point of view, the site of the Ilhéu da Viúva Islet is a privileged place for the nesting of some pelagic seabirds species, belonging to the Procelariformes Order, of which the Cory's shearwater (*Calonectris diomedea borealis*, A010) is the best known example. To nest, this group of migratory birds with European unfavorable conservation statutes, depend on areas with little disturbance and inaccessible to predators. Thus, places like Ilhéu de São Jorge islet assume, in our days, supreme conservation interest. The other pelagic seabirds seeking these habitats are the Bulwer's petrel (*Bulweria bulwerii*, A387) and Madeira storm-petrel (*Oceanodroma castro*, A390). Here we can still find two shore seabird species breeding: the common Tern (*Sterna hirundo*, A193) and Yellow-legged Gull (*Larus cachinnans*). The common tern is a summer breeding population whose conservation status was assessed as Vulnerable in the last edition of the Red Book of Vertebrates of Portugal.

In the marine environment, due to the large hydrodynamic of its waters, there is a huge assembly of different fish species, some of commercial interest and livelihood for local people. In this ichthyological wealth, stand out as resident species, some large fish, such as the Dusky Grouper (*Epinephelus marginatus*), Island Grouper (*Mycteroperca fusca*) and the Red Hogfish (*Pseudolepidaplous scrofa*), as well as a variety of other

coastal species such as White Bream (*Diplodus sargus*), the Zebra Bream (*Diplodus cervinus*), Parrotfish (*Sparisoma cretense*), Turkish Wrasse (*Thalassoma Pavo*), Bluefin Damselfish (*Abudefduf luridus*) and the Azores Chromis (*Chromis limbata*). Typical are the several species of morays (*Muraena helena*, *M. augusti*, *Enchelycore anatina* and *Gymnothorax unicolor*). In the rocks there are colored patches of orange, red and brown which are colonies of sea squirts that are very similar to the marine sponges. The sea urchins are not very common, and live in small seafloor cavities.

Figure 52. Marine Core Area Seafloor with a parrot fish and Turkish wrasses

In the tidal area sea snails (*Gibbula* spp. and *Monodonta* spp.) and limpets (Patella spp.), which have high commercial value in Madeira. Occasionally Bottlenose dolphin (Tursiops truncatus, 1349), the Monk Seal (Monachus monachus, 1366) and the Common Turtle (Caretta caretta, 1224) can be spotted, species listed in Annex II of the Habitats Directive. These are species that are only passing through, and most of the time submerged emerge periodically to breathe, are difficult to observe. In the case of monk seals, which often use beaches inside sea caves to rest and breed, have in this area a sea cave near the Ilhéu da Viúva islet with conditions to be used, as happened in the past.

12.2.1. Characteristic species

The site of Rocha do Navio hosts various habitats and species of flora and fauna whose preservation is of community, national and regional interest. Although none of the natural habitats that occur in Rocha do Navio is priority, these harbor unique species, some of which are priority species. Listed below are the species and habitats characteristic of coastal and marine area of Rocha do Navio contained in Decree-Law No. 140/99 of April 24, which implemented in national law the EU directives on conservation of wild birds (Birds Directive) and of natural habitats and wild fauna and flora (Habitats Directive).

Natural e semi-natural Habitats listed in B-I annex of Dec. Law n.º 49/2005 of the 24th of February

Habitat Code	Habitat
1250	Vegetated sea cliffs with endemic flora of the Macaronesian coasts
5320	Lower formations of Euphorbia close to cliffs
8330	Submerged or partially submerged sea caves

Priority habitats are in Bold

Fauna species (except Birds) listed in B-I annex of Dec. Law n.º 49/2005 of the 24th of February

Species Code	Species
1224	***Caretta caretta***
1349	*Tursiops truncatus*
1366	***Monachus monachus***

Priority species are in Bold

Other animal (except birds) and flora species listed in B-IV e B-V annexes of Dec. Law n.º 49/2005 of the 24th of February

Annexes	Species
B-IV	***Caretta caretta***
B-IV	*Tursiops truncatus*
B-IV	***Monachus monachus***
B-IV	*Teira dugesii*
B-IV	*Pipistrellus maderensis*
B-IV	*Nyctalus leisleri verrucosus*

Priority species are in Bold

Bird species listed in A-I annex of Dec. Law n.º 49/2005 of the 24th of February

Species Code	Species
A010	*Calonectris diomedea*
A193	*Sterna hirundo*
A387	*Bulweria bulwerii*
A390	*Oceanodroma castro*

Priority species are in Bold

12.2.2. Important Natural Processes

The specific conditions characteristic of coastal systems assume greater importance in oceanic islands coastal systems due to more dynamic water bodies that are subject to. Consequently, most coastal lithological meteorization and the erosion of the coastline in these areas cause a greater mobilization of rocks, soils and some organisms to the coast-ocean line. The regular deposit of large masses of stone materials, plants and animals to the marine ecosystem, increase the amount of inorganic and organic nutrients available to the numerous species that inhabit coastal waters, making them one of the most productive ecosystems on the planet. This nutrient richness is higher in highly

oxygenated areas of interface between the marine environment and coastline, where the combination of transport processes of nutrients to the shallow depth of the marine substrate and availability of solar radiation, creating a conducive environment to the development of various species of plankton, necton, algae, fish, crustaceans, mollusks and many other life forms. The high biological richness, both in quantity and variability of organisms that inhabit or visit these areas, provides a high efficiency in the maintenance of transport cycles, nutrients recycling and clearance of contaminants, offered by the high variability of trophic and metabolic strategies adopted the simplest life forms such as bacteria and microalgae, to the most complex as fish, mammals and seabirds.

The marine abrasion is the process responsible for the creation of small isolated islands, which form due to its greater resistance to erosion - the islets. These small masses of rock, due to its low disturbance and isolation are important refuge areas for some species of plants and invertebrates. Given the absence of introduced predators, the islands are sanctuaries for many species of nesting seabirds, which in turn are important vectors for fertilization of plants that inhabit the rocky substrate, by depositing nutrient rich droppings, also contributing to the increase the of soil volume, usually scarce in the islets.

Oceanic islands like Madeira and their coastal areas are extremely rich areas in food sources for many pelagic marine species such as cetaceans, sea turtles and some fish species like tuna, swordfish and marlins, providing them a guarantee of survival. It is often observed, mainly between May and October groups of Atlantic spotted dolphins, striped dolphins, common whales and Bryde's whales feeding on "bait balls". These rich habitats located in the middle of the ocean, provide cetacean species of whales that feed in deep waters as the sperm whale (Physeter macrocephalus), short-finned pilot whale (Globicephala machrorhynchus), pygmy sperm whale (Kogia breviceps), important feeding areas at depths lesser than 2000 meters, very rare in the middle of the ocean, given the depth of the oceanic Atlantic abyssal plain. The fact that many species of whales visit the coastal waters of Madeira in the period between pregnancy and lactation, demonstrates the trophic importance that this site has for these species and hence for its conservation on a global scale.

The highest rate of erosion exerted by marine abrasion processes in relation to erosion caused by inland waterways caused that a significant portion of Madeira’s

shoreline is composed by steep cliffs with some natural terraces and associated slope deposits, beaches, rocky islets, submerged or partially submerged caves and some cascades that fall from small hanging valleys over sea cliffs.

In the wider valleys, more weathered by the streams and where there is a greater deposit of material resulting from inland slopes erosion, the coastline is smooth finishing in pebble beaches. Coastal riparian areas associated with small streams, or cascades, are the areas where the vegetation is more lush and diverse, thus being areas of high biological interest.

12.2.3. Main human impacts

The activities of exploitation of coastal resources, including fisheries, may be harmful to the entire marine ecosystem if excessive pressure is exerted on the stocks of some commercially exploited species. The techniques used in the capture of certain species, particularly gill nets, trawls and seines, fault by their low selectivity and massive capture potential. Despite the gill nets and trawl capture techniques are not current in Madeira, the seine is commonly used in the capture of mackerel (*Scomber japonicus*) and Blue jack mackerel (*Trachurus picturatus*). This type of fishing causes the drastic reduction of available food to whales and pelagic fish that feed on these species and consequently for many seabirds, which depend on fish balls encircled by cetaceans and pelagic fishes, to prey on mackerel species.

Regarding the line commercial fishing techniques, the “palangres” lines used to fish for black scabbard fish (*Aphanopus carbo*) and longline used to fish for "Good fish " as grouper (*Serranus Scriba* and *Serranus atricauda*) Spanish bream (*Pagellus bogaraveo*), Red porgy (*Pagrus pagrus*), Large-scale scorpion (*Scorpaena scrofa*) and Larger forkbeared (*Phycis phycis*) are techniques that constitute the biggest threats, especially to the various species of sea turtles, which are the main victims of incidental capture in these fishing devices, and that inevitably causes them death by drowning.

The large amount of garbage that is adrift in the coastal waters of Madeira, is a major threat to marine species, especially for those that feed on cnidarians and cephalopods such as sperm whales, pygmy sperm whales, short-finned pilot whales and

Figure 53. Grouper (*Serranus atricauda*) at Rocha do Navio seafloor

several species of sea turtles, which mistake plastic bags with their prey, causing them to choke or suffer from digestive tract infections and subsequently death. The dumping of garbage in the streams by the population, which indirectly flows to the ocean or directly in the ocean by crews, of fishing, leisure and commercial boats are the major sources of this type of purely and perfectly avoidable anthropogenic pollution.

The marine-touristic activities of cetaceans (whale & dolphin watching) and seabirds observation (seabird watching), are fast growing touristic activities.The lack of regulation of these activities, leading to some tour operators who flout the rules of good conduct on the observation of these marine species, exerting too much pressure on the animals daily and causing disturbances that may lead to withdrawal of these species in coastal areas, especially considering that many groups of cetaceans have lactating pups and the birds have chicks in the nest to feed, requiring thus, areas that can provide them guarantees of the survival of their juveniles.

Man introduced exotic species that have adapted to the ecological conditions of the island, are major causers of inumerous impacts to several native plant and animal species. In Madeira several species of mammals, which constitute real threats as the black rat (*Rattus rattus*), the brown rat (*Rattus norvegicus*), the mice (*Mus domesticus*),

Feral cat (*Felis silvestris catus*) and the Least weasel (*Mustela nivalis*) were introduced. This set of introduced terrestrial predators cause high mortality in native species, especially those using the cliffs as shelter and breeding area such as birds and bats. The high predatory pressure exerted on the populations of birds and bats, can lead to abandonment of the cliffs as preferred areas for breeding, causing a decrease in secure areas available for these species. Besides exotic animals, introduced exotic flora species besides competing with the indigenous plant species for substrate and nutrients are limiting available nesting spaces for several seabirds' species.

The discharge of untreated wastewater in coastal waters has harmful effects on marine species due to the input of many infectious agents in the aquatic environment that may influence the survivability of various organisms by affecting the base of the food chain composed by plankton, zooplankton and necton and consequently the top level predators such as mammals and seabirds.

The most damaging impact on the marine environment as a result of anthropogenic activities, is undoubtedly the deposition of mud, from activities developed in the stream beds, on the rocky seabed. The heavier particles are deposited on the entire marine substrate, preventing the fixation of many organisms, especially algae, crustaceans and molluscs, which are the main food sources for fish, while the finest fraction remains in suspension preventing the normal penetration of solar radiation, affecting the photosynthetic capacity of algae and their development. The effects of a lower incidence of radiation are well known in many marine areas, particularly in the intertidal, where chlorophytes algae disappeared from the surface layer, where they were dominant, being replaced by ochrophyta algae, which are usually dominant on deeper levels, indicating that the solar radiation that reaches midlittoral is the same as in clear waters would reach the infralittoral.

12.2.4. Relevant management practices

In order to minimize existing impacts on local fauna and flora, resulting from anthropogenic activities, some mitigation measures on the main threats and aditionally

management of biological resources and activities,. Thus and in order to reduce the impacts and potential threats some relevant management measures should be taken:

Regulate marine-touristic activities of dolphin & whale and sea birds watching in order to reduce the pressures of tourism on marine wildlife.

Increase knowledge about fauna and flora species and assess their population dynamics.

Define marine protected areas for cetaceans and seabirds.

Enhance surveillance and enforcement of the legislation defined for the area.

Control exotic species of plants and animals in the area of seacliff.

Assess the health of native biological communities and guarantee their maintenance.

Schedule and plan activities to aggregate extraction of geological materials from the stream bed to minimize their transport to the marine area.

Figure 54. Exhibition about the natural patrimony and its importance

Prevent the destruction of geological reference area.

Undertake environmental education programs about the natural patrimony and raise awareness of the impacts that human activities have on these resources.

Emphasize the public on the importance of nature conservation and natural resources.

Monitor economic important coastal resources to the population.

Acquire the knowledge needed to define strategies for the conservation of the site responding to human pressure

Assessing the need for updating the legal mechanisms enabling the proper management of the site and maintaining its natural and economic value.

12.3. RURAL AREA

Farms and forests areas that define the standard for rural areas, occupying a total area of 39,505 hectares, of which 3865 ha correspond to the agricultural sector and 35 640 ha correspond to the total forest area.

The Island's forest area comprises 15 500 ha of natural forest and 20,140 ha of exotic forest. The areas of native forest on the island include the laurel forest which comprises communities of indigenous tree species such as Bay tree (*Laurus novocanariensis*), Madeira laurel (*Ocotea foetens*), Madeira mahogany (*Persea indica*), Picconia (*Picconia excelsa*), Beefwood (*Heberdennia excelsa*), Madeira Holly (*Ilex perado*), Canary holly (*Ilex canariensis*), Dogwood (*Rhamnus glandulosa*), Madeira Pittosporum (*Pittosporum coriaceum*), Lily-of-the-valley tree (*Clethra arborea*), Wax myrtle (*Myrica faya*) and Canary laurel (*Appolonias barbujana*) of altitude and forest areas Madeira Juniper (*Juniperus cedrus maderensis*) and Yew (*Taxus baccata*). Of the the Mediterranean and Macaronesian forests described in European Union's Habitats

Directive Annex I, the Juniper forest, Yew forests and Macaronesian laurel forests are priority natural habitats and of community interest.

Regarding the organization of plant communities that make up the exotic forest, characterized by pure or mixed areas of eucalyptus (*Eucalyptus globulus*), Acacia (*Acacia spp.*) and Cluster pine (*Pinus pinaster*), Douglas fir (*Pseudotsuga mensiesii*), Cryptomeria (*Cryptomeria japonica*) and sweet chestnut (*Castanea sativa*), the latter being exploited by its fruits and the other species for their wood. These areas of exotic forest cover, the shrub stratum is usually represented by Scotch broom (*Cytisus scoparius*) and common gorse (*Ulex europaeus*), while the herbaceous stratum the dominant species are the Bracken (Pteridium aquilinum) and various species of indigenous (Rubus Bollei, Rubus canariensis , Rubus ulmifolius) and endemic (Rubus grandifolius, Rubus vahlii) Brambles, these mainly in exotic forest areas close to the native forest. The mixed exotic forest areas, composed of 50% of eucalyptus, 40% of cluster pine and 10% of acacia, occupy approximately 7228 ha, dominating about 43% of the exotic forest area. Regarding pure monospecific forested areas, the cluster pine is the dominant species, which occupies approximately 5867 ha, while 1054 ha are exclusively eucalyptus and approximately 204 ha of acacia. The remaining 2454 ha of exotic forest area, are occupied by pure populations of other less abundant species such as Scots' pines, Insigne pines, Cryptomerias, Douglas firs, Chamaecypars cedars and Sweet chestnut trees.

Figure 55. Exotic forested areas close to native forest in Ilha Parish

The ownership type of forest is characteristically very small plots, given that of forest holdings 85% have an area less than 0.5 ha, 10% between 0.5 ha and 1 ha and only 5% have more than one ha plots. Most of exotic forestry plantations is composed of disordered, not subject to forest management plans and are mostly private property.

The lack of enforcement of forest harvesting operations and cleaning of forest plots using techniques such as preventive forestry using pruning and thinning, provides the accumulation of massive fuel loads such as the branches, bark and other forest residues, raising exponentially the risk of fire in these areas.

The development of forest management plans and implementation of forest harvesting operations, would keep the exotic forest plots in high productive state, either in the production of timber and celulose pulp for the paper industry, as in the valuable waste from forest harvesting operations, that can be used as fuel for biomass energy production.

The orographic characteristics influence the size of agricultural parcels, which are mostly built on small arranged volcanic rock terraces. Of the 10 382 farms registered, 9761 have an area less than 1 ha, in a total of 2713 hectares, 589 are between 1 and 5 ha comprising 885 ha of total agricultural area and only 21 have an area greater than 5 ha, in a total of 267 ha. Of the total number of farms, 8106 (1757 hectares) are used for permanent crops such as banana, orange, tangerine, apple, pear, cherry, lemon, plum, chestnut and vines, and other crops with minor expression as the custard apple, cherry, passion fruit and tamarilho. In the commercial production of vegetables, mainly cabbage, beans, sweet potatoes, potatoes, lettuce, onion, pumpkin and wheat, are produced in 7922 farms with 1715 ha. About 4559 small-sized farms, totaling 108 ha family farms are mainly devoted to subsistence farming or for their own consumption. Permanent pasture is the less frequent agricultural use due to the low number of livestock producers, about 545, occupying an area of 286 ha. In fact cattle rearing is much lower at present, limited to about 6000 cows, 17 000 pigs, 2000 sheep and 4000 head of goats. Though there are some for larger farms and more industrialized, most cattle producers have on average only three heads of cattle, which are created in small cattle barns.

The total manpower in the regional agricultural sector is 9030 employees, of which 7834 are family farm workers, usually made by the producer, spouse and other family members. The nonfamiliar agricultural manpower is restricted to 1196 workers, of whom only 635 are permanent employees.

With regard to major impacts caused by farming, these are associated with the use of agrochemicals, sometimes excessively utilized.

The regulation of agroforestry areas was carried out by municipal master plans defined for each county, which determine green areas, where buildings are only allowed to support agriculture and forestry practices.

12.4. URBAN AREA (LOCAL)

The urban areas of the proposed biosphere reserve include several settlements, with the largest population center located in the town of Santana. The typology of urban settlement is characteristically dispersed, composed of a mosaic of buildings, gardens and farmland or forest, typical of small cities and towns located in more rural areas. These clusters, have local public services, some private and small commercial establishments and various public facilities such as health centers, kindergartens, schools, gymnasiums, sports complexes, daycare homes, parish people's house and civic centers. The territorial distribution of urban settlements in rural areas like the municipality of Santana, is characterized by the existence of a more populated cluster in each parish, usually involving the local church and located on the main communication, route and smaller clusters dispersed and located between agricultural fields, accessible by roads, agricultural roads or paths.

Figure 56. Santana's urban tipology

13. CONSERVATION FUNCTION

13.1. CONTRIBUTION TO THE CONSERVATION OF LANDSCAPE AND ECOSSYSTEM BIODIVERSITY

The municipality of Santana extends from sea level to the highest mountain on the island. The cliffs, coves, terraces, hills, and mountains that make up the municipality landscape, are home to numerous cultural and biological values. The laurel forest and Rocha do navio site core areas of the proposed Biosphere Reserve, are Natura 2000 sites that harbour enormous diversity of life forms, encompassing several habitats and species of inestimable value, protected by the European Union Habitats and Birds Directives, thus being the key areas for conservation.

The coastline encompasses a wide diversity of natural habitats, especially the vegetated sea cliffs with endemic flora of the Macaronesian coasts, lower formations of Euphorbia close to cliffs and submerged or partially submerged sea caves. The cliffs are

areas of paramount importance for the preservation of vegetation predominantly xerophytic herbs and shrubs that include many Macaronesian and Madeira endemics. The islets that exist in the proximity of the coast, promote the scenic and natural value of the area and provide important seabird nesting areas. The cliffs and islets of the marine area are important nesting areas for some species of seabirds that are included in Birds Directive Annex I as the Cory's shearwater (*Calonectris diomedea borealis*), the common tern (*Sterna hirundo*), Bulwer's petrel (*Bulweria bulwerii*) and Madeira storm petrels (*Oceanodroma castro*).

Thelaurel forest core area is home to several exclusive Macaronesia and Madeira endemics, which include a large number of species of invertebrates, bryophytes and snails as well as some birds and bats, who find their refuge in this forest. In this area there are four habitats of Community interest, which are considered priorities by the European Union's Habitats Directive.

The nearly 300 arthropod endemic species to Macaronesia exist in the laurel forest core area, clearly showing the biological richness of this area and its importance to the preservation of these species, especially considering that 262 species of arthropods are Madeira exclusive species, contributing to the safeguard of these life forms. The laurel forest invertebrate fauna also includes 56 species of terrestrial mollusks, 30 of which are endemic to Madeira. The ecological importance of preserving the laurel forest in order to contribute to the conservation of several species of native invertebrates inhabiting it, is proportional to the significance that invertebrates have in maintaining the ecological balance of the laurel forest, since these species play vital tasks in the forest as nutrient transfer and recycling, maintaining the balance of the food chain, pollination of spermatophyta plants and transport of pterydophytes and fungi spores, among others.

The laurel forest provides shelter, food and nesting areas to 20 species of land birds, mostly Macaronesian endemics, especially the endemic Madeira firecrest (*Regulus madeirensis*) and long-toed pigeon (*Columba trocaz*), having a central role in their conservation. Bird species in turn have a key role in pest control, seed dispersal and forest regeneration.

Considering the abundance of insects existing in the laurel forest core area, it constitutes an area of high trophic importance to bat species that occur in it, as the grey-long-eared-bat (*Plecotus austriacus*) and the endemisms Madeira pipistrelle (*Pipistrellus*

maderensis) and Madeira leisler's bat (*Nyctalus leisleri verrucosus*). Besides food, many bats roost in centenarian Madeira Laurels (*Ocotea foetens*) and Madeira mahogany (*Persea indica*) trees, especially for the Madeira leisler's bats, which depend on tree cavities for shelter and breeding. By eliminating daily millions of insects that could affect the ecological balance of the laurel forest, the predation of bats on insects have an enormous weight in pest control and regulation of trophic balance of the entire ecosystem.

The importance for the conservation of biodiversity and landscape of the proposed Biosphere Reserve, is not confined to core areas. The county's mountainous area which is in part included in the transition area of the proposed reserve is also an area of high landscape and biological value and is integrated into the Natura 2000 network. In this area the priority habitats such as Macaronesian endemic Heaths predominantly composed of ericaceous as Madeira blueberries (*Vaccinium padifolium*), Tree heath (*Erica arborea*), Madeira heath (*Erica madeirensis*) and Besom Heath (*Erica platycodon madeirincola*). In addition to the heaths, also the Madeira juniper (*Juniperus cedrus madeirensis*) and yew (*Taxus baccata*) forests reach their best conservation state in Santana's mountainous area, thereby enhancing the maintenance of biological and intraspecific diversity of these important *taxa* and habitats, as well as the recovery of areas where these are most degraded.

The mountainous area of the proposed Biosphere Reserve is also an area of high ornithological importance, since beyond harboring some endemic bird species and subspecies that spend their life cycle in this area, it is home to the only existing Madeira petrel (*Pterodroma madeira*) nesting area, the world's rarest seabird and one of the most endangered.

Figure 57. The rare Madeira Petrel (*Pterodroma madeira*)

The Rocha do Navio site, which includes 6 km of coastline, encompassing cliffs, coves, submerged and semi-submerged caves, beaches and the islets of Rocha do Navio and São Jorge, combines the natural and landscape beauty with its ecological importance. In the rocky sea cliffs, dominated by macaronesian xerophytic vegetation like the Fish stunning spurge (*Euphorbia piscatoria*), the Madeira sea stock (*Matthiola maderensis*), the Pride-of-Madeira (Echium nervosum), the Burnt sow thistle (*Sonchus ustulatus*) the Narrow–leaved rock mustard (*Sinapidendron angustifolium*), the saucer plant (*Aeonium glandulosum*) and the rare Juniper (*Juniperus turbinata* ssp. *canariensis*). In the sea cliff areas where small streams and beautiful waterfalls exist, the Wax myrtle (*Myrica faya*) and Canary laurels (*Appolonia barbujana*) are abundant.

13.2. CONSERVATION OF SPECIES BIODIVERSITY

The high species richness and conservation status of the core areas of proposed biosphere reserve, provides the various fauna and flora species appropriate conditions to the course of their life cycles, reproductive success and hence to its preservation. These areas are home to various Macaronesian and local endemics, some of which are listed in the Birds and Habitats Directives as priority species. In addition to the core areas, the

remaining area in the proposed Biosphere Reserve, by definition, provides favorable ecological conditions for species that don't have their habitats within the core areas and whose biological requisites are fulfilled in the transition area. In fact, it is in the buffer and transition areas where among others, several native Asteraceae and Fabaceae species occur, proving that the whole proposed biosphere reserve has an important role in preserving the full range of native species contained therein, acomplishing in a exquisite way its global and local biodiversity conservation function.

The various Macaronesian and Madeira endemic species, which occur in the area of the proposed Biosphere Reserve, demonstrate the importance that this area has for the preservation of biodiversity.

13.3. CONSERVATION OF GENETIC BIODIVERSITY

The contribution of the proposed Biosphere Reserve for the conservation of genetic diversity begins with the status of conservation of natural, landscape and cultural values that the areas included in the reserve will promote.

The high number of existing endemic subspecies in the area of the proposed Biosphere Reserve in the diverse taxonomic groups is a reflection of genetic diversity that exists within the Macaronesian subpopulations, which are advanced in the process of speciation and hence possessing unique haplotypes within the species. This genetic diversity extends to the microgeographical level mainly in some endemic plant species, which adapted to environmental conditions of habitats where they live in, acquiring phenotypic characteristics distinct from other conspecific individuals. A clear example of this phenomenon of genetic-phenotypic microgeographic variation within the area of the proposed Biosphere Reserve is Mandon's Chrysanthemum (*Argyranthemum pinnatifidium*), an endemic plant that includes three endemic subspecies, two of which live within the area of the proposed Biosphere Reserve: *Argyranthemum pinnatifidium montanum* that inhabits the mountainous areas in the Central Mountainous Massif, including the transition area, and *Argyranthemum pinnatifidium pinnatifidium* that inhabits laurel forest core area.

Besides the endemic species, the proposed Biosphere Reserve is highly important in the conservation of native species whose distribution extends to other areas of biogeographical areas and due to their recent colonization are at the beginning of the speciation processes. A clear example of this phenomenon is the Grey-long-eared-bat (*Plecotus austriacus*), a species with Palearctic distribution, which has in Madeira a differentiated population at the morphological and genetic level in relation to European conspecific populations. Whereas it is a recent evolutive branch , the divergence of these characters is insufficient for differentiation as an endemic subspecies. It is however a evolutionary significant unit (ESU), undoubtedly contributing to the preservation of genetic biodiversity of this bat species. In the proposed Biosphere Reserve is located the largest colony of this species, which by virtue of being a breeding colony acquires greater conservation importance of this ESU. Besides the above examples, the proposed biosphere reserve includes many widely distributed native species, common in other biogeographic areas, whose subspecies, varieties or local ESU's undoubtedly contribute to the enrichment of the genetic diversity of them.

In addition to the genetic variability of the endemic and indigenous species, the proposed Biosphere Reserve proposal has great importance at the level of genetic variability of agricultural species. Indeed, one characteristic of traditional agriculture, which is still scattered all over the municipality of Santana, is the reuse of seeds to make new crops. The reuse of seed by farmers allowed the maintenance of a germplasm bank of high biological value, since there are many indigenous unique varieties, which are well adapted to the physical and chemical characteristics of soils, which otherwise would have disappeared. Considering the acidity and high iron and aluminum soil content, many varieties have tolerance to the metallic stress induced by these elements in such high concentrations. It was thanks to the traditional sustainable agriculture which enabled the Isoplexis Germplasm Bank headquartered at the Center for Macaronesian Studies (CEM) at the University of Madeira (UMa), through standards filed with the International Genetic Plant Resources Institute (IPGRI), collect, evaluate, characterize and conserve plant genetic resources, including dozens of local varieties of beans, wheat, rye, corn and sweet potatoes.

Figure 58. Active seed collection of BSJBM

Besides the Isoplexis Germplasm Bank, focused on agriculture cultivars preservation, the seed bank of the Madeira Botanical Garden in partnership with the Conservatoire Botanique National de Brest (France) have made a comprehensive collection of Spermatophyta seeds and of pterydophyta spores from natural populations., This collection allowed its propagation and reintroduction into their natural habitats, contributing to the preservation of genetic variability of flora species in their habitats as well as in the seed bank.

The large wine producing area existing in the proposed Biosphere Reserve includes a wide diversity of grapes and vine species. The dominant varieties, of European origin (*Vitis vinifera*) are the "Tinta", "Tinta Negra", "Sercial", "Boal", "Verdelho", "Verdelho-Tinto", "Malvasia-Fina", "Malvasia-Cândida" and "Terrantez", which have the highest commercial value and are normally used for production of Madeira table wines and internationally renown fortified wines are grown primarily by commercial producers. Besides the above European varieties, American varieties of the species *Vitis aestivalis* and hybrids between the former and *Vitis vinifera* like the "Jaqué", "Canim" and "Americano" became common after the *Phylloxera* outbreak in the nineteenth century. These varieties, despite being banned from the table wine and liqueurs commercial

circuit, are used in wine production for home consumption, known as a dry wine. Moreover there are other varieties grown in smaller quantities, but because they aren't grown in other parts of the globe, form an unusual genetic pool of wine producing vines of high biological value, which greatly contribute to the preservation of its genetic biodiversity that is worth saving.

Figure 59. Wine plantation (*Vitis vinifera*)

Besides the huge native biological richness, the proposed biosphere reserve is home to a wide variety of unique crop varieties, preserved through time by the maintenance of intergenerational agricultural traditions, deserving special attention for its contribution to the global genetic diversity preservation.

14. DEVELOPMENT FUNCTION

14.1. POTENTIAL FOR FOSTERING ECONOMIC AND HUMAN DEVELOPMENT WHICH IS SOCIO-CULTURALLY AND ECOLOGICALLY SUSTAINABLE

The increasing demand in international markets for certified organic products, produced or manufactured in a artesal with natural raw materials, could increase the development of sustainable economic activities in the proposed biosphere reserve. Distinguished by its unique characteristics, these products can become the county's image and reach specific niches in the major world markets, where environmental quality and the effects of chemical additives used in the manufacture of conventional products have on health, are prime factors taken into account when selecting products to purchase. The development of environmentally sustainable handcrafted economic activities creates conditions for the emergence of ancillary economic activities such as tourism activities.

Figure 60. Concentrated lemon juice and "ponchilha" factory in Ilha parish

Fishing

Policies set by the regional authorities in the field of fisheries and marine resources, were conspicuous by their exclusion of low selectivity fishing methods, which are extremely harmful to the balance and maintenance of local fish stocks, but also by strengthening the monitoring of economic activities carried out within the territorial waters the region. The balance between maintaining fisheries and stocks were sustained through the adjustment of the fleets and fishing gear available resources of fish species caught commercially. The regional fishing fleet for black scabbard fish, tuna fish and other commercial fish has 408 vessels. These vessels use lines and trotlines, angling gear that enable good selectivity, low mortality of species of no commercial interest preventing the capture of small dimensions fishes due to the size of the hook. In the case of catching tuna fleet, the technique used is jump and stick, a sustainable ancestral technique which is based on the use of a stick with one line per angler, allowing the shoal escape. Only the small fish catching fleet like sardines and mackerel, with a total of 44 boats are allowed to use seines, a method highly selective for the target species, whose mesh size is regulated to allow the escape of smaller specimens. Including related activities such as manufacturing, the fisheries sector employs about 1.5% of the population.

In relation to the nominal catch of fish unloaded at auction in the region in 2008, the black scabbard fish was the most downloaded about 3100 tons, followed by tuna with about 2,500 tons, horse mackerel, mackerel and sardines with about 650 tons and commercial fish with about 300 tons. The species with lower volume of discharges are the conger eel and squid with 6 tons and 2 tons respectively.

The exclusive economic zone (EEZ) in the region is approximately 110,000 square nautical miles and is characterized by the absence of a platform, being the main points of fishing seamounts or fishing grounds, which rise from the abyssal plain at 4000 meters average depth, where the bulk of the regional fleet is engaged. In the coastal zone, only a few small vessels developed craft activity, mainly with the use of angling capture techniques catch species considered as commercial as the snappers, mullet, groupers, and sea breams.

The existence of several marine reserves in the region, integrated into the European ecological network Natura 2000, which management plans determine the total prohibition of the development of professional and sport fishing industry has great importance in the maintenance of stocks of some species of commercial interest, particularly in commercial fish species.

The integration of regional commercial fishing fleet in the EU policy on fisheries, has resulted in a significant investment in structures and port facilities and the modernization and construction of vessels, but also in the development of aquatic resources, particularly through the deployment of artificial reefs, aquaculture growth and the determination of closed seasons as recently established for the populations of limpets (Patella aspera and Patella candida).

The use of capture techniques and highly selective determination of catch quotas by species, coupled with investment in aquaculture, research and resource development, creation of marine reserves and the size and structure of the local fleet, determined the sustainability of the industry and that presents a high development potential, particularly in sustained exploration of new marine resources such as crustaceans.

Agriculture and livestock

The high potential for sustainable development of agriculture in the proposed Biosphere Reserve area is expressed by the small size of farms where farming is developed in a distinctly handmade way, and is little mechanized and typically policultural, where crop associations and rotations are used since ancient times.

The increasing growth of certified organic production in the agricultural area that exists in the municipality of Santana, brings environmental and economic gains, while preserving the ecological balance and achieving higher profits with organic products as well as the socio-cultural development, whereas the mosaic landscape will thus be preserved at the expense of large land consolidation uncharacterized from landscape and local traditions, and can thus be coupled to other tourism products on either gourmet or ethnographic context.

The vast wealth of the municipality of Santana in varieties of cereals and other agricultural native species, enable farmers to produce unique varieties of high quality and

guaranteed sales. These raw materials leverage the production of processed products with unique organoleptic qualities that in an integrated model of sustainable tourism will create more economic value for the population and county.

Figura 61. Organic lemon orchard in Ilha parish

The germplasm bank support to regional organic farming, by characterizing and preserving native varieties suited to this type of farming, in addition to productivity gains, will bring economic and environmental gains for the county and simultaneously preserve the indigenous natural resources.

Local Products

The preparation of various typical products of the Santana's county as Santana bread made with sweet potato, biscuits, jams, liqueurs, spirits and traditional soups, create a considerable potential socio-economic development, particularly considering the strong reputation that the county has on tourism, especially the thatched houses, an ex-libris of the region. In addition, the traditional handicraft adds potential for a socio-

cultural, human and economic development in the county, mainly through the implementation of certification of all characteristic local products.

Figure 62. Local agriculture and agro-industrial products sale

The creation of the Association Santana Solidary City (ASCS), under the INTERREG III – B program, which coordinates a project of solidarity economy, enabled social inclusion of people with employment difficulties, but who generally have extensive knowledge of the traditions and the way of cooking of various typical local products. One of the successful initiatives of the ASCS, is the company "Sweet Traditions" that manufacture various traditional products with commercial success, including the traditional bread and cookies that are sold in supermarkets throughout the region. This associative project demonstrates the potential of development of economic and socio-cultural activities being environmentally sustainable and could play a key role in new initiatives of similar scope in the area of the proposed Biosphere Reserve.

Tourism

The municipality of Santana has an extremely rich cultural heritage and natural landscape which encourages the development of diversified tourism. The complementarities between the various components will create unique tourism products of great value and sustain socio-economic growth in harmony with local values. The enormous variety of natural, cultural and landscape recourses which can be exploited in a sustainable way, reveal the great potential for growth that the tourism industry may have in the county and can be seen as a sustainable development model by other municipalities in the region and establish the younger generations in the county, allowing them to perpetuate the development of tourism characteristics of local culture.

Figure 63. Touristic footpath in Laurel forest

Renewable energies

The production of electricity from renewable sources, has suffered in recent years a strong increase provided largely by the development model adopted by the region. The penetration of clean energy produced by combining the components water and wind, currently accounts for about 33.5% of all energy produced.

Madeira Island has 10 hydroelectric and three wind farms being Paúl da Serra the largest, with about five dozen wind turbines. The contribution from sources of heat production is becoming less and point to further reductions with the implementation of new production projects based on solar and wind energy, with the deployment of more wind turbines and the construction of ponds holding water in Paúl da Serra's plateau, which will ensure greater stability in power generation from hydropower. This year is expected to restructure the Calheta's hydroelectric power system for 30 MW of power, installation of a new wind farm with 5MW of power and two photovoltaic parks, one located in Caniçal with 6MW of power and the other in Paúl da Serra with 9 MW. The strong growth of energy produced from renewable sources and decrease of the energy produced from fossil fuels leads to reduce the dependency on imported petroleum products and pollutant emissions arising from their use, providing a sustainable socio-economic development with a low carbon footprint.

Waste management

The effort by the municipality of Santana in the area of waste management through the collection in ecopoints around the county, which allowed that about 83% of the waste collected in the county would ultimately be used for recycling or incineration with the use of part of the green solid waste and wood chips in the Public Gardens Municipal.

The waste generated and collected in the municipality of Santana, is then routed through the transfer system, Screening, Treatment and Recovery Waste of the Autonomous Region of Madeira for the Transfer Station of the Eastern Zone (ETZL) situated in the valley of Porto Novo, in Santa Cruz County. This infrastructure, operating from April 2007, receives and compresses the waste collection in undifferentiated Transfer Building, followed by its transport to the Solid Waste Treatment Station (ETRS),

where it is directed to appropriate treatment like incineration or landfill. As for selective waste collection (glass, waste electrical and electronic equipment, used mineral oils, green waste, batteries, used tires, scrap and waste batteries and accumulators) deposited in Ecocentro these are sent for recycling.

The scope of activities of the Meia Serra's Solid Waste Treatment Station (ETRS) includes the incineration of solid urban waste to produce electricity, hospital and slaughterhouses waste treatment, organic waste composting, waste sorting and routing recycling and operation on landfills, and activities in the field of environmental education.

The ETRs is equipped with a municipal solid urban waste incineration (IIRSU) aimed at energy recovery from municipal waste through a controlled and automated process, which in addition to thermally treat the waste, enables the production of electricity.

Municipal Solid Waste composting setup (ICRSU) aims at the enhancement of organic garden waste and food of plant origin, through the process of aerobic biological degradation. In a simpler way, it is a natural process by which microorganisms transform the organic matter (leaves, grass, debris or peel vegetables and fruits, etc.) in a humic stabilized substance called compound, a kind of fertilizer with soil improver properties, used in agriculture.

Installation of Hospital Waste and Slaughterhouses Incineration (IIRHM) aims to treat hazardous hospital waste, coming from units providing human and animal care and related research, in addition to products not intended for human consumption, including those from the slaughterhouse, produced in Madeira

The IIRHM has two incineration lines with a capacity of 0.5 tons per hour, each consisting of two combustion chambers where temperatures reach the 1100 º C. To this treatment is associated the waste energy recovery, including through two heat exchangers and turbo-generator group. The facility is equipped with two gas treatment systems, similar to the IIRSU mutually independent. The by-products produced, including slag and fly ash are directed to landfill (AS). In the case of ash, they are flushed prior to placement into proper cells at AS.

The Landfill (AS) systems are the final disposal of waste not suited to treatment by incineration and / or composting, as well as slag and ash (before flushing) resulting from the incineration processes. Additionally, they serve to support the situations of downtime and / or emergency treatment processes installed. The landfill currently operating in

ETRs Meia Serra (2nd Phase B), consists of a cell of MSW and slag, where produced incineration slag is deposited slag and, eventually, urban waste and similar, and an ash cell to flushing incineration ashes deposition. Three landfills are closed and sealed at ETRs.

The wastewater and leaching treatment produced in ETRs is provided by Wastewater Treatment Station (WWTP). This installation consists of three independent treatment systems: primary or biological conducted in an aeration pond; physical-chemical treatment with addition of chemical reagents and dehydration of sludge formed and tertiary process of reverse osmosis (HI). The by-products produced by the WWTP including sludge, which are dried and deposited at AS, and HI concentrated, can have four different final destinations: the IIRSU incineration, incineration in IIRHM, reuse in the process of blanketing the ashes and incineration facilities, and/or injection into the AS. The effluent from the WWTP corresponds to the HI permeate, which enables total high-quality internal reuse, including IIRSU process water, irrigation, washing, among the main uses.

Used tires generated in the region are forwarded to the Park Storage, Crushing and Packaging of Used Tyre, which is equipped with special equipment for grinding these materials, which, after preparation, are transported by land and sea for recovery in mainland Portugal.

The Platform for Storage, Milling and Timber Packaging is intended for the processing of wood packaging with a view to their dispatch for recycling. The station also has a building for Compression of Ferrous Metals, which aims the compaction of various ferrous materials with low volume, resulting from the separation performed in facilities aiming the subsequent packing and shipping for recycling or recovery in mainland Portugal.

The ETRs in Meia Serra has an environmental education centre integrated, placed in a former Rangers home that was retrieved in 2006 under the first phase of recovery of the area surrounding the ETRs. The Centre is intended to increase public awareness and environmental education, exhibitions and other activities, with main focus on Preschool Education and the 1st cycle of basic education. Among the activities regularly undertaken at the Centre, there are the workshops for the reuse of materials and games on the theme of waste, in addition to the study visits undertaken to ETRs. In the surrounding

area there is a small area for picnics and even a path between the Environmental Education Centre and the site of Ribeiro Serrão, in the parish of Camacha, county of Santa Cruz.

The high efficiency in the management of waste produced in the county, from the selective deposition in ecopoints by the population, until the perfect interaction with the transfer, Screening, Treatment and Waste Recovery system of the Autonomous Region of Madeira, is demonstrative of the high capacity of enhancement of environmental quality and an indicator of future vision of sustainability and well-being of the entire population of the area of the proposed Biosphere Reserve and its ability to social and economic development.

