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Every door to sustainable development is a valuable opportunity to link economic progress, quality of life and nature preservation. This is particularly true in the case of small communities. It is only through measures supported by the intelligent integration of man and his environment, through models planned in a participated way, that it becomes possible to move from the rhetoric of disoriented growth to a reality of sustainable societies.

The classification of Biosphere Reserve, supported in the forms that we are now bringing forward, is one step of enormous potential. This publication defines the excellent characteristics of the natural and cultural heritages already recognized by UNESCO. Each individual, institution or entity will now have to find out how best to sustain his/its own development. The role of the Administration will be one of preserving the characteristics that enabled such classification, while acting as stimulating agent of the projects for excellence that may emerge imbued with the spirit of the Biosphere Reserves of Corvo and Graciosa Islands.

Soon, the Government of the Azores will submit the proposal of Flores Island as Biosphere Reserve. By having this set of areas classified at the highest level, we are contributing to secure the opportunities for sustainable development that the Azores Archipelago deserves.

The President of the Regional Government of the Azores

Carlos Manuel Martins do Vale César
Part I: Summary

1. Name
   Graciosa Island Biosphere Reserve

2. Country
   Portugal, Autonomous Region of the Azores
3 Fulfillment of the Three Functions of Biosphere Reserves
3.1 Conservation
The proposed Biosphere Reserve is centered on the island of Graciosa, the second smaller island of the Azores, which is situated in the Central Group of the archipelago. It includes the entire island and a marine area, covering a total area of 12,173 ha, encompassing landscapes, geological, environmental and cultural values unique at regional, national and international levels.

The island is separated by a valley into two massifs, possessing a plain to the North and Northwest. It is the lowest island of the Azores with most of its surface inferior to 150 meters above sea level. The island’s highest point is situated at 402 meters above sea level. It possesses several islets, of which two stand out for their natural importance, the Praia and Ilhéu de Baixo islets.

A prolonged occupation, agriculture and animal breeding have resulted in an humanized landscape of great cultural significance but, even so, areas that serve as refuge to unique biologic and ecosystemic values have been preserved.

One of the most important natural values of the island is its geo-diversity, characterized for a variety of geological structures, forms and materials. The central volcano (Caldeira), is distinguished by slag and spatter cones, surtseyan cones, basaltic lava flows, sub-volcanic forms, volcanic depressions, caves and algares (gas originated domes). In the interior of the Caldeira is situated the “Furna of Enxofre”, a volcanic cavity that is amongst the places where protection, preservation and the sharing of biological, aesthetic, scientific and cultural values are of more importance. The Caldeira was recently classified as a Natural Regional Monument. This new classification integrates this protected area into the Regional Network of Protected Areas. In the island it’s also possible to find thermal springs, of which the most important is located on the coast of Carapacho, in the interior of a thermal facility.

The proposed Biosphere Reserve includes in its limits varied coastal habitats, ever-green forests and vegetation of altitude. Eight habitats listed in the Annex I of the EU Habitats Directive are identified in the island, one of which having priority status. Four protected areas are integrated in the EU NATURA 2000 Network: 2 Special Protection Areas (SPA)
and 2 Sites of Community Importance (SCI).

Graciosa island has a significant array of endemisms, with 60 endemic species confirmed, 40 of which are Azorean endemisms, and 20 are Macaronesian endemisms. The invertebrate fauna has 33 terrestrial arthropods endemic to the Azores and 13 endemic to the Macaronesian Region. As for mollusks, there are 15 species endemic to the Azores and 2 endemic to the Macaronesia. In relation to birds, there are 9 endemic sub-species to the Azores and 1 to the Macaronesia. The proposed Biosphere Reserve encloses important bird areas on an international level, since several species of rare or endangered birds nest there, some of which are listed in the EU Birds Directive. It’s also relevant the presence of two species of endemic bats, one endemic to the Azores and the other to the Macaronesia.
3.2 Development
The population of Graciosa island has had a negative growth in the last century. Reaching almost 8,500 inhabitants in the beginning of XX century, in 2004 the estimated population had declined to 4,700 inhabitants.

Agriculture and cattle raising has always played a major role in the economy to the present days, and the relation of the population with the rural life is part of their cultural identity. Agriculture is extensive and diverse, and is developed both for subsistence and for commercial exports. Exported goods are primary or transformed products, as is the case of wine production.

The trend for population reduction and products with a low value in modern markets have been reflected in the economy of the island. The renovation of the economy has to be achieved through restructuring activities and adapting to new markets, valuing the unique characteristics of the island. These objectives are translated in the elaboration and implementation of diverse instruments, in territorial management and activities, such as the Municipal Master Plan (PDM), Regional Territorial Planning Act for the Azores (PROTA), the Sustainable Development Regional Plan for the Autonomous Region of the Azores (PReDSA) and the Tourism Planning Act for the Autonomous Region of the Azores (POTRAA).

The proposed Biosphere Reserve has several characteristics that enable the creation of such new products and valuing the existing ones, taking advantage of environmental and cultural values, in a sustainable development principle.

The mild climate and the different attractive landscapes give Graciosa great potential for a multi-functional tourism. There is a regional interest in developing a specialized tourism that brings Man and nature together and that fosters the cultural development. The Graciosa island has unique natural values, both at a biological and geological levels.
Besides the natural values, the proposed Biosphere Reserve has a rich and diverse ethnography, both locally as regionally. In Graciosa a great importance is given to the preservation of the cultural traits that define the island, which is translated in the high number of cultural associations that exist in the island.

The development of activities based on valuing the natural and cultural patrimony of the proposed Biosphere Reserve, that complement or even substitute some of the low rentability practices will foster the renovation of the economy and local social development. The creation of the Biosphere Reserve in this area will create a common platform to stimulate initiatives for the conversion of activities and value the natural and cultural patrimony.
3.3 Logistic Support
The island of Graciosa has motivated the development of scientific work for a long time, chiefly for its singular natural characteristics. The island is frequently visited by scientific expeditions in various fields of knowledge, largely in natural sciences in the areas of volcanology and biology. Experiments finished and underway in natural resources management, introduced species eradication and habitat restoration, as well as existing infrastructures, make the proposed Biosphere Reserve an ideal place to undertake research, demonstration and management projects and to train researchers and technicians in those areas.

The Eco-School (Ecoteca), located in the Cultural, Sport and Recreational Association of Luz, places special focus in the development of activities that foster the change in habits and behaviors of the population to achieve a better relation with the environment. These actions are important in the solving problems such as the production of residues, as well as to foster the protection of the environment. This Eco-school is open during all year and organizes training courses, exhibitions and environmental awareness sessions.

Another initiative aiming the increase of awareness and environmental education is the program “Eco-Schools”. This program was created by the Foundation for Environmental Education and was implemented in the Azores by the Regional Secretariat for the Environment and the Sea. The program aims to implement environmental educational measures on a daily basis in schools, in parallel to regular curricular activities, fostering an environmental consciousness in future generations.

The island has a continued presence of the Volcanology and Seismology Observatory from the University of the Azores, through continuous automatic data collection and frequent visits of researchers of that institution. On the Praia islet there are infrastructures to support scientific work that allow the stay of researchers for short periods.

The proximity of the University of the Azores, with departments on the islands of Faial, Terceira, and São Miguel, allows for an easy access to specialized researchers, scientific equipment and facilities. The University, which represents an institution of excellence in research on a regional and global scale, partakes in various international projects and
thus benefits from know-how and training exchange.

Results obtained from integrated resource management on Graciosa have been successfully used in producing material on public outreaching and environmental education initiatives with ample distribution on the island and elsewhere.

The role that Graciosa plays regarding logistic support, training and environmental education could be expanded by the centralized management mechanism of a Biosphere Reserve, through promotional mechanisms of the area and the international exposure that the Biosphere Reserve designation concedes.
Criteria for Designation as a Biosphere Reserve
Encompass a mosaic of ecological systems representative of major biogeographic regions, including a gradation of human intervention.
The island of Graciosa is the second smallest island of the Azores, situated in the Central Group of the Archipelago. The island is composed by two massifs separated by a valley, with a plain to the North and Northwest. It is the lowest island of the Azores, with its greater part at less than 150 meters above sea level and its highest point at 402 meters. The island’s area is approximately 62 m$^2$, and the estimated population in 2004 was of 4,777 inhabitants. The population density is low, with an average of 77 inhabitants per km$^2$. The island presents a linear settlement along roads and paths and the largest urban concentrations are in Santa Cruz da Graciosa, Praia, Guadalupe and Luz.

Graciosa has a diversified landscape and a rich collection of habitats and rare species, characteristic to the biogeographical region of Macaronesia, which includes the Archipelago of Cape Verde, Canary Islands, Madeira and the Azores and a part of the coastal NW Africa. On this island areas of low human intervention and a high ecological value can be found, that are example some of its islets, important nesting areas for marine birds. It also bears some locations with rare combination of habitats of high complexity. In some of the island’s cliffs and in some of its islets we can find well preserved natural habitats such as the endemic coastal cliffs and the coastal plains where some very rare species may be found. Particular habitats and species are also found associated with thermal waters and volcanic formations.

In a general sense, the island is divided in 4 morphologically distinct zones, conditioned by the topography:

- **North/Northwest Plain**: very populated, used fundamentally for agriculture, interweaved by some pastures, in large regular terrains, and a linear settlement along the roads and paths. This area, representing roughly a third of the island’s surface, with altitudes between 30 and 100 meters, has scattered small volcanic structures.

- **Central Massif**: relatively high, marked by the elevations Serra Branca (360 m), Serra Dormida (398 m), and Serra das Fontes (375 m), that divide the island perpendicularly to the north and the southeastern shores. The topography is
sometimes regular and rounded, with pastures, woods and some agricultural land, sometimes rough, covered by pastures and woods, where the settlement is minimal.

- **The Valley between the Central Massif and the Caldeira Massif**: parallel to the Central Massive, from the northeast coast to the southeastern point, rising up to 200 meters but well protected from the western and northeastern winds, the land is intensely occupied with diversified uses, agriculture, fruticulture, pastures, woods and forests.

- **Caldeira Massif**: located in the southeastern part of the island, with a maximum altitude of 402 m, formed by a volcanic crater. It is the coolest and most humid part of the island, dominated by pastures and sparse woods, exposed to the wind. In the interior of the sheltered crater, there are areas well covered with Japanese cedar (*Cryptomeria japonica*), still holding some indigenous species and at the bottom of the crater is covered by permanent pastures.

In relation to the rest of the archipelago, Graciosa is the island where the least of its surface is covered in pasture lands. In its rural landscapes, it is notable the vast areas of enclosures for the viticulture, of the “Verdelho” and “Isabella” grapes, mostly in the northwest area of Santa Cruz, for the regularity of small terrains enclosed in low dry stone walls on the black volcanic soil. In addition to agriculture, fishing is also traditional, chiefly conducted from small boats. Still in the primary sector, forestry is done in a regulated manner.
4.2
Be of significance for biological diversity conservation
To the great interest volcanologic patrimony of the proposed Biosphere Reserve, is associated a high biological diversity. In the volcanic cavity of Graciosa island it’s possible to find rare plant species of great interest both for the variety and the existing endemisms. There are 10 identified species of bryophytes mentioned in the European Bryophytes Red List by their rarity and by their restricted distribution (endemic species to the Macaronesia and Europe). Those cavities also constitute habitats for the arthropod fauna of the Azores. From the list of 37 taxa of cave-dwelling arthropods known in Graciosa, four are endemic.