14.2. If Tourism is a Major Activity

In 2009, the available tourism offer, on all surveyed forms of accommodation, was 30 266 beds, 95.5% in hotels, 1.9% in rural tourism facilities, 1.6% in holiday camps and hostels and 1.0% in touristic villas. The municipality of Santana possesses 362 beds, a number that has remained stable since 2005 and now represents only 1.3% of the total share of existing beds in the Region.

Overnight stays in all types of accommodation reached 5.6 million, representing a decrease of 11.2% compared with the previous year. Residents in Portugal contributed with more than 950,400 overnight stays, resulting in a monthly increase of 15.7%, while non-resident aliens originated approximately 4.7 million room nights, representing a decrease of 15.2% in this variable. The main source markets were the United Kingdom, Germany, France, Netherlands, Finland and Austria, which totaled 77.4% of nights spent by non-resident aliens.

The average stay in collective accommodation facilities of the Autonomous Region of Madeira in 2009 decreased slightly compared with the previous year (from 5.3 to 5.2 nights). Considering the type of housing, we observed the highest average stay in tourist

homes (5.6 nights) in hotel establishments (5.2 nights) and on rural tourism facilities (4.8 nights).

Tourism growth

In 2009 the tourist industry in the Autonomous Region of Madeira was characterized by a drop in key indicators. Total income, overnight stays and guest arrivals in accommodation establishments decreased by 14.1%, 11.5% and 10.1% respectively. The months of February, March and July presented the most significant breaks in the overnights (-16.2%, -15.5% and -13.6%, respectively), greatly influenced by a decrease in global demand as a result of market recoil due to the global financial crisis.

Tourist establishments in the municipality of Santana recorded in 2009, 35,960 overnight stays, -14.2% than in the previous year and an annual change of -13.5% in the number of incoming guests. The net rate of bed occupancy stood at 27.2% and the rate of bedroom occupancy at 25.1%. Monthly, the months that recorded room occupation rate above annual average, were April (35.0%), May (46.1%), June (27.4%), July (27.9%), August (35.0%), September (28.0%) and October (28.4%) and below average in November (17.6%), December (10.8%), January (8.9 %), February (15.6%) and March (19.9%). Room occupancy rates below the regional average (54.8%), it is apparent that Santana has seasonal influx of tourists and with few tourists, expressed at low occupancy of the few beds that local units have.

It is however expected that the Municipality of Santana will adopt a sustainable development strategy, promoting its natural and cultural heritage which will lead to medium-term increases in the number of tourists and occupancy rates.

Tourism Development Potential

The municipality of Santana brings together natural and cultural characteristics with high tourism potential, especially for nature tourism, ecotourism, scientific tourism,

adventure tourism, underwater spearfishing, canyoning, recreational fishing, marine wildlife watching and other tourism niches with strong growth in demand globally.

If the inclusion of the municipality of Santana in the network of Biosphere Reserves of UNESCO is verified, will enhance the projection of the municipality as a touristic destination of excellence, where it can be appreciated and experienced the culture, traditions and gastronomy, as well as the beautiful and diverse landscapes, which are born in the blue ocean, crossing the green of the terraces and forests to reach the rugged beauty of the massive volcanic mountains, painted in thousand shades of yellow, red and black.

The huge amount of footpaths and "Levadas" that tear the worldwide known rural and wild landscapes of Santana, can be complemented with other typical tourist products, as well as the environmental certification of their tourism units, giving international recognition to the tourism product Santana, enhancing their growth in a world where environmental concerns are increasingly a prerequisite to success.

Figure 64. One of the beautiful waterfalls in Santana

Tourism planning

The Plan for Tourism Management of the Autonomous Region of Madeira (POT), defined as strategic priorities for tourism development the consolidation of the dominant product, consolidate emerging tourism products and improve the exploitation of tourism resources by shaping new products. This would improve the quality of existing tourism offer and enhance the segmentation and diversification of regional tourism. In this perspective were identified as primary resources the sea and landscape derived products, which includes footpaths and "levada" walks, paths in natural and protected areas, gardens and parks, volcanism and mountain, sport fishing, boat rides, sailing, diving, surfing and kayaking tours that could be supported and complemented by various infrastructures such as golf courses, sports training centers, conference centers and ports.

14.2.1 Type(s) of tourism

The municipality of Santana is an excellent location for a wide range of tourist activities, especially nature tourism, ecotourism and adventure tourism. Despite being born recently in the region, adventure tourism has been one of the fastest growing niches in particular the activities of canyoning and paragliding, which have excellent conditions to their practice in Santana. Nature tourism was introduced a long time ago in the regional market and has strong expression in the municipality of Santana, namely trough the several existing footpaths and levadas there in, still in high demand in the county, especially the footpaths Queimadas - Caldeirão Verde e Pico do Areeiro - Pico Ruivo - Achada do Teixeira, which remains the most successful and with higher demand. In relation to ecotourism, is the latest tourism niche and with little expression, but considering the natural heritage of Santana shows large growth potential. In order to clarify the specificities of the different types of tourism activities that may be developed, is set below its typology:

Beach tourism - visits to sites with built or natural bathing infrastructure and with good weather conditions, particularly with many hours of sunshine, low rainfall and high / mild temperatures, with the aim of carrying out outdoor recreation activities;

Cultural tourism - visits carried out by persons outside the host community, motivated in part or in whole by historical, artistic, scientific or lifestyle / heritage interests of a community, region, group or institution;

Nature tourism - visits to places of great wealth in terms of natural patrimony, with the motivation to admire the landscapes and places of great scenic beauty, and take cultural, agricultural and sports activities;

Ecotourism - visits to natural sites for the sole purpose of admiring, studying and enjoying its beauty, vegetation, wildlife and all its natural characteristics;

Adventure - leisure activity carried out in an exotic, remote or wild location usually outdoors, with high levels of involvement and activity on the part of participants, originated from the emergence of extreme sports in the second half of the twentieth century.

The excellent natural conditions allied to the diverse offer of footpaths, "levadas" and existing picnic parks allow conducting activities in direct contact with nature, including levada walks, which are unique worldwide.

The existent pebble beaches and well integrated seaside resorts, of which differentiates the Ribeira de São Jorge complex where there is a freshwater lagoon of enormous beauty, enabling the execution of activities or bathing in freshwater, as well as at sea.

The municipality of Santana has a diverse range of holiday cottages, hotels and restaurants, located in the rural areas of the municipality where tourists can experience the local flavors and tastes and enjoy a peaceful and enjoyable stay in a unforgettable landscape.

The low disturbance as a result of the absence of commercial fishing operation in the municipality, together with the existence of Rocha do Navio reserve, functioning as natural nursery for many fish species, enhances the performance of fishing and tourism activities, either from the coast or underwater spearfishing. The fishing activities can extend to the creeks, where is possible to fish common trout, rainbow trout and eel, embedded in scenarios of extreme beauty and tranquility.

The marine area of the municipality holds a great biological wealth, housing several species of seabirds, fish and flora of Macaronesian coasts, determining optimal conditions for carrying out tourist activities, especially birdwatching and scuba diving.

At the cultural level, the limited but genuine existing built patrimony, from the thatched houses to churches and museums, are accessories spaces that can greatly enrich the experience of tourists visiting the municipality of Santana.

Places of Interest

Several churches and parish chapels

Representative of religious architecture in Madeira, these religious structures encompass some important pieces of religious art, and valuable work done in tile, especially the mother church of São Jorge and the Penha de França chapel.

Figure 65. Santo António Chapel

Viewpoints

There are various viewpoints on the sea cliffs and hills, where you can see the indentations and bays of the coast, views of breathtaking landscapes, springs and waterfalls, cultivated fields in an environment of tranquility and absence of pollution.

"Serragem da Achadinha" water sawmill

This building is the only functional water sawmill still existing in the archipelago of Madeira. Provides the visitor the chance to live part of Santana's cultural past, by observing how the wood cutting process was made when the indigenous forest were then explored.

"Casas de Fio e meio Fio" Thatched houses

Being one of the ex-libris in Madeira island, yarn and half yarn houses, commonly known as thatched houses, are typical of Santana municipality and integrate the heritage

buildings to visit. Its historical, architectural and landscape interest, constructive homogeneity, characteristic to an architecture linked to agricultural activity, are a landscape feature of Santana.

"Casas Redondas" Thatched houses

These buildings are more common in the parish of São Jorge and are thus commonly known as São Jorge Houses, are a landscape, historical and architectural trait with unique characteristics and high tourism and ethnographic interest.

Water mills

Water mills, once common in Madeira's landscape, are a cultural landmark of the importance that cereals had in the economy and lives of Santana's inhabitants. At the site of Achadinha, parish of São Jorge, there is a functional water mill, where the corn is still grinded, thus being a cultural heritage of considerable touristic interest.

"Fortim do Faial" fort

The "Fortim do Faial" fort, recently restored, is the only monument of the military heritage in the municipality of Santana. It is a building of high tourist interest, both for its architecture as well as for the beautiful landscape on the parish of Faial.

"Homem em Pé" Basaltic Dyke

It is a very well known geomonument of high landscape, geomorphological, ethnographic and tourist value and is considered one of the geological ex-libris of the altitude landscapes in the municipality of Santana.

"Pico Ruivo" and central mountainous massif peaks

With high landscape and tourism value, Pico Ruivo is the highest peak of the island, from which one can observe the peaks that make up the central massif. The different viewpoints located on the tracks crossing the mountain ranges, provide the visitor a magnificent view of the various volcanic dikes and veins that originated the beautiful and abrupt landscapes.

Figure 66. Winter landscape of the Central Massif Mountains

Basalt prismatic disjunction flow

Located on the west bank of the Ribeira do Faial, this geomorphological formation consists of basaltic prisms, possesses exceptional beauty and interest.

"Penha d'Águia" massif

This rock mass formed by multiple layers of lava flows of basaltic nature, rises up to 589 meters altitude and is one of landscape ex-libris of the municipality of Santana with high geological and tourism interest.

"Afloramento fitofossilífero de São Jorge" fossils

Located in the volcanic tuff of the Ribeira de São Jorge valley, this geological formation holds fossils of 30 plant species with an estimated age of 2 million years and is one of the geological sites of greater interest in Madeira, due to its uniqueness.

Figure 67. Panoramic view of Penha D'Águia massif

14.2.2 Tourist facilities and description of where these are located and in which zone of the proposed Biosphere Reserve

Structure	Type	Parish
Casa das Hortênsias	Accommodation	Arco S. Jorge
Quinta da Quebrada		
Quinta do Arco		
Casa do Povo do Arco de São Jorge	Institution of public utility	
Museu do vinho e da vinha	Patrimony	
Restaurante A Grotea	Restaurants	
Restaurante Casa de Chá de São Jorge		
Restaurante O Arco		
Refúgio das Camélias	Accommodation	Faial

Casa do Povo do Faial	Institution of public utility	
Capela da Penha	Patrimony	
Fortim do Faial		
Ponte Velha do Faial		
Penha D'Águia	Touristic footpath	
Restaurante Casa de Chá do Faial	Restaurants	
Restaurante Chaves		
Restaurante Foz da Ribeira do Faial		
Restaurante Ponte Velha do Faial		
Complexo Balnear da Ribeira do Faial	Bathing complex	
Ilha Montanha	Accommodation	Ilha
Casa do Povo da Ilha	Institution of public utility	
Caldeirão Verde / Caldeirão do Inferno	Touristic footpath	
Moinho do Comandante	Accommodation	S. Roque Faial
Residencial San Roque		
Ribeiro Frio Cottages		
Vila Adelaide		
Centro de Ed. Ambiental do Ribeiro Frio	Environmental education center	
Casa do Povo de São Roque do Faial	Institution of public utility	
Ribeiro Frio / Balcões	Touristic footpath	
Ribeiro Frio / Portela		
Casas de abrigo do Ribeiro Frio	Logistic support unit	
Posto Florestal do Pico do Areeiro		
Posto florestal do Ribeiro Frio		
Casa Tia Clementina	Accommodation	Santana
Casas Campo do Pomar		
O Colmo		
Quinta do Furão		
Rancho Madeirense		
Rancho Madeirense		
Residencial O Cortado		
Área de R. e lazer da Achada do Teixeira	Area of recreation and leisure	
Área de R. e lazer das Queimadas		
Área de R. e lazer do Pico das Pedras		

Área de R. e lazer do Pico Ruivo		Santana/Ilha Santana/São Jorge
Casa da Cultura	Exhibition centre	
Casa do Povo de Santana	Institution of public utility	
Capela de Santo António	Patrimony	
Fontanário de Santa Ana		
Pico Areeiro/Miradouro Ninho da Manta	Touristic footpath	
Queimadas / Pico das Pedras		
Parque Temático da Madeira	Exhibition centre	
Restaurante / Pizzaria Malta Gira	Restaurants	
Restaurante A Faia		
Restaurante Bragado's		
Restaurante Cantinho da Serra		
Restaurante Estrela do Norte		
Restaurante Estrela Polar		
Restaurante O Colmo		
Restaurante O Cortado		
Restaurante O Til		
Restaurante O Vime		
Restaurante Quinta do Furão		
Restaurante Rancho Madeirense		
Casa de abrigo da Achada do Teixeira	Logistic support unit	
Casa de abrigo do Pico Ruivo		
Casas de abrigo das Queimadas		
Casas de abrigo do Pico das Pedras		
Achada do Teixeira / Ilha	Touristic footpath	
Queimadas / Caldeirão Verde		
Cabanas de São Jorge	Accommodation	São Jorge
Casa das Proteas		
Turismo de habitação Fajã Alta		
Casa do Povo de São Jorge	Institution of public utility	
Calhau da Ribeira de São Jorge	Patrimony	
Igreja Matriz de São Jorge		
Serragem da Achadinha		
Ribeiro Bonito	Touristic footpath	

Restaurante Cabanas	Restaurants	
Restaurante Casa de Palha		
Posto Florestal do Cascalho	Logistic support unit	
Complexo B. Foz da Ribeira de S. Jorge	Bathing complex	

14.2.3 Indicate positive and/or negative impacts of tourism at present or foreseen

The Tourism Management Plan of the Autonomous Region of Madeira is an indicator of careful planning by the government in regional tourism development, which is the main economic activity in the region. This plan sets the strategic lines of development activity taking into account the basic principles of sustainable development, highlighting the main lines of development of complementary products related to rural tourism, nature tourism, ecotourism, adventure tourism and scientific tourism.

Tourism projects developed in the municipality of Santana are mostly rural tourism accommodation units that have been adapted to this type of housing being careful to keep the typological characteristics of buildings and their architectural and landscape integration, in Santana's typical rural mosaic.

Santana is a municipality without large hotel units and the existing ones, by their size, have similar impacts to a family home. The promotion and integration of Santana's main touristic assets, related to culture, heritage, gastronomy and natural resources, has a positive effect in the municipality, either by creating new business opportunities and jobs as well as for maintaining the population balance, by settling the youngest population in the county.

The recognition of the importance of sustainable tourism as a key factor for the development and success of the tourism product "Santana", causes positive impacts as it leads to evaluation, rehabilitation and preservation of built heritage, which instead would probably fall into abandonment, either by migration of the younger generation, lack of financial resources to undertake their recovery or even low socio-economic interest by the lack of tourist flow, which would justify the investment.

The growing effort emprehended by the local authority in the recovery and revitalization of cultural values and traditions of the county, of which a good example is the international touristic event "48 hours dancing" dedicated to folklore, which

expresses the music and traditional dance, but also the typical costumes of the various localities of the county, is already a reference of the identity development and authenticity of local population and a way of distinction of Santana's touristic offer in relation to other municipalities in the region.

Figure 68. Madeira Thematic Park in Santana

The municipality of Santana is also known for having some of the most spectacular trails and "levadas" in the whole island, including the footpath that goes from the picnic and recreation area of the Queimadas until the Caldeirão Verde and Caldeirão do Inferno, but also the route that connects Achada do Teixeira to Pico Ruivo and Pico do Areeiro. The high number of tourists who daily engage these pathways could cause negative impacts on landscape, flora and fauna. However, because these pathways are well defined and marked and the activity is well regulated, there are no expected negative impacts.

The excellent existing infrastructures in the municipality, such as bathing areas, viewpoints, accessibilities, walking trails, theme park and leisure areas, combined with the quality services provided by various restaurants, rural tourism houses among others,

offer excellent support conditions to visitors looking to enjoy Santana's landscapes and fresh air.

Santana is a municipality where tourism activities, by the characteristics already described, is an example of how tourism can have more positive than negative effects and also provide conditions for local people to develop sustainable economic activities, which may obviously increase if Santana is nominated a Biosphere Reserve.

Figure 69. Touristic path in a "Levada"

14.3. BENEFITS OF ECONOMIC ACTIVITIES TO LOCAL PEOPLE

Nature Tourism as the core tourist niche in the municipality of Santana, will attract many tourists who appreciate nature and traditional customs, which is socio-economic advantage to a county so rich in natural and cultural values, allowing people to monetize these assets for their benefit. The huge environmental gains offered by the existence of three sites of Natura 2000 and their conservation, are themselves attractive eitheir for biological diversity they hold, as well as by the magnificent scenery they offer.

Combining the natural resources with the built cultural and ethnographic heritage, chiefly folkloric and gastronomic traditions, Santana has a huge potential for the development in the quality of life of local inhabitants, arising from benefits provided by tourism model and also the international reputation that will win with its classification as a Biosphere Reserve.

15. LOGISTIC SUPPORT FUNCTION

15.1. RESEARCH AND MONITORING

15.1.1. To what extent has the past and planned research and monitoring programme been designed to address specific management questions in the potential biosphere reserve

The Madeira Regional Government has undertaken a remarkable effort in the preservation of natural resources, both in the assessment, intervention and maintenance of habitats and species as well as the management of important resources as soil and water. The best proof Madeira's Regional Government determination in the planning of research and monitoring programs that allow knowing and preserving biodiversity, is the creation of several terrestrial and marine nature reserves, where it includes the first Portuguese nature reserve, which were subsequently incorporated as SCIs and as SPAs under the Natura 2000 Network.

The importance of good management of these resources culminated in the creation of several government entities for its management and supervision in particular Madeira Natural Park (PNM) and Water Management and Investments (IGA) and equipping them with multidisciplinary technical-scientific collaborators with capability to collect and analyze scientific data that enable decision making based on sound scientific information, and in establishing structures for logistical support such as nurseries, germplasm banks and laboratories. The work developed by these entities has received international recognition in both the high success of projects to preserve endangered species such as monk seal (*Monachus monachus*) and the Madeira Petrel (*Pterodroma madeira*) as in preserving unique habitats such as the altitude heathlands by regulation of grazing activities in this area and establishing protected areas of laurel forest, classified as a Biogenetic Reserve by the Council of Europe in 1992 as World Natural Heritage by UNESCO in 1999.

The success of these initiatives came from research and monitoring programs conducted in areas as diverse as meteorology, water resources, phytosociology, marine biology, among others that led to an action strategy that that was transversal to all

entities with responsibility in the conservation and management of terrestrial and marine natural resources.

The municipality of Santana has played and continues to play a key role in maintaining these unique species and habitats, considering that within the area of the proposed Biosphere Reserve, there are several patches of native vegetation representing various habitats, the marine Reserve of Rocha do Navio of paramount importance for success in preserving the monk seal and several species of seabirds and the Central Mountainous Massif where the only nesting area of the Madeira Petrel is located, areas where research and monitoring of habitats and species are permanent.

Besides the natural areas under protection which houses, the logistical support structures created by governmental entities and the knowledge resulting from planned and executed research and monitoring studies in various scientific fields, have proved to be decisive in the management of native wild and agricultural resources in the municipality of Santana, striking in the large number of Santana's varieties existing in germplasm banks, as well as restoration of wild populations of rare species like the white orchid *Goodyera macrophylla*, an endemic endangered species, threatened of extinction in the wild, whose recovery was carried out in Ribeiro Frio's nursery, located in the parish of São Roque do Faial.

There have been many cultural studies conducted in the district of Santana, justified by its patrimonial wealth. The research carried out, mainly by technicians of the Regional Directorate of Cultural Affairs (DRAC), included the inventory and registration of the built, written, gastronomy, folklore and musical heritage. The knowledge resulting from conducted research work was relevant in the management of human resources and financial strategies since it allowed local authorities to act efficiently on preservation of local culture, including through financial support for the recovery of original characteristics of the various types of traditional buildings, musical and folkloric groups, manufacturing and marketing of traditional products.

15.1.2. Brief description of past research and/or monitoring activities

Project	Year	Entities
Queimadas Forest improvement	1998	DRF
Pico Assumadouros tree planting	2005	
Madeira laurel forest – Quantitative and qualitative characterization	1992/1995	PNM
Conservation and restoration of Madeira's priority habitats and species	1994	
Management and conservation of Madeiran Laurel forest	1997	
Footpath offer within the Madeira Natural Park	2001/2002	
Footpaths and Levadas safety	2002	
Promotional Merchadising of Rocha do Navio Reserve	2002	
Epiphytic Bryophytes diversity in Madeira Laurel forest	2005	
Studies for PNM land use plan	2006/2009	
" A Laurissilva da Madeira" Exhibition	2006/2009	
PNM area brochure	2006/2009	PNM / Adrama / Acaporama
Rural valorisation of Achada do Marques	2003	Ilha parish council / PNM
Plant survey and their traditional uses	2006	Ilha House of the people / PNM
Madeira Natural Park on Santana – its limits, preventive measures and support provided to users	2006	Ilha House of the people / Ilha parish council / PNM
Study of Santana's footpaths	2002	Santana house of the people / PNM
Collection of Santana's oral tradition	2009	Santana parish council

15.1.3. Brief description of on-going research and/ or monitoring activities

Several regional authorities develop activities related to environmental education, monitoring and safeguarding of the natural heritage in the area of the proposed Biosphere Reserve, in collaboration with the local municipality. Presently, the entities developing projects in this area within the municipality of Santana are the Regional Directorate of Forestry (DRF), the Regional Directorate of Environment (DRA / DSCN), the Madeira Botanical Garden Eng Rui Vieira (JBMRV), the University of Madeira (UMa) and the Madeira Natural Park (PNM). Apart from regional institutions, there are projects developed under the Community Initiative Programme Interreg IIIB Azores-Madeira-Canary funded by the EU, as the Network of Macaronesia Centers for Education and Environmental Information (REIA - MAC), on which is integrated the Ribeiro Frio Environmental Education Center, an initiative of the Municipality of Santana (CMS) and the Regional Directorate of Environment. The Municipality of Santana also developed various initiatives related to its cultural heritage, through support to projects dedicated to gastronomy, folklore, music and built heritage sites. Besides Santana's city council, the municipality parish councils and people's houses have developed several initiatives in cooperation with various regional entities or individually. An example of the effort that has been undertaken by these entities is the project of collecting the oral tradition of Santana, who was supported by the parish council of Santana through the edition of a book as a way to publicize this work of inestimable cultural value. Projects in development include:

Project/ Activity	Action/Activity	Entities
Actions of promotion and environmental awareness	Nature classes	DRF
	Footpaths	
	Guided visits	
	Educational workshops	
	Lectures about "The forest of Santana"	
	Educational games	
	Exhibition " The forest of Santana"	
Pico das Pedras forest nursery	Production of indigenous and endemic plants	
Actions targeting	Botanical garden seed bank	JBMRV

species at extinction risk	Embryo *in vitro* culture	
	Actions of population multiplication	
	Monitoring of all natural populations	
	Dormancy rupture tests and seedlings	
Project "Biobase"	Madeira biodiversity database	DRA
Project "Biodiversidade da Madeira.net"	Update on safety and operation of Madeira biodiversity portal	
Project "Estudo do estado de Conservação da Biodiversidade Indígena e Endémica da RAM"	Edition and publication of of books about Madeira's biodiversity, in collaboration with local scientific community	
Ribeiro Frio Environmental education center	Recieve and direct visitors to the environmental education center	DRA/CMS
	Conducting thematic exhibitions	
	Mini-lab for logistic support for practical activities	
Ilha parish certified organic orchards	Support the annual certification of growers in organic farming in Ilha parish	Ilha parish council/ PNM
Demonstration and experimental field in organic farming	Implementation of a citrus orchardas a field trial for organic farming, brochure and conversion manual publication for organic lemon production	
Minimizing the damage caused by long-toed-pigeon in agricultural fields	Monitoring the conservation status of long-toed-pigeons	PNM
	Prevention methods of damage caused by long-toed-pigeons, helping farmers to minimize the damage by delivering protection nets and heliographic tapes	
Highlands Ecosystem and Madeira petrel recovery	Madeira petrel conservation under the LIFE program, now continued by PNM	
Knowing and preserving biodiversity	LIFE Project to raise awareness and dissemination of protected areas, mainly Special Areas of Conservation	

PNM planning and dissemination	Assessments on different uses and projects to be developed within PNM area	
Isoplexis - Agricultural germbank of Macaronesia	Collection and storage in the germbank of native varieties and cultivars	UMa
	Providing seeds to farmers	
Santana oral tradition	Collection and recording of songs, novels, essays and short stories of Santana	Santana parish council

Besides the aforementioned activities, are ongoing the monthly monitoring of air temperature, solar radiation, wind and rainfall through Automatic Meteorological Stations (EMA's) located in the Pico das Pedras and São Jorge, the implementation of the "Atlas of the birds of Madeira Archipelago" by the Office of Madeira Natural Park (SPNM), monitoring of bats, from which it was possible to identify an important feeding area of endemism of the Madeira pipistrelle (*Pipistrellus maderensis*) and Madeira-leisler's-bat (*Nyctalus leisleri verrucosus*) located in the parish of São Jorge.

In the cultural and ethnographic context, several projects are underway for the classification and recovery of cultural heritage in the municipality of Santana, lead by the Regional Directorate of Cultural Affairs (DRAC) in conjunction with Santana's City council, Parish Councils and People's houses, with particular emphasis on the built heritage, place names, folklore, music and traditional musical instruments, costumes and cuisine.

15.1.4. Brief description of planned research and/or monitoring

In addition to activities carried out and which are ongoing, there are several planned initiatives by the Municipality of Santana, Parish Councils and People's Houses, in cooperation with several regional entities and some researchers, reinforcing the strong investment in sustainable agriculture, conservation and natural resource management that has been conducted in the municipality of Santana. Planned activities include:

Awareness and dissemination of protected areas mainly Special Areas of Conservation

Inventory of traditional oral literature of the Municipality of Santana

Inventory of bat roosts and feeding areas in the municipality of Santana.

Sustainable Agriculture: The use of bats on organic farms in the municipality of Santana as a method of biological control.

Criation of the Centre of Studies and Conservation of Macaronesia bats.

15.1.5. Estimated number of national scientists participating in research within the proposed biosphere reserve

Permanently about 20

Occasionally about 60

15.1.6. Estimated number of foreign scientists participating in research within the proposed biosphere reserve

Permanently 1 - 2

Occasionally an annual average of 10 - 20

15.1.7. Estimated number of masters and/ or doctoral thesis carried out on the proposed biosphere reserve

Considering the current number of Masters and Doctorate theses in progress within the various scientific areas, the growing number of students who start the Bologna 2nd cycle and the increased interest in the appointment of Santana as a Biosphere Reserve might raise in these students, provides that the number of theses could reach 6 per year at the full development stage of the reserve.

15.1.8. Research station(s) within the proposed Biosphere Reserve

In the area of Pico das Pedras forest station is located one automatic weather station (EMA) in operation since April of this year and one udometer which is collecting data a few years now, both belonging to the Regional Laboratory of Civil Engineering (LREC), which measure daily various meteorological parameters. In the area of the lighthouse of São Jorge, is located another EMA, one of six that are in Madeira archipelago as part of the National Meteorology Institute (IM) network.

The Ribeiro Frio Environmental Education Center, has a laboratory prepared to support some field work activities on integrated research projects.

The shelter houses and ranger stations are regularly used as laboratories and logistical support units in field work campaigns of biodiversity, ecology and astronomy studies. The center of reception of the Rocha do Navio reserve also works as a support station and laboratory for projects and activities of land and marine ecology, conservation and biodiversity.

15.1.9. Permanent research station(s) outside the proposed Biosphere Reserve

The Autonomous Region of Madeira is endowed with several research centers, well equipped and accredited, home to national and international scientists. These centers develop research projects in various areas of expertise, integrating several cooperation projects with local businesses and providing specialist services to the community. Permanent research stations, distinguished by its reputation:

• CEM - Centre for Macaronesian Studies (www3.uma.pt/cem). The research developed by CEM is focused on Macaronesian biodiversity, its conservation, development of biological resources, studies in geology, oceanography, water resources and sustainable use of agricultural crops and native plants. CEM conducts activities to provide community

services, complementing the scientific research carried out within the Unit

• CQM - Centro de Química da Madeira (cqm.uma.pt). The CQM is a fundamental research center for the implementation of R&D in the Autonomous Region of Madeira, promoting post-graduate training and interaction with other national and international R&D units. The CQM develops research in the areas of natural products and materials and provides services to the scientific community and local business.

• CCM - Centre for Mathematical Sciences (ccm.uma.pt). Constitutes a permanent structure for the promotion of basic scientific research and applied research projects grouped under the science of mathematics and physics.

• CEEAplA - Center for Applied Economic Studies of the Atlantic (www.uma.pt / portal / html / CEEAplA). The CEEAplA is a permanent structure for the promotion of basic scientific research and applied research projects grouped under the fields of economics and business, including Labour Economics, Regional Economics, Public Sector Economics, Economic History, Finance and business Management.

• CITMA - Centre for Research and Technology of Madeira (www.citma.pt). CITMA is an institution dedicated to fostering the scientific and technological research in the Autonomous Region of Madeira, supporting the scientific community on funding applications of research projects.

• LGH - Laboratory of Human Genetics (www3.uma.pt/lgh). The Laboratory of Human Genetics is a research unit in molecular biology and Human cytogenetics, and providing specialized services such as DNA testing in detecting genetic abnormalities and the detection of different genetic and chromossomic pathologies.

• LREC - Regional Laboratory of Civil Engineering (www.lrec.pt). The Regional Laboratory of Civil Engineering is an institution dedicated to research and providing services to public and private entities, particularly in the areas of consulting and testing in the field of Civil Engineering

• MB - Whale Museum (www.museudabaleia.org). The Whale Museum is primarily devoted to the exhibition of pieces dedicated to the history of whaling, but also for environmental education, research and conservation of cetaceans occurring in the sea of Madeira.

• EBM - Marine Biology Station of Funchal (www.cm-funchal.pt/cmf). Integrating the research teams of Marine Biology, Department of Science of Funchal City Hall and the

Laboratory of Marine Biology and Oceanography, Department of Biology, University of Madeira, develops research projects mainly in the area of marine biology and fisheries.

• JBMRV - Madeira Botanical Garden Eng. Rui Vieira (www.sra.pt / jarbot). The JBMRV dedicated to research of Macaronesian flora and in particular the study of plant biodiversity in the archipelago of Madeira. The research undertaken in this institution focuses on various aspects of systematics and biology of plants, essential to the conservation of plant diversity and other areas of research.

• PNM - Parque Natural da Madeira (www.pnm.pt). PNM main focus is to promote and participate in scientific research in the field of nature protection and the environment.

• IH - Hydrographic Institute (www.hidrografico.pt). The Hydrographic Institute as state Laboratory plays an important role in support of the scientific community in the areas of marine science and technology, development of multidisciplinary projects in R&D, in partnership with national and foreign institutions in the fields of Physical Oceanography, Marine Geology, Chemistry, Geography, Navigation and environmental protection.

• IM - Institute of Meteorology (www.meteo.pt). IM conducts research in the fields of meteorology, climatology and sismology, focusing its research efforts on projects that accrue to direct applications to use in operational activity, looking for a progressive improvement of the information available to its users.

15.1.10. Permanent monitoring plots

The marine area of Rocha do Navio site and the land areas of laurel forest and the Central mountains, Natura 2000 sites, due to the species and habitats these sites possess, some of which are of conservation priority in the Habitats Directive, are areas subject to permanent monitoring. Besides the sites that integrate the ecological network of the European Union, other areas classified under different regimes of protection are subject to permanent monitoring of its natural values. In all these areas, various monitoring programs are developed focising about diverse ecological parameters of various endemic and indigenous flora and fauna species and also about human activities and their impacts.

The control of rodent populations and invasive plant species, by their ability to naturalization and destruction of natural habitats, shall be made either within the

protected and surrounding areas , creating a buffer to the dispersal of these species, enabling the maintenance of the natural characteristics of these areas.

The Society for the Protection and Study of Birds (SPEA) develops annual monitoring programs of terrestrial and marine bird species, organizing censuses of some species of birds, which are open to voluntary participation of the population, while conducting environmental awareness campaigns. The same entity develops a program for monitoring impacts of power lines on bird populations.

In addition to the monitoring carried out permanently in the land area, there are monitoring programs in the marine area, undertaken by the Marine Biology Station, the Regional Directorate of Fisheries and the Whale Museum.

15.1.11. Research facilities of research station(s)

The various entities, Laboratories, Research Centres and Research Stations, have appropriate equipment and facilities to develop research projects in several areas of biology, Genetics, Medicine, Chemistry, Biochemistry, Physics, Mathematics, Meteorology, Hydrology, Engineering and Veterinary Medicine. The region has a solid database on the geology and terrestrial and marine flora and fauna.

15.1.12. Other facilities

The area has several logistic support units distributed throughout the archipelago, namely the various ranger stations and shelters of the Regional Directorate of Forestry, the Madeira Natural Park stations and municipal shelters as the Ecological Park of Funchal support facilities. These facilities often serve as accomodation for groups of researchers involved in ongoing research projects in the Autonomous Region of Madeira, which can count on the valuable assistance of the Forestry Police and Nature warden, who possess deep knowledge of Madeira's natural areas.

Several institutions have equipped vessels for the research projects in marine areas. The Whale Museum has a research vessel and a semi-rigid boat for close proximity research activities such as cetaceans photoidentification work.

15.1.13. Does the proposed biosphere reserve have an Internet connection

Internet access has full coverage on the island. In urban centers there are fiber optic broadband networks, digital telephone line network by ADSL (Asymmetric Digital Subscriber Line) and ADSL2 / 2 +. In some urban areas free access to wireless network (wi-fi) is available.

15.2. ENVIRONMENTAL EDUCATION AND PUBLIC AWARENESS

15.2.1. Describe environmental education and public awareness activities, indicating the target group(s)

In the Region, including Santana, 92 schools are enrolled in environmental education program "Ecoescolas" (eco-schools), where students discuss issues related to water, waste, energy, climate change, biodiversity, organic farming, noise and transport. This initiative, which takes place during the school year, aims to encourage attitude change and adoption of daily life sustainable behaviors at the personal, family and community level. The activities included in the program eco-schools are coupled with various education and environmental awareness actions, developed by the Regional Directorate of Forestry, Regional Directorate of Environment and Madeira Natural Park, including hiking, nature classes, guided tours, educational workshops, educational games, exhibitions and distribution of educational material for participants.

15.2.2. Indicate facilities for environmental education and public awareness activities, indicating the target group(s)

The various equipment and structures that exist in the municipality of Santana, confer a high capacity for providing support to activities involving education and environmental awareness, encouraging the active participation of the population in the implementation and adoption of environmentally sustainable behaviors and the

valorisation of their natural heritage. The Regional Directorate of Forestry has in Santana ranger stations in Ribeiro Frio, Cascalho, Pico das Pedras, Pico do Areeiro and Vale da Lapa and also several shelters in Pico Ruivo, Achada do Teixeira, Queimadas (2 houses), Pico das Pedras and at Ribeiro Frio. In the area of Rocha do Navio there is a station of Madeira Natural Park, used for observation and surveillance and also serves as space for education and environmental exhibitions.

In Ribeiro Frio, parish of São Roque do Faial, the Regional Directorate of Environment has an environmental education center, housed in a educational core dedicated to the Madeira laurel (*Ocotea foetens*) laurel forest. The core of environmental education is composed by a nature store, a course where you can observe many of the characteristic species of this forest and a small laboratory to support research and monitoring undertaken in the area.

In the various schools of the county there are several books devoted to regional biodiversity, published by the Regional Directorate of Environment, which allow students of the different ages to realize of the rich natural heritage that can be observed in natural areas.

15.3. SPECIALIST TRAINING

In recent years various government institutions concerned with the environment, sustainable agriculture and resource management have conducted training courses on the regional natural heritage and organic farming. The courses were formatted for teachers, tour guides and people in general, different types of learners requiring different contents. Additionally, several developed research and conservation projects, including LIFE Nature, relied on campaigns of field work which involved many volunteers, who generally were fellows involved in masters and doctoral thesis on ecology and conservation and also Research Biology students from the University of Madeira. The participation of several national and international researchers in collaborative projects with local scientists, motivate the technical and scientific exchange and training and

professional enrichment for all intervenients. The data collected and published in several projects, allows increasing knowledge about species and habitats under study and thus enables the structuring of more specific and rich content, resulting in a gradual gain in the quality of professional training courses.

The institutions responsible for managing projects, often arrange visits to nature reserves which held conservation work, recreational activities and workshops, allowing the general population to participate actively in the success of the project and simultaneously enriching their knowledge.

15.4. POTENTIAL TO CONTRIBUTE TO THE WORLD NETWORK OF BIOSPHERE RESERVES

The Autonomous Region of Madeira, the first region of Portugal to classify a nature reserve, includes several nature reserves and protected land and marine areas of international importance such as the laurel forest, classified as World Natural Heritage by UNESCO in 1999, the Salvage and Desert Islands, which are Biogenetic Reserves by the Council of Europe.

The excellent results obtained by regional authorities in the sustainable management and efficient operation of many protected areas are internationally recognized and demonstrates the ability that the region has as developers and managers of cooperative projects that contribute to sustainable development of all mankind.

As an integral area of the Network of Biosphere Reserves of the Atlantic (REDBIOS), the region has an active role in multiparty meetings of network members, under the Man and Biosphere Program (MAB). The inter-regional and international extends to projects with the Azores and the Canary Islands in several areas including sustainable tourism, sustainable agriculture and biodiversity.

All international projection obtained by the region, result of the great successes in managing its natural resources, sustainable development and international cooperation, demonstrating the vast potential of projection that the proposed Santana Biosphere Reserve can bring to the world network of Biosphere Reserves.

16. USES AND ACTIVITIES

16.1. CORE AREA(S)

16.1.1. Describe the uses and activities occuring within the core area(s)

i. Terrestrial area

The Core Zone is a fully protected area whose use in terms of socio-economic activity is restricted to the development of walking and visitation in terms of enjoying the landscape and bird watching. The use in forestry, agriculture and livestock is residual. Basically the Core Zone has a targeted use for nature and biodiversity conservation.

Figure 70. Land core area

ii. Marine area

The Marine Core area has a predominantly oriented use towards the conservation of coastal habitats, ecosystems and species. The classification of the area restricts activities as fishing or seafood collection. The visitation for tourism and education are other

frequent activities, benefiting from the logistics and monitoring station that the Madeira Natural Park installed.

16.1.2. POSSIBLE ADVERSE EFFECTS ON THE CORE AREA(S) OF USES OR ACTIVITIES OCCURRING WITHIN THE CORE AREA(S)

In and / or outside of the core areas there aren't any activities that may have adverse effects on these areas. Tourism development, if not coordinated and orderly is a factor to be taken into account, thus the information and monitoring are crucial for the successful management of this activity in the areas of greatest natural interest. The introduction of exotic species also deserves attention because it can generate negative impacts on the landscape and also on the conservation of endemic and indigenous species.

The shingle extraction activities while located outside the most important areas of conservation, must be ordered and conducted under the rules in force, following the principles of good environmental practices.

16.2. BUFFER ZONE(S)

16.2.1. Describe the main land uses and economic activities in the buffer zone(s)

The land of the terrestrial buffer zone are composed mainly of forest land, primarily used for tourism purposes, particularly for conducting landscape and local flora and fauna contemplation tours, on existing tracks for the purpose. In this area there is a leisure area well bounded, equipped and signalled, which is normally used by the locals as an area for resting and socializing. The agricultural and livestock use is practically nonexistent, and is reduced to small areas in residual number and located in the lower area of the buffer zone, which lies closer to agricultural areas.

In the marine buffer zone there are no other major economic activities.

16.2.2. Possible adverse effects on the buffer zone of uses or activities occurring within or outside the buffer zone(s) in the near and longer terms

In the marine buffer zone, given the lack of maritime-tourist activities and considering that fishing activities are small and those that exist are performed using sustainable methods such as artisanal fishing lines, there are no other activities that may cause any adverse effect in this area.

With respect to the inland buffer zone of marine core area, is a classified area managed by Madeira Natural Park with use restrictions, consisting of Macaronesian coastal habitats and the area of cliff deposit by some vineyards and uninhabited houses which serve as support for farmers. In the cliff deposit there is a Madeira Natural Park support station, which serves as base for teams of Nature Wardens who supervise the the reserve, preventing the occurrence of activities that could have adverse effects in this area.

The high number of tourists, who hike in the surrounding area of the land buffer zone that surrounds the Laurel forest core area, potentiates the occurrence of damage by some less respectful tourists. However, the existence of well marked and equipped trails largely eliminates the potential damage caused by vegetation crushing and dispersal of garbage. Besides the walks, the local population makes some family gatherings during the summer season, in areas defined for the purpose, near the Forest Police station, which oversees the maintenance of the physical characteristics of the site, hence the pernicious effects of these activities are therefore diminished or even inexistent.

16.3. TRANSITION AREA

16.3.1. Describe the main land uses and major economic activities in the transition area(s)

The land in the transition zone is mostly used for population housing and for agriculture, mainly horticulture as the main economic activity is agriculture. The dwellings are scattered or in small clusters, surrounded by farmland and tipically with small gardens in front. Apart from farming, tourism has some importance chiefly rural tourism in typical houses retrieved for this purpose, all over the county. Supplementary economic activities are the normal for populations of some size, such as restaurants, cafes and bars as well as public and private services, transportation and education, concentrating in the areas of higher density as Santana, the county's capital and the main villages.

16.3.2. Possible adverse effects of uses or activities on the transition area(s)

In the terrestrial transition area, the agricultural parcels dominate land uses. The size of these plots is very conditioned by orographic characteristics, resulting in a mosaic of terraces where 94% of all registered farms have an area less than 1 ha, comprising a total of 2713 ha. Highly fragmented and small scale agriculture practiced in these lands, is almost entirely manual, since the mechanization at the local level is almost impossible, apart from small machines such as weeders and motor-hoes, which help farmers in hard agricultural tasks. The farms are usually polycultural, integrating several varieties at once, and practice crop rotation. Given the low mechanization and type of agriculture that integrates crop associations and cultural rotations, the adverse effects are minimal, restricting themselves to excessive use of agrochemicals by some farmers. This will be residual, whereas the regional and local authorities have implemented mandatory training for all farmers in the parsimonious and appropriate use of agrochemicals, enhancing greater environmental quality in rural areas, water and soils.

In relation to the marine transition area, there are no activities or uses that may be detrimental to the area. Overall, the marine transition zone is exempt of any activities, except in the summer months, where there is the use of bathing areas. Another activity of highest expression in the summer is shore fishing by line and underwater spearfishing, which due to the restrictions that regulate and control these activities, don't cause any adverse effects.

Figure 71. Small policulture traditional farm

17. INSTITUTIONAL ASPECTS

17.1. STATE, PROVINCE, REGION OR OTHER ADMINISTRATIVE UNITS

State: Portugal

Region: Autonomous Region of Madeira

County: Municipality of Santana

17.2. UNITS OF THE PROPOSED BIOSPHERE RESERVE

Core area(s)

The core areas are Sites of Community Interest, including terrestrial and marine areas integrated in the European ecological network Natura 2000.

Buffer zones

Buffer zones correspond to marine areas, public and private land, with defined uses through various local, regional and national management and planning tools.

Transition area

The transition areas are the remaining land area of the municipality of Santana, mostly comprised of rural land, urban and public and private plots, with defined use rules laid out by.management and planning tools.

17.2.1. Are these units contiguous or separate?

The units are contiguous, and the buffer zones surrounding the laurel forest and Rocha do Navio core areas and the transition zone has some land and other marine and involves all the core and buffer zones.

17.3. PROTECTION REGIME OF THE CORE AREA(S) AND IF APPROPRIATE OF THE BUFFER ZONE(S)

17.3.1. Core area(s)

The core areas of laurel forest and Rocha do Navio, are Sites of Community Interest (SCI's) from the Macaronesian biogeographical region, published by Commission Decision 2002/11/EC of 28 December under the Natura 2000 ecological network, which is the key policy instrument with regard to nature conservation and biological diversity within the European Union. EU Directives relating to Natura 2000 were transposed into Portuguese State law by the Decree-Law 140/99 of April 24, as amended by Decree No. 49/2005 of February 24 and adapted to the Autonomous Region of Madeira Regional Legislative Decree 5/2006/M of March 2

17.3.2. Buffer zones

Land use in buffer zones is regulated by several planning mechanisms with particular emphasis on measures resulting from the European Agricultural Fund for Rural Development (FEDER) for the period 2007-2013, applied in Madeira by the Rural Development Programme for Autonomous Region of Madeira (PRODERAM) and Santana's Municipal Master Plan. Most of the land included in buffer land zone, are classified as green areas, which allow exclusively the maintenance and restoration of previously existing buildings or construction of structures solely to support agricultural activity.

The activities in the marine buffer zone are regulated by various legal instruments, notably the Regional Legislative Decree on the establishment of Nature Reserve Site of Rocha do Navio, but also through various instruments such as the Plan for Land Use Management of the Autonomous Region of Madeira, Plan of Tourism Management of the Autonomous Region of Madeira and the Regional Environmental Policy.

17.4. LAND USE REGULATIONS OR AGREEMENTS APPLICABLE TO THE TRANSITION AREA

The use of land in the Transition area is governed by Santana's Municipal Master Plan and several guiding instruments as the Plan for Land Use Management of the Autonomous Region of Madeira, Plan of Tourism Management of the Autonomous Region of Madeira and the Regional Environmental Policy.

17.5. LAND TENURE OF EACH ZONE

17.5.1. Core area(s)

In the Marine core area of Rocha do Navio site, almost all of the land are cliffs coastal marine areas and areas of public domain.
In the laurel forest core area, land is publicly owned, a managed by the Regional Government of Madeira.

17.5.2. Buffer zones

Much of the buffer zone is land area, dominated by forest and agricultural land. The rest of the area corresponding to the buffer zone is marine area and some coastal cliffs.

17.5.3. Transition area

About 44.6% of the Transition area is marine area, the remaining area is occupied by private and public lands, which include all of the aggregated population of the proposed Biosphere Reserve.

17.5.4. Foreseen changes in land tenure

There are no plans to purchase land or expected changes in ownership of the land.

17.6. MANAGEMENT PLAN OR POLICY AND MECHANISMS FOR IMPLEMENTATION

Management plans and regulations existing in the area of the proposed Biosphere Reserve will continue to apply. There will be a strategic and reference plan for the Biosphere Reserve, between the various partners at the time of approval.

17.6.1. Indicate how and to what extent the local communities living within and next to the proposed biosphere reserve have been associated with the nomination process

The application process provided a number of opportunities for participation and involvement of local communities. Contacts were established with the local schools and promoted several events during which information was provided and encouraged the exchange of ideas and information collection in order to define the model of the Biosphere Reserve. The application file itself was also provided to public consultation in order to gather and input specific information. Various opportunities and contacts with local and regional media were used to promote and spread extensively the application process. Several formal contacts were established with business organizations, including commercial farmers, parish councils and nongovernmental organizations with the aim to inform and encourage their participation and support of the Biosphere Reserve application.

17.6.2. Main features of management plan or land use policy

Through the implementation of the Biosphere Reserve in the municipality of Santana, it will be possible to ensure sustainable growth of economic activities based on the exploitation and promotion of economical natural and cultural resources, certifying both the preservation and promotion. The use of the virtues derived from the

classification of the municipality of Santana as a Biosphere Reserve, will bring immeasurable benefits to the quality of life of residents.

17.6.3. Designated authority or cordination mechanisms to implement this plan or policy (name, structure and actions)

The coordination of the Biosphere Reserve and its entire planning process and management will be the responsibility of the municipality of Santana, through the Municipal Company Terracidade. It was precisely this county who assumed from the start the intention of development and creation of the Biosphere Reserve and gathered around this project all the necessary support. Initially, the council shall, through the Company's Terracidade, assumne the responsibility for implementation of activities and for planning and management of the Biosphere Reserve in the logic of openness and participation, either by creating an advisory council which will analyse the best suited management model in a medium and long term. Thus, the City Council assumes the normal requirements arising from the installation phase so that no difficulties or constraints in this phase could limit the future development of the reserve.

17.6.4. The means of application of the management plan or policy

In general and with regard to conservation actions, the means of development of the Biosphere Reserve of Santana will be provided by nature and biodiversity conservation and management programs itself. Similarly, either in this or other fields will be used means provided by the Rural Development Programme, the investment plan of the municipality, as well as the access to other sources of funding is predicted. The general application guidelines shall follow the procedures of management tools and development programs in place.

17.6.5. Indicate how and to what extent the local communities participate in the formulation and the implementation of the management plan or policy

The Biosphere Reserve also plans to establish itself as a space for participation and discussion of the models of sustainable development at local level, so that it is also a

mechanism for promoting the involvement of local communities. In addition to the obligations of general and sectoral legislation in place, that include procedures for public information and participation in Santana's Biosphere Reserve, will also adopt a permanent practice of information and encourage for public participation in all its actions and not limiting it to the Advisory Council.

17.6.6. The year of start of implementation of the management plan or policy

Considering that most of the sectoral management plans are approved and that the council is starting the process of revising the Municipal Master Plan, it is expected that the Strategic Plan and Reference Biosphere Reserve Santana can be completed in a period maximum of two years after their adoption.

17.7. FINANCIAL SOURCE(S) AND YEARLY BUDGET

17.7.1. Financial sources

As part of this application, the funding will be provided by entities with competence in the management of protected areas, species and habitats, monitoring, enforcement, environmental education, organic farming and promoting sustainable development as well as the Municipality Company Terracidade and Santana's City Council. Different actions can be co-financed by EU funds.

17.7.2. Yearly predicted budget

The budget for the various activities is estimated based on the projects to be implemented by the various entities involved in project development and management of the Biosphere Reserve plus the investment that the municipality will ensure at the level of management and overall coordination of activities of the Reserve. The estimated

budget for the Biosphere Reserve may be reviewed and adjusted by the authorities as budgetary constraints or investment opportunities in reach of the different departments.

	Year				
	n	**n+1**	**n+2**	**n+3**	**n+4**
Environmental education actions	31.250	25.250	25.250	25.250	1.000
Studies and monitoring	137.500	137.500	137.500	137.500	137.500
Species and habitats management	143.500	143.500	143.500	143.500	143.500
sustainable development	50.000	35.000	35.000	35.000	35.000
Total	**362.250**	**341.250**	**341.250**	**341.250**	**317.000**
Program management	120.000	55.000	27.500	27.500	27.500
Overall budget (€)	482.250	396.250	368.750	368.750	344.500

17.8. AUTHORITY(IES) IN CHARGE

17.8.1. The proposed Biosphere Reserve as a whole

Santana City Council

17.8.2. The core area(s)

Santana City Council, Terracidade, Madeira Natural Park, Regional Directorate of Forestry, Regional Directorate of Environment, Parish Councils.

17.8.3. The buffer zone(s)

Municipality of Santana, Terracidade, Regional Department of Forests, Regional Directorate of Environment, Parish Councils.

18. SPECIAL DESIGNATIONS

(X) UNESCO World Heritage Site

( ) RAMSAR Wetland Convention Site

(X) Other international conservation directives

- European Community Directive nº 79/409/CEE – Birds Directive
- European Community Directive nº 92/43/CEE –Habitats Directive

(X) Other regional conservation directives

- Zona de Reserva Integral de Apanha de Lapas (Decreto Regulamentar Regional nº 14/93/A, de 31 de Julho)

( ) Long term monitoring site

19. SUPPORTING DOCUMENTS

19.1. MAPS

19.1.1. General location

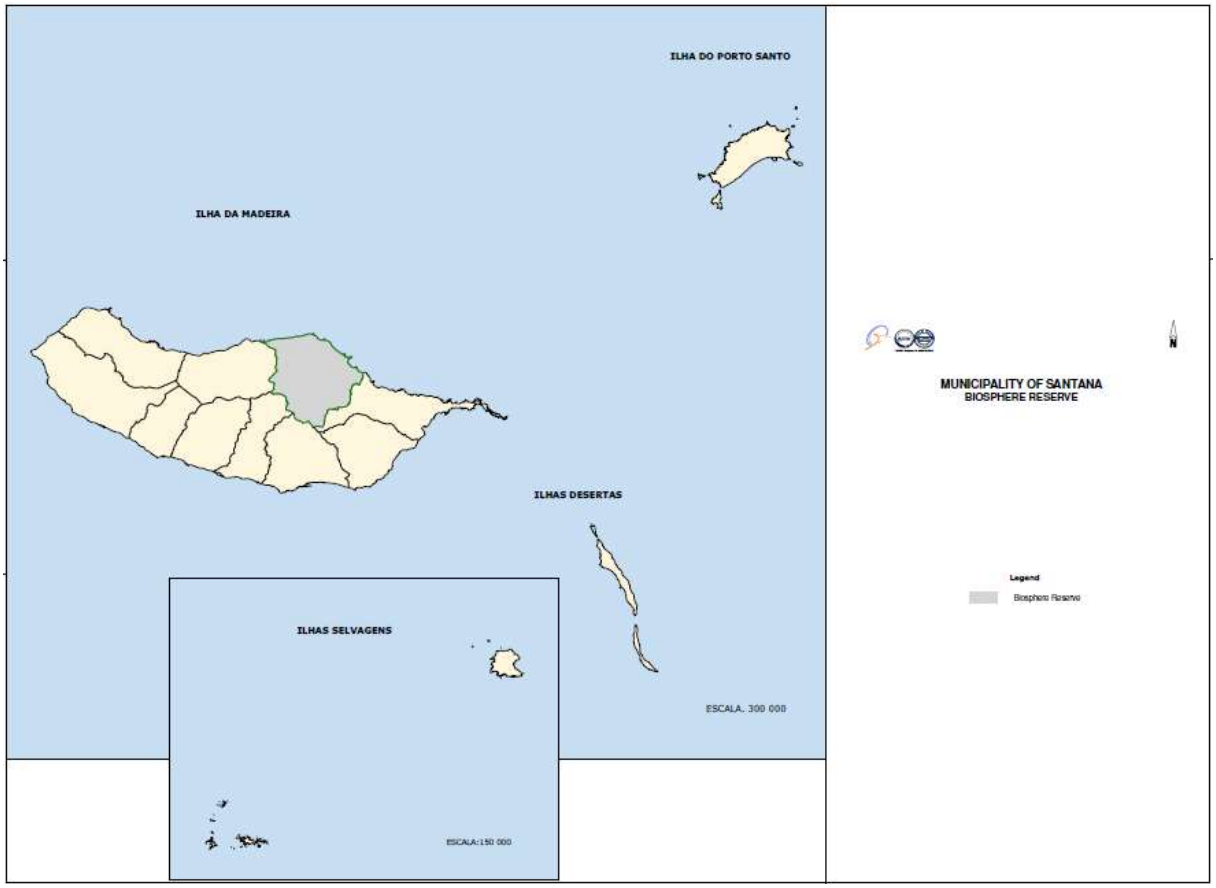

Figure 72. Santana Biosphere Reserve general location

19.1.2. Biosphere Reserve zonation map

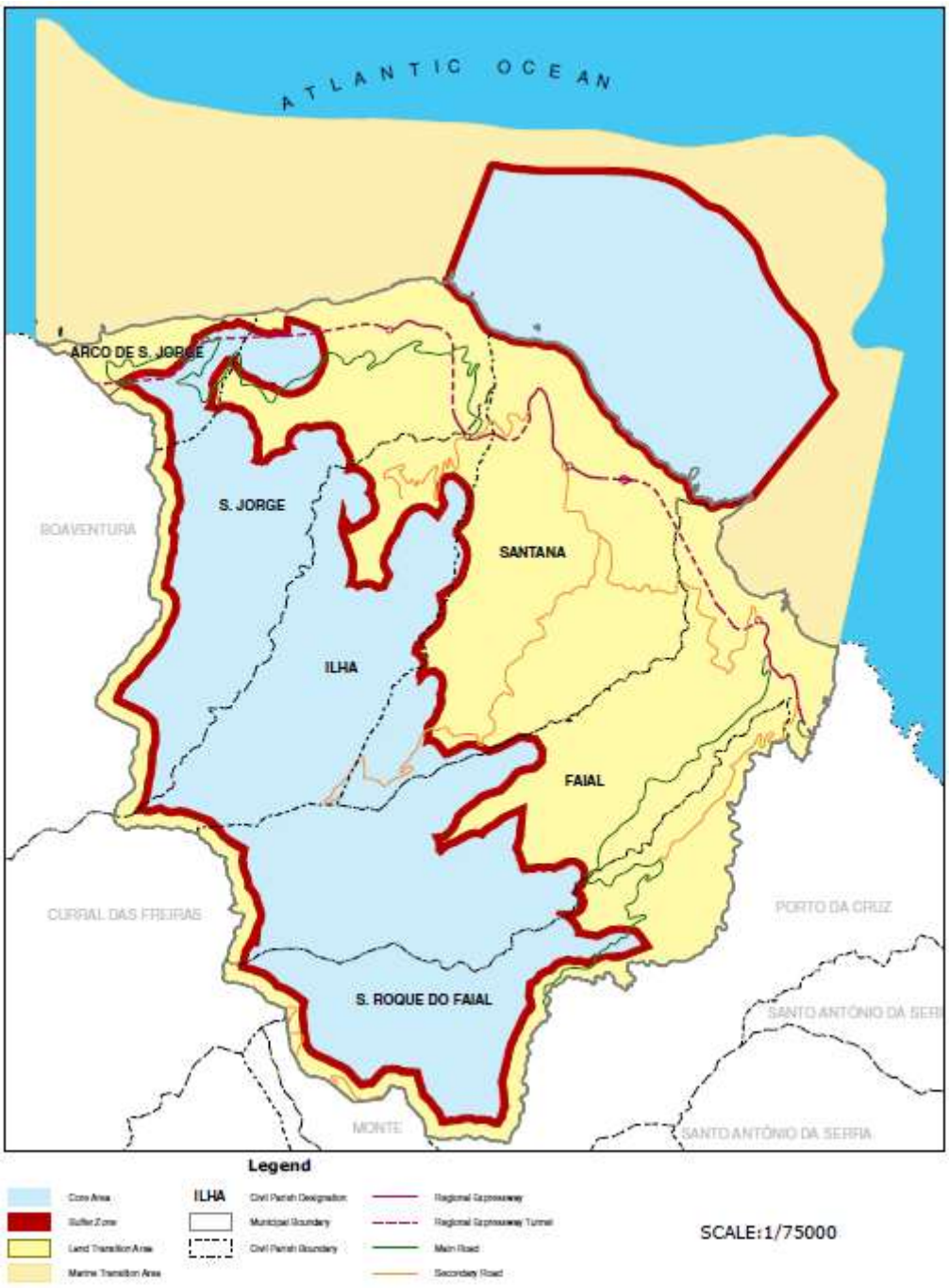

Figure 73. Santana Biosphere Reserve zonation

19.2. LIST OF LEGAL DOCUMENTS

19.2.1. Regional diplomas

Fisheries

(1993) Decreto Regulamentar Regional n.º 14/93/A, de 31 de Julho - Zona de Reserva Integral de Apanha de Lapas

(1995) Decreto Legislativo Regional n.º 11/95/M - *Regula o exercício da caça submarina na Região Autónoma da Madeira*

(2004) Portaria n.º 124/2004 **-** Define as normas para a atribuição das compensações pelos custos suplementares gerados pela ultraperifecidade em relação ao escoamento de tunídeos (*Thunnus obesus, Katsuwonus pelamis, Thunnus alalunga, Thunnus thynnus e Thunnus albacares*) do peixe-espada preto (*Aphanopus carbo*) e dos produtos aquícolas (*Sparus aurata, Pagrus pagrus e Pagellus bogaraveo*).

(2004) Portaria n.º 183/2004 **–** Altera a Portaria n.º 124/2004 Relativa às normas para a atribuição das compensações pelos custos suplementares gerados pela ultraperifecidade em relação ao escoamento de tunídeos (*Thunnus obesus, Katsuwonus pelamis, Thunnus alalunga, Thunnus thynnus e Thunnus albacares*) do peixe-espada preto (*Aphanopus carbo*) e dos produtos aquícolas (*Sparus aurata, Pagrus pagrus e Pagellus bogaraveo*).

Environmental conservation

(2006) Decreto Legislativo Regional n.º 5/2006/M, de 2 de Março - Adapta à Região Autónoma da Madeira o Decreto-Lei n.º 140/99, de 24 de Abril, alterado pelo Decreto-Lei n.º 49/2005, de 24 de Fevereiro, que procedeu à transposição para o ordenamento jurídico português, da Directiva n.º 79/409/CEE, do Conselho, de 2 de Abril, relativa à conservação das aves selvagens (directiva aves), na redacção que lhe foi dada pelas Directivas nºs 85/411/CEE, da Comissão, de 25 de Junho, 91/244/CEE, da Comissão, de 6 de Março, 94/24/CE, do Conselho, de 8 de Junho, e 97/49/CE, da Comissão, de 29 de Julho, e 92/43/CEE, do Conselho, de 21 de Maio, relativa à preservação dos habitats naturais e da fauna e da flora selvagens (directiva habitats), na redacção que lhe foi dada pela Directiva n.º 97/62/CE, do Conselho, de 27 de Outubro

Land management planning

(1982) Decreto Legislativo Regional n.º 14/82/M, de 10 de Novembro. – Cria o Parque Natural da Madeira,

(1995) Decreto Legislativo Regional n.º 12/95/M, de 24 de Junho - Plano de Ordenamento do Território na Região Autónoma da Madeira (POTRAM)alterado pelo Decreto Legislativo Regional n.º 9/97/M, de 18 de Julho

(1997) Decreto Legislativo Regional n.º 11/97/M, de 30 de Junho – Cria a Reserva Natural do Sítio da Rocha do Navio

(1997) Resolução do Conselho de Governo nº 1149/97 - Plano Regional da Política do Ambiente (PRPA)

(1998) Decreto Legislativo Regional n.º 18/98/M - Estabelece medidas de prevenção contra incêndios florestais

(2002) Decreto Legislativo Regional n.º 17/2002/M, de 29 de Agosto - Plano de Ordenamento Turístico da Região Autónoma da Madeira (POT)

(2002) Resolução do Conselho do Governo n.º1468/2002, de 2 de Dezembro - Plano de Política Energética da Região Autónoma da Madeira

(2004) Resolução do Governo Regional da Madeira n.º 1/2004/M, de 26 de Março – Ratificação do Plano Director Municipal (PDM) de Santana

(2004) Decreto Legislativo Regional n.º 24/2004/M, de 20 de Agosto – Estabelece o regime de conservação do Património Geológico

(2006) Resolução da Assembleia Legislativa da Região Autónoma da Madeira n.º 10/2006/M, de 30 de Maio - Plano de Desenvolvimento Económico e Social da Região Autónoma da Madeira (PDES) 2007-2013

(2008) Decreto Legislativo Regional n.º 35/2008/M – Estabelece o regime de protecção dos recursos naturais e florestais e revoga os Decretos Legislativos Regionais n.ºs 7/88/M, de 6 de Junho, e 21/88/M, de 1 de Setembro, que estabelecem o regime silvopastoril e regulam a protecção dos recursos florestais, respectivamente.

(2008) Decreto Legislativo Regional n.º 43/2008/M – estabelece o regime jurídico dos instrumentos de gestão territorial (RJIGT)

19.2.2. National Diplomas

Fisheries

(1987) Decreto Regulamentar n.º 43/87 de 17 de Julho – Define as medidas nacionais de conservação dos recursos biológicos aplicáveis ao exercício da pesca em águas, quer oceânicas, quer interiores, sob soberania e jurisdição portuguesas.

(1987) Decreto-lei n.º 278/87 de 7 de Julho – Fixa o quadro legal regulamentador do exercício da pesca e das culturas marinhas em águas sob soberania e jurisdição portuguesas.

(1998) Decreto-Lei n.º 383/98 de 27 de Novembro – Altera o Decreto-Lei n.º 278/87, de 7 de Julho, sobre contra-ordenações em matéria de pescas e culturas marinhas.

(2000) Decreto Regulamentar n.º 7/2000 de 30 de Maio – Altera o Decreto Regulamentar n.º 43/87, de 17 de Julho, estabelecendo as medidas nacionais dos recursos vivos aplicáveis ao exercício da pesca em águas sob soberania e jurisdição nacional.

(2000) Decreto-Lei n.º 246/2000 de 29 de Setembro – Define o quadro legal do exercício da pesca marítima dirigida a espécies animais e vegetais com fins lúdicos.

(2000) Portaria n.º 1102-B/2000 de 22 de Novembro – Aprova o Regulamento da Apanha.

(2000) Portaria n.º 1102-H/2000 de 22 de Novembro – Aprova o Regulamento da Pesca por Arte de Emalhar.

(2001) Portaria n.º 386/2001 de 14 de Abril - Altera a Portaria n.º 1102-H/2000, de 22 de Novembro (aprova o Regulamento da Pesca por Arte de Emalhar).

(2001) Portaria Nacional n.º 27/2001 de 15 de Janeiro – Fixa os tamanhos mínimos dos peixes, crustáceos e moluscos, de acordo com o previsto no artigo 48.º do Decreto Regulamentar n.º 43/87, de 17 de Julho, na redacção dada pelo Decreto Regulamentar n.º 7/2000, de 30 de Maio.

(2002) Portaria nº 402/2002 de 18 de Abril – Altera o anexo à Portaria n.º 27/2001, de 15 de Janeiro, no que se refere aos tamanhos mínimos para a solha avessa, a corvina legítima e a lagosta.

(2008) Lei nº 7/2008, de 15 de Fevereiro – Estabelece as bases do ordenamento e da gestão sustentável dos recursos aquícolas das águas interiores e define os princípios reguladores das actividades da pesca e da aquicultura nessas águas.

Environmental conservation

(1980) Decreto n.º 103/80 de 11 de Outubro – Aprova para ratificação a Convenção sobre a Conservação das Espécies Migradoras Pertencentes à Fauna Selvagem (Convenção de Bona).

(1993) Decreto-Lei n.º 19/93 de 23 de Janeiro – Estabelece normas relativas à Rede Nacional de Áreas Protegidas.

(1999) Decreto-lei n.º 140/99 de 24 de Abril – Revê a transposição para a ordem jurídica interna da Directiva n.º 79/409/CEE, do Conselho, de 2 de Abril (relativa à conservação das aves selvagens), e da Directiva n.º 92/43/CEE, do Conselho, de 21 de Maio (relativa à preservação dos habitats naturais e da fauna e da flora selvagens).

(1989) Decreto-lei n.º 316/89 de 22 de Setembro – Regulamenta a aplicação da convenção da vida selvagem e dos habitats naturais na Europa (Convenção de Berna).

(1990) Decreto-Lei n.º 114/90 de 5 de Abril – Promove a aplicação da Convenção sobre o Comércio Internacional nas Espécies da Fauna e Flora Selvagens Ameaçadas de Extinção (CITES).

(2005) Decreto-Lei n.º 49/2005 de 24 de Fevereiro - Primeira alteração ao Decreto- Lei n.o 140/99, de 24 de Abril, relativa à conservação das aves selvagens (Directiva Aves) e à preservação dos habitats naturais e da fauna e da flora selvagens (Directiva Habitats).

Land management planning

(1977) Lei n.º 33/77 de 28 de Maio – Fixa a largura e os limites do mar territorial e estabelece uma zona económica de 200 milhas do Estado Português.
(1978) Decreto-Lei n.º 119/78 de 1 de Junho – Define "Zona Económica Exclusiva" e fixa os seus limites.

(1979) Lei n.º 173/99 de 21 de Setembro – Lei de Bases Gerais da Caça.

(2002) Decreto-Lei n.º 202/2004 de 18 de Agosto – Estabelece o regime jurídico da conservação, fomento e exploração dos recursos cinegéticos, com vista à sua gestão sustentável, bem como os princípios reguladores da actividade cinegética.

(2007) Decreto-Lei n.º 16/2007 de 22 de Janeiro – Estabelece o regime jurídico aplicável ao mergulho amador.

19.2.3. European Diplomas

Fisheries

(1998) Regulamento (CE) n.º 850/98 do Conselho de 30 de Março de 1998 – Conservação dos recursos da pesca através de determinadas medidas técnicas de protecção dos juvenis de organismos marinhos.

(2003) Regulamento (CE) n.° 2328/2003 - Estabelece o regime de compensação dos custos suplementares em relação ao escoamento de determinados produtos da pesca dos Açores, Madeira, ilhas Canárias e dos departamentos franceses da Guiana e Reunião

Environmental conservation

(1979) Directiva n.º 79/409/CEE do Conselho, de 2 de Abril – Relativa à conservação das aves selvagens (Directiva Aves).

(1991) Directiva n.º 91/244/CEE da Comissão, de 6 de Março – Altera a Directiva 79/409/ CEE do Conselho, relativa a conservação das aves selvagens (Directiva Aves).

(1991) Directiva n.º 91/676/CEE do Conselho, de 12 de Dezembro - Relativa à protecção das águas contra a poluição causada por nitratos de origem agrícola.

(1992) Directiva n.º 92/43/CEE do Conselho, de 21 de Maio – Relativa à preservação dos habitats naturais e da fauna e da flora selvagens (Directiva Habitats).

(1994) Directiva 94/24/CE do Conselho, de 8 de Junho - Altera o anexo II da Directiva 79/409/CEE, relativa à conservação das aves selvagens (Directiva Aves).

(1997) Directiva 97/62/CE do Conselho, de 27 de Outubro – Relativa à adaptação ao progresso científico e técnico da Directiva 92/43/CEE relativa à preservação dos habitats naturais e da fauna e da flora selvagens (Directiva Habitats).

(1997) Directiva n.º 97/49/CE da Comissão, de 29 de Junho – Altera a Directiva 79/409/ CEE do Conselho, relativa a conservação das aves selvagens (Directiva Aves).

(2002) Decisão da Comissão 2002/11/CE de 28 de Dezembro – Adopta a lista dos Sítios de Importância Comunitária para a região biogeográfica macaronésica, nos termos da Directiva 92/43/CEE do Conselho.

19.3. SPECIES LIST

NOTE: The endemic species are listed in bold and the Macaronesian endemic species are listed underlined.

19.3.1. Chromista

19.3.1.1. Oomycota – 8 species

Albugo bliti
Albugo candida
Albugo portulacae
Albugo tragopogonis
Peronospora arborescens
Peronospora rumicis
Plasmopara viticola
Phytophthora infestans

19.3.2. Fungi

19.3.2.1. Glomeromycota – 2 species

Glomus fasciculatus
Glomus microcarpum

19.3.2.2. Zygomycota – 4 species

Endogone flammicorona
Choanephora cucurbitarum
Rhizopus stolonifer
Pilobolus crystallinus

19.3.2.3. Ascomycota – 1000 species

Abrothallus cetrariae
Abrothallus parmeliarum
Abrothallus parmotrematis
Abrothallus usneae
Acarospora cervina
Acarospora sulphurata
Micarea peliocarpa
Micarea prasina
Micarea synotheoides
Microsphaera alphitoides
Microsphaera platani
Microstoma album

Acarospora umbilicata
Acroconidiella tropaeoli
Acrocordia gemmata
Acrocordia macrospora
Acrostalagmus luteoalbus
Agonimia tristicula
Alectoria sarmentosa
Aleuria aurantia
Amerosporium madeirense
Amerosporium solani
Ampelomyces quisqualis
Amygdalaria pelobotryon
Anaptychia bryorum
Anaptychia ciliaris
Anaptychia crinalis
Annulohypoxylon stygium
Anomalographis madeirensis
Anthostomella maderensis
Anthracobia macrocystis
Anthracobia nitida
Apiognomonia veneta
Apiospora montagnei
Arachnopeziza aranea
Arachnopeziza obtusipila
Arthonia anglica
Arthonia anombrophila
Arthonia cinnabarina
Arthonia dispersa
Arthonia fuscopurpurea
Arthonia gelidae
Arthonia ilicina
Arthonia lapidicola
Arthonia muscigena
Arthonia pelvetii
Arthonia radiata
Arthonia ruderalis
Arthonia stictaria
Arthopyrenia antecellens
Moellerodiscus iodotingens iodotingens
Moelleropsis nebulosa
Mollisia dextrinospora
Mollisia fallens
Mollisia trabincola
Muellerella hospitans
Muellerella polyspora
Muellerella pygmaea
Mycobilimbia lurida
Mycoblastus alpinus
Mycoblastus sanguinarius
Mycosphaerella agapanthi
Mycosphaerella canariensis
Mycosphaerella cerasella
Mycosphaerella didymelloides
Mycosphaerella maderensis
Mycosphaerella mougeotiana
Mycosphaerella phyllitis
Mycosphaerella punctiformis
Mycosphaerella vacciniicola
Mycothyridium nobile
Myriotrema sordidescens
Myrothecium roridum
Nectria cinnabarina
Nectria lecanodes
Nemania diffusa
Neofuscelia delisei
Neofuscelia loxodes
Neofuscelia pulla
Neottiella aphanodictyon
Nephroma areolatum
Nephroma foliolatum
Nephroma helveticum
Nephroma laevigatum
Nephroma parile
Nephroma resupinatum
Nephroma tangeriense
Nesolechia oxyspora

Arthopyrenia cinereopruinosa
Arthothelium lirellans
Arthothelium norvegicum
Arthothelium reagens
Arthrinium phaeospermum
Arthrinium sporophleum
Arthrorhaphis citrinella
Ascobolus immersus
Ascobolus lignatilis
Ascochytella maderensis
Ascocoryne cylichnium
Aspergillus candidus
Aspergillus glaucus
Aspicilia caesiocinerea
Aspicilia cinerea
Aspicilia gibbosa
Aulographina pinorum
Bacidia absistens
Bacidia albonigrans
Bacidia arceutina
Bacidia auerswaldii
Bacidia endoleucoides
Bacidia fritzei
Bacidia incompta
Bacidia laurocerasi
Bacidia subincompta
Bacidina apiahica
Bactrospora carneopallida
Bactrospora homalotropa
Bactrospora patellarioides
Baeomyces rufus
Bapalmuia kakouettae
Beauveria felina
Bellemerea alpina
Biatora hertelii
Biatora turgidula
Biatorella microhaema
Biatorella ochrophora
Normandina pulchella
Ochrolechia androgyna
Ochrolechia maderensis
Ochrolechia pallescens
Ochrolechia parella
Ochrolechia szatalaensis
Ochrolechia tartarea
Ochrolechia upsaliensis
Octospora humosa
Oidium ceratoniae
Opegrapha atra
Opegrapha calcarea
Opegrapha circumducta
Opegrapha endoleuca
Opegrapha farinosa
Opegrapha glaucomaria
Opegrapha gyrocarpa
Opegrapha lithyrga
Opegrapha lutulenta
Opegrapha niveoatra
Opegrapha ochrocheila
Opegrapha prosodea
Opegrapha rufescens
Opegrapha rupestris
Opegrapha subelevata
Opegrapha thelotrematis
Opegrapha varia
Opegrapha vulgata
Orbilia epipora
Orbilia luteorubella
Ovularia sphaeroidea
Pachyella babingtonii
Pannaria conoplea
Pannaria rubiginosa
Pannaria tavaresii
Parmelia cetrata
Parmelia omphalodes
Parmelia saxatilis

Bispora antennata
Bisporella citrina
Blarneya hibernica
Blumeria graminis
Botrytis aeruginosa
Botrytis cinerea
Bryonora curvescens
Bryophagus gloeocapsa
Bryoria bicolor
Bryoria capillaris
Bryoria furcellata
Bryoria fuscescens
Bryoria lanestris
Buellia badia
Buellia disciformis
Buellia griseovirens
Buellia hypophana
Buellia italica
Buellia lindingeri
Buellia punctata
Buellia regularis
Buellia spuria
Buellia stellulata
Byssoloma croceum
Byssoloma diederichii
Byssoloma kalbii
Byssoloma leucoblepharum
Byssoloma leucocheiloides
Byssoloma llimonae
Byssoloma marginatum
Byssoloma rotuliforme
Byssoloma seroexspectata
Byssoloma subdiscordans
Caldariomyces fumago
Calicium abietinum
Calicium lenticulare
Calicium trabinellum
Caloplaca aegatica
Parmelia sinuosa
Parmelia sulcata
Parmeliella miradorensis
Parmeliella parvula
Parmeliella testacea
Parmeliella triptophylla
Parmelina carporrhizans
Parmelina quercina
Parmelina tiliacea
Parmelinopsis horrescens
Parmelinopsis minarum
Parmotrema arnoldii
Parmotrema chinense
Parmotrema crinitum
Parmotrema grayanum
Parmotrema perforatum
Parmotrema reticulatum
Parmotrema robustum
Parmotrema stuppeum
Parmotrema tinctorum
Patellea gregaria
Patellina amoena
Peltigera canina
Peltigera degenii
Peltigera didactyla
Peltigera horizontalis
Peltigera hymenina
Peltigera membranacea
Peltigera polydactylon
Peltigera praetextata
Peltigera rufescens
Peltula euploca
Peltula placodizans
Penicillium glaucum
Penicillium griseum
Perigrapha superveniens
Pertusaria amara
Pertusaria caesioalba

Caloplaca carphinea
Caloplaca chrysodeta
Caloplaca citrina
Caloplaca congrediens
Caloplaca conversa
Caloplaca crenularia
Caloplaca ferruginea
Caloplaca gomerana
Caloplaca holocarpa
Caloplaca irrubescens
Caloplaca marina
Caloplaca obliterans
Caloplaca phlogina
Caloplaca pyracea
Caloplaca sarcopidoides
Caloplaca saxicola
Caloplaca saxicola subsp. obliterata
Caloplaca scoriophila
Candelariella vitellina
Canoparmelia crozalsiana
Capnodium citri
Capnodium mangiferum
Capronia leptogii
Capronia normandinae
Carbonea distans
Carbonea vitellinaria
Catapyrenium cinereum
Catillaria atomarioides
Catillaria nigroclavata
Catillaria subfraudulenta
Catinaria atropurpurea
Catinaria leucoplaca
Cecidonia umbonella
Ceratostomella maderensis
Cercospora latens
Cetraria aculeata
Cetraria muricata
Cetraria sepincola
Pertusaria coccodes
Pertusaria corallina
Pertusaria heerii
Pertusaria hemisphaerica
Pertusaria heterochroa
Pertusaria hymenea
Pertusaria leioplaca
Pertusaria maximiliana
Pertusaria multipuncta
Pertusaria ophthalmiza
Pertusaria pluripuncta
Pertusaria pustulata
Pertusaria rupestris
Pertusaria teneriffensis
Pertusaria velata
Pestalotiopsis funerea
Pezicula cinnamomea
Pezicula rubi
Peziza arvernensis
Peziza badia
Peziza cerea
Peziza micropus
Peziza praetervisa
Peziza sepiatra
Peziza vesiculosa
Pezoloma iodopedis
Phacidium maderense
Phaeocalicium tibellii
Phaeographis dendritica
Phaeographis lyellii
Phaeographis smithii
Phaeophyscia cernohorskyi
Phaeophyscia chloantha
Phaeophyscia ciliata
Phaeophyscia endococcinea
Phaeophyscia endococcinodes
Phaeophyscia hispidula
Phaeophyscia orbicularis

Chaenotheca brunneola
Chaenotheca furfuracea
Chaenotheca gracilenta
Chaetomella circinata
Chaetomella flavoviridis
Chaetomella helicotricha
Chaetomella longiseta
Chaetomella madeirensis
Chaetomella ochracea
Chaetomella sacchari
Chaetomella viridescens
Chaetomella viridiolivacea
Cheilymenia fimicola
Cheilymenia stercorea
Cheilymenia striata
Chloridium atrum
Chromosporium viridescens
Chrysothrix candelaris
Chrysothrix chlorina
Chrysothrix chrysophthalma
Ciborinia hirsuta
Cladonia arbuscula
Cladonia bellidiflora
Cladonia caespiticia
Cladonia cariosa
Cladonia chlorophaea
Cladonia convoluta
Cladonia cornuta
Cladonia crispata
Cladonia decorticata
Cladonia deformis
Cladonia digitata
Cladonia fallax
Cladonia fimbriata
Cladonia firma
Cladonia foliacea
Cladonia furcata
Cladonia gracilis
Phaeophyscia pusilloides
Phaeopyxis punctum
Phlyctis agelaea
Phlyctis argena
Phoma batatas
Phoma caricae-papayae
Phoma hedericola
Phyllachora cynodontis
Phyllachora eucalypti
Phyllachora graminis
Phyllachora heimii
Phyllosticta azevinhi
Phyllosticta concentrica
Phyllosticta nuptialis
Physcia adscendens
Physcia aipolia
Physcia albinea
Physcia biziana
Physcia caesia
Physcia clementei
Physcia dimidiata
Physcia leptalea
Physcia lithotodes
Physcia stellaris
Physcia tribacia
Physcia tribacioides
Physconia distorta
Physconia muscigena
Physconia subpulverulenta
Physconia venusta
Pilidium acerinum
Placopsis gelida
Placopsis parellina
Platismatia glauca
Plectania kohniae
Plectania melastoma
Plectania rhytidia
Plectocarpon macaronesiae

Cladonia macaronesica
Cladonia macilenta
Cladonia macrophyllodes
Cladonia mediterranea
Cladonia nana
Cladonia ochrochlora
Cladonia pertricosa
Cladonia pocillum
Cladonia polydactyla
Cladonia portentosa
Cladonia rangiferina
Cladonia squamosa
Cladonia stereoclada
Cladonia subcervicornis
Cladonia subulata
Cladonia tenuis
Cladonia uncialis
Cladosporium herbarum
Clasterosporium hydrangeae
Claussenomyces clavatus
Claussenomyces dacrymycetoideus
Cliostomum flavidulum
Cliostomum griffithii
Coccocarpia erythroxyli
Coccomyces delta
Coleroa circinans
Coleroa robertiani
Collema crispum
Collema cristatum
Collema furfuraceum
Collema nigrescens
Collema rugosum
Collema ryssoleum
Collema subflaccidum
Collema subnigrescens
Collema tenax
Colletotrichum dematium
Coniochaeta pulveracea
Plectocarpon scrobiculatae
Pleospora herbarum
Plicaria endocarpoides
Podosphaera euphorbiae
Podosphaera pannosa
Podospora curvula
Polychidium dendriscum
Polychidium muscicola
Polycoccum pulvinatum
Polydesmia fructicola
Polydesmia pruinosa
Porina atlantica
Porina borreri
Porina chlorotica
Porina effilata
Porina hoehneliana
Porina isidiata
Porina leptosperma
Porina mastoidea
Porina rosei
Porina semecarpi
Porpidia albocaerulescens
Porpidia flavicunda
Porpidia glaucophaea
Porpidia macrocarpa
Porpidia speirea
Porpidia tuberculosa
Proliferodiscus pulveraceus
Pronectria pertusariicola
Protopannaria pezizoides
Protoparmelia badia
Pseudephebe pubescens
Pseudevernia furfuracea
Pseudocyphellaria aurata
Pseudocyphellaria crocata
Pseudocyphellaria intricata
Pseudocyphellaria lacerata
Pseudocyphellaria mougeotiana