There are 57 endemisms in Graciosa island of which 30 are Azorean endemisms, 14 are Macaronesian endemisms and 13 are European endemisms. Regarding terrestrial arthropods, 33 are Azorean endemisms and 13 are Macaronesian endemisms. As for terrestrial mollusks there are 10 endemic species to the Azores and 2 to the Macaronesia. The richness of vertebrate endemisms is also high, with 9 endemic birds to the Azores and one to the Macaronesia and 2 endemic bats, the Azorean bat (*Nyctalus azoreum*) endemic to the Azores and the Madeira bat (*Pipistrellus maderensis*) endemic to the Macaronesia. Both these bat species are included in the Annex IV of the EU Habitats Directive, with rigorous protection status. In the marine area of the proposed Biosphere Reserve there are several species of organisms with important conservation value, of which stand out the limpets (*Patella aspera and P. candei*) that have both cultural and economic interest, the dusky grouper (*Epinephelus marginatus*), and the comb grouper (*Mycteroperca fusca*) amongst others. Several species of cetaceans are also present, all included in the Annex IV of the EU Habitats Directive. It’s also relevant to mention the probable existence of an endemic sub-species of the band-rumped storm petrel (*Oceanodroma castro monteiroi*), with only two known nesting places, Praia and Ilhéu de Baixo islets, both in Graciosa. This marine bird has an unfavorable conservation status at a world level and, being confirmed this new sub-species, the role of Graciosa island on it’s conservation is of paramount importance.

Graciosa island presents well preserved coastal and marine environments, although some human pressure exists in specific coastal zones due to urbanization. The coastal organism
communities are determined specially by their morphology and types of substrates.

The local fishermen are the main users of marine resources, but fishermen from nearby islands (chiefly Terceira and São Jorge) also fish there frequently. The fishing techniques most commonly used are hand lines and pole and line, directed to demersal species and tunas. This type of fishing is considered traditional and, being efficiently managed, is compatible for the preservation of the exploited species.

Agriculture is well developed and diverse, still using many traditional agricultural methods, including the viticulture in enclosures. Agriculture is developed in extensive regimen in small properties, although some of the labor is partially mechanized and regular use of agricultural additives is made. In parallel to agriculture, there is also forestry, mainly of Japanese cedar (Cryptomeria japonica).

Classifying the area as a Biosphere Reserve could help preserve traditional exploitation methods as an alternative to more intensive methods and revert several situations, such as mono-specific livestock breeding and the use of additives to maintain pasture areas, by reintroducing more environmental and economically sustainable methods.
Provide an opportunity to explore and demonstrate approaches to sustainable development on a regional scale
The proposed Biosphere Reserve may efficiently contribute to the diffusion of sustainable development measures to the other islands of the Azores and even to other similar regions around the world, through the development of methodologies for the valuing of the local natural and cultural patrimonies.

The use of sustainable artisanal agricultural and fishing techniques, the valuing of the natural and cultural patrimonies through the tourism, the valuing of export products using quality certification, the restoration of natural and cultural patrimony are amongst several lines of work that can be followed and that are already under development as part of the Regional Government of the Azores strategy for a sustainable development.

Graciosa has been used for several years in experiments for the integrated management of protected areas, habitat restoring and invasive species eradication. The innovations created in Graciosa had, and still have, reflexes not only at a local level but also in the sustainable management of natural spaces in other islands of the Azores. Likewise, these innovations have served as examples of good practices at a national and even international levels.

The creation of a Biosphere Reserve in this island will create a common discussion platform, and will help to orientate the efforts to achieve a socio-economic development compatible with the preservation of natural and cultural values.

Locally there are infrastructures offering information regarding the proposed Biosphere Reserve natural spaces and about the sustainable development measures implemented there. Some of these stand out, as is the case of the Eco-School (Ecoteca) and the walking trails signaled with interpretative outdoor posters. Graciosa is emblematic for its natural landscapes, making it an example for the other islands of success cases in applying measures for the socio-economic development, based in natural and cultural sustainability.

Additionally, the strong ties created by cooperating on various international projects between the Regional Government and other institutions in the archipelagos of the Azores, Madeira and Canaries, should facilitate the circulation of information throughout the Macaronesian region and could be further enriched by integrating the proposed reserve into REDBIOS (Eastern Atlantic Network of Biosphere Reserves).
4.4 Have an appropriate size to serve the three functions of biosphere reserves
The area proposed as a Biosphere Reserve includes the total area of an island, located in the Central Group of the Azores archipelago, and a substantial surrounding marine area. Although the land area of the island is reduced in size, it supports a significant diversity of habitats of international importance, recognized and classified by the EU NATURA 2000 Network. On the other hand, considering that the archipelago has 9 islands, the inclusion of the entire land mass of an island could have a very different impact to that of an area in a terrestrial contiguous territory.

The marine area that constitutes all the external area of the proposed Biosphere Reserve, allows the efficient management of the coastal systems and the unique important habitats, such as some of the islets. This management will permit that those habitats function as refuges for several marine species that will, in consequence, benefit the commercial marine activities in neighboring areas.

The fact that the proposed Biosphere Reserve is enclosed in a relatively small area and has a simple zonation, will contribute to an efficient management to achieve the conservation, development and logistic support goals, influencing, at the same time, the entire population of the proposed reserve. The human activities will be easy to monitor and control, and the population concentration will aid in the creation of a common forum to think and discuss the activities developed inside the reserve. The good management of the proposed Biosphere Reserve will reflect not only in the development of the local communities, but will also influence other communities, serving as a demonstrative example of the advantages in the use of sustainable development measures through the conservation of natural and cultural values.

The proposed Biosphere Reserve is dimensioned to achieve all the functions of a Biosphere Reserve, framing this dimension by the Azores archipelago reality. The total proposed area corresponds to 10,784.4 ha (108 km²). The Core Areas total 555 ha (5.6 km²) and correspond to around 5.2% of the total area with 204 ha (2.4 km²) marine and 351 ha (3.1 km²) terrestrial. These dimensions are enough to guarantee the preservation of the natural values in a long term since they include the most important areas for biodiversity in the island and in the surrounding marine area.
The Buffer Zone corresponds to 17.7% of the total area of the proposed Biosphere Reserve, with 1,914 ha (19 km²). This area is dimensioned to efficiently protect the Core Areas, allowing the development of human activities in the neighboring areas without compromising the protection of the natural values.

Biosphere Reserve of Graciosa Island

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<tr>
<th></th>
<th>Area (ha)</th>
<th>% of Area</th>
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<tbody>
<tr>
<td>Core Area</td>
<td>555.34</td>
<td>5.15</td>
</tr>
<tr>
<td>Buffer Zone</td>
<td>1,913.8</td>
<td>17.7</td>
</tr>
<tr>
<td>Transition Area</td>
<td>8,315.26</td>
<td>77.1</td>
</tr>
<tr>
<td>Total</td>
<td>10,784.4</td>
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</tbody>
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Through appropriate zonation
legal status, their size, the main conservation objectives

The five proposed Core Areas correspond to five protected areas under different denominations and an area proposed as an Important Bird Area (IBA) under the BirdLife International Programme. These areas cover a total of 555.4 ha and are not continuous except in the case of the Core Area covering the coastal area called Ilhéu de Baixo Islets and Restinga. The other Areas are the Natural Regional Monument of Caldeira da Ilha Graciosa (Caldeira), Ponta Branca, Ponta da Barca and Praia Islet.

These five Core Areas have several species and habitats protected by international conventions, national and regional regulations. A great part of the area is integrated in the EU NATURA 2000 Network. Besides the targeted Natura 2000 natural values, it is also intended to preserve unique geologic values at a world level.

The Natura 2000 Sectoral Plan for the Azores region identified possible conservation difficulties in the proposed Core Areas. The planned conservation objectives are organized on several levels and include: suspending and reverting degradation factors in the Core Areas; protecting the Core Areas by controlling human activities in the surrounding areas; man-made territory and activity planning; where necessary, implementing changes in land use practices to guarantee natural habitats at a long term; restoring natural habitats in the Core and adjacent areas and promoting public awareness and environmental education.

Caldeira Natural Regional Monument of Graciosa Island

The Caldeira constitutes the biggest forest area in the island, including a dense coverage by Japanese cedar (*Cryptomeria japonica*) and some of mix vegetation with natural and exotic species. With a cooler climate, more humid than in most of the island and sheltered from the wind, its interior walls, with pronounced slopes, are covered with these woods, being the central and lowest part partially covered by pastures. The Caldeira consists of an interesting geologic structure, containing in its interior “Furna do Enxofre”, an
outstanding volcanic cavity, considered unique at an international level. The Natural Partial Forest Reserve of Caldeira da Graciosa, created and delimited by the Regional Decree no. 27/88/A of July 22, was republished as Natural Regional Monument by the Regional Decree no. 24/2004/A of July 14. The proposed Core Area has 119.87 ha.

**Natura 2000 Network areas**

Four of the proposed areas are part of the EU NATURA 2000 Network either as Site of Community Importance (SCI) or as Special Protection Areas (SPA). In the Autonomous Region of the Azores, the SPA were declared to the European Commission in 1990, having being transposed to the internal juridical frame by the Regional Decree no. 14/2004/A, of May 20. The SCI areas were transposed to the internal juridical frame by the Regional Decree no. 18/2002/A, of May 16.

**Ilhéu de Baixo Islets – Restinga**

The 204 ha of the Core Area “Ilhéu de Baixo Islets – Restinga” are situated in the SE corner of the island. The area is about 1 Km apart from the shoreline, and the islets result from the dismantling of a small volcanic structure by marine erosion. The entire Restinga shoreline is composed by cliffs, with areas where the natural and semi-natural vegetation dominate. The terrestrial part of the Core Area has around 81 ha and comprises a coastal zone extending to the south, forming a peninsula that surrounds the islets called Ilhéu de Baixo. The islets are essentially composed by lava flows and pyroclastic deposits and are in a good natural preservation status. The Carapacho, the westernmost point of the Core Area is a small village that extends along the shore, and has a great touristic importance due to the presence of the Carapacho Terms. Some agricultural areas are also included in the Core Area.

The coastal area surrounding the Ilhéu de Baixo islets has a great speleological importance
due to the presence of volcanic caves. The islets hold important communities of coastal vegetation and one of the most important multi-specific marine bird colonies in the Azores. In this area important marine birds nest, many of which are listed in the Annex I of the EU Birds Directive. The access to the islets is difficult and, hence, the human influence is very low.

**Ponta Branca**

The Core Area Ponta Branca is situated in the SW part of the island, having an area of 101 ha. It comprises chiefly the coastal cliff (Figure 9) with particular geological materials, where there is a dominance of natural and semi-natural vegetation of coastal cliffs. Most of the area is of very difficult access and the human activities in the area are restricted to a narrow band on the top, used for traditional agriculture. It holds habitats and species listed in the annexes of the EU Habitats Directive. Regarding the vegetal species it is important to refer the presence of *Azorina vidalii* (EU priority species), *Erica scoparia* ssp. *azorica*, *Myosotis maritima*, *Spergularia azorica* e *Ammi trifoliatum*.

**Ilhéu da Praia**

This Core Area is composed by the islet Ilhéu da Praia, with an area of 9.92 ha and situated at 1.5 Km from shore. The islet shoreline is composed by pronounced slopes of volcanic rock, cobblestone beaches and cliffs. Easily accessible and very attractive it is sometimes visited by tourists. In this area nest important marine bird species, some of which listed as priority species in the Annex I of the EU Birds Directive. This islet also holds one of the most important multi-specific bird colonies in the Azores.

**Important Bird Area (IBA BirdLife)**

**Ponta da Barca**

This Core Area is in the process of being designated as a BirdLife Important Bird Area and, hence, still doesn’t have a legal status. Having 39.99 ha, is located in the north shore of the island, and consists in a band stretching from the shoreline to the top of the cliff. It is covered by coastal and cliff Macaronesian vegetation and is composed by an inaccessible sea cliff with crevices and clay intrusions.

b) Describe briefly the buffer zone(s), their legal status, their size, and the activities which are
ongoing and planned there

The Buffer Zones total 1,913.8 ha, including marine and terrestrial areas and consisting chiefly in public domain and private lands.

The general conservation objectives for the terrestrial area derive from the implementation of several territory management instruments, including the Municipal Masters Plan, the Management Plan for the Shoreline, the Regional Territorial Planning Act for the Azores, the Sustainable Development Regional Plan for the Autonomous Region of the Azores and the Natura 2000 Network Sectoral Plan for the Autonomous Region of the Azores. Amongst the diverse goals of these instruments, it's relevant to mention the control of all human activities in the Core Areas' surroundings, man-made territorial planning and activities and, when necessary, implementing changes to land
use practices in order to guarantee the preservation of natural habitats in the long run, habitat restoration in bordering areas and the promotion of public education and awareness.

Main objectives in the marine Buffer Zone include maintaining the environmental quality of the area by developing sustainable activities, habitat and resource restoration and the progressive transformation of several extractive activities into non-extractive activities by valuing resources and promoting public education and awareness.

Further objectives for the Buffer Zones consist of reaching a common agreement on land use practices amongst the various activities and stakeholders while guaranteeing that these bring positive impacts to the Core area and developing sustainable human activities, such as ecotourism and valued environmentally sustainable products.

**Caldeira Natural Regional Monument of Graciosa Island**

The Buffer Zone surrounding this Core Area is mostly covered by pastures in medium sized properties. Where the slope is more accentuated, the pastures are replaced by low woods and communitary pastures used for cattle breeding. In the SW corner it merges with the Buffer Zone of Restinga and these two Buffer Zones total 451 ha.

**Ilhéu de Baixo Islets – Restinga**

The Buffer Zone surrounding Restinga is composed of a terrestrial and a marine parts. The terrestrial fraction, inserted in the south slope of Caldeira, is composed by sparse areas of low vegetation as well as partitioned and communitary pastures. Closer to the sea there is a diversified mosaic of small agricultural properties, delimited by low dry stone walls. In this area diverse recreational activities are developed. This terrestrial fraction merge in it’s NE corner with the Buffer Zone of Cadeira da Graciosa and these two total 451 ha. In the marine fraction of the Buffer Zone, with 451 ha, some professional and recreational fishing is developed.
Ponta Branca

The Buffer Zone surrounding the Ponta Branca Core Area includes a terrestrial and a marine parts. The marine fraction has 384 ha and is used chiefly by professional recreational fishermen. The terrestrial fraction, with 322 ha, has low human intervention and has a good vegetal cover. Its covered mainly by wide partitioned pastures delimited by low dry stone walls. The populational density in the area is very low.

Ilhéu da Praia

The Buffer Zone surrounding Ilhéu da Praia (a small islet) is strictly marine and is used chiefly by professional fishermen and recreational boats. The total area is 158.5 ha.

Ponta da Barca

The Buffer Zone surrounding Ponta da Barca includes a terrestrial and a marine parts. The marine fraction, with 294 ha, has low interference by human activities, being sometimes used by professional and recreational fishermen. In the terrestrial fraction, with 102 ha, the main activities developed are agriculture and cattle grazing, and is covered by portioned properties delimited by low dry stone walls traditionally devoted to viniculture.

c) Describe briefly the transition area as envisaged at the time of nomination, the types of questions to be addressed there in the near and the longer terms

The bulk of the proposed Biosphere Reserve area (77.1 %) is comprised by the Transition Area that covers a total area of 8,315 ha. Besides being characterized by a linear urbanistic organization along roads and trails, the Transition Area also has a strong rural
expression, composed by several types of agricultural landscapes. It’s here that most of the island’s production activities take place, including the viniculture, varied extensive agriculture, cattle raising and some industrial activities (dairy, traditional preserves, pastry, wine). Some extractive activities are also developed here (building stone, sand, wood).

Estimating by the population decline that the island has felt during the last century, an increase in the human pressure is not to be expected in a medium to long term, in a way that compromises the conservation of the natural values included in the proposed Biosphere Reserve.

There is a great potential, through the communication channels already established on the island with the local population, in applying designed sustainable development approaches on the island. Several sustainable development programmes have already been applied with the participation of the resident population, local businesses, Municipal and Regional Governments and, in the future, financial emphasis shall be given to similar initiatives.
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.
The creation of an advisory committee with participation on the management of the proposed Biosphere Reserve is anticipated, composed by representatives of the main stakeholders. The elements of the advisory committee have not yet been decided but will most probably include the main public entities and representatives of the local community and the main stakeholders in the proposed Biosphere Reserve.

The reduced population makes the implementation of efficient consultation mechanisms easy, permitting the effective participation of all interested in participating. The creation of an electronic forum is being discussed, to create a permanent and efficient way of communication between the population and the management of the proposed Biosphere Reserve. Relevant management measures will be presented to the population and discussed in order to reach the best possible consensus for all stakeholders concerned, in accordance with environmental and culture conservation and development objectives.
4.7 Mechanisms for implementation
a) Mechanisms to manage human use and activities in the buffer zone or zones

Several management mechanisms for activities in the terrestrial part of the Buffer Zones are already in progress, such as: FEADER – European Fund for Rural Agriculture Development 2007-2013 (agricultural good practice code), implemented in the Azores by the Prorural Program. At a regional level, mechanisms include POOC (Management Plan for the Shoreline), POTRAA (Tourism Planning Act for the Autonomous Region of the Azores) in public discussion phase, PRA (Regional Water Plan), PROTA (Regional Territorial Planning Act for the Azores) in elaboration phase, and, at a municipal level, PDM (Municipal Masters Plan).

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

The management strategies already in action shall be continued, namely those established by the Regional Territorial Planning Act for the Azores, the Sustainable Development Regional Plan for the Autonomous Region of the Azores, Tourism Planning Act for the Autonomous Region of the Azores and the Sectoral Plan for the Natura 2000 Network in the Autonomous Region of the Azores.

Besides the above-mentioned plans, PDRuAçores – Rural Development Plan for the Azores Region will also be applied to the Buffer and Transition areas,

In addition, a management plan for the proposed Biosphere Reserve will be produced in conjunction with the interactive participation of the local community.

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

In the Azores, REAPA (Regional Network of Protected Areas of the Azores Autonomous Region), translates and implements the IUCN Protected Areas classification, adapting this classification to the geographic, environmental cultural and politic-administrative particularities of the Azores archipelago territory.

REAPA envisage the creation of an Island Natural Park (INP), constituted by the terrestrial classified areas in each island territory, and with the possibility of including marine areas to the external limit of the Territorial Sea (12 nautical miles). The INP is the basic management unit of the Regional Network of Protected Areas of the Azores Autonomous Region and will be created through a Regional Legislative Decree.

The management system of the Regional Network of Protected Areas of the Azores Autonomous Region will be published and implemented in 2008, after a public hearing process. Until it’s publication, the management of the proposed Biosphere Reserve will be assured by the Environmental Island Service, an operational unit of the Regional Government of the Azores, coordinated by it’s Regional Secretary of
d) Programs for research, monitoring, education and training

The scope of research undertaken on the island has included several research programmes and higher-level education programmes, promoted in great part by the University of the Azores. Various ongoing research projects cover topics such as the biology and ecology of several species, ecological modeling and habitat restoration, seismology and volcanology, meteorology and climate. It is expected that research will not only continue but also augment with the implementation of the proposed Biosphere Reserve as the island will serve as a natural laboratory for integrated and sustainable management studies.

Monitoring is essential for assessing the results of the implemented management measures. Guaranteeing resources for implementing measures and monitoring will become one of the main functions of the management authority. In addition, and in terms of research, monitoring will enable the assessment of several reserve management theories. Research projects dedicated to the implementation mechanisms and functioning of the Biosphere Reserve will need monitoring to test the theoretical hypotheses. The implementation of a Biosphere Reserve will reinforce the existing monitoring and will make the work more efficient by creating common goals.

Environmental education and training programmes have been developed both locally and on a regional level. The Regional Government of the Azores, in collaboration with local municipals and Non Governmental Organizations (NGOs), has been installing a Regional Network of eco-schools (Ecotecas) since 1999. The second eco-school created in the Azores was the one located in the Luz locality in Graciosa, in partnership between the Regional Government and the Cultural, Sport and Recreational Association of Graciosa. This space is open to the population and develops actions on information, training, and environmental awareness and can also host public sessions, receive researchers and hold several types of events related with environmental and cultural preservation.

The Regional Government of the Azores occasionally promotes training and informative programmes in agriculture and fisheries with the objectives of improving conditions and revitalizing these important socio-economic activities on the island. Similar initiatives are also promoted by
professional associations. The Professional School of Praia teaches professional courses in areas with direct interest to the development of the local economic activities.

The creation of a Visitor’s Centre at Furna do Enxofre is being prepared. This centre will be created not only due to the importance and designation of this geological structure, but also to enhance the visitor’s experience and to dignify the Natural Monument.

The proposed Biosphere Reserve intends to be a model of development centered in the preservation of the natural and cultural patrimonies. The results obtained in the integrated management of resources in Graciosa will have an important impact on the implementation of similar measures in other islands in the archipelago and even in other areas with similar characteristics around the world.
5.1 Signed by the authority/authorities in charge of the management of the core area(s):

Full name: Dr. Frederico Abecasis David Cardigos
Title: Regional Director of Environment
Date: 17.04.2007

5.2 Signed by the authority/authorities in charge of the management of the buffer zone(s):

Full name: Dr. Frederico Abecasis David Cardigos
Title: Regional Director of Environment
Date: 17.04.2007
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: Dra. Ana Paula Pereira Marques
Title: Regional Secretary of Environment and Sea
Date: 17.04.2007

5.4 Signed by the authority/authorities, elected local government recognized authority or spokesperson representative of the communities located in the transition area:

Full Name: José Ramos de Aguiar
Title: President of Santa Cruz da Graciosa Municipality
Date: 09.04.2007
(official support letter in annex)

5.5 Signed on behalf of the MAB National Committee or focal point

Full Name: Ambassador Fernando Andresen Guimarães
Title: President of the UNESCO National Commission
Date: 17.04.2007
Part II: Description

Location

Latitude and Longitude

Latitude
39° 03’ N

Longitude
28° 00’ W

Northern Limit
39° 06’ N

Southern Limit
38° 59’ N

Western Limit
028° 05’ W

Eastern
027° 55’ W
7 Area
7.1 Size of terrestrial core area(s)
The terrestrial Core Area has a dimension of 350.97 ha.