Coniosporium bambusae
Coniosporium inquinans
Coniothyrium maderense
Coprotus breviascus
Coprotus duplus
Coryne atrovirens
Cresponea premnea
Cryphonectria gyrosa
Cryptolechia carneolutea
Cyclaneusma niveum
Cymadothea trifolii
Cystocoleus ebeneus
Cytodiscula carnea
Cytospora nobilis
Dactylospora imperfecta
Daldinia concentrica
Degelia atlantica
Degelia ligulata
Degelia plumbea
Dematium nigrum
Dendrodochium roseum
Dermatocarpon luridum
Dermatocarpon miniatum
Dermatocarpon trapeziforme
Diaporthe eres
Diatrype stigma
Diatrypella quercina
Didymella lycopersici
Didymella maderensis
Dimerella lutea
Dimerella luteola
Dimerella pineti
Diplodia scoparii
Diploicia canescens
Diploicia subcanescens
Diploschistes actinostomus
Diploschistes caesioplumbeus
Diploschistes diacapsis
Pseudocyphellaria norvegica
Psilolechia lucida
Psora decipiens
Psoroma hypnorum
Punctelia reddenda
Punctelia stictica
Punctelia subrudecta
Pyrenidium actinellum
Pyrenidium hyalosporum
Pyrenula acutispora
Pyrenula dermatodes
Pyrenula harrisii
Pyrenula laevigata
Pyrenula macrospora
Pyrenula nitida
Pyronema omphalodes
Pyrrhospora lusitanica
Pyxine cocoes
Pyxine sorediata
Pyxine subcinerea
Ramalina arabum
Ramalina bourgeana
Ramalina calicaris
Ramalina chondrina
Ramalina complanata
Ramalina confertula
Ramalina crispatula
Ramalina cuspidata
Ramalina decipiens
Ramalina dilacerata
Ramalina farinacea
Ramalina fastigiata
Ramalina fraxinea
Ramalina lacera
Ramalina maciformis
Ramalina maderensis
Ramalina pollinaria
Ramalina polymorpha

Diploschistes gypsaceus
Diploschistes scruposus
Diplotomma alboatrum
Dirina insulana
Dirinaria applanata
Discosia artocreas
Discosia ceratoniae
Discosia vagans
Endocarpon pusillum
Endococcus rugulosus
Enterographa crassa
Enterographa elaborata
Enterographa hutchinsiae
Enterographa zonata
Erysiphe cichoracearum
Erysiphe necator
Euopsis granatina
Eurotium herbariorum
Eutypa flavovirens
Eutypella annonae
Evernia prunastri
Fellhanera bouteillei
Fellhanera christiansenii
Fellhaneropsis myrtillicola
Fellhaneropsis vezdae
Fimaria theioleuca
Fissurina quadrispora
Fissurina triticea
Flavoparmelia caperata
Fusarium diplosporum
Fuscopannaria leucophaea
Fuscopannaria leucosticta
Fuscopannaria mediterranea
Fuscopannaria olivacea
Fuscopannaria praetermissa
Geocoryne variispora
Gibbera salisburgensis
Gloeoglossum glutinosum
Ramalina portuensis
Ramalina pusilla
Ramalina requienii
Ramalina scopulorum
Ramalina siliquosa
Ramalina subdecipiens
Ramalina subfarinacea
Ramalina subgeniculata
Ramalina subpusilla
Ramalina webbii
Ramsbottomia asperior
Ramularia circumfusa
Ramularia filaris
Ramularia plantaginea
Ramularia thrinciae
Rhizina undulata
Rhizocarpon geographicum
Rhizocarpon inimicum
Rhizocarpon intermediellum
Rhizocarpon lavatum
Rhizocarpon lusitanicum
Rhizocarpon ochrolechiae
Rhizocarpon petraeum
Rhizocarpon tinei
Rhizocarpon viridiatrum
Rhymbocarpus fuscoatrae
Rhymbocarpus neglectus
Rimelia cetrata
Rimularia insularis
Rinodina alba
Rinodina albana
Rinodina beccariana
Rinodina biloculata
Rinodina canariensis
Rinodina ericina
Rinodina exigua
Rinodina gennarii
Rinodina intermedia

Glomerella cingulata
Gloniella adianti
Gloniopsis biformis
Glonium abbreviatum
Glonium microsporum
Gnomonia australis
Golovinomyces cichoracearum
Graphina anguina
Graphis elegans
Graphis lineola
Graphis scripta
Gyalecta jenensis
Gyalecta schisticola
Gyalectidium colchicum
Gyalectidium filicinum
Gyalidea madeirensis
Gyalideopsis anastomosans
Gyromitra infula
Haematomma leprarioides
Haematomma ochroleucum
Haematomma sorediatum
Helvella lacunosa
Helvella leucomelaena
Herteliana taylorii
Heterodermia albicans
Heterodermia isidiophora
Heterodermia japonica
Heterodermia leucomelos
Heterodermia obscurata
Heterodermia pseudospeciosa
Heterodermia spathulifera
Heterodermia speciosa
Heterodermia squamulosa
Homostegia piggotii
Hyalotia viridis
Hymenelia lacustris
Hyperphyscia adglutinata
Hypoderma agapanthi
Rinodina madeirensis
Rinodina oxydata
Rinodina roboris
Rinodina sophodes
Rinodina trachytica
Roccella allorgei
Roccella canariensis
Roccella fuciformis
Roccella hypomecha
Roccella linearis
Roccella maderensis
Roccella phycopsis
Roccella tinctoria
Roccella tuberculata
Roccella vicentina
Rosellinia callosa
Rosellinia obtusispora
Roselliniella nephromatis
Saccobolus depauperatus
Sarcoscypha aronesica
Schismatomma decolorans
Schismatomma graphidioides
Schismatomma pitardii
Schismatomma umbrinum
Sclerococcum sphaerale
Sclerococcum tephromelarum
Sclerotinia sclerotiorum
Scoliciosporum pruinosum
Scoliciosporum umbrinum
Scutellinia scutellata
Scutellinia setosa
Scutellinia vitreola
Scutula miliaris
Scutula stereocaulorum
Septonema atrum
Septonema bisporioides
Septonema toruloideum
Septoria bromi

Hypogymnia maderensis
Hypogymnia physodes
Hypogymnia tavaresii
Hypogymnia tubulosa
Hypogymnia vittata
Hypomyces chrysospermus
Hypomyces lateritius
Hypotrachyna endochlora
Hypotrachyna laevigata
Hypotrachyna rachista
Hypotrachyna revoluta
Hypotrachyna rockii
Hypotrachyna sinuosa
Hypotrachyna taylorensis
Hypoxylon fuscum
Hypoxylon rubiginosum
Hysterium alneum
Hysterium angustatum
Hysterium pulicare
Karschia agapanthi
Kretzschmaria deusta
Lachnum microsporum
Lachnum virgineum
Lanzia echinophila
Lasallia pustulata
Lasiobolus cuniculi
Lasiobolus intermedius
Lasiodiplodia theobromae
Lecanactis abietina
Lecanactis subabietina
Lecania cyrtella
Lecania turicensis
Lecanidion atratum
Lecanographa dialeuca
Lecanographa farinosa
Lecanographa grumulosa
Lecanora albella
Lecanora albescens
Septoria cerastii
Septoria chelidonii
Septoria gerberae
Septoria petroselini
Septoria poliomela
Septoria smilacina
Septoria stellariae
Skyttea elachistophora
Skyttea tephromelarum
Solenopsora holophaea
Solenopsora vulturiensis
Solorina saccata
Sphaerellothecium
Sphaerophorus globosus
Sphaerotheca castagnei
Sphaerotheca fuliginea
Sphaerulina rehmiana
Sphinctrina anglica
Sphinctrina tubiformis
Sphinctrina turbinata
Spilonema paradoxum
Squamarina cartilaginea
Squamarina lentigera
Squamarina oleosa
Stachybotrys alternans
Stemphylium vinosum
Stenocybe nitida
Stereocaulon azoreum
Stereocaulon delisei
Stereocaulon evolutum
Stereocaulon paschale
Stereocaulon vesuvianum
Sticta canariensis
Sticta dichotomoides
Sticta dufourii
Sticta fuliginosa
Sticta limbata
Sticta sinuosa

Lecanora allophana
Lecanora basaltigena
Lecanora bolcana
Lecanora caesiorubella
Lecanora campestris
Lecanora cancriformis
Lecanora charodes
Lecanora chlarotera
Lecanora chlaroterodes
Lecanora circumborealis
Lecanora confusa
Lecanora conizaeoides
Lecanora dispersa
Lecanora epibryon
Lecanora expallens
Lecanora gangaleoides
Lecanora glabrata
Lecanora hartungii
Lecanora intricata
Lecanora intumescens
Lecanora jamesii
Lecanora leprosa
Lecanora lisbonensis
Lecanora muralis
Lecanora polytropa
Lecanora populicola
Lecanora pulicaris
Lecanora rupicola
Lecanora rupicola sulphurata
Lecanora sambuci
Lecanora schistina
Lecanora strobilina
Lecanora subcarnea
Lecanora subfusca
Lecanora sulphurata
Lecanora sulphurella
Lecanora sylvestris
Lecidea carrollii
Sticta sylvatica
Stilbella fimetaria
Strigula angustata
Strigula fossulicoloides
Strigula macaronesica
Strigula minor
Strigula nitidula
Strigula tagananae
Syncesia myrticola
Tapellaria similis
Teloschistes chrysophthalmus
Teloschistes flavicans
Tephromela atra
Thecotheus holmskioldii
Thelopsis isiaca
Thelopsis rubella
Thelotrema lepadinum
Thelotrema monosporum
Thelotrema petractoides
Thelotrema subtile
Toninia albilabra
Toninia aromatica
Toninia cinereovirens
Toninia massata
Toninia mesoidea
Toninia sedifolia
Toninia squalida
Toninia thiopsora
Toninia toepfferi
Toninia tristis
Torula herbarum
Trapelia coarctata
Trapelia corticola
Trapelia obtegens
Trapeliopsis pseudogranulosa
Trapeliopsis wallrothii
Tremolecia atrata
Trichobolus zukalii

Lecidea fuscoatra
Lecidea lapicida
Lecidea lithophila
Lecidea ocelliformis
Lecidella asema
Lecidella elaeochroma
Lecidella elaeochromoides
Lecidella euphorea
Lecidella stigmatea
Lepraria crassissima
Lepraria incana
Lepraria neglecta
Leprocaulon microscopicum
Leproloma membranaceum
Leptogium azureum
Leptogium brebissonii
Leptogium burgessii
Leptogium chloromelum
Leptogium cochleatum
Leptogium coralloideum
Leptogium corniculatum
Leptogium cyanescens
Leptogium furfuraceum
Leptogium gelatinosum
Leptogium hibernicum
Leptogium laceroides
Leptogium lichenoides
Leptogium resupinans
Leptosphaeria maderensis
Leptosphaerulina trifolii
Leptotrochila prunellae
Leptotrochila ranunculi
Leptotrochila repanda
Leptotrochila verrucosa
Lethariella canariensis
Leveillula taurica
Lichenodiplis lecanorae
Lichenodiplis lichenicola
Trichoglossum hirsutum
Trichophaea gregaria
Trichophaea variornata
Trichophaea woolhopeia
Trichothecium roseum
Trullula olivascens
Tuber puberulum
Tuckermanopsis chlorophylla
Umbilicaria crustulosa
Umbilicaria hirsuta
Umbilicaria spodochroa
Urnula torrendii
Usnea articulata
Usnea barbata
Usnea ceratina
Usnea cinchonae
Usnea cornuta
Usnea dasypoga
Usnea decora
Usnea diffracta
Usnea erecta
Usnea filipendula
Usnea flammea
Usnea florida
Usnea fragilescens
Usnea fulvoreagens
Usnea glabrata
Usnea glabrescens
Usnea hesperina
Usnea hirta
Usnea implicita
Usnea jamaicensis
Usnea japonica
Usnea lapponica
Usnea leucina
Usnea madeirensis
Usnea plicata
Usnea rubicunda

Lichenopeltella peltigericola
Lichenosticta alcicornaria
Lichenostigma maureri
Lichina pygmaea
Llimoniella neglecta
Lobaria amplissima
Lobaria immixta
Lobaria meridionalis
Lobaria patinifera
Lobaria pulmonaria
Lobaria scrobiculata
Lobaria sublaevis
Lobaria variegata
Lobaria virens
Lobothallia radiosa
Lophodermium lauri
Lophodermium maculare
Lophodermium pinastri
Loxospora ochrophaeoides
Macentina stigonemoides
Macrophoma flaccida
Malbranchea pulchella
Massalongia carnosa
Megalaria pulverea
Melanelia glabra
Melanelia glabratula
Melanelia olivacea
Melanelia subaurifera
Meliola maculans
Menegazzia physodes
Menegazzia terebrata
Menezesia setulosa
Micarea adnata
Micarea cinerea
Micarea coppinsii
Micarea lignaria
Micarea melaena
Usnea rubrotincta
Usnea scabrata
Usnea subcornuta
Usnea subfloridana
Usnea subscabrosa
Usnea wirthii
Valsa congesta
Valsaria donacina
Vermiculariopsis circinotricha
Verrucaria fuscella
Verrucaria glaucina
Verticillium theobromae
Vezdaea dawsoniae
Vezdaea leprosa
Vibrissea catarhyta
Vibrissea decolorans
Vibrissea filisporia
Vibrissea flavovirens
Vouauxiella lichenicola
Woessia canariensis
Xanthoparmelia conspersa
Xanthoparmelia madeirensis
Xanthoparmelia somloensis
Xanthoparmelia stenophylla
Xanthoparmelia subramigera
Xanthoparmelia tinctina
Xanthoria ectaneoides
Xanthoria elegans
Xanthoria fallax
Xanthoria parietina
Xanthoria resendei
Xylaria comosa
Xylaria cupressiformis
Xylaria hypoxylon
Xylaria mellisii
Xylaria polymorpha

19.3.2.4. Basidiomycota – 453 species

Abortiporus biennis
Agaricus arvensis
Agaricus augustus
Agaricus campestris
Agaricus cupreobrunneus
Agaricus impudicus
Agaricus lanipes
Agaricus nivescens
Agaricus pilatianus
Agaricus silvaticus
Agaricus silvicola
Agrocybe pediades
Agrocybe praecox
Amanita baccata
Amanita ceciliae
Amanita citrina
Amanita eliae
Amanita franchetii
Amanita gemmata
Amanita muscaria
Amanita rubescens
Amanita vaginata
Amphinema byssoides
Antrodia ramentacea
Aphelaria tuberosa
Armillaria gallica
Armillaria mellea
Armillaria obscura
Astraeus hygrometricus
Athelia rolfsii
Auricularia auricula-judae
Biatoropsis usnearum
Bjerkandera adusta
Boletus aereus
Boletus badius
Mycena tintinnabulum
Mycena vitilis
Naohidemyces vaccinii
Omphalina ericetorum
Ossicaulis lignatilis
Panaeolina foenisecii
Panaeolus acuminatus
Panaeolus fimicola
Panaeolus sphinctrinus
Panaeolus subbalteatus
Panellus stipticus
Parasola hemerobia
Parasola plicatilis
Peniophora aluticolor
Peniophora incarnata
Peniophora lycii
Phaeolepiota aurea
Phaeolus schweinitzii
Phallus impudicus
Phellinus contiguus
Phellinus ferruginosus
Phellinus igniarius
Phellinus pini
Phellinus torulosus
Phellinus tuberculosus
Phlebiopsis gigantea
Pholiota alnicola
Pholiota conissans
Pholiota gummosa
Pholiota highlandensis
Pholiota lenta
Phragmidium bulbosum
Phragmidium mucronatum
Phragmidium sanguisorbae
Phragmidium tuberculatum

Boletus chrysenteron
Boletus edulis
Boletus erythropus
Boletus impolitus
Boletus pruinatus
Boletus pulverulentus
Boletus subtomentosus
Botryobasidium aureum
Botryobasidium conspersum
Botryobasidium subcoronatum
Bovista aestivalis
Bovista delicata
Bovista plumbea
Cantharellus cibarius
Cerotelium fici
Chalciporus piperatus
Chroogomphus fulmineus
Clathrus ruber
Clavaria acuta
Clavaria fragilis
Clavulina coralloides
Clavulina rugosa
Clavulinopsis corniculata
Clavulinopsis helvola
Clitocybe agrestis
Clitocybe costata
Clitocybe fragrans
Clitocybe geotropa
Clitocybe gibba
Clitocybe metachroa
Clitocybe nebularis
Clitocybe phaeophthalma
Clitocybe vibecina
Coleosporium tussilaginis
Collybia asterospora
Coltricia perennis
Coniophora arida
Coniophora olivacea
Phragmidium violaceum
Phylloporia ribis
Phyllotopsis nidulans
Piloderma byssinum
Pisolithus arrhizus
Pleurotellus dictyorhizus
Pleurotus dracaenae
Pleurotus limpidus
Pleurotus ostreatus
Pluteolus schmitzii
Pluteus atromarginatus
Pluteus cervinus
Pluteus plautus
Pluteus thomsonii
Porostereum spadiceum
Porpomyces mucidus
Postia caesia
Postia rancida
Psathyrella artemisiae
Psathyrella candolleana
Psathyrella conopilus
Psathyrella gracilis
Psathyrella hydrophora
Psathyrella multipedata
Psathyrella piluliformis
Psathyrella prona
Psathyrella spadiceogrisea
Pseudohydnum gelatinosum
Psilocybe coprophila
Puccinia acetosae
Puccinia addita
Puccinia allii
Puccinia andryalae
Puccinia antirrhini
Puccinia arenariae
Puccinia barkhausiae-rhoeadifoliae
Puccinia brachypodi
Puccinia buxi

Conocybe tenera
Coprinellus ephemerus
Coprinellus micaceus
Coprinopsis cinerea
Coprinus comatus
Coprinus tuberosus
Coriolopsis telfarii
Cortinarius cinnamomeus
Cortinarius sanguineus
Crepidotus applanatus
Crepidotus luteolus
Crepidotus mollis
Crepidotus variabilis
Crucibulum laeve
Cyathus poeppigii
Cyathus striatus
Cyclomyces maderensis
Cylindrobasidium laeve
Cystoderma amianthinum
Cystoderma carcharias
Cystoderma granulosum
Dacrymyces stillatus
Daedalea incana
Dicheirinia maderensis
Entoloma chalybaeum
Entoloma hirtipes
Entoloma lampropus
Entyloma cynosuri
Entyloma dahliae
Fibroporia vaillantii
Flammula angulatispora
Flammulina velutipes
Fomes fomentarius
Frommeëlla duchesneae
Frommeëlla tormentillae
Galerina hypnorum
Galerina laevis
Galerina marginata
Puccinia calcitrapae
Puccinia canariensis
Puccinia chrysanthemi
Puccinia cnici-oleracei
Puccinia coronata
Puccinia crepidicola
Puccinia cynodontis
Puccinia dioicae
Puccinia epilobii
Puccinia frankeniae
Puccinia graminis
Puccinia graminis subsp. graminicola
Puccinia hieracii
Puccinia hordei
Puccinia hyparrheniicola
Puccinia iridis
Puccinia jasmini
Puccinia junci
Puccinia lapsanae
Puccinia magnusiana
Puccinia malvacearum
Puccinia marquesi
Puccinia menthae
Puccinia obscura
Puccinia oxalidis
Puccinia pelargonii-zonalis
Puccinia polygoni-amphibii
Puccinia punctata
Puccinia purpurea
Puccinia recondita
Puccinia rumicis-scutati
Puccinia sorghi
Puccinia stenotaphri
Puccinia striiformis
Puccinia tanaceti
Puccinia vincae
Puccinia violae
Pucciniastrum epilobii

Galerina sideroides
Ganoderma applanatum
Ganoderma australe
Ganoderma barretii
Ganoderma lucidum
Ganoderma resinaceum
Ganoderma silveirae
Geastrum lageniforme
Geastrum minimum
Geastrum saccatum
Gomphidius viscidus
Graphiola phoenicis
Gymnopilus junonius
Gymnopilus penetrans
Gymnopilus picreus
Handkea excipuliformis
Hebeloma crustuliniforme
Hebeloma cylindrosporum
Hebeloma sarcophyllum
Hebeloma sinapizans
Heterobasidion annosum
Hydnangium carneum
Hydnellum caeruleum
Hydnellum concrescens
Hydnellum scrobiculatum
Hydnum barbirussa
Hygrocybe chlorophana
Hygrocybe coccinea
Hygrocybe conica
Hygrocybe insipida
Hygrocybe laeta
Hygrocybe mucronella
Hygrocybe ovina
Hygrocybe pratensis
Hygrocybe psittacina
Hygrocybe punicea
Hygrocybe reidii
Hygrocybe virginea
Pucciniastrum guttatum
Ramaria curta
Ramaria gracilis
Ramaria stricta
Resiniceum bicolor
Rhizopogon roseolus
Rhizopogon subareolatus
Rhodocollybia butyracea
Rhodocybe gemina
Rhodocybe hirneola
Rickenella fibula
Ripartites metrodii
Russula atropurpurea
Russula cessans
Russula cyanoxantha
Russula emetica
Russula paludosa
Russula rosea
Russula rubra
Russula sardonia
Russula subfoetens
Russula torulosa
Schizophyllum commune
Schizopora paradoxa
Scleroderma areolatum
Scleroderma bovista
Scleroderma cepa
Scleroderma citrinum
Scleroderma polyrhizum
Scleroderma torrendii
Scleroderma verrucosum
Sclerotium durum
Septobasidium foliicola
Serpula lacrymans
Sphacelotheca andropogonis
Sphaerobolus stellatus
Spongipellis spumeus
Sporotrichum citrinum

Hygrocybe vitellina
Hygrophoropsis aurantiaca
Hymenogaster maurus
Hymenogaster vulgaris
Hyphodontia sambuci
Hyphodontia stipata
Hypholoma capnoides
Hypholoma fasciculare
Inocybe assimilata
Inocybe asterospora
Inocybe brunnea
Inocybe geophylla
Inocybe mixtilis
Inocybe napipes
Inocybe repanda
Inocybe rimosa
Jamesdicksonia brizae
Jamesdicksonia dactylidis
Jamesdicksonia linearis
Junghuhnia nitida
Laccaria amethystina
Laccaria bicolor
Laccaria laccata
Laccaria lateritia
Lacrymaria lacrymabunda
Lactarius deliciosus
Lactarius piperatus
Laeticorticium roseum
Laetiporus sulphureus
Laurobasidium lauri
Laxitextum bicolor
Leccinum scabrum
Lenzites betulina
Lepiota felina
Lepista inversa
Lepista nuda
Leucoagaricus leucothites
Leucoagaricus naucinus
Sporotrichum roseum
Steccherinum ochraceum
Stereum bellum
Stereum gausapatum
Stereum hirsutum
Stereum insignitum
Stereum ostrea
Stereum retirugum
Stereum sanguinolentum
Strobilurus esculentus
Stropharia aeruginosa
Stropharia aurantiaca
Stropharia semiglobata
Stropharia stercoraria
Suillus bellini
Suillus bovinus
Suillus collinitus
Suillus flavidus
Suillus granulatus
Suillus luteus
Syzygospora bachmannii
Tapinella panuoides
Terana caerulea
Thelephora terrestris
Tilletia bromi
Tilletia cerebrina
Tilletia laevis
Trametes gibbosa
Trametes ochracea
Trametes velutina
Trametes versicolor
Tranzschelia pruni-spinosae
Trechispora nivea
Tremella foliacea
Tremella lobariacearum
Tremella lobariacearum
Tremella mesenterica
Trichaptum abietinum

Leucoagaricus nympharum
Leucopaxillus giganteus
Lycoperdon atropurpureum
Lycoperdon lividum
Lycoperdon molle
Lycoperdon montanum
Lycoperdon nigrescens
Lycoperdon perlatum
Lycoperdon purpuraceum
Lyophyllum decastes
Lysurus mokusin
Macrocystidia cucumis
Marasmiellus ramealis
Marasmius amaryllidis
Marasmius androsaceus
Marasmius hudsonii
Megacollybia platyphylla
Melampsora euphorbiae
Melampsora hypericorum
Melampsora lini
Melanoleuca decembris
Metulodontia nivea
Milesina blechni
Miyagia pseudosphaeria
Mutinus caninus
Mutinus elegans
Mycena acicula
Mycena alcalina
Mycena capillaripes
Mycena epipterygia
Mycena galericulata
Mycena galopus
Mycena haematopus
Mycena hiemalis
Mycena pelianthina
Mycena polygramma
Mycena pura
Mycena seynesii
Trichaptum fuscoviolaceum
Tricholoma acerbum
Tricholoma equestre
Tricholoma portentosum
Tricholoma saponaceum
Tricholomopsis rutilans
Tubaria conspersa
Uredo digitariae
Uredo herneriae
Uredo trichophora
Uromyces anthyllidis
Uromyces armeriae
Uromyces beticola
Uromyces bidenticola
Uromyces dianthi
Uromyces ervi
Uromyces euphorbiae
Uromyces euphorbiicola
Uromyces graminis
Uromyces guerkeanus
Uromyces limonii
Uromyces lupini
Uromyces pisi-sativi
Uromyces polygoni-avicularis
Uromyces rumicis
Uromyces scrophulariae
Uromyces setariae-italicae
Uromyces trifolii-repentis
Uromyces viciae-fabae
Ustilago cynodontis
Ustilago digitariae
Ustilago hordei
Ustilago overeemi
Ustilago panici-glauci
Ustilago penniseti
Ustilago striiformis
Vascellum pratense
Volvariella gloiocephala

Mycena supina
Mycena tenella
Volvariella surrecta

19.3.3. Protozoa

19.3.3.1. Myxomycota – 19 species

Arcyria denudata
Arcyria oerstedii
Badhamia papaveracea
Badhamia utricularis
Craterium minutum
Diderma hemisphaericum
Didymium difforme
Didymium iridis
Didymium quitense
Enteridium lycoperdon
Fuligo septica
Lycogala epidendrum
Physarum compressum
Physarum nodulosum
Physarum nutans
Stemonitis splendens
Trichia contorta
Trichia favoginea
Trichia lutescens

19.3.4. Plantae

19.3.4.1. Bryophyta – 505 species

Acanthocoleus aberrans
Acaulon muticum
Acaulon triquetrum
Acrobolbus wilsonii
Adelanthus decipiens
Aloina aloides
Aloina ambigua
Aloina rigida
Alophosia azorica
Amphidium mougeotii
Amphidium tortuosum
Anacolia webbii
Lejeunea flava moorei
Lejeunea hibernica
Lejeunea lamacerina
Lejeunea mandonii
Lejeunea patens
Lepidozia cupressina
Lepidozia reptans
Leptobarbula berica
Leptobryum pyriforme
Leptodictyum riparium
Leptodontium flexifolium
Leptoscyphus cuneifolius

Andoa berthelotiana
Andreaea alpestris
Andreaea heinemannii heinemannii
Andreaea rothii rothii
Andreaea rupestris
Aneura pinguis
Anoectangium aestivum
Anomobryum julaceum
Anthoceros agrestis
Anthoceros caucasicus
Anthoceros punctatus
Antitrichia californica
Antitrichia curtipendula
Aphanolejeunea azorica
Aphanolejeunea madeirensis
Aphanolejeunea microscopica
Aphanolejeunea sintenisii
Archidium alternifolium
Asterella africana
Atrichum angustatum
Atrichum undulatum
Barbula convoluta
Barbula unguiculata
Bartramia pomiformis
Bartramia stricta
Bazzania trilobata
Blindia acuta
Brachymenium notarisii
Brachytheciastrum velutinum
Brachythecium albicans
Brachythecium percurrens
Brachythecium rivulare
Brachythecium rutabulum
Bryoerythrophyllum campylocarpum
Bryoerythrophyllum recurvirostrum
Bryoxiphium madeirense
Bryum alpinum
Bryum argenteum
Leucobryum glaucum
Leucobryum juniperoideum
Leucodon canariensis
Leucodon treleasei
Lophocolea bidentata
Lophocolea fragrans
Lophocolea heterophylla
Lophocolea minor
Lophozia bantriensis
Lophozia bicrenata
Lophozia heterocolpos
Lophozia sudetica
Lunularia cruciata
Mannia androgyna
Mannia fragans
Marchantia paleacea
Marchantia polymorpha
Marchantia polymorpha montivagans
Marchantia polymorpha ruderalis
Marchesinia mackaii
Marsupella adusta
Marsupella emarginata
Marsupella funckii
Marsupella profunda
Marsupella sprucei
Metzgeria conjugata
Metzgeria fruticulosa
Metzgeria furcata
Metzgeria leptoneura
Metzgeria temperata
Microbryum davallianum
Microbryum starckeanum
Microcampylopus laevigatus
Microlejeunea ulicina
Mnium hornum
Myurium hochstetteri
Nardia geoscyphus
Nardia scalaris

Bryum caespiticium
Bryum canariense
Bryum capillare
Bryum dichotomum
Bryum donianum
Bryum gemmiparum
Bryum mildeanum
Bryum muehlenbeckii
Bryum pseudotriquetrum
Bryum radiculosum
Bryum rubens
Bryum ruderale
Bryum sauteri
Bryum subapiculatum
Bryum torquescens
Calypogeia arguta
Calypogeia azorica
Calypogeia azurea
Calypogeia fissa
Calypogeia muelleriana
Calypogeia sphagnicola
Campylopus flexuosus
Campylopus fragilis
Campylopus incrassatus
Campylopus pilifer
Campylopus pyriformis
Campylostelium strictum
Cephalozia bicuspidata
Cephalozia catenulata
Cephalozia connivens
Cephalozia crassifolia
Cephalozia lunulifolia
Cephaloziella baumgartneri
Cephaloziella dentata
Cephaloziella divaricata
Cephaloziella granatensis
Cephaloziella hampeana
Cephaloziella rubella
Neckera cephalonica
Neckera complanata
Neckera crispa
Neckera intermedia
Neckera pumila
Nobregaea latinervis
Nowellia curvifolia
Odontoschisma denudatum
Odontoschisma prostratum
Oedipodiella australis
Orthodontium gracile
Orthodontium pellucens
Orthotrichum affine
Orthotrichum cupulatum
Orthotrichum diaphanum
Orthotrichum lyellii
Orthotrichum pallens
Orthotrichum rupestre
Orthotrichum tenellum
Oxyrrhynchium hians
Oxyrrhynchium pumilum
Oxyrrhynchium schleicheri
Oxyrrhynchium speciosum
Pallavicinia lyellii
Palustriella commutata
Palustriella falcata
Paraleucobryum longifolium
Pelekium atlanticum
Pelekium minutulum
Pellia endiviifolia
Pellia epiphylla
Phaeoceros carolinianus
Phaeoceros laevis
Phascum cuspidatum
Philonotis arnellii
Philonotis fontana
Philonotis marchica
Philonotis rigida

Cephaloziella stellulifera
Cephaloziella turneri
Ceratodon purpureus
Ceratodon purpureus stenocarpus
Chiloscyphus pallescens
Chiloscyphus polyanthos
Cinclidotus fontinaloides
Cirriphyllum crassinervium
Cladopodiella francisci
Cololejeunea minutissima
Cololejeunea schaeferi
Colura calyptrifolia
Conocephalum conicum
Corsinia coriandrina
Cratoneuron filicinum
Crossidium crassinerve
Crossidium squamiferum
Cryptoleptodon longisetus
Cyclodictyon laetevirens
Daltonia stenophylla
Dialytrichia fragilifolia
Dialytrichia mucronata
Dichodontium flavescens
Dichodontium pellucidum
Dicranella heteromalla
Dicranella howei
Dicranella humilis
Dicranella rufescens
Dicranella varia
Dicranoweisia cirrata
Dicranum canariense
Dicranum flagellare
Dicranum fuscescens
Dicranum montanum
Dicranum scoparium
Dicranum scottianum
Didymodon acutus
Didymodon fallax
Phymatoceros bulbiculosus
Physcomitrium pyriforme
Plagiochasma rupestre
Plagiochila bifaria
Plagiochila exígua
Plagiochila maderensis
Plagiochila porelloides
Plagiochila punctata
Plagiochila retrorsa
Plagiochila spinulosa
Plagiochila stricta
Plagiochila virginica
Plagiomnium affine
Plagiomnium rostratum
Plagiomnium undulatum
Plagiothecium denticulatum
Plagiothecium nemorale
Plagiothecium succulentum
Plasteurhynchium meridionale
Platyhypnidium riparioides
Pleuridium acuminatum
Pleuridium subulatum
Pleurozium schreberi
Pogonatum aloides
Pogonatum nanum
Pogonatum urnigerum
Pohlia annotina
Pohlia elongata
Pohlia nutans
Pohlia proligera
Polytrichastrum formosum
Polytrichum commune
Polytrichum juniperinum
Polytrichum piliferum
Porella canariensis
Porella cordaeana
Porella inaequalis
Porella obtusata

Didymodon insulanus
Didymodon luridus
Didymodon rigidulus
Didymodon tophaceus
Didymodon vinealis
Diphyscium foliosum
Diplophyllum albicans
Ditrichum flexicaule
Ditrichum punctulatum
Ditrichum subulatum
Drepanolejeunea hamatifolia
Dumortiera hirsuta
Echinodium setigerum
Echinodium spinosum
Encalypta vulgaris
Entosthodon attenuatus
Entosthodon convexus
Entosthodon fascicularis
Entosthodon krausei
Entosthodon muhlenbergii
Entosthodon obtusus
Entosthodon pulchellus
Ephemerum serratum
Epipterygium tozeri
Equinodium prolixum
Eucladium verticillatum
Eurhynchium striatum
Exormotheca pustulosa
Fabronia pusilla
Fissidens adianthoides
Fissidens asplenioides
Fissidens bryoides
Fissidens coacervatus
Fissidens crassipes warnstorfii
Fissidens crispus
Fissidens curvatus
Fissidens dubius
Fissidens fontanus
Pseudocrossidium revolutum
Pseudoscleropodium purum
Pseudotaxiphyllum elegans
Pseudotaxiphyllum laetevirens
Pterigynandrum filiforme
Pterygoneurum ovatum
Ptychomitrium nigrescens
Ptychomitrium polyphyllum
Racomitrium aciculare
Racomitrium aquaticum
Racomitrium elongatum
Racomitrium fasciculare
Racomitrium heterostichum
Racomitrium lanuginosum
Radula aquilegia
Radula carringtonii
Radula holtii
Radula jonesii
Radula lindenbergiana
Radula nudicaulis
Radula wichurae
Reboulia hemisphaerica
Rhabdoweisia fugax
Rhamphidium purpuratum
Rhizomnium punctatum
Rhynchostegiella curviseta
Rhynchostegiella durieui
Rhynchostegiella litorea
Rhynchostegiella macilenta
Rhynchostegiella tenella
Rhynchostegiella teneriffae
Rhynchostegium confertum
Rhynchostegium megapolitanum
Rhytidiadelphus loreus
Rhytidiadelphus squarrosus
Rhytidiadelphus triquetrus
Riccardia chamedryfolia
Riccardia incurvata

Fissidens gracilifolius
Fissidens luisieri
Fissidens microstictus
Fissidens monguillonii
Fissidens nobreganus
Fissidens ovatifolius
Fissidens polyphyllus
Fissidens pusillus
Fissidens rivularis
Fissidens serratus
Fissidens serrulatus
Fissidens sublineaefolius
Fissidens taxifolius
Fissidens viridulus
Fontinalis antipyretica
Fossombronia angulosa
Fossombronia caespitiformis
Fossombronia echinata
Fossombronia husnotii
Fossombronia pusilla
Frullania azorica
Frullania dilatata
Frullania ericoides
Frullania fragilifolia
Frullania microphylla
Frullania polysticta
Frullania tamarisci
Frullania teneriffae
Funaria hygrometrica
Geocalyx graveolens
Glyphomitrium daviesii
Gongylanthus ericetorum
Grimmia arenaria
Grimmia decipiens
Grimmia donniana
Grimmia funalis
Grimmia laevigata
Grimmia lisae
Riccardia latifrons
Riccardia multifida
Riccardia palmata
Riccia atlantica
Riccia atromarginata
Riccia bifurca
Riccia cavernosa
Riccia ciliata
Riccia ciliifera
Riccia crozalsii
Riccia crystallina
Riccia gougetiana
Riccia lamellosa
Riccia macrocarpa
Riccia nigrella
Riccia sorocarpa
Riccia subbifurca
Riccia trabutiana
Riccia warnstorfii
Saccogyna viticulosa
Scapania compacta
Scapania curta
Scapania gracilis
Scapania nemorea
Scapania subalpina
Scapania umbrosa
Scapania undulata
Schistidium agassizii
Schistidium apocarpum
Schistidium rivulare
Schistidium strictum
Sciuro-hypnum plumosum
Scleropodium touretii
Scorpiurium circinatum
Scorpiurium deflexifolium
Sematophyllum substrumulosum
Southbya nigrella
Southbya tophacea

Grimmia montana
Grimmia orbicularis
Grimmia ovalis
Grimmia pulvinata
Grimmia ramondii
Grimmia torquata
Grimmia trichophylla
Gymnocolea inflata
Gymnostomum aeruginosum
Gymnostomum calcareum
Gymnostomum viridulum
Gyroweisia reflexa
Gyroweisia tenuis
Habrodon perpusillus
Harpalejeunea molleri
Hedwigia ciliata
Hedwigia stellata
Heterocladium heteropterum
Heterocladium wulfsbergii
Heteroscyphus denticulatus
Homalia lusitanica
Homalia webbiana
Homalothecium aureum
Homalothecium sericeum
Hookeria lucens
Hygroamblystegium fluviatile
Hygroamblystegium humile
Hygroamblystegium tenax
Hygroamblystegium varium
Hygrobiella laxifolia
Hylocomium splendens
Hymenostylium recurvirostrum
Hyocomium armoricum
Hypnum cupressiforme
Hypnum jutlandicum
Hypnum uncinulatum
Isopterygiopsis pulchella
Isothecium algarvicum
Sphagnum auriculatum
Sphagnum compactum
Sphagnum subnitens
Syntrichia bogotensis
Syntrichia fragilis
Syntrichia laevipila
Syntrichia norvegica
Syntrichia princeps
Syntrichia ruralis
Targionia hypophylla
Targionia lorbeeriana
Telaranea europaea
Tetrastichium fontanum
Tetrastichium virens
Thamnobryum alopecurum
Thamnobryum fernandesii
Thamnobryum maderense
Thuidiopsis sparsa
Thuidium tamariscinum
Timmiella barbuloides
Tortella flavovirens
Tortella humilis
Tortella limbata
Tortella nitida
Tortella tortuosa
Tortula atrovirens
Tortula bolanderi
Tortula canescens
Tortula cuneifolia
Tortula lanceolata
Tortula marginata
Tortula muralis
Tortula solmsii
Tortula subulata
Tortula truncata
Trichostomum brachydontium
Trichostomum crispulum
Trichostomum tenuirostre

Isothecium myosuroides
Jubula hutchinsiae
Jungermannia atrovirens
Jungermannia calithrix
Jungermannia gracillima
Jungermannia hyalina
Jungermannia leiantha
Jungermannia pumila
Kindbergia praelonga
Kurzia pauciflora
Lejeunea canariensis
Lejeunea cavifolia
Lejeunea eckloniana
Trichostomum triumphans
Tritomaria exsecta
Tylimanthus madeirensis
Ulota calvescens
Ulota crispa
Weissia condensa
Weissia controversa
Weissia longifolia
Zygodon conoideus
Zygodon forsteri
Zygodon rupestris
Zygodon viridissimus

19.3.4.2. Pteridophyta – 73 species

Adiantum capillus-veneris
Adiantum hispidulum
Adiantum raddianum
Adiantum reniforme pusillum
Anogramma leptophylla
Arachniodes webbiana
Asplenium adiantum-nigrum
Asplenium aethiopicum braithwaitii
Asplenium anceps
Asplenium billotii
Asplenium hemionitis
Asplenium marinum
Asplenium monanthes
Asplenium onopteris
Asplenium septentrionale septentrionale
Asplenium trichomanes maderense
Asplenium trichomanes quadrivalens
Athyrium filix-femina
Blechnum spicant
Botrychium lunaria
Ceterach lolegnamense
Cheilanthes acrostica
Dryopteris affinis affinis
Dryopteris aitoniana
Dryopteris maderensis
Elaphoglossum semicylindricum
Equisetum telmateia
Huperzia dentata
Huperzia suberecta
Hymenophyllum maderense
Hymenophyllum tunbrigense
Hymenophyllum wilsonii
Lastrea limbosperma
Nephrolepis cordifolia
Notholaena marantae subcordata
Ophioglossum azoricum
Ophioglossum lusitanicum
Osmunda regalis
Phlebodium aureum
Phyllitis scolopendrium scolopendrium
Pityrogramma calomelanos
Polypodium interjectum
Polypodium macaronesicum
Polypodium vulgare

Cheilanthes guanchica
Cheilanthes maderensis
Cheilanthes tinaei
Christella dentata
Cosentinia vellea
Culcita macrocarpa
Cyrtomium falcatum
Cystopteris viridula
Davallia canariensis
Deparia petersenii
Dicksonia antarctica
Diphasiastrum madeirense
Diplazium caudatum
Doodia caudata
Dryopteris aemula
Polystichum drepanum
Polystichum falcinellum
Polystichum setiferum
Pteridium aquilinum aquilinum
Pteris incompleta
Pteris multifida
Pteris tremula
Pteris vittata
Selaginella denticulata
Selaginella kraussiana
Sphaeropteris cooperi
Stegnogramma pozoi
Vandenboschia speciosa
Woodwardia radicans