7.2 Size of marine core area(s)
The marine Core Area has a dimension of 204.37 ha.

7.3 Size of buffer zones(s)
The Buffer Zones have a dimension of 1,913.8 ha.

7.4 Size of transition area(s)
The Transition Area has a dimension of 8,315.26 ha.
8 Biogeographical Region
The islands of Azores, Madeira, Selvagens, Canaries, and Cape Verde share a great number of environmental, botanical and faunistic characteristics, constituting for this reason a biogeographical region. The first to use the term “Macaronesia”, meaning “happy” or “fortunate, enriched” islands, to nominate this region was the botanist Philip Barker Webb in 1845. In addition to these archipelagos, some authors also include the coastal zone of continental Africa between Agadir and Nouadhibou, where typical Macaronesian species such as the Azores Laurel (Laurus azorica) and the dragon tree (Dracaena draco) are found.

All these archipelagos are of volcanic origin and in several cases (e.g. Azores, Canaries and Cape Verde), historic volcanism has been recorded. A diversified landscape and the reduced direct effect of the glacier era made the Macaronesia region a key area for biodiversity in Europe. The volcanic origin of the islands and the fact that these where never directly joined to any continental land mass has contributed to the high endemism in the region. For some species groups endemism reaches prominent levels and in the case of plants, reaches the highest levels in Europe, only comparable on a global scale with that of the Galapagos Islands.

Although these areas embrace characteristics that put them into one biogeographical region their geographic distribution produces a highly diversified climate. The climate varies gradually from a sub-tropical humid climate characteristic of the Azores, an intermediate climate similar to the Mediterranean in Madeira and the Canaries, to a typical tropical climate with distinctive dry and wet seasons in Cape Verde. Besides the latitudinal climate difference, the distribution of biological components in different habitat types in Macaronesia is also greatly influenced by altitude.

Climate variations and the different degrees of remoteness from continental masses have created a wide variety of habitat types and species diversification between islands and island groups, in particular when referring to flora. In the Azores, the flora is eurosiberian-asian, in Madeira mediterranean, in the Canaries mediterranean-saharan, and in Cape Verde saharan-sudanian.

Due to this heterogeneity, some authors question the validity of this biogeographical region,
nonetheless, specific common characteristics prevail and Macaronesia is amply recognized in the majority of research and management objectives. On a European Union level, Macaronesia is recognized as a region of significant importance in biodiversity conservation and encompasses a large number of habitats cited in Annex I of the Habitats Directive and several endemism included in Annex II of the same Directive.

The Azores Archipelago consists of nine inhabited islands distributed in three groups between the latitudes 36º 55’ and 39º 43’ north and longitudes 24º 46’ and 31º 16’ west. The shortest distance to the European coast is 1,600 km and to Newfoundland approximately 1,900 km. The most oriental group includes the islands of Santa Maria and São Miguel and the uninhabited reef, Formigas. The central group comprises the islands of Terceira, São Jorge, Graciosa, Pico and Faial. The most occidental group is formed by the islands of Flores and Corvo.

The Azorean islands are aligned along a NW-SE orientation, expanding over a distance of 600 km between Santa Maria and Corvo. The Azores is located in a convergence zone of several tectonic structures, which movements are responsible for the seismic and volcanic activity on the islands and to a certain degree, the petroleum and other geochemical characteristics of lava flows. The most notable of these structures are the Mid-Atlantic Ridge, the Terceira Rift, Fracture Zone North of the Azores, Fracture Zone East of the Azores and Fracture Zone West of the Azores.

The Mid Atlantic Ridge is a pure distended structure, seismically active that extends north to south in the Atlantic and is intersected by transforming faults in a general E-W direction, dividing it into numerous fragments. This structure forms the limit between the American plate, located to the west, and the Eurasian and African plates, to the east. The islands of Flores and Corvo are on the American plate, to the west of the Mid Atlantic Ridge, and the remaining islands lie to the east of the Ridge.

The climate in the archipelago is in-between the sub-tropical humid and
Mediterranean climates, with relatively small temperature variations between summer and winter. Precipitation is high and increases from east to west. The air humidity is also elevated particularly at altitudes above 600m. In average, rainfall increases approximately 25% for every 100 meters in altitude.
9 Land Use History
References to islands that are now believed to be the Azores first appeared in several medieval cartography documents in the middle of the XIV century. Despite the reference to the Azores in documents before the XIV century, the islands remained pristine up to the XV century. There were no indigenous human populations and there is no record of any kind of colonization before that century.

The exact discovery date of Graciosa is uncertain, but it is a known fact that by 1437 the seven islands of the Oriental and Central groups of the Azores were already discovered, and it is also known that at July 2 of that year, a license to populate these islands was passed by the king to D. Henrique. Some time before those dates, around 1432, D. Henrique ordered the landing of livestock on Graciosa in the same way it was done in other islands. The landing of livestock, including sheep, pigs, goats and domestic birds, previously to colonization was customary to serve as future food source and to help to clear the vegetation.

The colonization of Graciosa is linked to the colonization of Terceira island, and probably occurred between 1450 and 1458, dates between the known colonization of Terceira and the date when it is known that Pedro Correia da Cunha was Donatary Captain of Graciosa island.

Although some uncertainty remains about the beginning of the colonization of Graciosa, it seems to be consensual that the first settlers came from Terceira and started the colonization in the areas now corresponding to Praia and Santa Cruz. Initially, Praia was the politic and administrative center of the island, but in 1475 these roles were transferred to Santa Cruz, by the Captain Pedro Correia da Cunha. Already with a considerable prosperity level and a significant number of inhabitants, Santa Cruz is declared a Village in 1486 (or 1500 according to other sources), following the same with Praia in 1546, both during the reign of D. João II.

The colonization of the remaining area of the island probably followed at a rapid pace from these two centers, in all directions including the interior (in the XVI century) which gives a unique character to the colonization of Graciosa in the archipelago context, due to the speed and the dispersion of the human occupation of the island’s area.

The urbanization in the Azores islands was done through the spreading of the settlements in areas
cleared for agricultural use, at some distance from the shore, creating a linear urban development roughly parallel to the shore. The continuity of this linear system was dependent on the geo-morphologic conditions in each island, existing cases in the larger islands where the linear system closed in a circle around the island, only with short interruptions, creating a system of settlement agglomerated and sequential, with tendency to concentration. Opposed to what happened in most islands, in Graciosa the settlement expanded to the interior of the island, due to the low and simple topography, having been created several interior urban centres away from the littoral belt. These urban centres evolved along an intricate network of paths that interweave a great part of the island.

The low altitude of the island (less than 400 meters) has limited the natural vegetal cover that is less diversified than in the remaining islands of the archipelago. The forests, meadows and bogs usual in the Azores above 500 meters in the “cloud zone” are almost absent in Graciosa and the vegetal landscape is dominated by coastal communities.

The clearing of the original vegetation probably started as soon as the first settlers arrived. It is referred by some sources that in 1622 the island had a shortage of building wood. In the beginning of the XIX century the first known experiment in reintroducing native species was made by Raimundo Pamplona Corte-Real, who ordered the planting of fayatree (Myrica faya).

The landscape, much flatter and less irregular than in the remaining islands of the Azores, contributed to the use of most of the island’s area for agriculture. Starting in the XVI century, besides small subsistence cultures around the urban areas, agriculture developed in two main types: “meadows” and “corrals”.

The “meadows” were larger fields, normally rectangular and enclosed by small dry stone walls, used for the cultivation of cereals (wheat and barley) and were placed in the area called “Courelas”, a platform NE of Guadalupe locality.

The “corrals”, small square fractions of land, delimited by low dry stone walls, are the traditional form of planting vines and create a microclimate that reflects on the characteristics of the wine produced. The viniculture became important in the XVII century, and was first done in the lava flows known as “biscoitos” since this was one of the few cultures that could live in that soil. In the middle of the XVII
century these lava terrains were already all used and the culture expanded to lands in the south part of the island (Luz) and at the end of the XVIII century it expanded to the planes in the northeastern part of the island, being these the most renowned in relation to the quality of produced wine.

These two cultures (cereals and grapes) have shaped the landscape of the island, but other were also important although more dispersed. In the first half of the XVI century the island exported wheat, barley, live stock, wine, wood, butter, honey, fruits and fish. In the XVII century the island helped other islands of the archipelago with first necessity goods in famine episodes.

In the second half of the XVII century Graciosa started having famine crises itself, fact that was caused by the population growth allied to an almost feudal system that was still in use there. Actually, the island kept a good production during these episodes, but the subsistence cultures were not enlarged to sustain the growing population and the goods produced were all exported.

With the decrease in the wheat market value and a crisis in the viticulture in the second half of the XIX century, these cultures lost some of their importance, altering the agricultural landscape. The corn started to be cultivated in the archipelago during the XVII century and in Graciosa it slowly stole space from the other cereals. In the beginning of the XX century, with the decrease of prices of the wheat flour imported into the Azores, the wheat production in Graciosa ceased to be profitable and the corn took it’s place, since corn flour was highly appreciated in the archipelago.

The entire archipelago was affected by a viticulture crisis in the middle of the XIX century, caused by fungi that destroyed the vines. With the loss of a great viticulture area the bovine pasture areas increased, chiefly in the areas facing south. Later the viticulture was revived with the introduction of new grape types, but the landscape is still marked by the XIX century crisis.

In the present days, the landscape is dominated by bovine pastures for milk production in the south, the viticulture in “corrals” around the island and the cereals, still characteristic of the platform northeast of Guadalupe, considered the island “barn”.

The natural vegetation that existed in the interior of Caldeira (the main volcanic crater) was cleared in the beginning of the colonization and the use given to these lands is not clear. Judging by the accentuated slopes and difficult access it is probable that they were used for less important cultures and as pasture. The landscape eventually became dry and harsh, which is documented by pictures from the beginning of the XX century. The forestry based in Japanese cedar (Cryptomeria japonica) and on some natural species began only in the decade of 1960, but today covers great part of the inner slopes of the crater.
10 Human Population of Proposed Biosphere Reserve
10.1 Core areas
Estimated present population: 100 inhabitants

10.2 Buffer Zones
Estimated present population: 300 inhabitants

10.3 Transition Areas
Estimated present population: 4,450 inhabitants
10.4

Brief description of local communities living within or near the proposed Biosphere Reserve (ethnic origin and composition, minorities...)

Brief description of local communities living within or near the proposed Biosphere Reserve (ethnic origin and composition, minorities...).
When the Azores Islands were discovered, they were uninhabited and no indigenous population is known. The current population is the outcome of several centuries of settlers and the inter-breeding of various ethnic groups.

The colonization of the island was probably initiated around 1450. The families of Duarte Barreto and Vasco Gil Sodré were the first to settle in the island. These, that should be contemporary, were soon joined by other settlers that are thought to have originated chiefly from the neighboring Terceira island and the mainland regions of the Beiras and Minho, as well as from the Flanders in the region that today corresponds to the northern Belgium. African slaves should be serving the rich families, as it was usual on those days, originating in great part from Cape Verde and Angola.

Between the decades of 1970 and 1980 there was a pronounced decrease in the total population, which happened in almost every island of the Azores. Actually, the island population decreased by one third between 1960 and 1980, which can be partially explained by emigration since not only the emigrants were many but were also the younger fraction of the population, contributing to lower the nativity rate.

Presently Graciosa has a population estimated around 4,800 inhabitants (the 2004 estimative was 4,777), dispersed in the four units of the island: Guadalupe, Luz, Praia e Santa Cruz. Most of the population is aged between 25 and 64 years old. There is a tendency to populational ageing with the ageing index (126.9) and the longevity index (43.5) above the regional average (62.4 and 42.7 respectively) and national average (108.7 and 43.1 respectively).

Although the mortality rate of 19.1% in 2004 was almost twice the nativity rate (9.7 %), the population has an increase rate of 0.61% which can be explained by some immigration.

The population of Graciosa is still very dependent on the primary sector, either as primary source of income or as a complementary activity. The population that is related to the primary sector is composed chiefly by independent workers in private properties. The exact fraction of the population involved in the primary sector is, however, difficult to calculate. Most of the population that is employed is related to the tertiary sector and corresponds to 5.4% of the island’s population. The secondary sector employs 3% of the population.
Name(s) of nearest major town(s)

The City of Angra do Heroísmo, is situated in Terceira island at 82 km distance. This City is only reachable by sea or air. Population of Angra do Heroísmo: 12,348 inhabitants (2001).
10.6 Cultural significance
As referred above, by the middle of the decade of 1430 Graciosa was already discovered but its colonization was only initiated around 1460, when it is known that Pedro Correia da Cunha was the Captain Donatary of the island, although he only established himself there in 1475.

An easy to work land, due to the smooth topography, enabled a rapid expansion and valuing of the agricultural activities that brought prosperity to the island for a long period. Notwithstanding, almost all the external commerce of Graciosa was made with Terceira island, since this island has a good port that was visited by large vessels and was the economic and administrative center at the time. This fact made Graciosa always dependent and strongly related with Terceira island.

The prosperity of the island, allied to the natural and climatic characteristics, was reflected in the architecture and in cultural aspects. It was usual to say that the island was inhabited only by nobility, due to the visible presence of an elite related to the nobility that lived in the island and held most of the lands, having had a important role in the cultural development of the island. In fact, most of the population was always poor and had not much to gain from the prosperity of the island. This fact created the paradox of a famine episode, in the second half of the XVII century, while the exports kept growing.

In Graciosa, the division between urban and rural spaces is well defined and is translated in the architecture. The localities of Praia and Santa Cruz, have buildings with a predominantly erudite trace, with rich details that show the former wealth. One of the interesting aspects of Santa Cruz relates to the fact that even in the noble and rich houses the wine press and the cellar are almost always present, placed in the ground floor.

Santa Cruz da Graciosa, located in the north shore, is the main administrative unit of the island. It is a picturesque village, that holds very good examples of old colonial architecture, reason why it was designated as Regional Patrimony in 1988.

With a regular design reflecting a planned development, it holds fine stone work, ample residences with refined design, rich churches with profusion of doors and windows, stone and iron work. In the centre of the village two big open tanks (pauis) remain from a time when rain water was collected and stored for the cattle and even the population consumption during water shortages in the summer. The building of these tanks dates back to middle of the XV century or beginning of the XVI century and is a reflex of the scarcity of water in the island. The walkway around the tanks depicts, in white and black stone work, the most iconic activities and products in the history of the island.

Just opposite to the tanks a wide public square – Rossio – with imposing trees that lend a pleasant shade. This comfortable square is the village’s visiting card: is a space thought to serve as a strolling area, playing ground for children and meeting point for the population.

The main church was built in the XV century. It’s design and proportions have been altered latter and as a result presents some characteristics of the Manuleline style. In it’s interior there are several chapels and in the main chapel we can find six paintings on
wood from the XVI century, famous works possibly painted by Cristóvão de Figueiredo that have a great value recognized internationally.

There are still some baroque architecture remainings from the XVI century, that include the three chapels on top of Nossa Senhora da Ajuda hill, overlooking the village. These three chapels are dedicated to St. John, St. Salvador and Our Lady of Ajuda, the last decorated with Portuguese hand painted tiles from the XVIII century.

Also from the XVI century is the Cruz da Barra (Barra Cross), an interesting monument in Manuelean style, brought to the island by Captain António de Freitas in 1520 and that is said to be original from the Portuguese city of Guimarães.

The Village of Praia is located south of Santa Cruz and, although older than the latter, was elevated to the category of Village and administrative unit only in 1546. Of the two villages, Praia had the smaller development and lost the administrative privileges in 1867. As is the case with Santa Cruz, Praia is placed in a sheltered and flat area but has some diverse characteristics from the former: it is structured along a coastal main street, linked to an interior secondary street, where the two churches of the village are located.

In the coastal street, facing the beach, a line of bright colored buildings with a simple architecture of two or three floors, some with a dormer, that create a homogeneous façade to the sea. This village was one of the whaling centers of the island and holds the cargo and transportation port of the island, but it’s main vocation is related to the fisheries.

Opposed to the erudite architectures of the villages of Santa Cruz and Praia, the rural architecture of the remaining urban centers in Graciosa is practical and clean. In the rural spaces the predominant architecture is sober, having several influences, and being composed chiefly by one or two floor houses in a linear disposition along the roads.

The traditional plan of the rural house in Graciosa is the “empena house” (side gabled house), characterized by the disposition of the house in relation to the street. Although present in other islands of the Azores, it was only in Graciosa where this type of architecture became the rule. The “empena house” is always perpendicular to the street, giving importance to the side in detriment of the façade, where the access to the interior is placed. There are three reasons for this design:

- The houses were always built turned to the rising sun to be “healthier”;
• Hides the family activities from the strangers in the street;
• Being usual to build the houses along the ways, it’s a good way of saving space.

The “empena house” has three basic types:

**Perpendicular kitchen**: this type evolved from older houses with dissociated kitchens, where two distinct blocks composed the house, spatially separated and corresponding to the sleeping area and the cooking and eating area. In this type of house, always with a single floor, the block that once was detached now appears perpendicular to the sleeping and living rooms, creating a plan in L, with cross-ripped roofs.

**Linear house**: in this type of house the kitchen is placed in the line of the living and sleeping rooms, creating a single façade, where most of the openings are, including two doors (one for the kitchen and the other for the rooms). In most cases this type of house is placed perpendicular to the street, and the ridge systematically facing the street is valorized in detriment of the façade. Internally this house is normally divided in three spaces: the kitchen, the rooms and the “store”, where is normal to find a wine press and the cellar.

**Integrated house**: with two uneven roof panels and its asymmetrical profile is the type of house that distinguishes the architecture of Graciosa. The compact and square plan, is divided in two linear bodies separated by a brick wall. The access to the interior is made through the façade perpendicular to the street (side-gabled). This type of house varies greatly in its internal disposition, from the simpler cases where each bock correspond to a room to the elaborate cases where the door at the main façade opens to a corridor leading to the kitchen and with a room in each side.

In the exterior of the houses, independently of the type, some practical elements are almost always found, that fuse in the rural landscape.

The tank and cistern are fundamental elements, since the island is relatively dry and the few water springs do not have a significant flow. The rain water is collected by ceramic gutters that surround the house along the eaves and conduct the water to the cistern or to the tank where it is stored. This method of collecting rain water is characteristic of the island and is still present in many rural houses.

The collection and storage of water is not restricted to the architecture of the houses, consisting in a constant worry in the island’s history and is represented in other types of collection, storage and
distribution of water. Together, all these structures comprise what is called the “water architecture” and many are unique to the Azores, since this island was the only with water shortage problems. This particular type of architecture is of extreme importance since it reflects the awareness and the know-how on the preservation of hydric resources.

Another element often present outside the rural houses is the “burra do milho” a wooden structure used to dry corn that is representative of the importance this cereal gained in the gastronomy. It’s a prismatic structure, with a rectangular base over four or more basalt pillars, where the corn is placed to dry. Being considered a “noble” structure, is normally placed in front of the house, along with the cistern.

The barns ("palheiros") are normally made of stone or brick walls, where firewood and straw for the animals is stored. The carriage house, with a construction similar to the barns is destined to the storage of tools and to protect the wooden carriage from the weather.

Since the corn and wheat breads are amongst the basic foods in the island, most houses have a bread oven. The oven with the chimney above appears as a prominent block in the back of the house, with a square cut and covered with tiles. The chimneys are one of the most interesting architectonic characteristics of the island, and have different shapes that range from bulky quadrangular shapes, probably corresponding to an older design, to the “hands on” chimney with a graceful silhouette that is widespread.

Also a result of the importance cereals once had in the island, there is a great number of windmills, architecture that became to be an ex-libris of Graciosa. According to some authors, the type of windmill that is characteristic of Graciosa is a reflex of the influence of the Flemish settlers, while other argue that the characteristic Byzantine domes point to a Middle East influence.

This type of windmill is composed by a conical stone building, normally white and with variable height, but with a slimmer profile when compared to the Portuguese and Spanish windmills. The roof is a red dome with a spike, with the bottom resting over a rail on the top of the round walls, like a hat, permitting to turn around all the structure.

From the roof emerge to the front, parallel to the ground, the shaft where the canvas sails are placed over a square wooden grid and from the sides and behind three strong poles connecting to the posts used to turn the roof around to position the sails downwind.

These windmills normally have two floors, connected by an inner stair. On the upper floor are the motor and grinding mechanisms, under the structure of the dome; on the ground floor are the box where the grinded floor falls through a wooden gutter, and the flour sacks, tools and other small elements.

Culturally, the island was also influenced by the natural aspects and by it’s history. The population always felt the loneliness and physic isolation. The need to socialize lead to the need to break silences and distances, which was done in several ways, namely through music.
One of the most important aspects of the Graciosa island is precisely the music. The calm, working people of the island is fond of the simple pleasures of life, either at the Carnival balls or at the public concerts or even at a family recital. In the middle of the XX century, in Graciosa there was an average of one piano for every 50 people, which testifies the musical erudition of the population.

It was this taste for music and parties that led to the creation of several music associations that, over the years, had the role of entertain, educate and bring happiness: the coral groups, the philharmonics and the folk and dancing groups.

The first philharmonic created in Graciosa was called "the Brazilian Negrões" in 1818, brought by Timóteo Espínola de Sousa Bettencourt an immigrant from Brazil. Later, other philharmonics were created and extinguished. Today, there are four philharmonics in the island, the oldest being the "União Praiense", created at 12 of May, 1889.

The singing tradition was kept alive by some singing groupings, that tried to keep alive and divulge the old songs. The folk group of the People’s House of Guadalupe, founded in 1978 is the group that has been more active as a faithful ambassador of the popular music.

In 1988 the Music Academy of Graciosa was created and today the positive effects are visible in terms of the quality of the produced music. This school teaches music initiation, advanced music, chanting, piano, ballet, history of music, trumpet, trombone, tuba, clarinet, flute and violin.

It’s also important to refer that the Carnival in Graciosa, with clear Brazilian influences, is extremely lively and constitutes a singular cultural phenomenon with significant expression. Is a room carnival, lived enthusiastically at the collectivities’ balls, where people dress up scrupulously and where the spontaneity, the joviality and creativity reign. In these occasions the mask contests in individual and group categories stand out, as does the "modas de viola", songs accompanied by the Portuguese and Azorean guitars.

The festivities in honor of the Holy Ghost have in this island great religious significance parallel to a profane expression. From Pentecost’s to the Summer, there are festivities in the several localities of the island. Besides those, there are still "folgas e folias" profane demonstrations, with emphasis to the “foliões das fontes” (folly of the fountains).

In the second week of August, the festivities of “Senhor Santo Cristo dos Milagres” (Holy Christ of Miracles) take place, attracting numerous visitors to the island as well as visiting emigrants.

Associated to the festivities there are always street fairs with food and drinks, artisany and traditional products, music and other entertainments, of which the bull runs on rope stand out. The close relation of Graciosa and Terceira islands is also manifested on this respect and, after the Terceira island, is in Graciosa where the bull runs have more cultural significance in the Azores.