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Abutilon grandifoliu
Abutilon egapotaicu
Abutilon striatu
Acacia dealbata
Acacia elata
Acacia farnesiana
Acacia longifolia
Acacia earnsii
Acacia elanoxylon
Acacia verticillata
Acanthus mollis
Acer pseudoplatanus
Achillea millefoliu
Achyranthes sicula
Adenocarpus complicatus
Aeonium arboreum
Aeonium glandulosum
Aeonium glutinosum
Limonium sinuatum
Linum bienne
Linum strictum
Linum trigynum
Linum usitatissimum
Lobelia erinus
Lobelia laxiflora
Lobelia urens
Lobularia maritima
Logfia gallica
Logfia minima
Lolium lowei
Lolium multiflorum
Lolium perenne
Lolium rigidum lepturoides
Lolium rigidum rigidum
Lolium temulentum
Lonicera etrusca

Agapanthus praecox orientalis
Agave americana
Agave atrovirens
Agave attenuata
Ageratina adenophora
Ageratina riparia
Ageratum conyzoides conyzoides
Ageratum houstonianum
Agrimonia eupatoria eupatoria
Agrostis castellana
Agrostis obtusissima
Agrostis pourretii
Agrostis stolonifera
Aichryson divaricatum
Aichryson dumosum
Aichryson villosum
Ailanthus altissima
Aira caryophyllea
Aira praecox
Aizoon canariense
Albizia lophantha
Alcea rosea
Alisma lanceolatum
Allium ampeloprasum
Allium neapolitanum
Allium paniculatum
Allium roseum
Allium triquetrum
Allium vineale
Aloe arborecens
Aloe vera
Alstroemeria pulchella
Alternanthera caracasana
Amaranthus blitum
Amaranthus caudatus
Amaranthus deflexus
Amaranthus graecizans
Amaranthus hybridus
Lonicera japonica
Lotus angustissimus
Lotus argyrodes
Lotus conimbricensis
Lotus glaucus
Lotus hispidus
Lotus lancerottensis
Lotus macranthus
Lotus ornithopodioides
Lotus parviflorus
Lotus pedunculatus
Lunaria annua
Lupinus angustifolius
Lupinus luteus
Luzula campestris
Luzula elegans
Luzula multiflora congesta
Luzula multiflora multiflora
Luzula seubertii
Lycium europaeum
Lycium intricatum
Lycopersicon esculentum
Lythrum hyssopifolia
Lythrum junceum
Malva nicaeensis
Malva parviflora
Malva sylvestris
Malvastrum coromandelianum
Mantisalca salmantica
Marcetella maderensis
Marrubium vulgare
Matthiola maderensis
Maytenus umbellata
Medicago intertexta
Medicago littoralis
Medicago lupulina
Medicago minima
Medicago orbicularis

Amaranthus muricatus
Amaranthus retroflexus
Amaranthus spinosus
Amaranthus viridis
Amaryllis belladonna
Ambrosia artemisifolia
Ammi majus
Ammi visnaga
Anagallis arvensis
Anchusa azurea
Andryala crithmifolia
Andryala glandulosa cheirantifolia
Andryala glandulosa glandulosa
Anomatheca laxa
Anthemis cotula
Anthoxanthum maderense
Anthoxanthum odoratum
Anthriscus caucalis
Anthyllis lemanniana
Antirrhinum majus
Aphanes australis
Apium graveolens
Apium nodiflorum
Apollonias barbujana
Aptenia cordifolia
Aquilegia vulgaris vulgaris
Arabidopsis thaliana
Arabis alpina caucasica
Araujia sericifera
Arbutus unedo
Arctium minus
Arctotis venusta
Arenaria leptoclados
Argemone mexicana
Argyranthemum dissectum
Argyranthemum haematomma
Argyranthemum pinnatifidum montanum
Argyranthemum pinnatifidum pinnatifidum
Medicago polymorpha
Medicago sativa
Medicago truncatula Gaertn.
Melanoselinum decipiens
Melica canariensis
Melica ciliata magnolii
Melilotus albus
Melilotus elegans
Melilotus indicus
Melilotus segetalis
Melilotus sulcatus
Melinis minutiflora
Melissa officinalis
Mentha aquatica
Mentha longifolia
Mentha pulegium
Mentha spicata
Mentha suaveolens
Mercurialis ambigua
Mercurialis annua
Mesembryanthemum crystallinum
Mesembryanthemum nodiflorum
Micromeria thymoides cacuminicolae
Micromeria thymoides thymoides
Micropyrum tenellum
Mimulus moschatus
Mirabilis jalapa
Misopates calycinum
Misopates orontium orontium
Modiola caroliniana
Monizia edulis
Muehlenbeckia sagittifolia
Musschia aurea
Musschia wollastonii
Myosotis arvensis
Myosotis discolor
Myosotis secunda
Myosotis stolonifera

Arisarum vulgare
Aristida adscensionis
Aristolochia paucinervis
Armeria maderensis
Arrhenatherum elatius bulbosum
Artemisia argentea
Artemisia verlotiorum
Arum italicum canariense
Arundo donax
Asclepias curassavica
Asparagus asparagoides
Asparagus scoparius Lowe
Asparagus setaceus
Asparagus umbellatus lowei
Asphodelus fistulosus
Aster squamatus
Astragalus boeticus
Astragalus pelecinus
Astragalus solandri
Atriplex glauca
Atriplex prostrata
Autonoe madeirensis
Avena barbata
Avena fatua
Avena sterilis
Ballota nigra
Barbarea verna
Bartsia trixago
Bassia tomentosa
Bellis perennis
Berberis maderensis
Beta maritima
Beta patula
Beta vulgaris
Bidens biternata
Bidens pilosa
Bituminaria bituminosa
Borago officinalis
Myosotis sylvatica
Myrica faya
Myrtus communis
Narcissus jonquilla
Neotinea maculata
Nerine sarniensis
Nicandra physalodes
Nicotiana glauca
Nicotiana tabacum
Nigela damascena
Normania triphylla
Nothoscordum gracile
Notobasis syriaca
Ocotea foetens
Odontites holliana
Oenanthe divaricata
Oenothera biennis
Oenothera longiflora longiflora
Oenothera stricta
Oenothera tetraptera
Olea maderensis
Ononis dentata
Ononis diffusa
Ononis mitissima
Ononis spinosa maritima
Opuntia ficus-barbarica
Opuntia tuna
Orchis scopulorum
Origanum vulgare virens
Ornithopus compressus
Ornithopus perpusillus
Ornithopus pinnatus
Ornithopus sativus
Orobanche crenata
Orobanche minor
Orobanche ramosa nana
Oryzopsis miliacea
Oxalis corniculata

Boussingaultia cordifolia
Brachiaria mutica
Brachypodium distachyum
Brachypodium sylvaticum
Brassica nigra
Briza maxima
Briza minor
Bromus catharticus
Bromus diandrus
Bromus hordeaceus hordeaceus
Bromus hordeaceus molliformis
Bromus lanceolatus
Bromus madritensis
Bromus rubens
Bromus sterilis
Brugmansia suaveolens
Bunium brevifolium
Bupleurum lancifolium
Bupleurum salicifolium salicifolium
Bystropogon maderensis
Bystropogon punctatus
Cakile maritima maritima
Calamintha nepeta sylvatica
Calceolaria tripartita
Calendula arvensis
Calendula maderensis
Calendula officinalis
Calluna vulgaris
Calystegia sepium sepium
Campanula erinus
Campanula lusitanica
Canna indica
Cardamine hirsuta
Cardiospermum grandiflorum
Carduncellus caeruleus
Carduus pycnocephalus
Carduus squarrosus
Carduus tenuiflorus
Oxalis debilis
Oxalis exilis
Oxalis latifolia
Oxalis pes-caprae
Oxalis purpurea
Panicum capillare
Panicum maximum
Panicum miliaceum
Panicum repens
Papaver dubium
Papaver pinnatifidum
Papaver rhoeas
Papaver somniferum somniferum
Parapholis filiformis
Parapholis incurva
Parentucellia viscosa
Parietaria debilis
Parietaria judaica
Paronychia echinulata
Paspalum dilatatum
Paspalum distichum
Paspalum vaginatum
Passiflora caerulea
Passiflora mollissima
Passiflora subpeltata
Patellifolia patellaris
Patellifolia procumbens
Pelargonium glutinosum
Pelargonium inquinans
Pelargonium odoratissimum
Pelargonium vitifolium
Pennisetum clandestinum
Pennisetum purpureum
Pennisetum villosum
Pericallis aurita
Persea indica
Petasites fragrans
Petrorhagia nanteuilii

Carex divisa
Carex divulsa divulsa
Carex extensa
Carex lowei
Carex malato-belizii
Carex muricata lamprocarpa
Carex pendula
Carex peregrina
Carex pilulifera pilulifera
Carex punctata
Carex viridula cedercreutzii
Carlina salicifolia
Carpobrotus edulis
Carthamus lanatus
Carthamus tinctorius
Castanea sativa
Catapodium rigidum
Cedronella canariensis
Cenchrus ciliaris
Centaurea calcitrapa
Centaurea melitensis
Centaurea sonchifolia
Centaurea sphaerocephala
Centaurium maritimum
Centaurium tenuiflorum
Centranthus calcitrapae
Centranthus ruber ruber
Centratherum muticum
Cerastium diffusum
Cerastium fontanum vulgare
Cerastium glomeratum
Cerastium vagans
Chamaemeles coriacea
Chamaemelum mixtum
Chamaemelum nobile
Chamaesyce nutans
Chamaesyce prostrata
Chasmanthe aethiopica
Petroselinum crispum
Peucedanum lowei
Phagnalon lowei
Phagnalon saxatile
Phalaris aquatica
Phalaris brachystachys
Phalaris canariensis
Phalaris coerulescens
Phalaris maderensis
Phalaris minor
Phalaris paradoxa
Phoenix canariensis
Phormium tenax
Phragmites australis
Phyllanthus tenellus
Phyllis nobla
Physalis peruviana
Phytolacca americana
Picconia excelsa
Pinus pinaster
Pittosporum coriaceum
Pittosporum undulatum
Plantago afra
Plantago arborescens maderensis
Plantago bellardii
Plantago coronopus
Plantago lagopus
Plantago lanceolata
Plantago leiopetala
Plantago major
Plantago malato-belizii
Plantago myosurus
Plantago ovata
Plectranthus fruticosus
Plumbago auriculata
Poa annua
Poa bulbosa
Poa compressa

Cheirolophus massonianus
Chelidonium majus
Chenopodium album
Chenopodium ambrosioides
Chenopodium murale
Chenopodium opulifolium
Chloris gayana
Chloris virgata
Chlorophytum comosum
Chrysanthemum coronarium
Chrysanthemum segetum
Cichorium endivia divaricatum
Cirsium latifolium
Cirsium vulgare
Cistus psilosepalus
Clethra arborea
Clinopodium vulgare
Coleostephus myconis
Colocasia esculenta
Commelina benghalensis
Commelina diffusa
Conium maculatum
Consolida ajacis
Convolvulus althaeoides
Convolvulus arvensis
Convolvulus massonii
Convolvulus siculus siculus
Convolvulus tricolor tricolor
Conyza bonariensis
Conyza canadensis
Conyza sumatrensis
Coriandrum sativum
Coronilla glauca
Coronopus didymus
Coronopus squamatus
Corrigiola littoralis
Cotula australis
Crambe fruticosa
Poa pratensis
Poa trivialis
Podranea ricasoliana
Polycarpon tetraphyllum diphyllum
Polycarpon tetraphyllum tetraphyllum
Polygala myrtifolia
Polygonum arenastrum
Polygonum aviculare
Polygonum capitatum
Polygonum hydropiper
Polygonum lapathifolium
Polygonum maritimum
Polygonum patulum
Polygonum persicaria
Polygonum salicifolium
Polypogon fugax
Polypogon maritimus
Polypogon monspeliensis
Polypogon viridis
Populus alba
Populus nigra
Portulaca oleracea oleracea
Portulaca oleracea sativa
Potamogeton nodosus
Potamogeton polygonifolius
Potamogeton pusillus
Potentilla anglica
Potentilla reptans
Prasium majus
Prunella vulgaris
Prunus cerasus
Prunus hixa
Pseudognaphalium luteo-album
Pseudosasa japonica
Psidium cattleyanum
Pycreus flavescens
Quercus robur
Radiola linoides

Crassula multicava
Crassula ovata
Crassula tetragona
Crassula tillaea
Crataegus monogyna
Crepis andryaloides
Crepis capillaris
Crepis divaricata
Crepis vesicaria haenseleri
Crinum bulbispermum
Crithmum maritimum
Cullen americanum
Cupressus macrocarpa
Cuscuta epithymum
Cuscuta planiflora
Cyclospermum leptophyllum
Cymbalaria muralis muralis
Cynara cardunculus
Cynodon dactylon
Cynoglossum creticum
Cynosurus cristatus
Cynosurus echinatus
Cynosurus effusus
Cyperus difformis
Cyperus eragrostis
Cyperus esculentus
Cyperus fuscus
Cyperus involucratus
Cyperus longus
Cyperus rotundus
Cytisus multiflorus
Cytisus scoparius scoparius
Cytisus striatus
Dactylis glomerata glomerata
Dactylis glomerata hispanica
Dactylis smithii hylodes
Dactylis smithii marina
Dactyloctenium australe
Ranunculus acris
Ranunculus arvensis
Ranunculus bulbosus aleae
Ranunculus cortusifolius major
Ranunculus flammula
Ranunculus muricatus
Ranunculus parviflorus
Ranunculus repens
Ranunculus trilobus
Raphanus raphanistrum raphanistrum
Rapistrum rugosum linnaeanum
Rapistrum rugosum rugosum
Reseda luteola
Reseda media
Reseda phyteuma
Rhamnus glandulosa
Rhus coriaria
Ricinus communis
Rivina humilis
Robinia pseudoacacia
Romulea columnae columnae
Romulea columnae grandiscapa
Rorippa nasturtium-aquaticum
Rosa mandonii
Rosa multiflora
Rosa rubiginosa
Rostraria cristata
Rubia agostinhoi
Rubia fruticosa fruticosa
Rubus bollei
Rubus canariensis
Rubus grandifolius
Rubus ulmifolius
Rubus vahlii
Rumex acetosella angiocarpus
Rumex bucephalophorus fruticescens
Rumex bucephalophorus canariensis
Rumex conglomeratus

Dactylorhiza foliosa
Danthonia decumbens
Datura innoxia
Datura stramonium
Daucus carota carota
Daucus carota hispidus
Delphinium maderense
Deschampsia argentea
Deschampsia maderensis
Dichanthium annulatum
Dichondra micrantha
Digitalis purpurea
Digitaria ciliaris
Digitaria sanguinalis
Diplotaxis catholica
Dittrichia viscosa viscosa
Draba muralis
Dracaena draco draco
Drosanthemum floribundum
Drusa glandulosa
Duchesnea indica
Echinochloa colonum
Echinochloa crus-galli
Echium candicans
Echium nervosum
Echium plantagineum
Eclipta prostrata
Eleocharis palustris
Eleusine indica
Eleusine tristachya
Elymus repens
Ephedra fragilis
Epilobium obscurum
Epilobium parviflorum
Epilobium tetragonum tetragonum
Eragrostis barrelieri
Eragrostis cilianensis
Eragrostis curvula
Rumex crispus
Rumex maderensis
Rumex obtusifolius
Rumex pulcher woodsii
Rumex simpliciflorus maderensis
Ruscus streptophyllus
Ruta chalepensis
Rytidosperma tenuius
Sagina apetala
Sagina procumbens
Salix canariensis
Salpichroa origanifolia
Salvia coccinea
Salvia leucantha
Salvia verbenaca
Sambucus ebulus
Sambucus lanceolata
Sambucus nigra
Samolus valerandi
Sanguisorba verrucosa
Saponaria officinalis
Saxifraga maderensis
Saxifraga pickeringii
Saxifraga stolonifera
Scabiosa atropurpurea
Scandix pecten-veneris pecten-veneris
Schoenoplectus triqueter
Scleranthus polycarpos
Scolymus maculatus
Scorpiurus sulcatus
Scorpiurus vermiculatus
Scrophularia hirta
Scrophularia lowei
Scrophularia racemosa
Scrophularia scorodonia
Sechium edule
Sedum brissemoretii
Sedum farinosum

Eragrostis minor
Erica arborea
Erica cinerea
Erica maderensis
Erica platycodon maderincola
Erigeron karvinskianus
Eriobotrya japonica
Erodium botrys
Erodium chium chium
Erodium cicutarium bipinnatum
Erodium cicutarium cicutarium
Erodium malacoides
Erodium moschatum
Eruca vesicaria sativa
Erysimum bicolor
Erysimum maderense
Eschscholzia californica
Eucalyptus globulus
Euphorbia exigua exigua
Euphorbia helioscopia
Euphorbia mellifera
Euphorbia peplus
Euphorbia piscatoria
Euphorbia platyphyllos
Euphorbia pterococca
Euphorbia segetalis
Euphorbia terracina
Fallopia convolvulus
Ferraria crispa
Festuca arundinacea
Festuca donax
Festuca jubata
Festuca rubra
Ficus carica
Filago lutescens atlantica
Filago pyramidata
Foeniculum vulgare
Fragaria vesca
Sedum fusiforme
Sedum nudum
Sedum praealtum
Semele androgyna
Senecio glastifolius
Senecio incrassatus
Senecio mikanioides
Senecio petasitis
Senecio sylvaticus
Senecio vulgaris
Senna bicapsularis
Senna pendula
Senna septemtrionalis
Sesamoides suffruticosa
Setaria megaphylla
Setaria parviflora
Setaria pumila
Setaria verticillata
Setaria viridis
Sherardia arvensis
Sibthorpia peregrina
Sida rhombifolia
Sideritis candicans
Sideroxylon mirmulans
Silene behen
Silene gallica
Silene inaperta inaperta
Silene nocturna
Silene uniflora
Silene vulgaris
Silybum marianum
Sinapidendron angustifolium
Sinapidendron frutescens frutescens
Sinapidendron frutescens succulentum
Sinapidendron gymnocalyx
Sinapidendron rupestre
Sinapis arvensis
Sisymbrium erysimoides

Frankenia laevis
Frankenia pulverulenta
Freesia refracta
Fuchsia arborescens
Fuchsia boliviana
Fuchsia magellanica
Fumaria bastardii
Fumaria capreolata
Fumaria montana
Fumaria muralis
Fumaria sepium
Furcraea foetida
Galactites tomentosa
Galinsoga parviflora
Galinsoga quadriradiata
Galium aparine
Galium murale
Galium parisiense
Galium productum
Galium scabrum
Galium verrucosum
Gamochaeta calviceps
Gamochaeta pensylvanica
Gastridium phleoides
Gastridium ventricosum
Gaudinia fragilis
Genista tenera
Gennaria diphylla
Geranium dissectum
Geranium lucidum
Geranium maderense
Geranium molle
Geranium palmatum
Geranium purpureum
Geranium robertianum
Geranium rotundifolium
Geranium rubescens
Gladiolus cardinalis
Sisymbrium officinale
Sisymbrium orientale
Smilax canariensis
Smilax pendulina
Solanum linnaeanum
Solanum mauritianum
Solanum nigrum nigrum
Solanum nigrum schultesii
Solanum patens
Solanum pseudocapsicum
Solanum villosum miniatum
Soleirolia soleirolii
Soliva stolonifera
Sonchus asper asper
Sonchus asper glaucescens
Sonchus fruticosus
Sonchus oleraceus
Sonchus pinnatus
Sonchus tenerrimus
Sonchus ustulatus maderensis
Sonchus ustulatus ustulatus
Sorbus maderensis
Sorghum halepense
Sparaxis grandiflora
Sparaxis tricolor
Spergula arvensis
Spergula fallax
Spergularia bocconei
Spergularia marina
Sphenopus divaricatus
Sporobolus africanus
Stachys arvensis
Stachys ocymastrum
Stachys sylvatica
Stellaria alsine
Stellaria media
Stenotaphrum secundatum
Stipa capensis

Gladiolus italicus
Globularia salicina
Glyceria declinata
Gomphocarpus fruticosus
Goodyera macrophylla
Hainardia cylindrica
Hakea sericea
Heberdenia excelsa
Hedera maderensis maderensis
Hedychium gardneranum
Hedypnois cretica
Helichrysum devium
Helichrysum foetidum
Helichrysum melaleucum
Helichrysum monizii
Helichrysum obconicum
Helichrysum petiolare
Helictotrichon marginatum
Heliotropium europaeum
Helminthotheca echioides
Herniaria cinerea
Hippocrepis multisiliquosa
Hirschfeldia incana
Holcus lanatus lanatus
Holcus mollis mollis
Hordeum marinum gussoneanum
Hordeum murinum glaucum
Hordeum murinum leporinum
Hydrangea macrophylla
Hyoscyamus albus
Hyparrhenia sinaica
Hypericum canariense
Hypericum glandulosum
Hypericum grandifolium
Hypericum humifusum
Hypericum linarifolium
Hypericum perfoliatum
Hypericum perforatum
Stipa neesiana
Suaeda vera
Succisa pratensis
Tagetes minuta
Tamarix gallica
Tamus edulis
Tanacetum parthenium
Taraxacum adamii
Taraxacum cacuminatum
Taraxacum duplidentifrons
Taraxacum hamatum
Taraxacum lainzii
Taraxacum lidianum
Taraxacum maderense
Taraxacum obovatum
Taraxacum officinale
Taraxacum praestans
Taxus baccata
Tecoma capensis
Teesdalia nudicaulis
Teline maderensis
Teline paivae
Tetragonia tetragonoides
Teucrium abutiloides
Teucrium betonicum
Teucrium francoi
Teucrium heterophyllum heterophyllum
Thlaspi arvense
Thymus micans
Tibouchina urvilleana
Tigridia pavonia
Tinantia erecta
Tolpis barbata barbata
Tolpis macrorhiza
Tolpis succulenta
Torilis arvensis arvensis
Torilis arvensis neglecta
Torilis arvensis purpurea

Hypericum undulatum
Hypochoeris glabra
Hypochoeris radicata
Ilex canariensis
Ilex perado perado
Illecebrum verticillatum
Impatiens balsamina
Impatiens sodenii
Impatiens walleriana
Ipomoea indica
Ipomoea ochracea
Ipomoea purpurea
Iris foetidissima
Iris pseudacorus
Iris xiphium
Isatis tinctoria
Isolepis cernua
Isolepis setacea
Isoplexis sceptrum
Ixia maculata
Jasione montana
Jasminum azoricum
Jasminum odoratissimum
Juncellus laevigatus laevigatus
Juncus acutus acutus
Juncus acutus leopoldii
Juncus articulatus
Juncus bufonius
Juncus bulbosus
Juncus capitatus
Juncus conglomeratus
Juncus effusus
Juncus foliosus
Juncus hybridus
Juncus inflexus
Juncus sorrentinii
Juncus tenuis
Juniperus cedrus maderensis
Torilis nodosa
Trachelium caeruleum caeruleum
Tradescantia fluminensis
Tradescantia pallida
Tradescantia virginiana
Tradescantia zebrina
Tragopogon hybridus
Trifolium angustifolium
Trifolium arvense
Trifolium bocconei
Trifolium campestre
Trifolium cernuum
Trifolium cherleri
Trifolium dubium
Trifolium fragiferum
Trifolium glomeratum
Trifolium incarnatum
Trifolium isthmocarpum
Trifolium lappaceum
Trifolium ligusticum
Trifolium ornithopodioides
Trifolium pratense
Trifolium repens
Trifolium resupinatum
Trifolium scabrum
Trifolium squamosum
Trifolium stellatum
Trifolium striatum striatum
Trifolium subterraneum subterraneum
Trifolium suffocatum
Trifolium tomentosum
Triplachne nitens
Tropaeolum majus
Ulex europaeus latebracteatus
Ulex minor
Umbilicus gaditanus
Umbilicus rupestris
Urospermum picroides

Juniperus turbinata canariensis
Kalanchoe daigremontiana
Kalanchoe delagonensis
Kalanchoe fedtschenkoi
Kalanchoe pinnata
Kickxia elatine elatine
Kickxia lanigera
Kickxia spuria integrifolia
Koeleria loweana
Krubera peregrina
Kyllinga brevifolia
Lablab purpureus
Lactuca serriola
Lactuca virosa
Lagurus ovatus
Lamarckia aurea
Lamiastrum galeobdolon
Lamium amplexicaule
Lamium hybridum
Lamium purpureum
Lantana camara
Lapsana communis communis
Lathyrus angulatus
Lathyrus annuus
Lathyrus aphaca
Lathyrus cicera
Lathyrus clymenum
Lathyrus ochrus
Lathyrus odoratus
Lathyrus sativus
Lathyrus sphaericus
Lathyrus sylvestris
Lathyrus tingitanus
Launaea arborescens
Laurus novocanariensis
Lavandula pedunculata maderensis
Lavandula pinnata
Lavandula viridis
Urtica membranacea
Urtica morifolia
Urtica portosanctana
Urtica urens
Vaccinium padifolium
Valerianella dentata
Valerianella locusta locusta
Valerianella microcarpa
Verbascum densiflorum
Verbascum pulverulentum
Verbascum sinuatum
Verbascum thapsus thapsus
Verbascum virgatum
Verbena bonariensis
Verbena officinalis
Verbena rigida
Veronica agrestis
Veronica anagallis-aquatica
Veronica arvensis
Veronica hederifolia
Veronica officinalis
Veronica persica
Veronica polita
Veronica serpyllifolia
Vicia angustifolia
Vicia articulata
Vicia benghalensis
Vicia capreolata
Vicia cordata
Vicia disperma
Vicia ervilia
Vicia hirsuta
Vicia lutea lutea
Vicia lutea vestita
Vicia narbonensis
Vicia parviflora
Vicia pubescens
Vinca major

Lavatera arborea
Lavatera cretica
Legousia hybrida
Legousia scabra
Lemna gibba
Lemna minor
Lens culinaris
Leontodon taraxacoides longirostris
Lepidium bonariense
Lepidium ruderale
Lepidium sativum
Lepidium virginicum
Leptospermum scoparium
Leucaena leucocephala
Leucanthemum vulgare
Viola arvensis
Viola odorata
Viola paradoxa
Viola riviniana
Visnea mocanera
Vitis vinifera
Vulpia bromoides
Vulpia geniculata
Vulpia muralis
Vulpia myuros
Wahlenbergia lobelioides lobelioides
Watsonia borbonica ardernei
Watsonia meriana
Wigandia caracasana
Xanthium strumarium strumarium

19.3.4.4. Chlorophyta – 6 species

Enteromorpha intestinalis
Codium adhaerens
Ulva lactuca
Valonia utricularis
Chaetomorpha linum
Codium fragile atlanticum

19.3.4.5. Rhodophyta – 3 species

Asparagopsis armata
Corallina officinalis
Jania rubens

19.3.4.6 Ochrophyta – 4 species

Halopteris filicina
Lobophora variegata
Dictyota dichotoma
Padina pavonia

19.3.5. Animalia

19.3.5.1. Porifera - 2 species

Petrosia ficiformis
Aplysina aerophoba

19.3.5.2. Platyhelminthes – 7 species

Andrya cuniculi
Kontikia bulbosa
Mosgovoyia ctenoides
Microplana hovassei
Fasciola hepatica
Microplana terrestris
Bipalium kewense

19.3.5.3. Annelida – 36 species

Dina lineata
Octolasion lacteum
Helobdella stagnalis
Amynthas corticis
Lumbriculus variegatus
Amynthas gracilis
Microscolex dubius
Amynthas morrisi
Microscolex phosphoreus
Metaphire californica
Allolobophora chlorotica
Ocnerodrilus occidentalis
Allolobophoridella eiseni
Dichogaster bolaui
Aporrectodea caliginosa
Fridericia bulbosa
Aporrectodea molleri
Allonais paraguayensis
Dendrobaena hortensis
Aulophorus furcatus
Dendrobaena lusitana
Dero obtusa
Dendrobaena madeirensis
Nais communis
Dendrobaena octaedra
Nais elinguis
Dendrodrilus rubidus
Nais pardalis
Eisenia fetida
Nais variabilis
Eiseniella tetraedra
Ophidonais serpentina
Lumbricus rubellus
Slavina appendiculata
Lumbricus terrestris
Tubifex tubifex

19.3.5.4. Nematoda – 63 species

Aphelenchoides fragariae
Aphelenchoides ritzemabosi
Xiphinema brevicollum
Xiphinema dissimile
Xiphinema diversicaudatum
Xiphinema index
Xiphinema intermedium
Xiphinema madeirense
Xiphinema pachtaicum
Xiphinema pachydermum
Xiphinema pseudocoxi
Xiphinema pyrenaicum
Xiphinema sahelense
Xiphinema santos
Trichuris leporis
Trichuris ovis
Trichuris vulpis
Stenonchulus troglodytes
Paratrichodorus acutus
Paratrichodorus allius
Paratrichodorus minor
Paratrichodorus porosus
Toxocara canis
Toxocara cati
Toxocara vitulorum
Ascaridia columbae
Ascaridia galli
Heterakis gallinarum
Spinicauda dugesii
Dermatoxys hispaniensis
Passalurus ambiguus
Caenorhabditis elegans
Strongyloides papillosus
Acanthocheilonema dracunculoides
Dipetalonema reconditum
Dirofilaria immitis
Ancylostoma caninum
Bunostomum trigonocephalum
Chabertia ovina
Oesophagostomum radiatum
Dictyocaulus filaria
Nematodirus spathiger
Protostrongylus rufescens
Graphidium strigosum
Haemonchus contortus
Haemonchus placei
Ostertagia ostertagi
Teladorsagia circumcincta
Trichostrongylus colubriformis
Trichostrongylus retortaeformis
Globodera pallida
Globodera rostochiensis
Helicotylenchus multicinctus
Rotylenchus buxophilus
Meloidogyne chitwoodi
Meloidogyne hapla
Meloidogyne incognita
Meloidogyne javanica
Pratylenchus brachyuris
Pratylenchus coffeae
Pratylenchus goodeyi
Radopholus similis
Rotylenchulus reniformis

19.3.5.5. Mollusca – 184 species

Actinella actinophora actinophora
Actinella arcta
Actinella armitageana
Actinella arridens
Actinella carinofausta
Actinella fausta
Actinella giramica
Actinella lentiginosa lentiginosa
Actinella lentiginosa stellaris
Actinella nitidiuscula nitidiuscula
Actinella obserata
Actinella robusta
Amphorella iridescens
Amphorella mitriformis
Amphorella tornatellina
Ancylus aduncus
Aporrhais pespelecani
Arion hortensis
Arion intermedius
Arion lusitanicus
Arion pascalianus
Assiminea eliae
Boettgeria crispa
Boettgeria deltostoma deltostoma
Boettgeria depauperata
Boettgeria exigua
Boettgeria obesiuscula
Bolma rugosa
Candidula intersecta
Caracollina lenticula
Carychium minimum
Carychium tridentatum
Caseolus abjectus candisatus
Caseolus calvus calvus
Caseolus calvus galeatus
Leiostyla abbreviata
Leiostyla anglica
Leiostyla arborea
Leiostyla cassidula
Leiostyla cheilogona
Leiostyla colvillei
Leiostyla concinna
Leiostyla falknerorum
Leiostyla filicum
Leiostyla fusca
Leiostyla gibba
Leiostyla heterodon
Leiostyla irrigua
Leiostyla lamellosa
Leiostyla laurinea
Leiostyla loweana loweana
Leiostyla loweana transiens
Leiostyla millegrana
Leiostyla recta recta
Leiostyla simulator
Leiostyla sphinctostoma
Leiostyla vincta mauli
Leiostyla vincta vincta
Leiostyla vincta watsoniana
Leptaxis furva
Leptaxis groviana groviana
Leptaxis membranacea
Leptaxis simia advenoides
Leptaxis simia simia
Leucophytia bidentada
Limacus flavus
Limax maximus
Lucilla scintilla
Lucilla singleyana
Luria lurida

Caseolus leptosticus leptosticus
Cecilioides acicula
Cecilioides eulima
Cochlicella acuta
Cochlicella barbara
Cochlicopa lubrica
Cochlicopa lubricella
Cochlicopa repentina
Columella microspora
Cornu aspersum aspersum
Craspedaria delphinuloides
Craspedaria moniziana
Craspedaria tiarella
Craspedaria watsoni
Craspedopoma lyonnetianum
Craspedopoma monizianum
Craspedopoma mucronatum
Craspedopoma neritoides
Craspedopoma trochoideum
Deroceras laeve
Deroceras lombricoides
Deroceras panormitanum
Deroceras reticulatum
Discocharopa aperta
Discula polymorpha agostinhoensis
Discula polymorpha alleniana
Discula polymorpha arenicola
Discula polymorpha depressiuscula
Discula polymorpha nebulata
Discula polymorpha polymorpha
Discula tabellata
Discullela compar
Discullela madeirensis madeirensis
Discullela madeirensis taeniata
Discullela spirulina
Discus guerinianus guerinianus
Discus rotundatus rotundatus
Epitonium clathrus
Mercuria balearica
Mercuria similis
Microxeromagna lowei
Milax gagates
Monodonta atrata
Nesovitrea hammonis
Oestophora barbula
Otala lactea lactea
Ovatella aequalis
Oxychilus alliarius
Oxychilus cellarius
Oxychilus draparnaudi draparnaudi
Paludinella littorina
Paralaoma servilis
Patella aspera
Patella candei
Patella piperata
Pedipes pedipes
Physella acuta
Pisidium casertanum
Pisidium personatum
Plagyrona placida
Planorbarius corneus corneus
Planorbella duryi
Planorbis moquini
Plutonia albopalliata
Plutonia behnii
Plutonia marcida
Plutonia nitida
Plutonia ruivensis
Pseudomelampus exiguus
Punctum pygmaeum
Pyrgella leacociana
Radix balthica
Rumina decollata
Rumina saharica
Spirorbula latens
Spirorbula squalida

Epitonium lamellosum
Erosaria spurca
Ferussacia folliculus
Galba truncatula
Gibbula umbilicalis
Gyraulus albus
Gyraulus parvus
Haliotis tuberculata
Hawaiia minuscula
Helicodiscus parallelus
Hemilauria limnaeana
Heterostoma desertae
Heterostoma pauperculum
Janulus bifrons
Janulus stephanophorus
Jujubinus exasperatus
Lauria cylindracea
Lauria fanalensis
Lehmannia valentiana
Staurodon seminulum
Stramonita haemastoma
Testacella haliotidea
Testacella maugei
Theba pisana pisana
Truncatella subcylindrica
Truncatellina linearis
Turritela turbona
Vallonia costata
Vallonia excentrica
Vallonia pulchella
Vertigo pygmaea
Vitrea contracta
Xerotricha apicina
Xerotricha conspurcata
yosotella denticulata
yosotella myosotis
Zonitoides arboreus
Zonitoides nitidus

19.3.5.6. Arthropoda – 3886 species

Abrolophus neobrevicollis
Acalles albolineatus
Acalles cinereus
Acalles coarctatus
Acalles dispar achadagrandensis
Acalles dispar dispar
Acalles festivus
Acalles globulipennis
Acalles histrionicus
Acalles machadoi
Acalles neptunus
Acalles nodiferus
Acalles oblitus
Acalles portosantoensis
Acalles pulverosus
Leia arsona
Leipaspis caulicola oceanica
Leipommata calcarata
Leipommata oromiana
Leistus ellipticus
Lepacis ozines
Lepidapion squamidorsum
Lepidocyrtus curvicollis
Lepidocyrtus montseniensis
Lepidocyrtus paradoxus
Lepidophallus hesperius
Lepidosaphes beckii
Lepidosaphes gloverii
Lepidosaphes pinnaeformis
Lepidosaphes ulmi

Acalles saxicola
Acalles senilis oceanicus
Acalles terminalis
Acalles tolpis
Acalles tristaensis
Acalles vau
Acalypta parvula
Acanthiophilus helianthi
Acanthiophilus walkeri
Acanthoscelides obtectus
Acarus siro
Acerentulus confinis maderensis
Acerentulus cunhai
Acerentulus ladeiroi
Aceria barroisi
Aceria sheldoni
Achaearanea acoreensis
Achenium hartungii
Acherontia atropos
Acheta domestica
Acheta hispanicus
Acheta meridionalis
Achroia grisella
Achrysocharoides atys
Achrysocharoides parva
Acipes decolor
Acipes lateralis
Acipes portosantoensis
Acipes serratus
Acipes waldeni
AcipesAtlanticus
Aclastus glabriventris
Aclastus gracilis
Aclastus macro
Aclastus solutus
Acleris variegana
Acontia lucida
Aconurella prolixa
Acritus homoeopathicus
Lepinotus inquilinus
Lepinotus reticulatus
Lepisma saccharina
Leptacinus pusillus
Leptacis vlugi
Lepthyphantes impudicus
Lepthyphantes mauli
LepthyphantesLundbladi
Leptobium paivae
Leptocera caenosa
Leptocera nigra
Leptodrassus hylaestomachi
Leptoiulus piceus
Leptomastix epona
Leptophloeus axillaris
Leptophloeus stenoides
Leptopilina boulardi
Leptopilina fimbriata
Leptopilina heterotoma
Leptotes pirithous
Leptotrichus leptotrichoides
Leptotrichus panzeri
Leptoylla segnis
Leptus millipedius
Lessertia dentichelis
Lestodiplosis longofilis
Lestremia cinerea
Leucania loreyi
Leucaspis lowi
Leucaspis pusilla
Leucohimatium arundinaceum
Leucopis griseola
Leucoptera malifoliella
Leucostoma crassum
Leucostoma engeddense
Liacarus madeirensis
Liacarus mucronatus
Liancalus glaucus
Liancalus virens

Acritus nigricornis
Acroclita guanchana
Acroclita subsequana
AcroclitaAnelpista
Acrogalumna longipluma
Acrolepiois infundibulosa
Acrolepiois mauli
Acrolepiois vespertella
Acrosternum heegeri
Acrosternum millierei
Acrotrichis cephalotes
Acrotrichis fascicularis
Acrotrichis insularis
Acrotrichis matthewsii
Acrotrichis montandoni
Acrotrichis sanctaehelenae
Acrotrichis sericans
Acrotrichis thoracica
Acrotrichis umbricola
Acrotrichis williamsi
Acrotylus insubricus
Acrotylus longipes
Aculo lycopersici
Aculus tetanothrix
Acupalpus brunneipes
Acupalpus notatus
Acyrthosiphon ilka
Acyrthosiphon lactucae
Acyrthosiphon malvae malvae
Acyrthosiphon pisum pisum
Acyrthosiphon spartii
Adalia bipunctata revelierei
Adalia decempunctata
Adalia testudinea
Adia cinerella
Adistemia watsoni
Aectrotanypus trifascipennis
Aedes aegypti
Aelia acuminata acuminata
Liburnia anthracina
Ligia italica
Limnebius grandicollis
Limnellia quadrata
Limnephilus cinctus
Limnesia atlantica
Limnophora bipunctata
Limnophora riparia
Limnophora setinerva
Limnophyes prolongatus
Limothri angulicornis
Limothri cerealium
Lindingaspis rossi
Lindorus lophanthae
Linepithema humile
Liophrurillus flavitarsis
Liorhyssus hyalinus
Lipaphis erysimi
Liparthrum artemisiae
Liparthrum bituberculatum
Liparthrum curtum
Liparthrum inarmatum
Liparthrum mandibulare
Liparthrum semidegener
Liposcelis bostrychophila
Liposcelis decolor
Liposcelis meridionalis
Liposcelis paetula
Lipothrix lubbocki
Liriomyza amoena
Liriomyza analis
Liriomyza euphorbiana
Liriomyza huidobrensis
Liriomyza orbona
Liriomyza strigata
Liris atrata
Lispe nana
Lispe tentaculata
Lispocephala mikii

Aelurillus lucasi
Aeolothri collaris
Aeolothri ericae
Aeolothri fallax
Aeolothri tenuicornis
Aepus gracilicornis desertarum
Aepus gracilicornis gracilicornis
Aethes francillana
Agabiformius lentus
Agabus maderensis
Agabus nebulosus
Agabus wollastoni
Agalenatea redii
Agdistis bifurcatus
Agdistis eudocanariensis
Agdistis salsolae
Agdistis tamaricis
Agistemus africana
Aglossa caprealis
Agonopterix perezi
Agonopterix scopariella
Agonum marginatum
Agrilus viridis viridis
Agriphila trabeatellus
AgriphilaAtlanticus
Agrius convolvuli
Agromyza reptans
Agrostothri meridionalis
Agrotis fortunata
Agrotis herzogi
Agrotis iilon
Agrotis lanzarotensis
Agrotis rutae
Agrotis segetum
Agrotis spinifera
Agrotis trux
AgrotisAtrux
Ahasverus advena
Aiolopus strepens strepens
Litargo pictus
Litargus coloratus
Litargus pilosus
Lithobius crassipes
Lithobius lusitanus
Lithobius melano
Lithobius pilicornis
Lithobius waldeni
Lithocharis ochracea
Lithocharis vilis
Lixus anguinus
Lixus cheiranthi
Lixus filiformis
Lixus juncii
Lixus pulverulentus
Lixus vectiformis
Lobesia neptunia
Loboptera decipiens decipiens
Loboptera fortunata
Lobrathium multipunctum
Locusta migratoria migratoria
Lonchidia clavicornis
Lonchoptera bifurcata
Lonchoptera lutea
Longitarsus aeneus
Longitarsus cerinthes
Longitarsus cinerariae
Longitarsus codinai
Longitarsus echii
Longitarsus isoplexidis
Longitarsus lycopi
Longitarsus nervosus
Longitarsus nigrofasciatus
Longitarsus nubigena
Longitarsus ochroleucus ochroleucus
Longitarsus ochroleucusLindbergi
Longitarsus ordinatus
Longitarsus parvulus
Longiunguis pyrarius