The bull runs usually take place in open fields or in roads closed for the occasion, so that everyone can take part and have space to run. The animals, tied to a long rope, are controlled by several men to avoid serious injuries to the crowd and to the animal. Contrary
to the Mediterranean bull fights, the animals are not injured with spikes or swords and when they start to get tired, are recalled. The main purpose and entertainment is not actually to fight the bulls, but to see the participants to defy the animal and then try to escape and, sometimes, get thrown in the air. These are the occasions when the most vibrant demonstrations from the crowd are seen, with laughter and applauses.

Despite the recreational side, the bull runs have also a manhood affirmation side and some ritualistic aspects. Women are seldom seen participating in the runs, and the most brave men acquire a higher social status. In the “calf runs”, where the bull is replaced by a calf, the main participants are teenagers trying to demonstrate their masculinity and the passage to the adulthood, through the demonstration of courage. This sociological side of the bull runs separate them from the bull fights in the arenas where only an elite participates and the sexual affirmation and passage rites have been lost. Although the continuation of the bull runs is reason for discussion even amongst the population of the Azores, the ritualistic side of these demonstrations explain their socio-cultural relevance.

Due to the unique natural characteristics and an important period of cultural development, the island also attracted, through the centuries, prominent figures of science and arts.

The first was the Jesuit priest António Vieira, who stayed in the island after the sinking of the ship where he was returning to Lisbon from Brazil. He spent two months in Graciosa, during which he devoted himself to writing. In gratitude for the hospitality of the island, he left back the devotion to the Rosary. Another known figure that followed António Vieira was the French writer Chateaubriand, in 1791, when he was fleeing from France to America after the French revolution. In his works “Voyage en Amérique, Essay Historique sur les Révolutions et Memóires d’Outre-Tombe”, the writer describes what he lived and felt in Graciosa.

In 1814 Almeida Garret, one of the leading names in the Portuguese literature, aged only 15 at the time, wrote his first poems in Graciosa. According to oral tradition, the poet felt in love by a damsel in the island named Lília, to whom he wrote several odes, later published in the book “Os primeiros versos de Garrett” by Mendo Bem, based in the original manuscript that Garret had offered to Francisco Homem Ribeiro, titled “Odes Anacreonticas compostas e oferecidas ao senhor Francisco Homem Ribeiro por J.B.S.L. seu menor criado”.

In 1879, the Prince Albert of Monaco – whose hydrographic and marine life studies are recognized as pioneering – arrived at Graciosa onboard his yacht “Hirondelle” and visited “Furna do Enxofre” and other volcanic cavities. He was the second naturalist to explore the interior of Furna do Enxofre (the first was the naturalist Fouqué, in 1873, author of “Voyage Geologique de l´Açores”), which raised the attention of the international scientific community to this geologic phenomenon for its interest and originality. He visited the cavity several times and in his work “Campagnes Scientifiques” considered it a “unique miracle of Nature”.

In 1922, the writer Raúl Brandão visited the Azores and, from the impressions taken from that trip, resulted two years latter the work
“As ilhas desconhecidas”. Although he did not visit Graciosa, he made relevant comments about the island in his book.

In the decade of 1950, Vitorino Nemésio writes unforgettable lines about Graciosa in his book “Corsário das Ilhas”. To Furna do Enxofre he calls “cathedral of the unwalkable lavas of the Azores”. More recently, João de Melo, a renowned Azorean writer, refers to the same cavity in his book “ Açores – o segredo das ilhas”: "(...) is really this idea that we are away from reality; in a dream, in a fiction page, as would have imagined the writer Julio Verne, in his Voyage to the center of the Earth”. The poet Victor Rui Dores, born in Graciosa, in his poem “Visions of the Islands” also refers to Furna do Enxofre in a feminine and erotic manner.

In Graciosa, there are three facilities that are important centres for culture: the Museum, the Cultural Centre and the Municipal Library.

The Museum is installed in the old grain house of the village. In the first floor there is an exhibition on agricultural and transportation ethnography, that cover the rural house, domestic ethnography, arts and crafts, photography amongst other elements. There is also a room for temporary exhibitions. In the ground floor are the cellar and wine press, the ex-libris of the museum, and another room with collections of objects related to diverse crafts.

The Cultural Centre, a wide and enjoyable space, has excellent acoustic conditions and is the place where diverse cultural activities are held. It has a room with 260 places, lateral galleries, a technologic stage, and the interior façades in basalt reproducing houses with windows and balconies.

The Municipal Library, opened in March of 2005 in a building where in the past was installed the court-house and the jail, holds several pedagogic activities and monthly exhibitions. It has four distinct rooms: audiovisuals, journals and newspapers, infanto-juvenile and exhibitions.

In a time when the globalization and massification are felt at all levels, a small island as Graciosa should make the difference through culture. The preservation of the cultural traditions, allied to the preservation of natural values, will help in the development of
the island, through the valuing of the products and creation of new markets. Is in this perspective that the designation or a Biosphere Reserve may help to ally the preservation of cultural and natural patrimony with the development of the population, projecting and valuing the image of the island.
11 Physical Characteristics
11.1 General description of site characteristics and topography of area
The island of Graciosa forms part of the Central Group of the Azores and, with an area of only 60.7 km² and a coastline of 38.9 km, it is the second smallest island in the archipelago (after Corvo) and flattest, having a maximum altitude at 405 m. The island is elongated along a NW-SE orientation, conditioned by the geotectonic structures associated to its formation being located in the extreme western part of the “Terceira Rift”. The “Terceira Rift” is an important tectonic structure in the Azores Region, evolved by the islands of Graciosa, Terceira and São Miguel and surrounding marine zones, including the submarine volcano of the D. João de Castro Bank.

With a maximum length of 12.6 km and maximum width of 7 km, Graciosa lies 56.8 km from Ponta da Serreta, on the island of Terceira and 36.5 km from the Fajã do João Dias, on the island of São Jorge.

From a geomorphic point of view, two distinct areas can be distinguished on Graciosa: 1) a low altitude area with gentle reliefs and characterised by various scoria cones – the northwest Plain and 2) a mountainous zone to the southeast. The mountainous zone is formed by three distinct volcanic masses: i) the Serra das Fontes, to the north, with a general NW-SE orientation and very steep slopes; ii) the central-meridian mass, to the south, which includes the sierras Dormida and Branca and iii) the Caldeira mass, in the extreme Southeast of the island, and corresponds to a polygenetic volcano with a caldera.

The NW Plain roughly occupies a third of the island with average altitudes of about 50 m and where 32 monogenetic cones (ex. Scoria cones) are implanted, and for the most part, defining a volcanic-tectonic NW-SE alignment. The larger volcanic cones in the area, Pico das Bichas and Pico da Ajuda, have mean basal diameters of 600 m and 540 m, respectively, and rectilinear steep slopes. The Pico das Caldeiras is the highest cone in the area, with an altitude of 181 m. The plain has a poor drainage system as water courses are almost non-existent in the area and even an organised superficial draining network is absent.

The Serra das Fontes mass is located in the central part of the island and represents
a more or less circular configuration, reaching a maximum altitude of 375 m, at Pico do Facho. The northern slopes descend progressively in direction of the coast while the south and eastern slopes are very steep and linear according to fault gradients. The water courses, reduced in number and with short flows, are essentially located on the northern flank of Serra das Fontes.

The Serra Branca-Serra Dormida geomorphic unit is formed by two reliefs separated by an elongated depression in a general NW-SE orientation. Serra Dormida lies to the north of this depression and is constituted by several volcanic cones with craters, aligned along a NW-SE direction, reaching a maximum altitude at Pico Timão (398 m).

The Serra Branca is located to the south of the depression and reaches its maximum altitude (375 m) at the Graciosa Aeolic Park and the Caldeirinha de Pêro Bothelho areas. The area’s most outstanding morphological characteristic corresponds to the SW slopes that exhibit very steep coastal inclines with considerable heights (sometimes surpassing 300 m), namely to the NW of Ponta Branca. Water courses are numerous at the Serra Branca and Serra Dormida mass, presenting an organised superficial drainage network.

The Caldeira mass is situated in the extreme SE part of the island and separated from the rest by a depression zone with a general NE-SW orientation. This depression zone, extending from the Praia parish, on the north coast, to the Bay of Folga, on the south coast, is associated to the SE coastal strip of the island, prior to the formation of the Caldeira’s central volcano. In other words, before the formation of the Caldeira Volcano, the “primitive island” terminated at this depression, SE of which was the Atlantic Ocean. Substantiating this hypothesis, is the presence of submarine pyroclastic deposits in the Bay of Folga-Limeira area.

The Caldeira mass corresponds, morphologically, to a stratovolcano with caldera constituted by lava flows and various volcaniclastic deposits, related to the activity of various eruptive centres implanted along the volcano flanks and in the caldera’s interior. The water courses in this geomorphologic unit are numerous, especially on the NE flanks of the volcano, having developed a well-defined radial superficial drainage network of the consequent type (i.e. when the path of the water courses are conditioned by the slopes of the volcano’s flanks).
11.1.1 Highest elevation above sea level
The highest elevation above sea level reaches an altitude of 405 m.

11.1.2 Lowest elevation above sea level
The lowest elevation above sea level is 0 m.

11.1.3 For coastal/marine areas, maximum depth below sea level
For coastal/marine areas, maximum depth below sea level is more than 100 m.
According to the Köppen climatic classification system, the Azores islands are situated in the transition zone between a Mediterranean climate (Csa) and a humid subtropical climate (Cfb). Rainfall is relatively high in the entire archipelago with a tendency to increase from east to west. Air humidity is also high especially at altitudes above 600 meters. In average, precipitation increases approximately 25% every 100 meters in altitude.

Climatic conditions in the Azores Archipelago result largely from the general atmospheric circulation of the North Atlantic. The weather is essentially influenced by the development, orientation and dislocation of the Azores anti-cyclone, as well as the consequent mixing of air masses (tropical, marine and polar marine).

The island’s physical relief is one of the most important contributing climatic factors; apart from modifying wind velocity, it also raises humid air along the cliffs and ridges, causing relief cloud formation, mists, and orographic precipitation.

The warm branch of the Golf Stream south of the archipelago also greatly affects the climatic conditions causing high humidity and reduced temperature amplitudes.

At a local level, the climate is influenced by the reduced land area and altitudes, thus, the climatic conditions produced by high altitudes that occur on other islands in the archipelago are not experienced on Graciosa. The mean annual precipitation is slightly higher on the top and along the SE slopes of the Serra Branca, in the centre of the island and lower in the NW part of the Plain zone. In relation to the average annual temperature, the highest temperatures occur in the lower lying areas, especially in the NW Plain zone while the lowest average temperatures occur in Serra das Fontes, Serra Dormida and Serra Branca.

The mean annual precipitation varies between 37 mm in July and 118 mm in November. The average annual temperature has a variation of about 9ºC, with lower temperatures recorded in February (normal average 13,6ºC) and highest in August (normal average 22,3ºC).
11.2.1
**Average temperature of the warmest month**
Average temperature of the warmest month (August) is 22.3°C.

11.2.2
**Average temperature of the coldest month**
Average temperature of the coldest month (February) is 13.6°C.