Aiolopus thalassinus thalassinus
Alebra viridis
Aleiodes apicalis
Aleiodes coxalis
Aleiodes gasterator
Aleiodes gastritor
Aleiodes testaceus
Aleochara binotata
Aleochara clavicornis
Aleochara funebris
Aleochara lindbergi
Aleochara moesta
Aleochara puberula
Aleochara verna
Aleurodicus dispersus
Aleuroplatus perseaphagus
Aleurothrixus floccosus
Aleurotrachelus rhamnicola
Aleyrodes proletella
Allodia ornaticollis
Allodia pistillata
Allogalumna alamellae
Allopauropus aristatus
Allopauropus brincki
Allopauropus cuenoti
Allopauropus dahli
Allopauropus gracilis
Allopauropus laurinus
Allopauropus millotianus
Allopauropus subminutus
Allopauropus vulgaris
AllopauropusAlicundus
Allotropa conventus
Alloxantha fulva
Alloxysta brevis
Alloxysta minuta
Alloxysta pedestris
Alloxysta victrix
Aloconota granulosa
Lonympha carne
Lordiphosa andalusiaca
Lordithon thoracicus
Loricera wollastonii
LoriculaLundbladi
Lorryia ferula
Lorryia stellata
Lotophila atra
Loxosceles rufescens
Lucasius myrmecophilus
Lucasius scitus
Lucilia sericata
Luffia lapidella
Luperina madeirae
Lycaena phlaeas phlaeoides
Lycoriella conspicua
Lycosoides coarctata
Lyctocoris campestris
Lyctocoris dimidiatus
Lyctus brunneus
Lygus maritimus
Lymexylon navale
Lymnophyes madeirae
Lymnophyes minimus
Lymnophyes natalensis
Lymnophyes pentaplastus
Lynicus exhortator
Lysibia nana
Lysiphlebus fabarum
Lysiphlebus testaceipes
Macaridion barreti
Macaroeris cata
Macaroeris desertensis
Macaroeris diligens
Macaroeris moebi
Macaroeris nidicolens
Machilinus portosantensis
Machimus madeirensis
Machimus monticola

Aloconota gregaria
Aloconota maderensis
Aloconota philonthoides
Aloconota planifrons
Aloconota sulcifrons
Alphitobius diaperinus
Alphitobius laevigatus
Alysia alticola
Alysia atra
Alysia manducator
Amara aenea
Amara cottyi cottyi
Amara superans
Amaurorhinus bewickianus
Amaurorhinus clermonti salvagis
Amaurorhinus monizianus monizianus
Amblyolpium franzi
Amblyptilia acanthadactyla
Amblyseius largoensis
Amblyteles armatorius
Amegilla maderae
Amerus troisi
Amischa analis
Amischa decipiens
Amischa nigrofusca
Amitus fuscipennis
Amitus longicornis
Amitus spiniferus
Ammeia pulchella
Amphiareus constrictus
Amphibolothri grassii Buffa
Amphorophora rubi
Anacaena conglobata
Anacaena marchantiae
Anacharis euchariodes
Anacharis inmunis
Anagyrus aligarhensis
Anagyrus belibus
Anagyrus bohemani
Machimus novarensis
Machimus portosanctanus
Macrocentrus collaris
Macrocentrus madeirensis
Macrocoma oromiana
Macrodiplosis pustularis
Macroglossum stellatarum
Macrolophus pygmaeus
Macronychia striginervis
Macropelopia nebulosa
Macrosiphoniella artemisiae
Macrosiphoniella madeirensis
Macrosiphoniella millefolii
Macrosiphoniella sanborni
Macrosiphoniella tapuskae
Macrosiphum euphorbiae
Macrosiphum rosae
Macrosteles ossiannilssoni
Macrosteles ramosus
Macrosthetus tuberculatus
Maculolachnus submacula
Madeirostiba truncorum
Maderentulus maderensis
Madiza glabra
Magdalis barbicornis
Mahencyrtus comara
Makaronesa basicyanea
Makaronesa carinus
Makaronesa obscuripes
Makaronesa obumbrata
Makaronesa tetraspila
Makaronesa tinctipennis
Makarorysa madeco
MakarorysaMadalta
Malacomyia sciomyzina
Malthinus scriptus
Malthodes kiesenwetteri
MalvapioMalvae
Mangora acalypha

Anagyrus eudococci
Anamastigona pulchella
Anapausis wollastoni
Anaphothri graminum Priesner
Anaphothri obscurus
Anaspis imitator
Anaspis proteus
Anastatus bifasciatus
Anatella atlanticiliata
Anax ephippiger
Anax imperator
Anax parthenope
Ancistrocerus gazella
Ancistrocerus madaera
Ancistrocerus parietum
Ancylosis convexella
Ancylosis roscidella
Andrena maderensis maderensis
Andrena wollastoni wollastoni
Andricus foecundatrix
Anechura schmitzi
Anemophilus crassus
Anemophilus subtessellatus
Anemophilus trossulus
Aneuclis incidens
Aneurhynchus galesiformis
Aneuropria foersteri
Anillobius portosantoi
Anillobius solifuga
Anisodactylus binotatus
Anisoebilis canariensis
Anisolabis maritima
Anisopilothri venustulus
Anisopteromalus calandrae
Anobium punctatum
Anoecia corni
Anoecia vagans
Anomaloppia madeirensis
Anommatus duodecimstriatus
Mantara bifurcata
Mantis religiosa
Mantura chrysanthemi
Maoriocus koriflae
Masoreus orientalis nobilis
Mastrus rufulus
Mauleus maderensis
Mayetia moscosoensis
Mayetia nevesi
Mayridia formosula
Mecyna asinalis
Medon apicalis
Medon indigena
Medon ripicola
Medon vicentensis
Megacara hortulana
Megachile versicolor
Megalothorax minimus
Megamelodes quadrimaculatus
Megarthrus longicornis
Megaselia angusta
Megaselia angustiata
Megaselia basispinata
Megaselia giraudii
Megaselia lata
Megaselia longicostalis
Megaselia marina
Megaselia nigra
Megaselia pleuralis
Megaselia ruficornis
Megaselia rufipes
Megaselia scalaris
Megaselia subpleuralis
Megasternum concinnum
Megastylus orbitator
Megophthalmidia decora
Meioneta fuscipalpa
Meladema lanio
Melanaphis bambusae

Anommatus maderensis
Anopheles cinereus
Anoscopus albifrons
Anoscopus assimilis
Anotylus complanatus
Anotylus glareosus
Anotylus insignitus
Anotylus nitidifrons
Anotylus nitidulus
Antaxius spinibrachius
Anteon ephippiger
Anthelephila pedestris
Anthicus brunneus
Anthicus crinitus
Anthicus lubbockii
Anthocoris alienus
Anthocoris gallarumulmi
Anthocoris nemorum
Anthomyia maura
Anthomyia pluvialis
Anthomyza baezi
Anthomyza umbrosa
Anthophila threnodes
Anthrax anthrax
Anthrenus verbasci
Antigastra catalaunalis
Antlemon halidayi
Anurida granaria
Aonidiella aurantii
Aonidiella lauretorum
Aoplus madeirae
Apaeleticus inimicus
Apanteles appellator
Apanteles circumscriptus
Apanteles dorsalis
Apanteles phaloniae
Apanteles propinquus
Apanteles tedellae
Apanteles xanthostigma
Melanaphis donacis
Melanaspis smilacis
Melani alienus
Melanochaeta pubescens
Melanophila acuminata
Melanophthalma distinguenda
Melanophthalma fuscipennis
Melanostoma mellinum
Melanostoma wollastoni
Melanthri fuscus
Meligethes isoplexidis
Meligethes nigrescens
Meligethes planiusculus
Meligethes varicollis
Meliscaeva auricollis
Melittobia acasta
Meloboris collector
Meloe austrinus
Meloe flavicomus
Meloe mediterraneus
Melyrosoma abdominale
Melyrosoma artemisiae
Melyrosoma oceanicum
Menemerus semilimbatus
Menophra maderae
Merismus megapterus
Merrifieldia bystropogonis
Mesapamea maderensis
Mesaphorura krausbaueri
Mesiotelus maderianus
Mesochorus curvulus
Mesochorus madeirensis
Mesochorus nuncupator
Mesochorus stigmator
Mesogastrura libyca
Mesophylax oblitus
Mesopolobus aequus
Mesopolobus fuscipes
Mesopolobus laticornis

Apatema fasciata
Aperileptus lineatocollis
Aphaereta minuta
Aphanarthrum bicolor
Aphanarthrum euphorbiae
Aphanarthrum piscatorium
Aphaniosoma obscuratum
Aphanogmus bicolor
Aphanogmus clavicornis
Aphanogmus fumipennis
Aphanogmus microneurus
Aphanogmus vicinus
Aphanus rolandri
Aphelinus abdominalis
Aphelinus asychis
Aphelinus chaonia
Aphelinus humilis
Aphelinus varipes
Aphidius avenae
Aphidius ervi
Aphidius matricariae
Aphidius rhopalosiphi
Aphidius ribis
Aphidius smithi
Aphidius urticae
Aphis caellae
Aphis craccivora
Aphis epilobii
Aphis fabae
Aphis farinosa
Aphis gossypii
Aphis hederae
Aphis nasturtii
Aphis nerii
Aphis paralios
Aphis parietariae
Aphis pomi
Aphis praeterita
Aphis punicae
Mesopolobus tibialis
Messor structor
Meta barreti Kulczynski
Meta obscura
Meta stridulans
Metanotalia maderensis
Metaphorura affinis
Metaphycus dispar
Metaphycus flavus
Metellina merianae
Meteorus affinis
Meteorus cinctellus
Meteorus pendulus
Meteorus versicolor
Methorasa latreillei
Metoia ampliata
Metophthalmus asperatus
Metophthalmus exiguus
Metophthalmus ferrugineus
Metophthalmus sculpturatus
Metopolophium dirhodum
Metopolophium festucae
Metriocnemus eurynotus
Metriocnemus fuscipes
Mezium affine
Mezium americanum
Mezium sulcatum
Miastor metraloas
Micaria albovittata
Micaria pallipes
Micracreagrella caeca madeirensis
Micracreagrina madeirensis
Micrambe ulicis
Micranurida pygmaea
Micrelytra fossularum
Micreremus brevipes
Microchironomus deribae
Microctenonyx subitaneus
Microectra junci

Aphis ruborum
Aphis sarothamni
Aphis sedi
Aphis solanella
Aphis spiraecola
Aphis tirucallis
Aphis ulicis
Aphis umbrella
Aphodius eudolividus
Aphodius fimetarius
Aphodius ghardimaouensis
Aphodius granarius
Aphodius hydrochaeris
Aphodius pedrosi
Aphodius sturmi
Aphrodes bicinctus
Aphrodes brachypterus
Aphrosylus jucundus
Aphrosylus madeirensis
Aphrosylus venator
AphrosylusAtlanticus
Apion frumentarium
Apis mellifera
Aplomyia confinis
Aploneura lentisci
Apocheiridium ferum
Aporodes floralis
Apotetrastichus contractus
Apotomus chaudoirii
Aprionus spiniger
Aproaerema anthyllidella elachistella
Aprostocetus flavifrons
Aprostocetus grylli
Aprostocetus hagenowii
Aprostocetus hians
Aprostocetus microcosmus
Aprostocetus nubigenus
Aprostocetus occidentalis
Aprostocetus pausiris
Microlestes corticalis
Microlestes luctuosus chobauti
Microlestes negrita
Microlinyphia johnsoni
Micromus angulatus
Micromus sjostedti
Microplax interrupta
Microplitis aduncus
Microplitis spectabilis
Micropsectra freyi
Micropteromyia ghilarovi
Microstagetus parvulus
Microterys colligatus
Microterys nietneri
Microvelia gracillima
Microvelia pygmaea
Miktoniscus arcangelii
Miktoniscus chavesi
Miktoniscus linearis
Miktoniscus patiencei
Milesia crabroniformis
Milichiella lacteipennis
Minilimosina fungicola
Minilimosina parvula
Minilimosina vitripennis
Miotropis unipuncta
Mirax rufilabris
Miscogaster glabricula
Misumena nigromaculata
Misumena spinifera
Mniophilosoma laeve
Mniotype albostigmata
Mocuellus collinus
Modicogryllus burdigalensis burdigalensis
Mogulones geographicus
Molophilus baezi
Monalocoris parvulus
Monelliois pecanis
Monochamus galloprovincialis

Aprostocetus phloeophthori
Aprostocetus toddaliae
Aprostocetus viatorum
Apterona helicoidella
Apterygothri wollastoni
Aptinothri rufus
Aradus lugubris
Araneus hortensis
Araniella maderiana
Arbiblatta chavesi
Arbiblatta infumata
Arctosa cinerea
Arctosa maderana
Arenocoris waltlii
Argiope bruennichi
Argiope trifasciata
Argyrodes argyrodes
Argyrodes incertus
Arhopalus ferus
Arhopalus rusticus
Arhopalus syriacus
Ariadna insidiatrix
Ariadna maderiana
Aridelus rufotestaceus
Armadillidium granulatum
Armadillidium tigris
Armadilloniscus ellipticus
Arrenurus autochthonus
Arrhenophagus chionaspidis
Arrhopalites caecus
Arrhopalites elegans
Arrhopalites mauli
Arthroli convexiuscula
Arthroli humilis
Arthroli picea
Arytinnis incuba
Arytinnis umbonata
Asaphes suspensus
Ascalenia echidnias
Monodiscodes intermedius
Monomorium carbonarium
Monomorium pharaonis
Monomorium subopacum
Monopis barbarosi
Monopis crocicapitella
Monopis herickxi
Monopis nigricantella
Monotoma longicollis
Monotoma picipes
Monotoma spinicollis
Montana barretoi
Montandoniola moraguesi
Moranila californica
MormiaMaderensis
Mosillus subsultans
Muellerianella fairmairei
Multioppia insulana
Musca biseta
Musca domestica
Musca osiris
Musca sorbens
Musca vitripennis
Muscina levida
Muscina prolaa
Muscina stabulans
Myathropa usta
Mycetaea subterranea
Mycetaspis personata
Mycetophila blanda
Mycetophila britannica
Mycetophila edwardsi
Mycetophila nigromadera
Mycetophila ocellus
Mycetophila perpallida
Mycetophila pictula
Mycetophila pumila
Mycetophila suffusala
Mycetophila trinotata

Ascogaster quadridentata
Ascotis fortunata wollastoni
Asecodes congruens
Asellus aquaticus
Asetadiptacus emiliae
Asianidia chinai
Asianidia chrysanthemi
Asianidia decolor
Asianidia insulana
Asianidia madeirensis
Asianidia melliferae
Asianidia vallicola
AsianidiaAlbula
AsianidiaAtlantica
Asobara tabida
Aspidapion radiolus chalybeipenne
Aspidiotus destructor
Aspidiotus maderensis
Aspidiotus nerii
Aspilota fuscicornis
Astata boops
Asteia amoena
Astenus bimaculatus
Astenus chimaera
Astenus lyonessius
Asterodiaspis variolosa
Asterolecanium rehi
Astichus maculipennis
Asymmetrasca decedens
Ataenius brevicollis
Ataenius heinekeni
Atherigona varia
Atheroides serrulatus
Atheta amicula
Atheta atramentaria
Atheta coriaria
Atheta crassicornis
Atheta gagatina
Atheta haligena
MycetophilaMadocella
Mycetoporus johnsoni
Mycetoporus johnsoni
Mycetoporus portosanctanus
Mycodiplosis melamorae
Mycomya prominens
Mymar taprobanicum
Myoocus eatoni
Myospila meditabunda
Myrmecina graminicola
Myrmecocephalus concinnus
MyrmecoporaMaritima
Myrmecoxenus picinus
Myrmeleon alternans
Myrrha octodecimguttata
Mythimna serradaguae
Mythimna unipuncta
Mythimna vitellina
Myzaphis bucktoni
Myzaphis rosarum
Myzocallis boerneri
Myzocallis castanicola
Myzocallis coryli
Myzocallis kuricola
Myzus ascalonicus
Myzus cerasi
Myzus cymbalariae
Myzus hemerocallis
Myzus ornatus
Myzus persicae
Nabis caiformis
Nabis eudoferus ibericus
Nabis valentinae
Nacaeus impressicollis
Nacerdes melanura
Nannophilus eximius
Napomyza lateralis
Nargus bicolor
Nargus vandeli

Atheta harwoodi
Atheta immucronata
Atheta insignis
Atheta leileri
Atheta longicornis
Atheta luridipennis
Atheta palustris
Atheta sanguinolenta
Atheta trinotata
Atheta zealandica
Atlantidium barretoi
Atlantidium mateui
Atlantidium secundum
Atlantochrysa atlantica
Atlantocis lauri
Atlantoocus adustus
Atlantoocus personatus
Atlantoocus semicircularis
Atomaria apicalis
Atomaria insecta
Atomaria munda
Atomaria pusilla
Atomaria scutellaris
AtomariaAlternans
Atomoscelis onusta
Atractides hystricipes
Atractides insulanus
Atractides macaronensis
Atractides maderensis
Atractides rutae
Atropacarus striculus insularis
Attalus lusitanicus lusitanicus
Attalus maderensis
Attalus minimus
Attalus oceanicus
Attalus remanei
Attalus rostratus
Attalus rugosus
Aturus atlantis
Nasonia vitripennis
Nasonovia dasyphylli
Nasonovia ribisnigri
Naubates harrisoni
Naubates pterodromi
Naupactus godmani
Neamerus lundbladi
Neanura muscorum
Nebrioporus dubius
Necremnus alticola
Necremnus artynes
Necremnus cosconius
Necremnus folia
Necremnus fumatus
Necrobia ruficollis
Necrobia rufipes
Neelus murinus
Nehemitropia lividipennis
Nemorilla maculosa
Neoascia podagrica
Neoasterolepisma myrmecobia
Neoasterolepisma pelagodromae
Neobisnius lathrobioides
Neochrysocharis aratus
Neoclytus acuminatus
Neoderelomus piriformis
Neomariania rebeli
Neomyia cornicina
Neomyzus circumflexus
Neoscona crucifera
Neoscona subfusca
Neotoxoptera formosana
Neotoxoptera oliveri
Neotrama maritima
Neotrichoporoides dispersus
Neotrichoporoides intaminatus
Neotrichoporoides mediterraneus
Neotrichoporoides viridimaculatus
Neottiura herbigrada

Atyaephyra desmaresti
Aulacaspis rosae
Aulacaspis tubercularis
Aulacigaster falcata
Aulacigaster leucopeza
Aulacoderus maderae
Aulacorthum solani
Auletobius maderensis
Aulonothroscus integer
Austroagallia caboverdensis
Austroagallia hilaris
Austromenopon echinatum
Autographa gamma
Autophila dilucida
Azaisia obscura
Azaisia setitarsis
Bacillothri bagnalli
Bactra lancealana
Bactra minima
Bactra venosana
Bactrocera oleae
Baeonotus micro
Baetis enigmaticus
Baetis maderensis
Balclutha frontalis
Balclutha pellucens
Bamboosiella repentina
Bambusaphis bambusae
Banchus insulanus
Barretonus desertae
Barretonus hinterseheri
Barretonus major
Barretonus minor
Baryconus europaeus
Barypeithes indigens indigens
Baryscapus diaphantus
Bedellia somnulentella
Belaphotroctes atlanticus
Belba interlamellaris
Nephanes titan
Nephopterix angustella
Nephrotoma antithrix
Nephrotoma brevipennis
Nephrotoma lucida
Nephus conjunctus
Nephus depressiusculus
Nephus flavopictus
Nephus hiekei
Nesacinopus pelagicus
Nesarpalus cimensis cimensis
Nesarpalus cimensis maderae
Nesarpalus gregarius
Nesidiocoris tenuis
Nesoclutha erythrocephala
Nesophrosyne cellulosa
Nesotes arboricola
Nesotes asper asper
Nesotes asper maderensis
Nesotes confertus colasi
Nesotes confertus confertus
Nesotes congregatus
Nesotes futilis
Nesotes gagatinus
Nesotes graniger
Nesotes infernus infernus
Nesotes infernus wollastoni
Nesotes leacoccianus
Nesotes lucifugus lucifugus
Nesotes lucifugus maritimus
Nesotes monodi
Nesotes obliteratus
Nesotes portosanctanus
Nesotes subdepressus
Nesothri propinquus
Nesticodes rufipes
Netelia testacea
Netelia thoracica
Neumania atlantida

Belopus elongatus
Bembidion atlanticum atlanticum
Bembidion illigeri
Bembidion schmidti schmidti
Bembidion tabellatum
Bembidion tethys
Bemisia afer
Bemisia afer
Bemisia lauracea
Bemisia tabaci
Beosus maritimus
Berginus tamarisci
Bertkauia lucifuga
Berytinus hirticornis pilipes
Berytinus montivagus
Bethylus boo
Bethylus fuscicornis
Bethylus latus
Bethylus linearis
Bethylus tenuis
Binodoxys angelicae
Biosteres wesmaelii
Bisnius cephalotes
Bisnius sordidus
Blabinotus spinicollis
Blacus armatulus
Blacus exilis
Blacus humilis
Blacus pappianus
Blacus ruficornis
Blaniulus guttulatus
Blaps gigas
Blaps lethifera
Blastobasis adustella
Blastobasis decolorella
Blastobasis desertarum
Blastobasis divisus
Blastobasis insularis
Blastobasis lacticolella
Neurocladus brachiidens
Neuroterus anthracinus
Neuroterus aprilinus
Neurotomia coenulentella
Nezara viridula
Nicobium castaneum
Nicobium velatum
Niditinea fuscella
Nielseniella brinki
Nielseniella maderensis
Nigma puella
Nipaecoccus nipae
Nitidula carnaria
Nitidula flavomaculata
Noctua pronuba
Noctua teixeirai
Nomophila noctuella
Nopoiulus kochii
Norbanus cerasio
Norrbomia marginatis
Nosferatumyia no
Nosoyllus fasciatus
Nostima picta
Nothrotrombidium lundbladi
Nothrus palustris
Notiophilus geminatus
Notiophilus quadripunctatus
Nycterosea obstipata
Nycteus meridionalis
Nysius contiguus
Nysius cymoides
Nysius ericae ericae
Nysius immunis
Ochlerotatus eatoni
Ochropleura leucogaster
Ochrosis ventralis
Ochthebius algicola
Ochthebius heeri
Ochthebius quadrifoveolatus

Blastobasis laurisilvae
Blastobasis lavernella
Blastobasis luteella
Blastobasis marmorosella
Blastobasis maroccanella
Blastobasis nigromaculata
Blastobasis ochreopalpella
Blastobasis pica
Blastobasis rebeli
Blastobasis salebrosella
Blastobasis serradaguae
Blastobasis spectabilella
Blastobasis splens
Blastobasis subdivisus
Blastobasis virgatella
Blastobasis vittata
Blastobasis walsinghami
Blastobasis wolffi
Blastobasis wollastoni
BlastobasisBassii
Blatta orientalis
Blattella germanica
Blepharita inexspectata
Bogidiella madeirae
Boletina nigravena
Bolitophila saundersii
Bolothri insularis
Bombus maderensis
Bombus ruderatus
Boophilus annulatus
Boreoheptagyia legeri
Boromorphus maderae
Botyodes diniasalis
Bourletiella arvalis
Bourletiella bicincta
Brachycarenus tigrinus
Brachycaudus bicolor
Brachycaudus cardui
Brachycaudus helichrysi
Ochthebius rugulosus
Ochthebius subpictus subpictus
Octotemnus opacus
Ocypus aethio
Ocypus fortunatarum
Ocypus obscuroaeneus schatzmayri
Ocypus olens
Ocypus pedemontanus
Ocys harpaloides
Odonaspis saccharicaulis
Odontocepheus elongatus
Odontothri retamae
Odontothri ulicis
Oecanthus pellucens pellucens
Oecia oecophila
Oecobius minor
Oecobius navus
Oecobius selvagensis
Oecobius similis
Oedaleus decorus decorus
Oedemera barbara
Oestrus ovis
Oinophila v-flava
Oius lethierryi
Olibrus affinis
Olibrus bicolor
Olibrus cinerariae
Olibrus liquidus
Olibrus millefolii
Oligomerus ptilinoides
Oligonychus perseae
Oligosita subfasciata
Oligota analis
Oligota canariensis
Oligota muensteri
Oligota parva
Oligota punctulata
Oligota pusillima
Oligota selvagensis

Brachycaudus rumexicolens
Brachycaudus schwartzi
Brachydesmus proximus
Brachydesmus superus
Brachyiulus lusitanus
Brachyiulus pusillus
Brachymeria minuta
Brachypeplus mauli
Brachypogon griseipennis
Brachypterolus antirrhini
Brachypterona vieirai
Brachypterus labiatus
Brachysteles wollastoni
Brachystomella parvula
Bracon chiloecus
Bracon ericeti
Bracon hebetor
Bradleycypris obliqua
Bradycellus assingi
Bradycellus excultus
Bradycellus harpalinus
Bradycellus maderensis
Bradycellus wollastoni
Bradysia diversispina
Bradysia nitidicollis
Brevicornu griseicolle
Brevicornu intermedium
Brevicornu sericoma
Brevicornu verralli
Brevicoryne brassicae
Brevipalpus obovatus
Brevipalpus phoenicis
Brindalus maderae
Brindalus schatzmayri
Brontaea tonitrui
Bruchidius Decellei
Bruchidius foveolatus
Bruchidius lichenicola
Bruchidius lividimanus
Oligotoma nigra
Olisthopus elongatus
Olisthopus ericae
Olisthopus humerosus
Olisthopus maderensis acutangulus
Olisthopus maderensis maderensis
Olpium pallipes
Omalium ocellatum
Ommatoiulus moreletii
Omonadus floralis
Omosita colon
Omosita discoidea
Oncocephalus pilicornis
Oncopodura crassicornis
Oniscus asellus
Ontsira antica
Onychiurus circulans
Onychiurus eudostachianus
Onychiurus ghidinii
Onychiurus insubrarius
Ooctonus vulgatus
Ooencyrtus telenomicida
Opacifrons coxata
Opalimosina liliputana
Opalimosina mirabilis
Ophiomyia beckeri
Ophion atlanticus
Ophiusa tirhaca
Ophonus ardosiacus
Ophonus stictus
Opilo domesticus
Opilo mollis
Opogona omoscopa
Opogona sacchari
Opopaea concolor
Oppiella nova
Oranmorpha guerinii
Orchestes fagi
Orchisia costata

Bruchidius seminarius
Bruchidius varius
Bruchus pisorum
Bruchus rufimanus
Bryaxis lusitanicus
Bryaxis pandellei curticollis
Bryobia rubrioculus
Bryophaenocladius illimbatus
Bryophaenocladius subvernealis
Bryotropha domestica
Bryotropha plebejella
Buchananiella continua
Buchnerillo litoralis
Bunochelis spinifera
Byrsinus flavicornis
Byrsinus laticollis
Byrsinus pilosulus
Cacoecimorpha pronubana
Cacoylla atlantica
Cacoylla exima
Cacoylla pyri
Cadra cautella
Cadra figulilella
Caenois fissirostris
Caenois waltoni
Calacalles wollastoni
Calamoncosis minima
Calaphis flava
Calathus colasianus
Calathus complanatus complanatus
Calathus complanatus vandeli
Calathus fimbriatus
Calathus pecoudi
Calathus subfuscus
Calathus vividus
Cales noacki
Caliroa cerasi
Callaspidia mediterranea
Callaspidia notata
Oribatula cognata
Oribatula frisiae
Orius albidipennis
Orius laevigatus maderensis
Orius limbatus
Orius niger
Ornativalva plutelliformis
Ortheziola vejdovskyi
Ortho basalis
Ortho kalmii
Orthocentrus fulvipes
Orthocentrus marginatus
Orthocentrus monilicornis
Orthoceratium lacustre
Orthocladius fuscimanus
Orthocladius rivicola
Orthocladius thienemanni
Orthomus barbarus haligena
Orthomus bedelianus
Orthomus berrai
Orthomus curtus
Orthomus dilaticollis
Orthomus gracilipes
Orthomus lundbladi
Orthomus pecoudi
Orthomus susanae
Orthoperus aequalis
Orthoperus atomarius
Orthoperus atomus
Orthostigma funchalense
Orthostigma maculipes
Orthostigma madeirense
Orthostigma minusculum
Orthostigma pumila
Orthotomicus erosus
Orthotylus flavosparsus
Oscinella frit
Oscinella maura
Oscinella nitidigenis

Calliphora vicina
Calliphora vomitoria
Calliptamus madeirae
Callitula bicolor
Callomyia dives
Calocheirus mirus
Caloptilia aurantiaca
Caloptilia azaleella
Caloptilia coruscans
Caloptilia laurifoliae
Caloptilia schinella
Caloptilia staintoni
Calosoma maderae maderae
Calymmaderus solidus
Calyptomerus dubius
Camicnemus curvipes
Campanulotes madeirensis
Campiglossa producta
Campiglossa valida
Campodea quilisi
Campoletis ensator
Campoletis madeirae
Campoletis viennensis
Camponotus sylvaticus
Campoplex difformis
Campoplex faunus
Campoplex praeoccupator
Camptocera glaberrima
Camptocladius stercorarius
Camptopus lateralis
Campylomyza flavipes
Canace actites
Canace nasica
Canarichelifer teneriffae
Canthophorus dubius
Capitophorus elaeagni
Capitophorus hippophaes hippophaes
Caprainea bremondi
CaradrinaClavipalpis pinkeri
Oscinella pusilla
Osmia madeirensis
Osmia niveata
Ostearius melanopygius
Othius arieiroensis
Othius baculifer
Othius jansoni
Othius ruivomontis
Othius strigulosus
Otiorhynchus cribicollis
Otiorhynchus rugosostriatus
Otiorhynchus sulcatus
Oulema melanopus
Outachyusa raptoria
Ovatus crataegarius
Oxidus gracilis
Oxyaciura tibialis
Oxycarenus lavaterae
Oxyethira spinosella
Oxypleurus nodieri
Oxypoda carbonaria
Oxypoda lurida
Oxypoda magdalenae
Oxytelus piceus
Oxytelus sculptus
Oxythri ajugae
Ozognathus cornutus
Ozyptila atlantica
Pachymerium ferrugineum
Pachyneuron aphidis
Pachyneuron formosum
Pachyneuron groenlandicum
Pachysternum capense
Pachytychius robustus
Pactolinus major
Paidiscura orotavensis
Pales exsulans
Palliduphantes schmitzi
Palorus ratzeburgi

Carcino pumilio
Carcino troglodytes
Cardepia deserticola antinea
Cardiocladius capucinus
Cardiocladius freyi
Cardiocondyla emeryi
Cardiocondyla mauritanica
Cardiophorus femoratus
Cardiophorus oromii
Carios vespertilionis
Carpelimus bilineatus
Carpelimus corticinus
Carpelimus exilis
Carpelimus nigrita
Carpelimus simplicicollis simplicicollis
Carpophilus bifenestratus
Carpophilus dimidiatus
Carpophilus hemipterus
Carpophilus marginellus
Carpophilus mutilatus
Carpophilus nepos
Carpophilus quadrisignatus
Carposina anopta
Carposina atlanticella
Cartodere bifasciata
Cartodere constricta
Cartodere nodifer
Cartodere satelles
Carulaspis juniperi
Carulaspis minima
Caryocolum marmoreum marmoreum
Caryocolum marmoreum pulchra
Caryocolum sciurella
Cassida hemisphaerica
Cathormiocerus curvipes
Cathormiocerus maderae
Cathormiocerus variegatus
Cathormiocerus viennoti
Catopidius murrayi
Palpita vitrealis
Panonychus citri
Panonychus ulmi
Pantoclis sulcata
Pantoclis trisulcata
Parachipteria punctata
Parachipteria willmanni
Paracolpodia capitata
Paradeucalion desertarum
Paradromius insularis insularis
Paradromius insularis oceanicus
Paradromius linearis
Paragus coadunatus
Parahyponomeuta bakeri
Paralabella curvicauda
Paraleyrodes bondari
Paraleyrodes citricolus
Paraliochthonius cavalensis
Paraliochthonius hoestlandti
Parallelodera parallela
Parametriocnemus stylatus
Paramormia cornuta
Paramormia ustulata
Paranchus albipes
Parapelecois mediocris
Paraphaenocladius impensus
Paraphloeostiba clavicornis
Paraphloeostiba gayndahensis
Pararge aegeria
Pararge xiphia
Pararotruda nesiotica
Parasaissetia nigra
Paraschizaphis rosazevedoi
Parasteatoda tepidariorum
Parastyphloderes lindbergi
Paratibellus oblongiusculus
Paratrechina jaegerskioeldi
Paratrechina longicornis
Paratrichlocladius rufiventris

Catopsilia florella
Caulonomus rhizophagoides
Caulophilus oryzae
Caulotrupis erberi
Caulotrupis impius
Caulotrupis lacertosus
Caulotrupis lucifugus
Caulotrupis opacus
Caulotrupis pyricollis
Caulotrupis subnitidus
Caulotrupis terebrans
CaulotrupisChevrolati
CaulotrupisConicollis
Cavariella aegopodii
Cavariella theobaldi
Cecidophyois malpighianus
Cenopalpus pulcher
Centistes edentatus
Centrocoris variegatus
Centromerus anoculus
Centromerus sexoculatus
Centromerus variegatus
Cephennium australe
Cephennium mycetoeides
Ceraleptus gracilicornis
Ceraleptus obtusus
Ceraphron trissacantha
Cerataphis brasiliensis
Cerataphis orchidearum
Ceratinois acripes
Ceratinois infuscata
Ceratitis capitata
Ceratobia oxymora
Ceratophysella denticulata
Ceratophysella engadinensis
Ceratophysella gibbosa
Ceratoppia bipilis
Ceratothri ericae
Ceratozetes mediocris
Paratrissocladius excerptus
Paratullbergia callipygos
Parazuphium baeticum mauretaniae
Pardosa proxima
Paregle audacula
Parisotoma notabilis
Parlatoria camelliae
Parlatoria theae
Parocyusa longitarsis
Paromalus flavicornis
Paromalus luderti
Paromius gracilis
Parthenolecanium persicae
Parthenolecanium rufulum
Parydra coarctata
Parydra fossarum
Passaloecus gracilis
Pauesia picta
Pealius azaleae
Pealius madeirensis
Pediobius bruchicida
Pediobius epigonus
Pediobius latice
Pediobius metallicus
Pegomya bicolor
Pegomya lateropunctata
Pegomya lyneborgi
Peirates strepitans
Pellenes geniculatus
Pellenes maderianus
Pempeliella lundbladi
Pemphigus bursarius
Pemphigus populitransversus
Pentalonia nigronervosa
Pentapleura pumilio
Pentatemnus arenarius incognitus
Pentatrichopus fragaefolii
Penthimia irrorata
Pericoma improvisa

Cerchysiella centennalis
Cerchysius subplanus
Cercyon nigrice
Cercyon quisquilius
Cercyon terminatus
Cerobasis albipes
Cerobasis annulata
Cerobasis maderensis
Cerobasis nigra
Cerodontha denticornis
Cerodontha morosa
Cerodontha pygmaea
Ceroplastes floridensis
Ceroplastes rusci
Ceroplastes sinensis
Ceroptres clavicornis
Ceutorhynchus pallidactylus
Ceutorrhynchus obstrictus
Chaetanaphothri orchidii
Chaetocladius melaleucus
Chaetocnema hortensis
Chaitophorus leucomelas
Chalarus perplexus
Chalcoscirtus sublestus
Chamaemyia polystigma
Chamobates pusilus
Charagmus cachectus
Charagmus gressorius
Charagmus intermedius
Charitopes areolaris
Chauliacia canarisi
Chauliacia lineata
Cheiloneurus elegans
Cheilotrichia nemorensis
Cheiracanthium albidulum
Cheiracanthium pelasgicum
Chersodromia colliniana
Chetogena acuminata
Chilocorus bipustulatus
Peridroma saucia
Perigona nigrice
Perilitus debilis
Periocus alboguttatus
Periocus bivari
Periocus milleri
Periplaneta americana
Periplaneta brunnea
Perirrhytus edentulus
Perirrhytus eudomadeirensis
Perirrhytus lundbladi
Perirrhytus madeirensis
Peristenus maderae
Peritrechus gracilicornis
Peritrechus nubilus
Perittia carlinella
Petrobia harti
Phacophallus pallidipennis
Phacophallus parumpunctatus
Phaedrotoma exigua
Phaedrotoma flaveola
Phaedrotoma nitidulator
Phaedrotoma rudis
Phaenocarpa rufice
Phaenoglyphis villosa
Phaenospectra flavipes
Phalangium opilio
Phaleria atlantica
Phaleria ciliata
Phanacis hypochoeridis
Phaneroptera nana
Phaneroptera sparsa
Phanerotoma maculata
Phaonia canariensis
Phaonia sordidisquama
Phaonia trimaculata
Pharoscymnus decemplagiatus
Phasia pusilla
Pheidole megacephala

Chinacapsus atlanticus
Chinacapsus chaoensis
Chinacapsus distinctus
Chinacapsus elongatus
Chinacapsus intermedius
Chinacapsus limbatellus
Chinacapsus parvus
Chinacapsus proteus
Chinacapsus similis
Chinacapsus whitei
Chinacapsus wollastoni
Chironomus dorsalis
Chirothri aculeatus
Chirothri manicatus
Chlorichaeta albipennis
Chlorissa faustinata
Chlorocytus koponeni
Chloropelix canariensis
Chlorophorus pilosus
Choneiulus palmatus
Chorebus canariensis
Chorebus cubocephalus
Chorebus longicornis
Chorebus norae
Choreutis nemorana
Chremylus elaphus
Chromaphis juglandicola
Chromatomyia horticola
Chromatomyia nigra
Chrysis ignita
Chrysis magnidens
Chrysocharis discalis
Chrysocharis entedonoides
Chrysocharis gemma
Chrysocharis miranda
Chrysocharis pallipes
Chrysodeixis acuta
Chrysodeixis chalcites
Chrysoesthia drurella
Pheidole pallidula
Phenacoccus latipes
Phenacoccus madeirensis
Phenacoccus monieri
Phenolia limbata tibialis
Pherbellia inclusa
Phereoeca allutella
Phibalothrips dispar
Philoceanus becki
Philodromus insulanus
Philodromus punctiger
Philodromus simillimus
Philonthus cognatus
Philonthus discoideus
Philonthus fenestratus
Philonthus jurgans
Philonthus longicornis
Philonthus politus
Philonthus rectangulus
Philonthus turbidus
Philonthus umbratilis
Philonthus ventralis
Philorhizus conicipennis
Philorhizus umbratus
Philorhizus vieirai
Philorhizus wollastoni nitidus
Philorhizus wollastoni wollastoni
Philorinum sordidum
Philygria madeirae
Philygria stictica
Phlebotomus sergenti
Phloeonomus punctipennis
Phloeonomus pusillus
Phloeopora corticalis
Phloeopora testacea
Phloeotribus perfoliatus
Phlogophora meticulosa
Phlogophora wollastoni
Phoenicococcus marlatti

Chrysolina aericana
Chrysolina bankii
Chrysolina fragariae
Chrysolina hyperici
Chrysomphalus aonidum
Chrysomphalus dictyospermi
Chrysomphalus diversicolor
Chrysomphalus pinnulifer
Chrysomya albice
Chrysomya megacephala
Chrysoperla agilis
Chrysoperla lucasina
Chrysopophthorus hungaricus
Chrysopophthorus petiolus
Chrysotus barretoi
Chrysotus cilipes
Chrysotus femoratus
Chrysotus neglectus
Chthonius ischnocheles
Chthonius tetrachelatus
Chyromya flava
Cicadulina bipunctata
Cilea silphoides
Cimex lectularius
Cinara cupressi
Cinara juniperi
Cinara pilicornis
Cinara pinea
Cinara pinimaritimae
Cinara tujafilina
Cinetus angustatus
Cionus alauda
Circulifer haematoce
Circulifer opacipennis
Cirrospilus diallus
Cirrospilus elongatus
Cirrospilus nephelodes
Cirrospilus pictus
Cirrospilus setipes
Phoetalia circumvagans
Pholcus dentatus
Pholcus madeirensis
Pholcus magnus
Pholcus phalangioides
Pholcus silvai
PholcusParvus
Phora cilicrus
Phoracantha semipunctata
Phronia biarcuata
Phronia exigua
Phronia maderina
Phronia maderopulchra
Phronia nitidiventris
Phthiracarus ferrugineus
Phthiracarus globosus
Phthiracarus laevigatus
Phthiracarus lentulus
Phthiracarus torosus
Phthitia plumosula
Phthora angusta
Phthorimaea operculella
Phylidorea contraria
Phyllaphis fagi
Phyllocnistis canariensis
Phyllocnistis citrella
Phyllodrepa devillei
Phyllonorycter chiclanella
Phyllonorycter juncei madeirae
Phyllonorycter mespilella
Phyllonorycter messaniella
Phyllonorycter myricae
Phyllonorycter platani
Phyllotreta consobrina
Phyllotreta procera
Phymatodes testaceus
Phytocoris mauli
Phytocoris selvagensis
Phytodietus ericeti

Cis fuscipes ellié
Cis puncticollis
Cis wollastoni
Cixius madeirensis
Cixius verticalis
CixiusChaoensis
Clada oromii
Clavigesta sylvestrana
Cleis retiferana
Cleis staintoni
Cleis subcostana
Cleis subjunctana
Cleis uncisecta
Cleopus pulchellus
Clinodiplosis cilicrus
Clistopyga incitator
Clistopyga linearis
Clitostethus arcuatus
Cloeon peregrinator
Clogmia albipunctatus
Closterotomus norwegicus
Clubiona decora
Clunio marinus
Clypastrea maderae
Clytocerus wollastoni
Clytus arietis
Cnemeplatia latice
Coboldia fuscipes
Cobososia pallescens
Coccidoxenoides perminutus
Coccinella algerica
Coccinella genistae
Coccophagus lycimnia
Coccophagus semicircularis
Coccotrypes carpophagus
Coccotrypes dactyliperda
Coccus hesperidum
Coccus viridis
Cochylimorpha decolorella
Phytoliriomyza arctica
Phytoliriomyza pectoralis
Phytoliriomyza scotica
Phytomyza affinis
Phytomyza flavicornis
Phytomyza obscura
Phytomyza obscurella
Phytomyza ranunculi
Phytomyza rufipes
Phytomyza tenella
Phytonemus pallidus
Phytosus balticus
Pieris brassicae wollastoni
Pieris rapae
Piezodorus lituratus
Pilophorus perplexus
Pimpla dorsata
Pimpla rufipes
Pimpla turionellae moraguesi
Pinalitus conspurcatus
Pinalitus insularis
Pinalitus viscicola
Pineus pini
Pinnaspis aspidistrae
Pionosomus madeirae
Piophila casei
Pirnodus soyeri
Pisaura quadrilineata
Pissodes castaneus
Pityophagus laevior
Placonotus donacioides
Placonotus granulatus
Placusa pumilio
Placusa tachyporoides
Plagiolepis schmitzii
Plagiomerus diaspidis
Planchonia arabidis
Planchonia zanthenes
Planococcus citri

Coelositona latipennis latipennis
Coelositona puberulus
Coenosia attenuata
Coenosia humilis
Coleophora coracipenella
Coleophora glaucicolella
Coleophora orotavensis
Coleophora versurella
Colias croceus
Coloceras damicorne
Colomerus vitis
Coloradoa rufomaculata
Comidolon acutice
Comilura concinnata
Condica capensis
Conicera dauci
Conicera tibialis
Conomorium amplum
Conoppia palmincincta
Conorhynchus conicirostris
Conostethus venustus venustus
Conostigmus brunneipes
Conostigmus fanalensis
Coproica ferruginata
Coproica hirticula
Coproica hirtula
Coproica lugubris
Coproica rufifrons
Copromyza equina
Coproporus pulchellus
Coptera fissa
Coquillettomyia lobata
Coranus aegyptius
Cordalia obscura
Cordicollis instabilis instabilis
Cordicollis litoralis
Cordyla crassicornis
Cordyla murina
Cordylomera spinicornis nitidiformis
Planococcus minor
Platurocypta punctum
Platyarthrus aiasensis
Platyarthrus maderensis
Platycleis falx
Platyedra subcinerea
Platygaster cyrsilus
Platygaster tenerifensis
Platynocheilus cuprifrons
Platynota rostrana
Platypalpus altuum
Platystethus degener
Platystethus nitens
Platystethus spinosus
Platytomus tibialis
Plectiscidea amicalis
Plectiscus impurator
Pleotrichophorus chrysanthemi
PlesiothrPerplexus
Pleurophorus caesus
Plinachtus imitator
Plinthisus brevipennis
Plinthisus canariensis
Plinthisus flavipes
Plinthisus longicollis
Plodia interpunctella
Ploeosoma ellipticum
Ploiaria chilensis
Ploiaria domestica
Plutella xylostella
Pnigalio pectinicornis
Pnigalio soemius
Poaspis cunhii
Podagrion pachymerum
Podalonia rothi
Podalonia tydei
Podoribates longipes
Poecilus wollastoni
Pogonocherus hispidulus

Corixa affinis
Corixa punctata
Cornutiplusia circumflexa
Corticaria fagi
Corticaria fulva
Corticaria inconspicua
Corticaria maculosa maculosa
Corticaria pubescens
Corticaria serrata
Corticaria umbilicata
Corticarina curta
Cortinicara gibbosa
Corylophus tectiformis
Corynoptera globiformis
Corynoptera laureti
Cosmopolites sordidus
Cosmopterix attenuatella
Cosmopterix pulchrimella
Cossyphodes wollastonii
Costaconvexa centrostrigaria
Cothonaspis gracilis
Crataerina acutipennis
Crenidorsum aroidephagus
Creontiades pallidus
Creophilus maxillosus
Cricotopus beckeri
Cricotopus bicinctus
Cricotopus ornatus
Cricotopus similis
Cricotopus vierriensis
Croantha ornatula
Crocidosema plebejana
Crombrugghia laetus
Crossocerus elongatulus elongatulus
Crossopalpus aeneus
Cryphia maderensis
Cryphia simonyi
Cryptamorpha desjardinsii
Cryptaspidiotus aonidioides
Pogonognathellus longicornis
Polistes dominulus
Pollenia angustigena
Pollenia pediculata
Pollenia rudis
Polycentropus flavostictus
Polycrates consutus
Polyderis algiricus
Polydesmus coriaceus
Polypedilum convictum
Polypedilum nubifer
Polyphagotarsonemus latus
Polyxenus fasciculatus
Porcellio atlantidum
Porcellio cataractae
Porcellio dilatatus
Porcellio eudopullus
Porcellio ferroi
Porcellio gruneri
Porcellio lamellatus
Porcellio leptotrichoides
Porcellio maculipes
Porcellio normani
Porcellio scitus
Porcellio xavieri
Porcellio zarcoi
Porotachys bisulcatus
PostelectrotermesPraecox
Potamocypris pallida
Praeacedes atomosella
Praon volucre
Prays citri
Prays friesei
Pria dulcamarae
Prinerigone vagans
PrinerigonePigra
Priocnemis faillae corax
Pristiphora atlantica
Pritha nana

Crypto hortensis
Cryptoblabes gnidiella
Cryptocephalus nubigena
CryptocephalusCrenatus
Cryptolestes capensis
Cryptolestes ferrugineus
Cryptophagus cellaris
Cryptophagus dentatus
Cryptophagus laticollis
Cryptophagus nitiduloides
Cryptophagus pilosus
Cryptophagus saginatus
Cryptophilus integer
Cryptophyllaspis bornmuelleri
Cryptopygus ponticus
Cryptopygus scapelliferus
Cryptopygus thermophilus
Cryptoserphus flavipes
Cryptotermes brevis
Cryptothri nigripes
Cryptus lundbladi
Crytea sanguinator
Ctenarytaina eucalypti
Ctenichneumon hermaphroditus
Ctenocephalides canis
Ctenocephalides felis felis
Ctenolepisma lineata
Ctenolepisma longicaudata
Ctenolepisma vieirai
Ctenoplusia limbirena
Cucullia calendulae
Culex hortensis maderensis
Culex molestus
Culex pipiens
Culex theileri
Culicoides newsteadi
Culicoides obsoletus
Culicoides puncticollis
Culicoides scoticus
Proasellus coxalis
Proatelurina eudolepisma
Probaryconus minor
Procas armillatus
Procecidochares utilis
Prochyliza nigrimana
Proconura aeneonitens
Proctostephanus madeirensis
Proctostephanus stuckeni
Proeces acicula
Proisotoma minuta
Promethes sulcator
Proocus pulchripennis
Propolydesmus laevidentatus
Prosopothri titschacki
Prostheca aspera
Protapanteles lateralis
Protapanteles luciana
Protapanteles militaris
Protapanteles mygdonia
Protapanteles pinicola
Protaphorura fimata
Protaphorura hortensis
Proteinus atomarius
Protentomon barandiarani
Proteroiulus fuscus
Protopulvinaria pyriformis
Psacasta exanthematica exanthematica
Psalmatophanes barretoi
Psammoecus personatus
Psammotettix alienus
Psara bipunctalis
Pselactus calvus
Pselactus spadix sulcipennis
Pselaphochernes dubius
Pselaphochernes lacertosus
Pselaphochernes scorpioides
Pselaphus minyo
Psenulus pallipes parenosas

Culiseta longiareolata
Curimopsis brancomontis
Curimopsis horrida
Curimopsis madeirensis
Curimopsis ovuliformis
Curimopsis senicis
Curimopsis wollastoni
CurimopsisCapitata
Cybocephalus sphaerula
Cyclophora maderensis
Cyclophora puppillaria lilacinipes
Cyclosa insulana
Cyclosa maderiana
Cydia archaeochrysa
Cydia pomonella
Cydia splendana
Cydnus aterrimus
Cylindroiulus attenuatus
Cylindroiulus brachyiuloides
Cylindroiulus britannicus
Cylindroiulus digitus
Cylindroiulus exiguus
Cylindroiulus fimbriatus
Cylindroiulus gemellus
Cylindroiulus hirticauda
Cylindroiulus infernalis
Cylindroiulus insolidus
Cylindroiulus julipes
Cylindroiulus kappa
Cylindroiulus laurisilvae
Cylindroiulus lundbladi
Cylindroiulus madeirae
Cylindroiulus numerosus
Cylindroiulus obscurior
Cylindroiulus pallidior
Cylindroiulus propinquus
Cylindroiulus quadratistipes
Cylindroiulus rabacalensis
Cylindroiulus speluncaris

Pseudachorutes palmiensis
Pseudaphycus maculipennis
Pseudaraeopus lethierryi
Pseudaulacaspis pentagona
Pseudexechia trivittata
Pseudisotoma sensibilis
Pseudobium gridellii ibericum
Pseudocatolaccus nitescens
Pseudococcus calceolariae
Pseudococcus cimensis
Pseudococcus comstocki
Pseudococcus longispinus
Pseudococcus viburni
Pseudocollinella jorlii
Pseudolycoriella bruckii
Pseudolynchia canariensis
Pseudomedon obscurellus
Pseudomogoplistes madeirae
Pseudomogoplistes squamiger
Pseudonapomyza atra
Pseudoparlatoria parlatorioides
Pseudopezomachus bituberculatus
Pseudophloeophagus aeneopiceus
Pseudophloeophagus tenax
Pseudorhacochelifer coiffaiti
Pseudorthocladius curtistylus
Pseudosinella octopunctata
Pseudoxenos heydeni
Psilocera confusa
Psilopa aequalipes
Psilopa clara
Psilothrix illustris
Psilus fuscipennis
Psocathropos lachlani
Psoculus neglectus
PsPsylliodes stolidus
Psychoda cinerea
Psychoda minuta
Psychoides filicivora

Cylindroiulus transmarinus
Cylindroiulus truncorum
Cylindroiulus uroxiphos
Cylindroiulus velatus
Cylindroiulus waldeni
Cylindroiulus xynon
Cylindroiulus ynnox
Cylindroiulus zarcoi
CylindroiulusCaramujensis
CylindroiulusCristagalli
Cylindromyia brassicaria
Cymindis maderae
Cymindis paivana
Cymindis suturalis eudosuturalis
Cymoptus vieirai Carmona
Cynaeda dentalis
Cynedesmus formicola
Cypha reducta
Cyphocleonus armitagei
Cyphoderus albinus
Cyphopterum fauveli
Cyphopterum quartaui
Cyphopterum retusum
Cyphopterum salvagensis
Cypridois lusatica
Cypridois vidua
Cyrba algerina
Cyrtogaster clavicornis
Cyrtogaster degener
Cyrtophora citricola
Dacnusa faeroeensis
Dacnusa flavicoxa
Dacnusa plantaginis
Dacnusa pubescens
Dacnusa sibirica
Dactylochelifer latreillei
Dactylopius coccus
Dactylosternum abdominale
Dactylotrypes longicollis
Psylliocus ramburii
Psylliodes amplicollis
Psylliodes chrysocephalus
Psylliodes erberi
Psylliodes hospes
Psylliodes laticollis
Psylliodes pyritosus
Psylliodes tarsatus
Psylliodes umbratilis
Psylliodes vehemens vehemens
Psylliodes wollastoni
Ptenidium laevigatum
Ptenidium pusillum
Pteremis fenestralis
Pterocomma populeum
Pteromalus alternipes
Pteromalus amage
Pteromalus ametrus
Pteromalus anaxis
Pteromalus integer
Pteromalus intermedius
Pteromalus poisoensis
Pteromalus puparum
Pteromalus semotus
Pteromalus speculifer
Pterostichus aterrimus aterrimus
Pteroxanium kelloggi
Ptilinus cylindripennis
Ptilinus pectinicornis
Ptinella aptera
Ptinella denticollis
Ptinus fur
Ptinus latro
Ptinus variegatus
Pulex irritans
Puliciphora borinquenensis
Pullimosina heteroneura
Pullimosina vulgesta
Pullimosina zayensis

Danaus plexippus
Dasyhelea flavoscutellata
Dasyphora albofasciata
Dasyphora pratorum
Dasyyllus gallinulae gallinulae
Decticus albifrons
Delia bracata
Delia echinata
Delia flavibasis
Delia platura
Delia radicum
Dendroacalles ornatus
Dendrocerus aphidum
Dendrocerus laevis
Dendrocerus punctipes
Depressaria ultimella
Deraeocoris punctum
Deraeocoris serenus
Dermestes frischi
Dermestes maculatus
Derolathrus parvulus
Desmometopa m-nigrum
Deucalion oceanicum
Deuterixys carbonaria
Deutonura plena
Deutonura sinistra
Diadegma aculeatum
Diadegma basale
Diadegma chrysostictus
Diadegma flavoclypeatum
Diadegma nigriscapus
Diadegma semiclausum
Diadromus collaris
Diaeretiella rapae
Dialectica hedemanni
Dialectica scalariella
Diamesa alata
Diamesa permacra
Diaphania indica
Pulvinaria floccifera
Pulvinaria grabhami
Pulvinariella mesembryanthemi
Pycnopogon fasciculatus
Pycnoscelus surinamensis
Pygostolus falcatus
Pyralis farinalis
Pyramica membranifera
Pyrausta sanguinalis
Pyroderces argyrogrammos
Quedius curtipennis
Quedius levicollis
Quedius nigrice
Quedius simplicifrons
Raglius alboacuminatus
Ramblinus spinipalpis
Ramusella clavipectinata
Ramusella confusa
Raphimetopus ablutella
Reduvius personatus
Reticulitermes grassei
Rhacaplacarus ortizi
Rhagio latipennis
Rhagio scolopaceus
Rhagovelia nigricans maderensis
Rhamphus subaeneus
Rhaphitelus maculatus
Rheocricotopus atripes
Rheotanytarsus guineensis
Rheotanytarsus pentapoda
Rhicnocoelia impar
Rhinoncus castor
Rhinoppia minimedia
Rhinoppia subpectinata
Rhinothripiella ctenifera
Rhipicephalus bursa
Rhipicephalus sanguineus
Rhipicephalus turanicus
Rhipidothri brunneus

Diapria conica
Diasemiois ramburialis
Diaspidiotus laurinus
Diaspidiotus perniciosus
Diaspis boisduvalii
Diaspis bromeliae
Diaspis echinocacti
Dibrachys affinis
Dibrachys cavus
Dicaelotus montanus
Dicaelotus pumilus
Dicaelotus resplendens
Dichochrysa sensitiva
Dichodiplosis langeni
Dichomeris acuminatus
Dichrogaster longicaudata
Dichrogaster madeirae
Dichrogaster tenerifae
Dichromacalles dromedarius
Dicladocerus ii
Dicranocephalus agilis
Dicranocephalus albipes
Dicranomyia maderensis
Dicranomyia michaeli
Dicranomyia vicina
Dicrotendipes septemmaculatus
Dictyla indigena
Dictyna civica
Dicyphus hyalinipennis
Dicyphus poneli
Dicyrtomina minuta
Dicyrtomina ornata
Dienerella argus
Dienerella elegans
Dienerella ruficollis
Dieuches schmitzi
Diglyphus chabrias
Diglyphus crassinervis
Diglyphus eleanorae
Rhizophagus bipustulatus
Rhizophagus depressus
Rhodobium porosum
Rhodochlanis salsolae
Rhodometra sacraria
Rhomphaea nasica
Rhopalicus tutela
Rhopalomesites euphorbiae
Rhopalomesites maderensis
Rhopalomesites palmi
Rhopalosiphoninus latysiphon
Rhopalosiphoninus staphyleae
Rhopalosiphoninus tulipaellus
Rhopalosiphum maidis
Rhopalosiphum nymphaeae
Rhopalosiphum oxyacanthae
Rhopalosiphum padi
Rhopalosiphum rufiabdominale
Rhyacionia buoliana
Rhyncaphytoptus ficifoliae
Rhyparobia maderae
Rhytideres plicatus
Rhyzobius chrysomeloides
Rhyzobius litura
Rodolia cardinalis
Roederiodes longirostris
Rugathodes madeirensis
Rugilus orbiculatus
Ruspolia nitidula
Rymosia lauricola
Rymosia maderensis
Rymosia spinipes
Saccharicoccus sacchari
Saemundssonia peusi
Saissetia cerei
Saissetia coffeae
Saissetia oleae
Saldula arenicola arenicola
Saldula pallipes

Diglyphus isaea
Dilophus maderae
Dilophus oceanus
Dilta lundbladi
Dilta madeirensis
Dinocampus coccinellae
Dinoderus bifoveolatus
Dinotrema aplicatum
Dinotrema brunneicornis
Dinotrema caudatum
Dinotrema concinnum
Dinotrema concolor
Dinotrema distractum
Dinotrema glabriscutum
Dinotrema lacessivum
Dinotrema lineolum
Dinotrema madeiracola
Dinotrema mesocaudatum
Dinotrema tenerifensis
Dinotrema tuberculatum
Dinotrema ultimum
Diospilus rubricollis
Dioxyna sororcula
Diplazon laetatorius
Diplostyla concolor
Diplotemnus pieperi
Dipoenata longitarsis
Dipogon variegatus
Diptacus gigantorhynchus
Disparrhopalites patrizii
Displotera maderae
Distoleon catta
Diuraphis noxia
Dixa tetrica
Docosia gilvipes
Dohrniphora cornuta
Dolichoiulus eumadeirae
Dolichoiulus madeiranus
Dolichoiulus salvagicus
Saldula palustris
Salticus mutabilis
SalvagoPselactus mauli
Saprinus caerulescens caerulescens
Saprinus chalcites
Saprinus semistriatus
Saprinus subnitescens
Sapromyza hirtiloba
Sapromyza imitans
Sapromyza inconspicua
Sapromyza indigena
Sapromyza laurisilvae
Sapromyza madeirensis
Sapromyza mauli
Sapromyza ultima
Sarcophaga africa
Sarcophaga amputata
Sarcophaga argyrostoma
Sarcophaga crassipalpis
Sarcophaga kunonis
Sarcophaga madeirensis
Sarcophaga tibialis
Sarothrogammarus cataractae
Sarothrogammarus madeirensis
Scaeva albomaculata
Scaeva pyrastri
Scaeva selenitica
Scambus monticola
Scapheremaeus corniger
Scaptodrosophila lebanonensis
Scaptomyza apicalis
Scaptomyza disticha
Scaptomyza flava
Scaptomyza flaveola
Scaptomyza graminum
Scaptomyza pallida
Scaptomyza tetrasticha
Scarites abbreviatus abbreviatus
Scarites abbreviatus cimensis

Dolichomiris linearis
Dolichomitus lateralis
Dolycoris numidicus
Dometorina plantivaga insularis
Donus lunatus
Drapetis assimilis
Drassodes lapidosus
Drassodes lutescens
Drassodes rugichelis
Drepanosiphum oregonensis
Drepanosiphum platanoidis
Drino imberbis
Droacalles lunulatus
Dromius angustus alutaceus
Drosophila ampelophila
Drosophila ananassae
Drosophila busckii
Drosophila buzzatii
Drosophila fasciata
Drosophila forcipata
Drosophila funebris
Drosophila hydei
Drosophila immigrans
Drosophila madeirensis
Drosophila melanogaster
Drosophila mercatorum
Drosophila repleta
Drosophila simulans
Drosophila subobscura
Drosophila virilis
Drymus pilicornis
Dryo luridus
Dryocoetes villosus villosus
Duponchelia fovealis
Dusona peregrina
Dynaspidiotus britannicus
Dysaphis apiifolia
Dysaphis crataegi crataegi
Dysaphis crithmi
Scarites abbreviatus desertarum
Scatella crassicosta
Scatella major Becker
Scatella paludum
Scatella stagnalis
Scathophaga litorea
Scathophaga stercoraria
Scatophila cavice
Sceliphron caementarium
Scenopinus albicinctus
Scenopinus fenestralis
Schistocerca gregaria gregaria
Schizaphis graminum
Schizaphis pyri
Schizaphis rotundiventris
Schrankia costaestrigalis
Sciapus glaucescens
Sciocoris helferi
Sciocoris maculatus
Sciocoris sideritidis
Scirtothri inermis
Scirtothri longipennis
Scobicia barbata
Scoliopteryx libatrix
Scolopostethus pilosus maderensis
ScopaeusSubopacus
Scopula irrorata
Scotognapha paivai
Scotophaeus blackwalli
Scotophaeus cultior
Scotophaeus musculus
Scrobipalpa ocellatella
Scrobipalpa portosanctana
Scrobipalpa suaedicola
Scrobipalpa vasconiella
Scutellista obscura
Scutigera coleoptrata
Scutigerella immaculata
Scymnus abietis

Dysaphis emicis
Dysaphis foeniculus
Dysaphis maritima
Dysaphis plantaginea
Dysaphis pyri
Dysaphis tulipae
Dysdera coiffaiti
Dysdera crocata
Dysdera longibulbis
Dysdera nesiotes
Dysdera portisancti
Dysdera wollastoni
DysderaDiversa
Dysmicoccus boninsis
Dysmicoccus brevipes
Earias insulana
Echemus modestus
Echidnophaga murina
Echinodera pallida
Echinosomidia porcellus
Echinotheridion gibberosum
Ecphylus caudatus
Ectemnius cephalotus
Ectemnius continuus rufitarsis
Ectemnius sexcinctus
Ectobius haeckeli
Ectobius panzeri
Ectomocoris chiragra
Ectoocus briggsi
Ectoocus rileyae
Ectoocus strauchi
Ectroma dalmatinum
Ectroma koponeni
Eidmannella pallida
Elachertus lateralis
Elachertus marginalis
Elachertus pulcher
Elachertus sobrius
Elachertus sylvarum
Scymnus epistemoides
Scymnus haemorrhoidalis
Scymnus interruptus
Scymnus limbatus
Scymnus limnichoides
Scymnus marinus
Scymnus nubilus
Scymnus rubromaculatus
Scymnus subvillosus
Scymnus suturalis
Scytodes thoracica
Scytodes velutina
Segestria florentina
Sehirus aeneus
Seioptera vibrans
Seira domestica
Seis biflexuosa
Seis lateralis
Seis punctum
Seis thoracica
Seladerma tarsale
Selania leplastriana
Semidalis candida
Sepedophilus lusitanicus
Sepedophilus monticola
Sepedophilus nigripennis
Sepedophilus testaceus
Sericoderus lateralis
Sesamia nonagrioides
Setaphis canariensis
Sibinia primita
Sigara lateralis
Signiphora aleyrodis
Silvanoprus scuticollis
Silvanus lateritus
Simulium intermedium
Simulium petricolum
Simulium ruficorne
Sinella pulcherrima jugoslavica

Elachiptera bimaculata
Elachiptera megaspis
Elachisoma aterrimum
Elachisoma bajzae
Elachisoma pilosum
Elachista encumeadae
Elasmus maderae
Elasmus platyedrae
Elatobium abietinum
Elliodes glabrata glabrata
Elliodes glabrata oblongior
Eluma caelatum
Ematheudes punctella
Embidoocus enderleini
Emblethis angustus
Emblethis denticollis
Emblethis griseus
Emmelina monodactyla
Empicoris brevispinus
Empicoris rubromaculatus
Empoasca alsiosa
Empoasca distinguenda
Empoasca fabalis
Encarsia formosa
Encarsia hispida
Encarsia inaron
Encarsia levadicola
Encarsia lounsburyi
Encarsia lutea
Encarsia noahi
Encarsia pergandiella
Encarsia tricolor
Encyrtus infelix
Endomia occipitalis
Endrosis sarcitrella
Enicmus histrio
Enicmus transversus
Enicospilus atrodecoratus
Enicospilus faciator
Sinella pulcherrima pulcherrima
Singhiella citrifolii
Siphona maderensis
Siphoninus phillyreae
Siphunculina striolatum
Sirex noctilio
Sirocalodes nigroterminatus
Sitobion avenae
Sitobion fragariae
Sitobion luteum
Sitona cinnamomeus
Sitona discoideus
Sitona flavescens
Sitona humeralis
Sitona lineatus
Sitophagus hololeptoides
Sitophilus granarius
Sitophilus oryzae
Sitophilus zeamais
Sitotroga cerealella
Smicronyx albosquamosus
Sminthurides parvulus
Sminthurinus aureus
Sminthurinus elegans
Sminthurinus gamae
Sminthurinus niger
Smittia aterrima
Smittia nudipennis
Sogatella nigeriensis
Solva nigritibialis
Sophiothri makaronesicus
Sophonia orientalis
Soteriscus bremondi
Soteriscus brumdocantoi
Soteriscus desertarum
Soteriscus fructuosi
Soteriscus madeirae
Soteriscus porcellioniformis
Soteriscus relictus

Enicospilus obtusangulus
Enicospilus striatipleuris
Enochrus politus
Enoplognatha diversa
Enoplognatha sattleri
Enoplops bos
Ensina decisa
Entelecara schmitzi
Entomacis platyptera
Entomobrya atrocincta
Entomobrya marginata
Entomobrya multifasciata
Entomobrya muscorum
Entomobrya pazaristei
Enytus homonymator
Enytus madeirae
Enytus nitidiventris
Enytus ericeti
Eosentomon delicatum
Eosentomon mixtum
Eosentomon noseki
Eotetranychus lewisi
Epermenia aequidentella
Ephedrus plagiator
Ephestia elutella
Ephestia kuehniella
Ephistemus globulus
Ephydra macellaria
Ephysteris brachyptera
Ephysteris promptella
Epicaecilius pilipennis
Epiclerus femoralis
Epidiaspis leperii
Epidiplosis filifera
Epinotia thaiana
Episinus maderianus
Episyrphus balteatus
Epitetracnemus intersectus
Epitrix cucumeris
Soteriscus wollastoni
Spalangia cameroni
Spalangia endius
Spalangia nigroaenea
Spalangia subpunctata
Spathius erythrocephalus
Spathius moderabilis
Spathius pedestris
Spathocera dalmanii
Spelobia bifrons
Spelobia eudosetaria
Spelobia luteilabris
Spelobia parapusio
Sperchon brevirostris
Spermophora senoculata
Spermophoride selvagensis
Sphaericus albopictus albopictus
Sphaericus albopictus albosquamosus
Sphaericus albopictus brevinasus
Sphaericus albopictus carinasus
Sphaericus albopictus flavotarsus
Sphaericus albopictus minutus
Sphaericus albopictus plantaginis
Sphaericus ambiguus
Sphaericus ater
Sphaericus bicolor
Sphaericus dawsoni
Sphaericus erinaceus
Sphaericus flavosquamosus
Sphaericus fragilis
Sphaericus leileri
Sphaericus longicornis
Sphaericus naviculiformis
Sphaericus nigrescens
Sphaericus nodulus
Sphaericus obscurus
Sphaericus orbatus
Sphaericus pilula
Sphaericus pinguis

Epuraea luteola
Epuraea unicolor
Epyris longicollis
Eremocoris maderensis
Eretes sticticus
Eretmocerus mundus
Ergasiola ergasima
Ergates faber
Ericydnus sipylus
Ericydnus strigosus
Eriococcus araucariae
Eriococcus madeirensis
Eriophes barbujanae
Eriophyes parabuxi
Eriosoma lanigerum
Eristalinus aeneus
Eristalinus taenio
Eristalis tenax
Ernobius mollis mollis
Ernobius rufus
Ero aphana
Ero flammeola
Ero quadrituberculata
Ero tuberculata
Esperia sulphurella
Essigella californica
Esuridea lathridioides
Ethelurgus balearicus
Ethmia bipunctella
Eublemma ostrina
Eublemma parva
Euborelia annulipes
Eubrachium ovale
Eucallipterus tiliae
Eucalymnatus tesselatus
Eucarazzia elegans
Euceraphis punctipennis
Euchorthippus madeirae
Euchromius cambridgei
Sphaericus saetiger
Sphaericus selvagensis
Sphaericus truncatus basibulbosus
Sphaericus truncatus interpositus
Sphaericus truncatus truncatus
Sphaericus ventriculus
Sphaeridia pumilis
Sphaeridium bipustulatum
Sphaeriestes impressus
Sphaerocera curvipes
Sphaeroderma rubidum
Sphaerophoria rueppellii
Sphaerophoria scripta
Sphegigaster nigricornis
Sphenella marginata
Sphingonotus caerulans
Sphingonotus rubescens rubescens
Sphrodus leucophthalmus
Spilomalus biquadratus
Spilomena canariensis
Spilonota ocellana
Spilostethus pandurus
Spiloyllus cuniculi
Spinilimosina brevicostata
Spodoptera cilium
Spodoptera exigua
Spodoptera littoralis
Spoladea recurvalis
Stactobia atra
Stactobia nybomi
Steatoda distincta
Steatoda grossa
Steatoda nobilis
Steganacarus applicatus
Steganacarus carusoi
Steganacarus insulanus
Steganacarus similis
Stegobium paniceum
Stelis ornatula

Euchromius ocellea
Euconnus campestris campestris
Euconnus pragensis maderae
Eucosma cana
Eucyclo serrulatus serrulatus
Euderomphale cortinae
eudeuophrys vafra
Eudonia angustea
Eudonia decorella
Eudonia scoriella
Eudonia shafferi
Eudonia stenota
Euiella devonica
Euiella gracei
Euiella similIs
Eulachnus mediterraneus
Eulachnus rileyi
Euleia heraclei
Eumacepolus dulcis
Eumerus hispidus
Euodynerus variegatus
Eupelmus vesicularis
Eupelo reticulatus
Eupeodes corollae
Eupeodes luniger
Eupeodes nuba
Euphyllura canariensis
Euphyllura olivina
Eupitecia latipennata
Eupitecia massiliata
Eupitecia rosai
Euplectus intermedius
Euplectus karsteni
Euplectus lundbladi
Euplectus sexstriatus
Euplexia dubiosa
Eupristina verticillata
Eupteryx capreola
Euro impressicollis impressicollis
Stenaphorura quadrispina
Stenichnus helferi helferi
Stenichnus tythonus mesmini
Stenichnus tythonus tythonus
Stenocaecilius caboverdensis
Stenocarus ruficornis
Stenodema guentheri
Stenolophus marginatus
Stenolophus teutonus
Stenomacrus affinitor
Stenomacrus caudatus
Stenomastax madeirae
Stenoniscus pleonalis
Stenoponia tripectinata tripectinata
Stenoptilia grisescens
Stenoptilodes taprobanes
Stenoptinea cyaneimarmorella
Stenostoma lowei
Stenus cicindeloides
Stenus guttula
Stenus heeri
Stenus ossium
Stenus providus
Stenus ruivomontis
Stenus undulatus
Stenus wollastoni
Stephanodes similis
Stereus cercyonides
Stethorus tenerifensis
Stethorus wollastoni
Stictopleurus abutilon
Stictopleurus pictus
Stictopleurus ribesi
Stigmatogaster dimidiatus
Stigmella atricapitella
Stigmella aurella
Stigmella centifoliella
Stilbus testaceus
Stilpnus gagates

Eurydema herbacea
Eurydema lundbladi
Eurydema ornata
Eurygnathus latreillei latreillei
Eurygnathus latreillei wollastoni
Euryomma peregrinum
Eurystylus bellevoyei
Eusandalum inerme
Euscelidius variegatus
Euscelis ormaderensis
Euseius hibisci
Eusphalerum metasternale
Eutheia schaumi
Eutriptus putricola
Euxestus erithacus
Euxestus parkii
Euxoa canariensis
Euzonitis quadrimaculata
Evergestis isatidalis
Exaeretia conciliatella
Exallonyx confusus
Exallonyx subserratus
Exechia bicincta
Exechia cinctiformis
Exechia fusca
Exitianus capicola
Exitianus fasciolatus
Exochus erythronotus
Eysarcoris ventralis
Fannia canicularis
Fannia incisurata
Fannia leucosticta
Fannia manicata
Fannia monilis
Fasciosminthurus quinquefasciatus
Filistata insidiatrix
Fiorinia fioriniae
Flastena fumipennis
Florodelphax leptosoma
Stomorhina lunata
Stomoxys calcitrans
Stosatea italica
Stricticollis tobias
Stromatium unicolor
Strophingia arborea
Strophingia fallax
Strophosoma melanogrammum
Strumigenys silvestrii
Stygnocoris fuligineus
Suillia innotata
Suillia oceana
Suillia variegata
Sunius propinquus
Superodontella lamellifer
Sylvicola cinctus
Sylvicola oceanus
Symbiotes gibberosus
Sympetrum fonscolombii
Sympetrum nigrifemur
Sympherobius fallax
Symphylella vulgaris
Symphylellois subnuda
Sympiesis dolichogaster
Sympiesis gordius
Sympiesis gregori
Sympiesis sericeicornis
Sympiesis thaianae
Symplecta pilipes pilipes
Sympycnus hispidus
Synagapetus punctatus
Synanthedon myopaeformis
Synclisis baetica
Syncopacma polychromella
Synema globosum
Synergus albipes
Synergus gallaepomiformis
Synopeas ciliatum
Synorthocladius semivirens

Folsomia candida
Folsomia penicula
Folsomides parvulus
Forcipomyia madeira
Forficula auricularia
Forficula lucasi
Frankliniella occidentalis
Franklinothri vespiformis
Friesea claviseta
Friesea ladeiroi
Friesea mirabilis
Frontinellina dearmata
Frontiphantes fulgurenotatus
Fucellia tergina
Furchadaspis zamiae
Gabrius nigritulus
Gabrius simulans
Gabronthus thermarum
Galgula partita
Galleria mellonella
Galumna alata multiiterata
Galumna obvia
Gamasomorpha insularis
Gammarus nox
Gamocoris punctipes punctipes
Ganaspis mundata
Garypus beauvoisii
Garypus levantinus
Garypus saxicola salvagensis
Gastrancistrus fuscicornis
Gastrothri mauli
Gauropterus fulgidus
Gelis carbonarius
Gelis longicauda
Geocoris lineola lineola
Geogarypus canariensis
Geogarypus minor
Geogarypus nigrimanus
Geomyza tripunctata
Synthesiomyia nudiseta
Syntomus fuscomaculatus
Syntomus lundbladi
Syntormon pallipes
Syntretus idalius
Syritta pipiens
Syromastus rhombeus
Syrphoctonus coloratus
Syrphophagus aeruginosus
Syrphophagus aphidivorus
Syrphus torvus
Syrphus vitripennis
Systasis basiflava
Systole albipennis
Tachinaephagus zealandicus
Tachyporus caucasicus
Tachyporus celer
Tachyporus dispar
Tachyporus nitidulus
Tachyporus quadriscopulatus
Tachys bistriatus
Tachys obtusiusculus
Tachysphex lindbergi
Tachyura curvimana
Tachyura lucasi
Taeniapion delicatulum
Taeniapion urticarium
Takecallis arundinariae
Tamarixia arboreae
Tamarixia pallicornis
Tamarixia pronomus
Tamarixia upis
Tanycarpa bicolor
Tanytarsus brundini
Tanytarsus curticornis
Tapinoma madeirense
Tarisa flavescens
Tarphius angusticollis
Tarphius angustulus

Geophilus carpophagus
Geophilus flavus
Geophilus truncorum
Geostiba arieiroensis
Geostiba bicacanaensis
Geostiba brancomontis
Geostiba caligicola
Geostiba ericicola
Geostiba filiformis
Geostiba formicarum
Geostiba graminicola
Geostiba lauricola
Geostiba lindrothi
Geostiba noctis
Geostiba occulta
Geostiba ogea
Geostiba portosantoi
Geostiba ruivomontis
Geostiba subterranea
Geostiba temeris
Geostiba tenebrarum
Geostiba vaccinicola
Geranomyia atlantica annulirostris
Geranomyia atlantica atlantica
Geranomyia bivittata
Geranomyia canariensis
Geranomyia unicolor
Gerris thoracicus
Gibbiuylloides
Gloeosoma velox
Glymma candezii
Glyphipterix diaphora
Glyphipterix pygmaeella
Glyptobrothus apicalis apicalis
Glyptotendipes pallens
Gnathocerus cornutus
Gnathocerus maxillosus
Gnathoribautia bonensis
Gonatopus lunatus
Tarphius brevicollis
Tarphius cicatricosus
Tarphius compactus
Tarphius echinatus
Tarphius excisus
Tarphius explicatus
Tarphius formosus
Tarphius inornatus
Tarphius lauri
Tarphius lowei
Tarphius lutulentus
Tarphius nodosus
Tarphius parallelus
Tarphius rotundatus
Tarphius rugosus
Tarphius sculptipennis
Tarphius sylvicola
Tarphius testudinalis
Tarphius truncatus
Tarphius zerchei
Tarsonemus occidentalis
Tarsonemus randsi
Tasgius winkleri
Tathorhynchus exsiccata
Taylorilygus apicalis
Tebenna micalis
Technomyrmex pallipes
Tegenaria domestica
Tegenaria maderiana
Tegenaria pagana
Tegenaria parietina
Telenomus othonia
Telenomus vinicius
Telmatogeton japonicus
Temelucha decorata
Temnothorax unifasciatus
Temnothorax wollastoni
Tenaga nigripunctella
Tenebrio molitor

Gonatopus nearcticus
Gonepteryx maderensis
Gonia bimaculata
Gonocephalum affine
Gonocephalum dilatatum
Gonocephalum rusticum
Gracilentulus gracilis
Gracilia minuta
Grammospila rufiventris
Graphoocus cruciatus
Gryllus bimaculatus
Gryon bolivari
Gryon misellum
Gryon subfasciatum
Gustavia fusifer
Gymnoscelis insulariata
Gymnoscelis rufifasciata
Gynaikothri ficorum
Gyochares nielswolffi
Gyonoma minutana
Gyrohypnus angustatus
Gyrohypnus fracticornis
Habrocerus capillaricornis
Habrolepis dalmani
Hadena atlantica
Hadena karsholti
Hadrus alpinus
Hadrus carbonarius carbonarius
Hadrus carbonarius paivae
Hadrus carbonarius sousai
Hadrus illotus
Hadula trifolii
Haemaphysalis inermis
Haemaphysalis punctata
Hahnia insulana
Halictus frontalis
Halipeurus abnormis
Halipeurus bulweriae
Halipeurus pelagicus
Tenebrio obscurus
Tenebroides mauritanicus
Teneriffa spicata
Tenothri frici
Tenothri hilarus
Tenuiphantes miguelensis
Tenuiphantes tenebricoloides
Tenuiphantes tenuis
Tephritis praecox
Tephrochlamys laeta
Tephrochlamys rufiventris
Tereticepheus undulatus
Teretrius poneli
Tessaradiplosis entomophila
Tethina alboguttata
Tethina pallipes
Tethina strobliana
Tetracanthella matthesi
Tetracnemoidea peregrina
Tetragnatha extensa
Tetragnatha obtusa
Tetramesa aequata
Tetramesa antica
Tetramesa lativentris
Tetramesa maderae
Tetramesa minor
Tetramesa subfumata
Tetramesa szelenyii
Tetramorium bicarinatum
Tetramorium caldarium
Tetranychus ludeni
Tetranychus urticae
Tetrastichus julis
Teuchophorus bipilosus
Textrix caudata
Thalassomya frauenfeldi
Thalassophilus caecus
Thalassophilus pieperi
Thalassophilus whitei whitei

Halipeurus spadix
Halipeurus theresae
Halobates micans
Halocladius varians
Halophiloscia couchii
Halophilosciidae
Halticoptera aenea
Halticoptera circulus
Haplodrassus dalmatensis
Haplodrassus signifer
Haploembia solieri
Haploprocta sulcicornis
Haploschendyla barbarica
Haploschendyla grantii M D
Haplothri gowdeyi
Haplothri kurdjumovi
Haplothri lundbladi
Haplothri niger M
Haplothri psilatipennis
Harmonia quadripunctata
Harpalus attenuatus
Harpalus distinguendus distinguendus
Harpalus tenebrosus
Hauptmannia benoni
Hebecnema anthracina
Hebecnema fumosa M
Hecamede albicans
Hecatera maderae
Hedma microcasis
Hegeter latebricola
Hegeter tristis
Helcystogramma convolvuli
Helicoverpa armigera
Helina atlantica
Helina clara
Helina evecta
Helina lundbladi
Helina reversio
Helina vilissima
Thalassosmittia atlantica
Thanatus vulgaris
Thaumalea brincki
Thaumalea subafricana
Thecabius affinis
Thecophora atra
Thecophora fulvipes
Thelaxes suberi
Themira minor
Theridion hannoniae
Theridion melanurum
Theridion musivivum
Therioaphis trifolii
Theroscopus fasciatulus
Theroscopus hemipteron
Thienemanniella clavicornis
Thinodromus transversalis
Thiodia glandulosana
Thiotricha wollastoni
Thoracochaeta brachystoma
Thorictus grandicollis westwoodi
Thrips angustice
Thrips atratus
Thrips flavus
Thrips major
Thrips nigropilosus
Thrips origani
Thrips pennatus
Thrips tabaci
Thrychosis legator
Thyas incerta
Thyois cancellata maderensis
Thysanoplusia orichalcea
Tigriopus fulvus
Tinea dubiella
Tinea murariella
Tinea trinotella
Tinearia alternata
Tineola bisselliella