11.2.3
**Mean annual precipitation**
The mean annual precipitation is 845 mm.
11.2.4

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

a) Manually

Meteorological data have been recorded manually since 1971.

b) Automatically

Meteorological data have been recorded automatically since 2002.

c) Name and location of station

Graciosa Aerodrome Meteorological Observatory
11.3 Geology, geomorphology, soils
On a volcano-stratigraphic perspective, four distinct complexes can be distinguished on Graciosa, and are, from the oldest to the most recent: the Volcanic Complex of Serra das Fontes, the Volcanic Complex of Serra Branca, the Caldeira Volcano and the Volcanic Complex of Praia (or the Victoria Unit). The latter two include contemporary units, i.e. with volcanic eruptions of a similar age.

In general terms, the island’s eruptive history is characterised by trachyte deposits, associated essentially to the Volcanic Complexes of Serra Branca and Caldeira Volcano, while the Volcanic Complex of Praia chiefly exhibits basaltic s.l. volcanic products.

Likewise, a predominance of basaltic s.l. products occur at the Volcanic Complex of Serra das Fontes, indicative of low explosivity primitive volcanism, typical of Graciosa, about 600,000 years ago.

The Serra Branca corresponds to the requisites of a central volcano with caldera, and with a subjacent magmatic chamber, where, about 350,000 years ago, an acid volcano with high explosivity predominated, attested by the trachyte rocks (ex. domes and coulees) that appear on the Ponta Branca slopes.

The Caldeira’s polygenetic volcano includes pomitic deposits, lahars, surges and pyroclastic flows that clearly indicate the occurrence of important volatile eruptive phases, subplinian to plinian in nature, during the formation of this volcanic structure, alternating with other less explosive eruptions, basaltic in nature, and emissions of lava flows and submarine and subaerial pyroclastics (ex. scoria and lapilli). The Caldeira Volcano’s primitive surtseyan and strombolian activity is evident, for example, at Ponta da Restinga, Carapacho, Ilhéus do Baixo Islets and Folga Bay. Additionally, a clear increment in subsequent eruptive explosions (with pomitic matter emissions) is apparent, evidence of magma differentiating processes at great depths, most probably directly linked to a magmatic chamber.

The formation of the Caldeira 12,200 years ago probably resulted from the combined action of hydromagmatic eruptions, one of which was responsible for the collapse of the NW flank of the volcano. The Caldeira’s walls are heavily eroded in certain areas and various debris from
the slopes can be found at the base, caused by mass movements, namely landslides and collapses.

Subsequent to the formation of the Caldeira, i.e. during the last 12,000 years, various eruptive episodes took place on Graciosa, namely, the episodes responsible to the formation of the intra-caldera cones, the domes “283” and “285” on the SW flanks of the Caldeira Volcano, the Caldeirinha de Pêro Bothelho and, furthermore, the basaltic flows of Pico Timão and the “Caldeira lava lake”.

Of these episodes, worth mentioning is the important effusive episode that took place in the Caldeira’s interior and that culminated with the formation of a lava lake, which main conduit would have been situated where the present day Furna do Enxofre is located. This lava lake spilled over the lower NW border of the caldera, in the form of a *pahoehoe* lava spill. This lava spill flowed towards the south coast, reaching Folga Bay and Luz, and also flowed north up to the Lagoa area, in the Praia parish, currently covering an area of over 4.2 km$^2$. This lava spill, during its trajectory along the central volcano’s slopes, produced several volcanic cavities, including the Furna da Maria Encantada (a lava tunnel located on the edge of the Caldeira), the Furna do Abel and the Galeria do Forninho, presently exhibiting a differentiated morphology in relation to the adjacent geological formations that are essentially pomitic.

The Praia Volcanic Complex (or Vitoria Unit) represents a sequence of low to moderate explosive eruptive episodes, essentially basaltic in nature (strombolian eruptions), that occurred, mainly, on the NW part of Graciosa and responsible for the formation of various volcanic cones (*scoria* and *spatter* cones). These eruptions occurred essentially along the tectonic directrix of the island (with a general NW-SE orientation), chiefly on land but also at sea in close proximity to the island.

In this last case, the associated surtseyan eruptions originated submarine pyroclastic deposits, such as the ones that can be found at various points on the island, namely in the extreme NW, between Barro Vermelho and the Ponta da Barca Lighthouse, near the Graciosa Aerodrome. The eruptive centres responsible for these volcanic products were situated off the coast and later destroyed by ocean erosive processes.

In a geological and volcanologic context of the island, it is worth referring to the fact that
the most recent geological formation on Graciosa corresponds to the Pico Timão eruption, less than 2,000 years ago. The associated basaltic lava flow, of the aa type, was emitted from this scoria cone, situated at about 300 m in altitude on the NE flank of Serra Dormida and extended for about 4 km, reaching the sea near Arrochela, Praia.

**Principal Geodiveristy Elements of Graciosa Island**

Graciosa possess a variety of geological structures, forms and material that reflect the geodiversity in this part of the Archipelago of the Azores, and include:

**Central Volcano**

The most important volcanic form on Graciosa is its central volcano with caldera, situated in the extreme SE of the island and which would have reached, during the pre-caldera phase, a maximum altitude of 600 m. This polygenetic structure is composed of alternating volcanlastic and lava flow deposits that developed
along relatively gentle slopes, with the exception of the SE flank.

The Caldeira Volcano has a mean basal diameter of about 4.4 km and occupies an area of approximately 18 km², reaching a maximum altitude of 405 m and a volume of about 2 km³. With these dimensions, it constitutes the smallest polygenetic volcano in the archipelago. An elliptical caldera exists at the summit, with a maximum diameter of approximately 1.6 km in a NW-SE orientation.

The formation of Caldeira Volcano probably initiated around 50,000 years ago, according to the surtseyan hydromagmatic eruptions, giving rise to tuffs such as the ones that can be observed today, for example, Ponta da Restinga and Carapacho. The eruptive episode responsible for the formation of its caldera would have occurred around 12,000 years ago.

**Scoria and spatter Cones**

The *scoria* cones are the most frequent volcanic forms on the island, dispersed in the NW Plain (32), the northern flank of Serra das Fontes (6), the reliefs that integrate the Central-Meridian mass of Serra Dormida and Serra Branca (18) and flanks of the Central Volcano (2). These cones are monogenetic structures, *i.e.* formed during a single volcanic eruption, chiefly strombolian, of low to moderate explosivity and, characterised by the formation of pyroclastic cones (with ashes, lapilli and blocks or bombs) and emission of lava flows.

Of the more than 50 *scoria* cones on Graciosa, about 60% exhibit well-preserved morphologies, with circular contours, inclined slopes, rectilinear and sectioned-off at the top by a crater. The terminal craters are associated to the moderate explosions that characterise basic magma eruptions and originate *scoria* cones.

The largest of the volcanic cones on Graciosa are: Quitadouro, Pico das Bichas, Pico Timão and Pico da Ajuda (the latter near Vila da Santa Cruz), with mean basal diameters of 635 m, 600 m, 550 m and 540 m, respectively, and average altitudes of about 100 m. Inversely, there are also small volcanic cones with diameters of less than 100 m and craters of reduced dimensions, such as the two small *scoria* cones located SW of Funchais.

Some cones are encircled by lava flows, for example Pico da Brasileira, Pico do Jardim, Pico da Hortelã, Pico da Forca and Pico Machado. In some cases, the *scoria* cones do not exhibit well-defined flat circular contours, or even, some adjacent cones have overlapping morphologies, revealing an irregular contour, for example, the Pico das Terças.

Graciosa also exhibits a well-preserved *spatter* cone (*i.e.* a cone formed by the accumulation of compound “sprinkled lava”) – the
Caldeirinha de Pêro Botelho. A volcanic pit exists at the base of the crater, which has a diameter of 150 m.

**Surtseyan Tuff Cones**

Graciosa also presents, although uncommon, tuff cones associated to hydromagmatic (or freatomagmatic) eruptions of basic magma (ex. surtseyan eruptions), especially in the SE part of the island. Besides being largely dismantled, caused by intense tectonic activity and erosion processes, it is possible to observe remains of tuff cones on the Ilhéu de Baixo Islets, at Ponta da Restinga and Folga Bay.

Additionally, two small structures with craters can be found in the Caldeira’s interior. The origin of these are associated to hydromagamtic events, with the Sra. da Saúde cone corresponding to a tuff cone, presenting a fragmented morphology and partially covered by pomitic pyroclastic matter associated with the Central Volcano.

**Basaltic Lava Flows**

The various lava flows reveal different external forms and internal structures, consequential of the physical composition and properties of the magma from which they derive, the effusion rate and surface features over which they flowed. In this context, it is possible to observed flows of the pahoehoe and aa type, a submarine lava stratum and several domes.

Graciosa is mostly covered by basaltic lavas s.l.. In the NW Plain, basaltic lava is the most abundant volcanic product, as well as, along the Serra das Fontes slopes, the Central-Meridian Mass reliefs and over the Central Volcano’s NW flank.

The pahoehoe lavas are relatively uncommon on Graciosa, and are essentially present in the Caldeira’s interior, the central volcano’s NW flank (ex. lava spill related to the lava lake) and in some coastal areas. These flows feature, in general, a smooth crust, sometimes
fragmented into plates, revealing in some cases a rippled, intertwined and/or stringed surface.

On the other hand, the aa lava flows are the most common morphology type on Graciosa, featuring a very uneven, wrinkled and rough surface. Numerous lava moulds of tree trunks and branches are present in some flow units, such as those found in the lava flows of Pico Machado, near Quitadouro.

Pillow lavas, with tubular or circular unit features, can be found at a small submarine lava flow at the Engrade Bay’s northern cliff base.

**Domes**

The two domes implanted on the Caldeira Volcano’s SW flank (domes “283” and “285”, or Beco and Fragosos domes), near the Luz parish, constitute the better preserved and most spectacular of these volcanic forms on Graciosa. These forms, with an almost circular flat section and mean diameter of 275 m and height of 100 m, are dispersed along a NW-SE alignment, parallel to the southern edge of the Caldeira. The dome “285”, located to the east, exhibits a small terminal crater from which arises a trachyte lava flow (termed a *coulee* due to its well defined morphological configuration), with a maximum thickness of 40 m and a cover distance of about 850 m.

Additionally, several domes occur in the Central-Meridian Mass, occasionally with associated thick lava flows. Nonetheless, these volcanic forms are not significant landmarks in the Graciosa landscape, as they are mostly covered by more recent volcanic deposits and only visible from the Serra Branca cliffs.

**Volcanic Caves and Pits**

On Graciosa, 10 volcanic cavities have been recorded, one being a volcanic pit or *algar* and the other 9 lava caves. The Caldeirinha de Pêro Bothelho constitutes the only volcanic pit known on the island, with a depth of about 37 m and located in the crater of a *spatter* cone implanted in the Serra Branca.

A significant number of these lava caves (5 in total) are implanted in the *pahoehoe* lava flow associated with the Caldeira’s lava lake. Worth mentioning, is the sequence of cavities extending from Furna da Maria Encantada (with about 57 m in length), to Furna d’Água and onto Furna do Abel (98 m in length). When combined, this sequence totals over 500 m from the Caldeira’a rim, although in a discontinued manner and at some segments, as lateral crystals associated to flow movements and/or the collapse of lava tubes.

Nonetheless, the most important volcanic cavity on the island of Graciosa is the Furna do Enxofre (or Sulphur Cave), the island’s true
ex-libris of geodiversity and one of the most notable cavities in the archipelago. It was recently classified and integrated in the Caldeira Natural Regional Monument of Graciosa Island.