Heliothis peltigera
HeliothrHaemorrhoidalis
Hellula undalis
Helorus ruficornis
Hemerobius madeirae
Hemerobius stigma
Hemiberlesia cyanophylli
Hemiberlesia insularis
Hemiberlesia lataniae
Hemiberlesia palmae M
Hemiberlesia rapax M
Heminothrus peltifer
Hemiptarsenus ornatus
Hemiptarsenus unguicellus
Hemiptarsenus varicornis
Hemitrichus seniculus
Henia bicarinata
Henia vesuviana
Herbulotina maderae
Hercinothri bicinctus
Hermanniella granulata
Herpetogramma licarsisalis
Hesperorrhynchus lineatotessellatus
Heterischnus nigricollis
Heterogaster canariensis
Heterogaster urticae
Heteromurus major
Heteromurus nitidus
Heteromyza atricornis
Heteropeza pygmaea
Heteropoda venatoria
Heterospilus divisus
Heterotho minutus
Hexacola hexatoma
Hexarthrum capitulum
Himantarium mediterraneum Meinert
Hipparchia maderensis
Hippobosca equina
Hippodamia variegata
Tineophoctonus euphranor
Tingis aetheria
Tingis insularis
Tingis maderensis
Tinodes cinereus
Tinodes merula
Tinotus morion
Tipula atlantica
Tipula lundbladi
Tipula paludosa
Tipula rufina maderensis
Tisbe ensifer
Tomicus destruens
Tomocerus minor
Tomosvaryella geniculata
Torneuma coecum
Torneuma desilvai
Torneuma maderense
Torneuma picocasteloense
Torrenticola affinis
Torrenticola crassa
Torrenticola crassirostris
Torrenticola elliptiformis
Torrenticola insulicola
Torrenticola maderensis
Torrenticola mandibularis
Torrenticola nesiotes
Torrenticola pharyngealis
Torrenticola rotunda
Torymoides kiesenwetteri
Toxeumorpha nigricola
Toxoptera aurantii
Toxoptera citricidus
Toya hispidula
Toya propinqua
Trabeculus schillingi
Trachyopella atomus
Trachyopella hem
Trachyopella leucoptera

Hippotion celerio
Hirticollis hispidus
Hirtodrosophila cameraria
Hirudicryptus canariensis
Hockeria chaoensis
Hodebertia testalis
Hofmannophila eudospretella
Hogna biscoitoi
Hogna heeri
Hogna ingens
Hogna insularum
Hogna maderiana
Hogna nonannulata
Hogna schmitzi
Holcaphis holci
Holcostethus strictus
Holobus ignoratus
Holoparamecus depressus
Holoparamecus niger
Holoparamecus singularis
Holothri soror
Holotrichapion wollastoni
Homalotyloidea dahlbomii
Homalotylus quaylei
Homolobus madeirensis
Homoporus desertarum
Homoporus fulviventris
Homoporus laeviusculus
Homoporus nypsius
Homoporus titanes
Homotherus locutor
Hoplandrothri hungaricus
Hoplandrothri maderensis
Hoplitis acuticornis
Hoplothri lepidulus
Hoplothri ulmi
Hormius maderae
Hormius oreas
Hormius tenuicornis
Trachyopella lineafrons
Trachyopella nuda
Trachyopella straminea
Trachyphloeus algesiranus
Trachyphloeus angustisetulus
Trachyphloeus laticollis
Trachyphloeus reichei
Trachyscelis aphodioides
Trachyzelotes holosericeus
Trachyzelotes lyonneti
Trechus alticola
Trechus assingi
Trechus bibulus
Trechus cautus
Trechus custos
Trechus debilis
Trechus decolor
Trechus dilutus
Trechus flavocinctus
Trechus flavomarginatus
Trechus fulvus fulvus
Trechus laranoensis
Trechus lundbladi
Trechus maderensis
Trechus minyo
Trechus nigrocruciatus
Trechus nugax
Trechus obtusus asturicus
Trechus signatus
Trechus silveiranus
Trechus tetracoderus
Trechus umbricola
Trialeurodes vaporariorum
Tribolium castaneum
Tribolium confusum
Tribremia brevitarsis
Trichadenotecnum circularoides
Trichiusa immigrata
Trichocera annulata

Horvathiolus canariensis
Horvathiolus superbus
Howardia biclavis
Humerobates rostrolamellatus giganteus
Hyadaphis coriandri
Hyadaphis foeniculi
Hyadina guttata
Hyalesthes madeires
Hyalesthes portonoves
Hyalochilus ovatulus
Hyalomma lusitanicum
Hydrellia albilabris
Hydrellia griseola
Hydrellia maura
Hydromya dorsalis
Hydroporus lundbladi
Hydroporus obsoletus
Hydroptila fortunata
Hydroptila juba
Hydroptila vectis
Hydrosmecta longula
Hydrotaea armipes
Hydrotaea ignava
Hydroyche maderensis
Hygrotus confluens
Hyicera curvator
Hylaeus maderensis
Hylaeus signatus
Hylastes angustatus
Hylastes linearis
Hylastinus obscurus
Hyles livornica
Hyles tithymali
Hylotrupes bajulus
Hylurgus ligniperda
Hypena lividalis
Hypena obsitalis
Hypera constans
Hypera melancholica
Trichoferus fasciculatus senex
Trichogramma cordubense
Trichogramma evanescens
Trichogramma gicai
Trichomalus consuetus
Trichomalus cupreus
Trichomalus elongatus
Trichomalus gynetelus
Trichomalus lucidus
Trichomalus rufinus
Trichoniscus bassoti
Trichoniscus pusillus
Trichonta laura
Trichoocus brincki
Trichoocus clarus
Trichoocus coloratus
Trichoocus difficilis
Trichoocus fastuosus
Trichoocus marmoratus
Trichophaga bipartitella
Trichophaga robinsoni
Trichophaga tapetzella
Trichophya huttoni
Trichophysetis whitei
Trichoplusia ni
Trichopria aequata
Trichopria crassifemur
Trichopria fucicola
Trichopria halterata
Trichopria madeirae
Trichopria verticillata
Trichorhina hoestlandti
Trichothyas petrophila
Triclistus lativentris
Trifurcula ridiculosa
Trigonorhinus zeae
Trimorus bassus
Trimorus rotundus
Trimorus trimareta

Hypera postica
Hyperaspis pantherina
Hyperomyzus lactucae
Hyperomyzus picridis
Hypoborus ficus
Hypocaccus brasiliensis
Hypocoprus latridioides
Hypogastrura manubrialis
Hypolimnas misippus
Hypolixus semilunatus
Hypomedon debilicornis
Hypoponera eduardi
Hypoponera punctatissima
Hyposoter corpulentus
Hypothenemus eruditus
Hyptiotes flavidus
Hyssopus cracens
Hyssopus tumidiscapus
Hysteroneura setariae
Icerya purchasi
Icerya seychellarum
Ichneumon nubigenus
Ichneumon sarcitorius
Ichneumon xanthorius
Idaea atlantica
Idaea maderae
Idiopterus nephrelepidis
Idris diversus
Ifnidius atlanticus
Illinoia azaleae azaleae
Illinoia lambersi
Ilythea nebulosa
Insignorthezia insignis
Iphiseius degenerans
Irwiniella nana
Irwiniella nobilipennis
Ischiodon aegyptius
Ischiolepta pusilla
Ischnaspis longirostris
Trimorus wollastonae
Trioza chenopodii
Trioza erytreae
Trioza fernandesi
Trioza laurisilvae
Trioza pittospori
Trioza urticae
Trisois oleae
Trissolcus basalis
Trissolcus semistriatus
Trixagus algiricus
Trixagus gracilis
Trixagus obtusus
Trixoscelis sexlineata
Trogium pulsatorium
Trogloneta madeirensis
Tromatobia lineata
Tropistethus seminitens
Trox scaber
Trupanea amoena
Trupanea insularum
Trupanea stellata
Trybliographa longicornis
Trypoxylon clavicerum
Tubaphis ranunculina
Tuberculoides annulatus
Tuberolachnus salignus
Tuoba zograffi
Tuponia mixticolor
Turinyphia maderiana
Tychius filirostris
Tydeus californicus
Tydeus caudatus
Tydeus kochi
Tylos latreillei
Tylos madeirae
Tylos ponticus
Typhaea stercorea
Typhlocyba maderae

Ischnocoris mundus
Ischnoglossa prolixa
Ischnopterapion modestum
Ischnosoma biplagiatum
Ischnura pumilio
Isoneurothri australis
Isotoma antennalis
Isotomiella minor
Isotomiella paraminor
Isotomodes productus
Isotomodes trisetosus
Isotomurus palustris
Issoria lathonia
Issus maderensis
Ixodes ricinus
Ixodiphagus hookeri
Javesella dubia
Kalaphorura tuberculata
Kalcapion semivittatum sagittiferum
Kalcapion semivittatum semivittatum
Karnyothri melaleucus
Kelisia ribauti
Kissister minimus
Kleidocerys truncatulus
Kleidotoma iloides
Kleidotoma longicornis
Kleidotoma longipennis
Kleidotoma tetratoma
Kochiura aulica
Kowarzia biacuminata
Kowarzia haemorrhoidalis
Kowarzia maderensis
Kowarzia rabacali
Kowarzia tetracuminata
Labia minor
Labidura riparia
Laccobius atricolor
Lachesilla greeni
Lachesilla pedicularia
Typhlodromus pyri
Typhlodromus rhenarus
Typhochrestus acoreensis
Tytthus parvice
Udea atlanticum
Udea ferrugalis
Udea maderensis
Udea numeralis
Uloborus walckenaerius
Uresiphita gilvata
Uroleucon erigeronense
Uroleucon hypochoeridis
Uroleucon jaceae jaceae
Uroleucon mierae
Uroleucon sonchi
Urozelotes rusticus
Utetheisa pulchella
Valenzuela burmeisteri
Valenzuela flavidus
Vanessa atalanta
Vanessa cardui
Vanessa vulcania
Velia maderensis
Vespula germanica
Villa nigrifrons
Virgatanytarsus albisutus
Viteus vitifoliae
Voria ruralis
Wahlgreniella arbuti
Wesmaelia petiolata
Wesmaelius navasi
Wesmaelius subnebulosus
Wichmannia pictipennis
Wollastoniella obesula
Xanthandrus babyssa
Xanthochilus saturnius
Xantholinus longiventris
Xanthomus pallidus
Xanthorhoe rupicola

Lachesilla tectorum
Laemostenus complanatus
Lamennaisia ambigua
Lampides boeticus
Lamprolonchaea smaragdi
Lamyctes emarginatus
Langelandia mauli
Langelandia porto-santoi
Lantanophaga pusillidactylus
Laophonte cornuta
Laparocerus abditus
Laparocerus acuminatus
Laparocerus aenescens
Laparocerus angustulus
Laparocerus calcatrix
Laparocerus chaoensis cevadae
Laparocerus chaoensis chaoensis
Laparocerus chaoensis cryptus
Laparocerus clavatus
Laparocerus colasi
Laparocerus distortus
Laparocerus excelsus
Laparocerus fritillus
Laparocerus garretai
Laparocerus hobbit
Laparocerus inconstans
Laparocerus instabilis
Laparocerus lamellipes
Laparocerus lanatus
Laparocerus lauripotens
Laparocerus lindbergi
Laparocerus madeirensis
Laparocerus max
Laparocerus morio
Laparocerus navicularis
Laparocerus noctivagans
Laparocerus prainha
Laparocerus schaumii
Laparocerus serrado
Xenillus latilamellatus
Xenillus tegeocranus
Xenochlorodes magna
Xenochlorodes nubigena
Xenomerus canariensis
Xenomerus ergenna
Xenomma convexifrons
Xenomma planifrons
Xenorchestes saltitans
Xenostrongylus histrio
Xenoylla cheopis
Xenoylla gratiosa
Xenylla maritima
Xenylla welchi
Xenylla xavieri
Xenyllodes armatus
Xestia c-nigrum
Xyalaspis petiolata
Xyleborinus saxesenii
Xyleborus perforans
Xylena exsoleta
Xylocoris canariensis
Xylodromus concinnus
Xylostiba tricolor
Xylota segnis
Xysticus grohi
Xysticus lanzarotensis
Xysticus madeirensis
Xysticus nubilus
Xysticus squalidus
Xysticus verneaui
Zaglyptus rufus
Zargus desertae
Zargus monizii
Zargus pellucidus
Zargus schaumii
Zatypota percontatoria
Zavrelimyia nubila
Zelleria oleastrella

Laparocerus silvaticus
Laparocerus undulatus
Laparocerus ventrosus
Laparocerus vespertinus
Laparocerus waterhousei
Lariophagus distinguendus
Larsia curticalcar
Lasioderma serricorne
Lasioglossum villosulum
Lasioglossum wollastoni
Lasius grandis
Lathriopyga longiseta
Lathys affinis
Latridius porcatus
Latrodectus tredecimguttatus
Lebertia madericola
Lebertia maderigena
Zelleria wolffi
Zelotes civicus
Zelotes longipes
Zelotes schmitzi
Zetha vestita
Zimirina lepida
Zodarion styliferum
Zoophthorus alticola
Zoophthorus ericeti
Zoophthorus pluricinctus
Zoophthorus rufithorax
Zorois rufipes
Zosis geniculata
Zygiella x-notata
Zygomyia valida
Zygota fuscata
Zygota wollastoni

19.3.5.7. Piscis – 71 species

Abudefduf luridus
Anguilla anguilla
Antennarius nummifer
Anthias anthias
Aphanopus carbo
Balistes carolinensis
Beryx decadactylus
Beryx splendens
Bodianus scrofa
Boops boops
Capros aper
Caranx hippos
Chromis limbata
Conger conger
Coris julis
Dentex dentex
Pagellus bogaraveo
Pagrus pagrus
Phycis phycis
Polyprion americanus
Pomatomus saltatrix
Pontinus kuhlii
Pseudocaranx dentex
Pseudolepidaplous scrofa
Raja clavata
Salmo trutta
Sarda sarda
Sardina pilchardus
Sarpa salpa
Scomber japonicus
Scorpaena maderensis
Scorpaena notata

Dentex gibbosus
Diplodus cervinus
Diplodus sargus
Diplodus sargus
Enchelycore anatina
Epinephelus marginatus
Gymnothorax unicolor
Helicolenus dactylopterus
Hippocampus hippocampus
Katsuwonus pelamis
Kyphosus sectator
Manta birostris
Mobula mobular
Mola mola
Mullus surmuletus
Muraena augusti
Muraena helena
Mycteroperca fusca
Naucrates ductor
Oncorhynchus mykiss
Scorpaena porcus
Scorpaena scrofa
Seriola dumerili
Seriola rivoliana
Serranus atricauda
Serranus cabrilla
Sparisoma cretense
Sparus aurata
Sphoeroides marmoratus
Sphyraena viridensis
Sphyrna zygaena
Synodus saurus
Thalassoma pavo
Trachinotus ovatus
Trachurus picturatus
Xiphias gladius
Xyrichtys novacula
Zenopsis conchifera
Zeus faber

19.3.5.8. Anfibia – 1 species

Rana perezi

19.3.5.9. Reptilia – 9 species

Caretta caretta
Chelonia mydas
Dermochelys coriacea
Eretmochelys imbricata
Lepidochelys kempii
Lepidochelys olivacea
Tarentola bishoffi
Tarentola mauritanica
Teira dugesii dugesii

19.3.5.10. Mammalia – 33 taxa

Balaenoptera acutorostrata
Balaenoptera borealis
Balaenoptera edeni
Balaenoptera musculus
Balaenoptera physalus
Bos taurus
Capra aegagrus
Delphinus delphis
Eubalaena glacialis
Globicephala macrorhynchus
Grampus griseus
Kogia breviceps
Megaptera novaeangliae
Mesoplodon bidens
Mesoplodon densirostris
Monachus monachus
Mus domesticus
Mustela nivalis
Nyctalus leisleri verrucosus
Orcinus orca
Oryctolagus cuniculus
Ovis aries
Physeter macrocephalus
Pipistrellus maderensis
Plecotus austriacus
Pseudorca crassidens
Rattus norvegicus
Rattus rattus
Stenella coeruleoalba
Stenella frontalis
Steno bredanensis
Tursiops truncatus
Ziphius cavirostris

19.3.5.11. Aves – 27 taxa

Accipiter nisus granti
Alectoris rufa hispanica
Anthus bertheloti madeirensis
Buteo buteo harterti
Carduelis carduelis parva
Columba livia atlantis
Columba trocaz
Coturnix coturnix confisa
Erithacus rubecula rubecula
Falco tinnunculus canariensis
Fringilla coelebs madeirensis
Motacilla cinerea schmitzi
Petronia petronia madeirensis
Pterodroma madeira
Puffinus puffinus puffinus
Regulus madeirensis
Scolopax rusticola
Serinus canaria canaria
Sylvia atricapilla heinecken
Sylvia conspicillata orbitalis
Turdus merula cabrerae
Apus Unicolor
Calonectris diomedea borealis
Bulweria bulwerii
Oceanodroma castro
Sterna hirundo
Larus cachinnans

19.4. LIST OF MAIN BIBLIOGRAPHIC REFERENCES

Abreu, A. D. (1995). Moluscos do Arquipélago da Madeira. *Islenha*, Nº 16:116-120

Abreu, A. D. (2005): Povoamentos Malacológicos em Substrato Móvel ao longo da Plataforma Insular Sul da Ilha da Madeira; PhD. Thesis, University of Madeira. 265pp.

Abreu, A. D. & Biscoito, M. J. (1998): A Vida nos Mares da Madeira, *Islenha*, Nº23 Jul/Dez: 5-14.

Alves, F. Chícharo, L. Serrão, E. & A. D. Abreu. (2003). Grazing by *Diadema antillarum* (Philippi) upon algal communities on rocky substrates. *Scientia Marina*, 67 (3): 307 – 311.

Araújo, R. & R. Calado (2003). Crustáceos decápodes do arquipélago da Madeira. Biodiversidade Madeirense: Avaliação e Conservação. Direcção Regional do Ambiente, Madeira.235 pp.

Bell, B. D. (2001). Removal of rabbits ftom Deserta Grande Island, Madeira Archipelago. *Arquipélago, Life and Marine Sciences*, Supp. 2 (Part B): 117-119.

Biscoito, M. & F. Zino (2002). Aves do Arquipélago da Madeira. Biodiversidade Madeirense: avaliação e Conservação. Direcção Regional do Ambiente; Madeira. 112 pp.

Borges, P. A. V. ; R. Cunha; R. Gabriel; A. F. Martins; L. Silva & V. Vieira (2005). Listagem da Fauna e Flora (Mollusca e Arthropoda, Bryophyta, Pterydophyta e Spermatophyta) terrestre dos Açores. Direcção Regional do Ambiente e Universidade dos Açores. Horta, Angra do Heroísmo e Ponta Delgada. 317 pp.

Borges, P. A. V.; C Abreu; A. M F. Aguiar; P. Carvalho; R. Jardim; I. Melo; P. Oliveira; C. Sérgio; A. R. M. Serrano & P. Vieira. (eds.) (2008). A list of terrestrial fungi, flora and fauna of Madeira and Selvagens archipelagos. Direcção Regional do Ambiente da Madeira and Universidade dos Açores. Funchal and Angra do Heroísmo.

Cabral, M. J.; J. Almeida; P. R. Almeida; T. Dellinger; N. Ferrand de Almeida; M. E Oliveira; J. M. Palmeirim; A. I. Queiroz, L. Rogado & M. Santos-Reis (coord). (2005). Livro Vermelho dos Vertebrados de Portugal. Peixes dulciaquícolas e migradores, anfíbios, répteis, aves e mamíferos. ICNB. Lisboa.

Carvalho, L. (2005). Flora e Vegetação Litoral da Freguesia de Santana. Relatório de Estágio Científico. Departamento de Biologia. Universidade da Madeira.

Costa, J. C., J. Capelo; R. Jardim & M. Sequeira. (2004). Catálogo Florístico do Arquipélago da Madeira. *Quercetea* 6: 187-200.

Direcção Regional do Ambiente (2006). Fauna e Flora da Madeira, Espécies endémicas ameaçadas, vertebrados e flora vascular. Governo Regional da Madeira. 140 pp.

Espino, F., A. Boyra; F. Tuya & R. Haroun (2006). Guia Visual de espécies Marinas de Canárias. Oceanográfica. 482 pp.

Fontinha, S., M. Sim-Sim; C. Sérgio & L. Hedenas. (2001). Briófitos endémicos da Madeira. Colecção Biodiversidade madeirense: Avaliação e Conservação, vol.1, pp.9-18.

Furtado, S. D. (1984). Status e distribuição das Plantas Vasculares Endémicas dos Açores. *Arquipélago – Life and Earth Sciences*, 5: 197-209.

Gabriel, R. & Sérgio, C. (1995). Bryophyte survey for a first planning of conservation areas in Terceira (Açores). *Cryptogamica Helvética*, 18: 35-41.

Hansen, A. & P. Sunding (1993). Flora of Macaronesia. Checklist of vascular plants. 4th revised Edition. *Sommerfeltia* 17: 1-295.

Harley, M., Cordi, B.; Abreu, A. D. & Nijhoff, P. (2006). Climate Change and Biodiversity – Meeting the challenge. Report of the *13th Annual Conference of the European Environment and Sustainable Development Advisory Councils*. 84pp.

Henriques, P., Sousa, R., Pinto, A.R., Delgado, J., Faria, G., Alves, A., Khadem, M. (2010) Life history traits of *Patella candei* (Mollusca: Patellogastropoda) of the Northeastern Atlantic. Journal of the Marine Biological Association.

ICNB (2008): Relatório Nacional de Implementação da Directiva Habitats (2001-2006); 252 pp.

Jardim, R. & D. Francisco (2000). Flora Endémica da Madeira. Múchia Publicações.

Jesus, J., Teixeira, S.; Teixeira, D.; Freitas, T. & Russo, D.. (2009). Vertebrados Terrestres Autóctones dos Arquipélagos da Madeira e Selvagens. Biodiversidade Madeirense. Avaliação e Conservação. Direcção Regional do Ambiente. 118 pp.

Levrel, H. Quels Indicateurs pour la Gestion de la Biodiversité?. *Les Cahiers de L' IFB*. INR. 94 pp.

Martin, J. L., M. Arechavaleta; P. A Borges & B. Faria (eds.). (2008). Las 100 especies amenazadas prioritárias de gestión en la región biogeográfica de la Macaronesia. Consejeria de Médio ambiente y Ordenación Territorial, Gobierno de Canárias. 500pp.

Martin, J. L.; H. Garcia; C. E. Redondo, I. Garcia & I Carralero (1995). La Red Canaria de Espacios Naturales Protegidos. Consejeria de Politica Territorial, Gobierno de Canárias. Santa Cruz de Tenerife. 412 pp.

Maul, G. E. (1949). Lista Sistemática dos peixes da Madeira. In: Vertebrados da Madeira, Vol. 2: 137-181.

Medeiros, D., J. V. Cruz, A. Malcata; S. Mendes (2005). Monitorização da Qualidade da Água das Lagoas de São Miguel – comparação de resultados entre 2001 e 2004. Secretaria Regional do Ambiente e do Mar. 178 pp.

Medina, F. M., Oliveira, P., Menezes, D., Teixeira, S., García, R., Nogales, M. (2010). *Trophic habits of feral cats in the high mountain shrubs of the Macaronesian Islands (NW Africa, Atlantic Ocean)*. Acta Theriologica (*in press*)

Menezes, D. & Oliveira, P.. (2003). Conservation of Madeira's Petrel through restoration of its habitat. Proceedings of the workshon on invasive species on European Islands and Evolutionary Isolated Ecosystems and Group of Experts on Invasive Alien Species (Convention on the Conservation of European Wildlife and Natural Habitats), Horta, Azores, 10-12 October.

Neves, H. C. & Valente, A. V. (1992). Conheça o Parque Natural da Madeira. RAM; PNM. 73 pp.

Ojeda Land, L. (2007). La Flora vascular terrestre en el catálogo de espécies amenazadas de Canárias. *El Indiferente* 19: 16-29.

Oliveira, P. (1999). A Conservação e gestão das aves do arquipélago da Madeira. Funchal. 106 pp.

Plano Director Municipal de Santana. 2003. Câmara Municipal de Santana. Região Autónoma da Madeira.

Press J. R. & M. J. Short (1994). Flora of Madeira. The Natural History Museum, London, 574 pp.

Rodriguez Luengo, J. L. & Garcia Casanova, J. (2002) espécies Invasoras en Canárias. Workshop on Invasive Alien Species on European Alien Species. Convention on the Conservation of European Wildlife and Natural Habitats. Strasbourg, 17 September 2002. T-PVS/IAS (2002) 2 addendum, 44pp.

Saldanha, L. (1995). Fauna Submarina Atlântica – Portugal Continental, Açores e Madeira. 3ª edição. Publicações Europa-América. Lisboa.364 pp.

Santos, D. & Aguiar, R. (eds.). (2006). Impactos e Medidas de Adaptação às Alterações Climáticas no Arquipélago da Madeira. Projecto CLIMAT II. Direcção Regional do Ambiente; Madeira.110 pp.

Schafer, H. (2005). Endemic vascular plants of the Azores: an updated list. *Hoppea, Denkschriften der Regensburgischen gesellschaft*, 66:275-283.

Secretaria Regional do Ambiente e do Mar (ed.) (2005). Monitorização da Qualidade da Água das Lagoas de São Miguel. 178 pp.

Segers, W., F. Swinnen & A. D. Abreu. (2009). An annotated checklist of the Marine Mollusca from the Archipelago of Madeira and the Selvagens (NE Atlantic Ocean). *Bocagiana*; 226. 60 pp.

Silva, C.S. 2009. Tradição Oral de Santana. Junta de Freguesia de Santana. 108 pp

Silva, L. & C. W. Smith (2004). A characterization of the non-indigenous flora of the Azores Archipelago. *Biological Invasions* 6: 193-204.

Silva, L., Ojeda, E. & Rodríguez Luengo, J. L. (eds.) (2008). Flora e fauna terrestre Invasora na Macaronésia. Top 100 nos Açores, Madeira e Canárias. ARENA, Ponta Delgada, 546 pp.

SRES. 2005. Plano de Ordenamento do Território da Região Autónoma da Madeira. Secretaria Regional do Equipamento Social da Região Autónoma da Madeira

SRTT. 2002. Plano de Ordenamento Turístico da Região Autónoma da Madeira. Secretaria Regional do Turismo e Transportes da Região Autónoma da Madeira. 31 pp.

Teixeira, D. & Abreu, C. (2003). Moluscos terrestres da Ponta de São Lourenço e Ilhéus Adjacentes. Biodiversidade Madeirense: Avaliação e Conservação. Direcção Regional do Ambiente. Madeira 122pp.

Teixeira, S., (2005). *"Os morcegos (Mammalia: Chiroptera) do Arquipélago da Madeira: Identificação Morfológica e Acústica. Um Contributo para a sua Conservação".* Tese de Licenciatura. Universidade da Madeira. Funchal. 50 pp.

Teixeira, S. (2008). Chordata – Chiroptera (Vespertilionidae, Molossidae). In: Borges, P.A.V., Abreu, C., Aguiar, A.M.F., Carvalho, P., Jardim, R., Melo, I., Oliveira, P., Sérgio, C., Serrano, A.R.M. & Vieira, P. (eds.). *A list of the terrestrial fungi, flora and fauna of Madeira and selvagens archipelagos.* pp. 366 – 368, Direcção Regional do Ambiente da Madeira and Universidade dos Açores, Funchal and Angra do Heroísmo.

Teixeira, S. & Jesus, J. (2009). *Echolocation calls of bats from Madeira Island: Acoustic characterization and implications for surveys*. Acta Chiropterologica. 11 (1): 183 - 190.

Vera, A., Samarín, C., Viera, G. & Delgado, G. (2008). Natura 2000 en Macaronesia. Guia Técnica. Consejeria de Médio Ambiente y Ordenación Territorial, Gobierno de Canárias.

Vieira, R. M. S. (2002). Flora da Madeira – Plantas naturalizadas no arquipélago da Madeira. *Bol. Mus. Mun. Funchal* Sup. 8: 5-281.

Wirtz, P. (1994). Underwater Guide. Fish. Madeira, Canary Islands, Azores. Verlag SN. Stuttgart.159 pp.

Zino, F., Hounsome, M. V. Buckle, P. A & Biscoito, M. (2008). Was the removal of rabbits and house mice from Selvagem Grande beneficial to the breeding of Cory's shearwaters (*Calonectris diomedea borealis*)? *Oryx* 42(1): 151-154.

19.4.1. Websites and other digital support information

Centro de Estudos da Macaronésia (www3.uma.pt/cem).
Centro de Química da Madeira (cqm.uma.pt).
Centro de Ciências Matemáticas (ccm.uma.pt).
Centro de Estudos de Economia Aplicada do Atlântico (www.uma.pt/portal/html/ceeapla).
Centro de Investigação e Tecnologia da Madeira (www.citma.pt).
Laboratório de Genética Humana (www3.uma.pt/lgh).
Laboratório Regional de Engenharia Civil (www.lrec.pt).
Museu da Baleia (www.museudabaleia.org).
Estação de Biologia Marinha do Funchal (www.cm-funchal.pt/cmf).
Jardim Botânico da Madeira Eng. Rui Vieira (www.sra.pt/jarbot).
Parque Natural da Madeira (www.pnm.pt).
Instituto Hidrográfico (www.hidrografico.pt).
Instituto de Meteorologia (www.meteo.pt).
Secretaria Regional do Turismo e Transportes (srtt2.wisepass.net)
Secretaria Regional do Ambiente e Recursos Naturais (www.sra.pt)
Câmara Municipal de Santana (www.cm-santana.com)

20. ADDRESSES

20.1. CONTACT ADDRESS OF THE PROPOSED BIOSPHERE RESERVE

Reserva da Biosfera de Santana, Madeira
Município de Santana
Sítio do Serrado
9230-116 Santana
Madeira
Portugal
gap@cm-santana.com
geral@terracidade.com
Telefone: +351.291. 570200
Fax: +351.291. 570201

ANNEXES

LETTERS OF SUPPORT

ANNEX TO BIOSFERE RESERVE NOMINATION FORM

Annex to Biosfere Reserve Nomination Form
MABnet Directory of Biosphere Reserves
Biosphere Reserve Description

ADMINISTRATIVE DETAILS

Country: PORTUGAL

Name of Biosphere Reserve: Reserva da Biosfera de Santana, Madeira

Year designated:

Administrative authorities: **Santana City Council**

Contact address: geral@terracidade.com

Related links: http://www.cm-santana.com/cmsantana/

DESCRIPTION

General description:

Madeira Island is characterized by having very steep relief and the coastal area is almost entirely composed of steep sea cliffs and some cliff deposits as a result of the retreat of the cliffs due to oceanic abrasion. In the center of the island there is a mountain massif composed of several mountains with altitudes above 1600 m, cut by numerous basaltic dykes and veins. In the eastern part of the massif, there is an extensive plateau with an average altitude of 1550 meters. The link between coastal and central mountain massif is made up of several hills and valleys, resulting from the water weathering of bedrock. This geomorphological complexity results in a huge set of heterogeneous bio-climatic characteristics that create conditions for the existence of a wide diversity of native climatophylous broadleaf vegetation and unique habitats, especially the Macaronesian coasts with endemic vegetation, the Mediterranean laurel forest of the Canary laurel, the temperate laurel forest of the Madeira laurel and high-altitude heathlands.

The proposed Biosphere Reserve corresponds to the entire onshore area of the municipality of Santana, and includes the adjacent marine area to the isobath of 200 m of depth.

The total resident population in the area of the proposed Biosphere Reserve is of 8591 inhabitants, of which 99% live in the transition zone, 1% in the buffer zone and 0% in core areas.

The core zones are Sites of Community Interest, which integrate Natura 2000 areas and the buffer zones correspond to ruled usage areas through various planning and management instruments. The transition zones consist mainly of rural land, urban and public and private plots, with rules for its use imposed by activities management plans .

Major ecosystem type:

Subtropical oceanic Island habitats characteristic of Macaronesian biogeographical region, especially the vegetated sea cliffs with endemic flora of the Macaronesian coasts, the Mediterranean laurel forest of the Canary laurel, the temperate laurel forest of the Madeira laurel and high-altitude heaths.

Major habitats & land cover types:

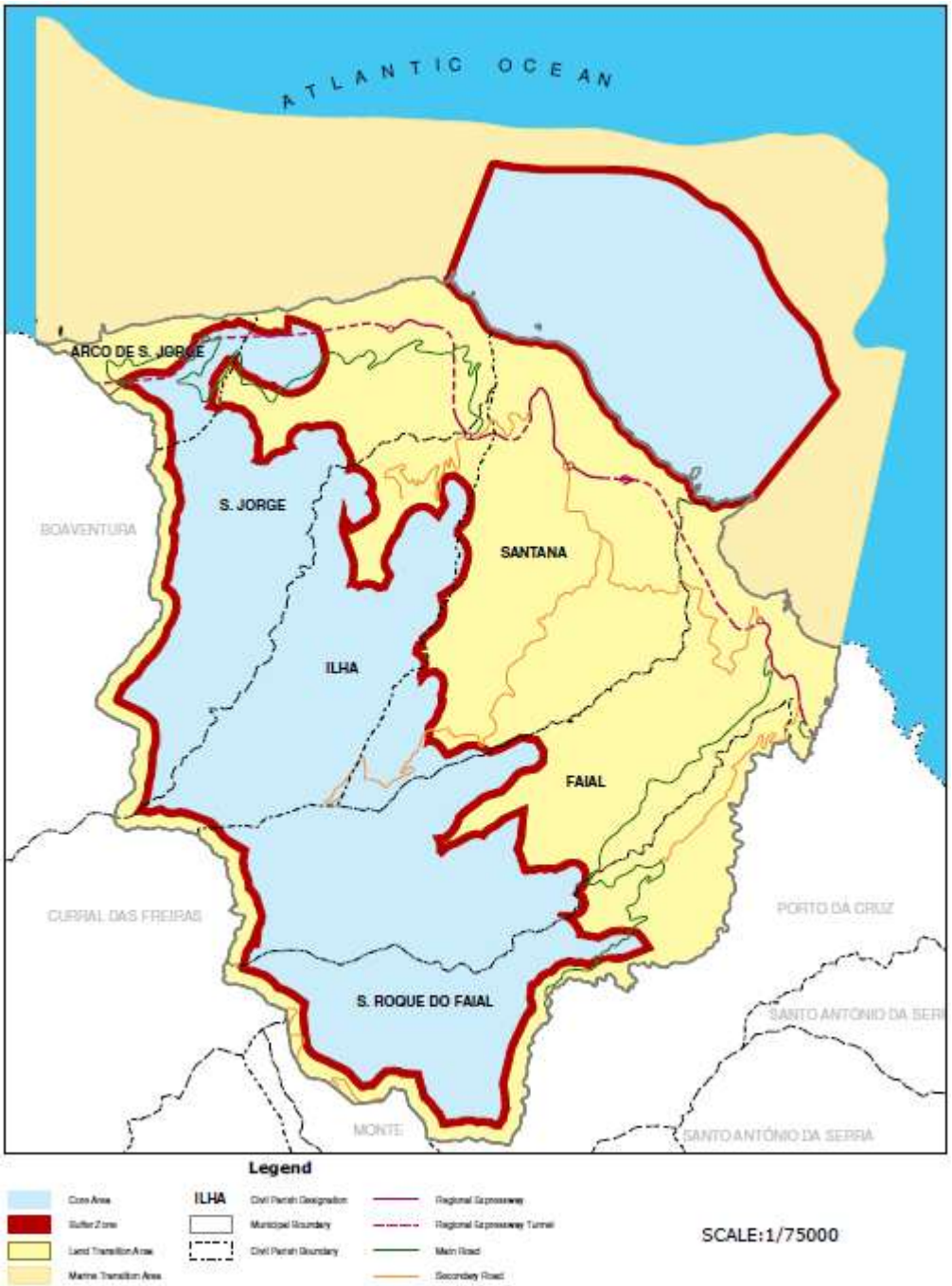
Terrestrial area; Coastal and Marine area; Rural Area; Urbana Area (Local)

Location (latitude e longitude):

Latitude: 32º 46’ N; Longitude: 16º 54’ W

Area (ha)
Total: 15.218,04
Core area(s): 5.884,05; marine 1.708,45; terrestrial 4.175,60
Buffer zone(s): 707,67; marine 109,68; terrestrial 597,99
Transition area(s): 8.626,32; marine 3.845,93; terrestrial 4.780,39

Different existing zonation:



Altitudinal range (metres above sea level**)**:

The highest elevation above sea level is 1861 meters

RESEARCH E MONITORING

Brief description:

Several regional entities develop activities related with Environmental Education, research, monitoring and safeguarding of natural heritage as well as several initiatives dedicated to gastronomy, folklore, music and built heritage sites. All the knowledge produced is published and available for review and future research and monitoring in the area of the proposed Biosphere Reserve or of the Network of Biosphere Reserves of the Eastern Atlantic (REDBIOS).

Specific variables (please fill in the table below and tick the relevant parameters)

Abiotic		Biodiversity	
Abiotic factors	✓	Afforestation/Reforestation	✓
Acidic deposition/Atmospheric factors	✓	Algae	✓
Air quality	✓	Alien and/or invasive species	✓
Air temperature	✓	Amphibians	
Climate, climatology	✓	Arid and semi-arid systems	
Contaminants		Autoecology	✓
Drought		Beach/soft bottom systems	✓
Erosion	✓	Benthos	✓
Geology	✓	Biodiversity aspects	✓
Geomorphology	✓	Biogeography	✓
Geophysics	✓	Biology	✓
Glaciology		Biotechnology	✓
Global change		Birds	✓
Groundwater	✓	Boreal forest systems	
Habitat issues	✓	Breeding	✓
Heavy metals		Coastal/marine systems	✓
Hydrology	✓	Community studies	✓
Indicators		Conservation	✓
Meteorology	✓	Coral reefs	
Modeling		Degraded areas	✓
Monitoring/methodologies	✓	Desertification	
Nutrients	✓	Dune systems	
Physical oceanography	✓	Ecology	✓
Pollution, pollutants		Ecosystem assessment	✓
Siltation/sedimentation	✓	Ecosystem functioning/structure	✓
Soil	✓	Ecotones	✓
Speleology		Endemic species	✓
Topography	✓	Ethology	✓
Toxicology		Evapotranspiration	✓
UV radiation		Evolutionary studies/Palaeoecology	
		Fauna	✓
		Fires/fire ecology	
		Fishes	✓
		Flora	✓
		Forest systems	✓
		Freshwater systems	✓
		Fungi	✓

		Genetic resources	✓
		Genetically modified organisms	
		Home gardens	✓
		Indicators	
		Invertebrates	✓
		Island systems/studies	✓
		Lagoon systems	
		Lichens	✓
		Mammals	✓
		Mangrove systems	
		Mediterranean type systems	✓
		Microorganisms	✓
		Migrating populations	✓
		Modeling	
		Monitoring/methodologies	✓
		Mountain and highland systems	✓
		Natural and other resources	✓
		Natural medicinal products	✓
		Perturbations and resilience	
		Pests/Diseases	✓
		Phenology	✓
		Phytosociology/Succession	✓
		Plankton	✓
		Plants	✓
		Polar systems	
		Pollination	✓
		Population genetics/dynamics	✓
		Productivity	✓
		Rare/Endangered species	✓
		Reptiles	✓
		Restoration/Rehabilitation	
		Species (re) introduction	
		Species inventorying	✓
		Sub-tropical and temperate rainforest	✓
		Taxonomy	✓
		Temperate forest systems	✓
		Temperate grassland systems	
		Tropical dry forest systems	
		Tropical grassland and savannah systems	
		Tropical humid forest systems	
		Tundra systems	
		Vegetation studies	✓

		Volcanic/Geothermal systems	
		Wetland systems	
		Wildlife	✓

Socio-economic		Integrated monitoring	
Agriculture/Other production systems	✓	Biogeochemical studies	
Agroforestry	✓	Carrying capacity	
Anthropological studies		Conflict analysis/resolution	
Aquaculture	✓	Ecosystem approach	✓
Archaeology		Education and public awareness	✓
Bioprospecting	✓	Environmental changes	
Capacity building		Geographic Information System (GIS)	✓
Cottage (home-based) industry	✓	Impact and risk studies	✓
Cultural aspects	✓	Indicators	
Demography		Indicators of environmental quality	✓
Economic studies	✓	Infrastructure development	✓
Economically important species	✓	Institutional and legal aspects	✓
Energy production systems		Integrated studies	✓
Ethnology/traditional practices/knowledge	✓	Interdisciplinary studies	✓
Firewood cutting		Land tenure	
Fishery	✓	Land use/Land cover	✓
Forestry	✓	Landscape inventorying/monitoring	✓
Human health	✓	Management issues	✓
Human migration		Mapping	✓
Hunting	✓	Modeling	
Indicators		Monitoring/methodologies	
Indicators of sustainability	✓	Planning and zoning measures	✓
Indigenous people's issues	✓	Policy issues	
Industry		Remote sensing	
Livelihood measures	✓	Rural systems	✓
Livestock and related impacts	✓	Sustainable development/use	✓
Local participation	✓	Transboundary issues/measures	✓
Micro-credits	✓	Urban systems	✓
Mining		Watershed studies/monitoring	
Modeling			
Monitoring/methodologies	✓		
Natural hazards	✓		
Non-timber forest products			
Pastoralism			
People-Nature relations	✓		
Poverty			
Quality economies/marketing			
Recreation			
Resource use	✓		
Role of women			
Sacred sites	✓		
Small business initiatives	✓		
Social/Socio-economic aspects	✓		
Stakeholders' interests			
Tourism	✓		
Transports			

CARTOGRAPHY