It is an imposing lava cave, with a maximum length of 194 m, maximum height of about 80 m and is singularly characterised by natural perfect vault. The Furna do Enxofre is located on the SE part of the central volcanic caldera and communicates with the exterior through two cracks positioned along a tectonic alignment in a NE-SW direction.

A tower approximately 37 m in height and a spiral staircase with 183 steps was built at the beginning of the XX century to access the cavity’s interior. A lake with a maximum depth of 22.5 m and temperature of about 16ºC, is located in the cavity’s interior, at the furthermost point from the staircase and at the deepest part of the cave. The interior also exhibits an important degasification field, constituted by a fumarole and mud pool from where, barley visible, carbon dioxide diffuse gasses are released at various points on the cave’s floor. In certain environmental conditions, carbon dioxide concentrations in the atmosphere can reach values above those recommended, therefore, this area is continuously monitored by the University of the Azores.

The genesis of the Furna do Enxofre is associated to the important effusive phase, hawaiitic in nature, that included the formation of a lava lake in the Caldeira’s interior, as mentioned above. During the eruption’s final phase, the existing lava in the caldera of the
Graciosa Volcano, still fluid, was drained along the volcano’s main nourishing conduit, leaving a void exactly where the cavity is now located.

Additionally, two thermal springs exist on Graciosa: at Carapacho and Homiziados Bay, both with gas emissions. The Carapacho spring, known since 1750, is captured in a well and used to supply a thermal resort while the spring at Homiziados Bay, referenced by Gaspar Fructuoso, is a small occurrence at the base of the coastal cliff, observable during low-tide. The temperature of the Carapacho thermal waters varies annually, ranging between 35 and 45º C. In 1980, a borehole for capturing water in the Courelas region, in the parish of Guadalupe, revealed the presence of hot/thermal water in the area, at about 60 m in depth and with temperature of around 42º C.

**Volcanic Depressions**

The Caldeira’s central volcano has at its summit, an oval shaped depression with a length of about 1600 m in a NW-SE direction, a maximum width of 800 m and maximum depth of 350 m. The formation of this subsidence caldera occurred around 12,000 years ago. The Caldeira’s rim is dissymmetric, higher on the SE extremity, reaching the island’s maximum altitude of 405 m, while the NW extremity merely reaches 252 m in altitude. The Caldeira’s walls, abrupt along its higher altitudes, are more gentle at the base due to the presence of deposits generated by mass movements, in particular collapses, fractures and landslides.

Graciosa possess several volcanic depressions, of reduced dimensions and, which largely constitute explosion craters implanted on the top of scoria cones. The dimensions of these craters vary greatly, from several tens of meters in diameter to diameters of 305 m, 270 m and 260 m at the scoria cones of Quitadouro, Pico das Bichas and Pico Timão, respectively.

Several of the craters exhibit horseshoe-shaped openings, such as is the case, amongst others, the cones at Quitadouro, Pico da Brasileira, Pico Timão and Pico da Hortelã. The
alignment of the crater and the monogenetic cones on Graciosa, define the volcanic-tectonic alignments of the island, as well as, deduce the principal active tectonic framework.

**Subvolcanic Forms: Veins and chimneys**

Along the Graciosa coastline, several basaltic veins *s.l.* (cf. Ponta da Barca Lighthouse, Ponta da Restinga and Quitadouro) and trachyte veins *s.l.* (*c.f.* Serra Branca) can be observed, usually in remote areas and inaccessible by land.

Coastal erosion sometimes reaches the monogenetic cones’ plumbing system, uncovering, besides vein systems, *scoria* and tuff chimneys. The most notable of these structures exist in the Porto Afonso and Ponta da Barca Lighthouse areas (ex. Pico Negro and Baleia Islet), in the NW part of the island and at Ponta da Restinga, on the SE extremity of the central volcano.
12 Biological Characteristics
Given the discontinuity of the Core Area, descriptions of the habitat/land cover types are presented according to each Core Area’s designation for a clearer understanding.

12.1.1. Main habitat/land cover types 1

Ilhéu de Baixo Islets-Restinga - Local

The Core Area “Ilhéu de Baixo Islets-Restinga” is situated on the Southeast point of Graciosa Island and integrates the “Ilhéu de Baixo Islets”, a coastal and marine area, totalling 243 ha. The east coast is more rugged with prominent features including the points at Moura and Restinga, which limit the small bay of Poça. A small and conspicuous group of islets, generally known as “Ilhéu de Baixo”, are situated about 1 km off the Restinga coast and are the outcome of ocean erosion processes acting on a small volcanic scoria mechanism with a maximum altitude of 73 m and an area of 9 ha. The Restinga point is elevated and steep and together with the point at Carapacho, situated about 500 m away, incorporate a small bay, to the east of which is a small elongated islet known as Navio (or Ship).

Stretching South from the Carapacho point is a group of rocks and islets, the most elevated having a triangular silhouette and known as Gaviota (or Seagull). The submersed coastal area is constituted by mixed substrate of sand and rock, with some caves and arches of various dimensions.

Of the specific characteristic habitat types, according to the Natura 2000 Network classification, the most important habitat types include:
### Coastal and halophytic habitats

<table>
<thead>
<tr>
<th>Large shallow inlets and bays + Sandbanks which are permanently partially submerged by sea water</th>
<th>Rocky habitats and caves</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Reefs</strong></td>
<td><strong>Submerged or partially submerged sea caves</strong></td>
</tr>
<tr>
<td>Flat coastal zones, open to the sea, covered by salt water, protected from the mechanic action of waves by barrier islands. Present a great diversity of sediments and bottoms, with a deep and well defined stratification of benthonic communities, with a rich biological diversity.</td>
<td>Coastal caves, with diverse bottoms and dimensions, some completely submerged and others partially above sea level, and even, partially covered by sea water only during high tide. Host communities of marine invertebrates and algae. A great diversity of marine invertebrates attach to the walls and ceilings. Bottom normally covered by fine sand; sometimes boulders are present.</td>
</tr>
<tr>
<td>Rocky or organic bottoms, submerged or exposed during low tide, elevating from the sea bottom in the sub-littoral zone, extending to the littoral where a continuous zonation of plant and animal communities exist. In these reefs benthonic plant and animal, as well as non benthonic, communities are present.</td>
<td>Communities of the coastal sea cliffs, dominated by the endemic species <em>Festuca petraea</em>.</td>
</tr>
<tr>
<td>Plant community characteristic of rocky, lava or coarse deposits of gravel, composed by endemic species, some rare, always with a low coverage density.</td>
<td></td>
</tr>
</tbody>
</table>

### Characteristic species

<table>
<thead>
<tr>
<th>Seaweeds</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Asparagopsis armata</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Dictyota dichotoma</strong></td>
<td><em>Dictyota</em> spp.</td>
</tr>
<tr>
<td><strong>Gigartina sp.</strong></td>
<td><em>Halopteris filicina</em></td>
</tr>
<tr>
<td><strong>Halopteris filicina</strong></td>
<td><em>Padina pavonica</em></td>
</tr>
<tr>
<td><strong>Pterocladiella capillacea</strong></td>
<td><em>Pterocladiella capillacea</em></td>
</tr>
<tr>
<td><strong>Sargassum vulgare</strong></td>
<td><em>Sargassum vulgare</em></td>
</tr>
<tr>
<td><strong>Stypocaulon scoparium</strong></td>
<td><em>Zonaria tournefortii</em></td>
</tr>
<tr>
<td><strong>Zonaria tournefortii</strong></td>
<td><em>Ordem Ceramiales</em></td>
</tr>
<tr>
<td>Characteristic species (cont.)</td>
<td></td>
</tr>
<tr>
<td>--------------------------------</td>
<td></td>
</tr>
<tr>
<td><strong>Vascular plants</strong></td>
<td></td>
</tr>
<tr>
<td>Juncus spp.</td>
<td>Asplenium marinum</td>
</tr>
<tr>
<td>Crithem maritimum</td>
<td>Asplenium marinum</td>
</tr>
<tr>
<td>Euphorbia azorica</td>
<td>Azorina vidali</td>
</tr>
<tr>
<td>Festuca petraea</td>
<td>Daucus azoricus</td>
</tr>
<tr>
<td>Spergularia azorica</td>
<td>Euphorbia azorica</td>
</tr>
<tr>
<td>Myosotis maritima</td>
<td>Plantago coronopus</td>
</tr>
<tr>
<td></td>
<td>Erica azorica</td>
</tr>
<tr>
<td><strong>Marine Macro-invertebrates</strong></td>
<td></td>
</tr>
<tr>
<td>Calcinus tubularis</td>
<td>Anemonia sargassensis</td>
</tr>
<tr>
<td>Centrostephanus longispinus</td>
<td>Arbacia lixula</td>
</tr>
<tr>
<td>Chromodoris britol</td>
<td>Calcinus tubularis</td>
</tr>
<tr>
<td>Corynactis viridis</td>
<td>Calliostoma zizyphinum</td>
</tr>
<tr>
<td>Galathea squamifera</td>
<td>Columbella adansoni</td>
</tr>
<tr>
<td>Holoturia spp.</td>
<td>Corynactis viridis</td>
</tr>
<tr>
<td>Lysmata seticauda</td>
<td>Hermodice carunculata</td>
</tr>
<tr>
<td>Miniacina miniacea</td>
<td>Myxilla spp.</td>
</tr>
<tr>
<td>Ophidiaster ophidianus</td>
<td>Paracentrotus lividus</td>
</tr>
<tr>
<td>Percnon gibbesi</td>
<td>Phoronis hippocrepia</td>
</tr>
<tr>
<td>Sphaerechinus granularis</td>
<td>Pinna rudis</td>
</tr>
<tr>
<td>Stramonita haemastoma</td>
<td>Stramonita haemastoma</td>
</tr>
<tr>
<td>Tedania spp.</td>
<td></td>
</tr>
<tr>
<td>Clathrina chloris</td>
<td></td>
</tr>
<tr>
<td>Antedon bifida</td>
<td></td>
</tr>
</tbody>
</table>
Characteristic species (cont.)

<table>
<thead>
<tr>
<th>Fishes</th>
<th>Birds</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Mullus surmuletus</strong></td>
<td><strong>Larus cachinnans</strong></td>
</tr>
<tr>
<td><strong>Balistes carolinensis</strong></td>
<td><strong>Arenaria interpres</strong></td>
</tr>
<tr>
<td><strong>Sphoeroides marmoratus</strong></td>
<td><strong>Calonectris diomedea</strong></td>
</tr>
<tr>
<td><strong>Chelon labrosus</strong></td>
<td><strong>Sternata hirundo</strong></td>
</tr>
<tr>
<td><strong>Synodus saurus</strong></td>
<td><strong>Charadrius alexandrinus</strong></td>
</tr>
<tr>
<td><strong>Chromis limbata</strong></td>
<td><strong>Larus cachinnans</strong></td>
</tr>
<tr>
<td><strong>Phycis phycis</strong></td>
<td><strong>Ocedeanodroma castro</strong></td>
</tr>
<tr>
<td><strong>Coris julis</strong></td>
<td><strong>Puffinus assimilis</strong></td>
</tr>
<tr>
<td><strong>Parablennius ruber</strong></td>
<td><strong>Sternata dougalii</strong></td>
</tr>
<tr>
<td><strong>Pseudocaranx dentex</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Pseudolepidaplois scrofa</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Sarda sarda</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Seriola dumerili</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Sphyraena viridensis</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Thalassoma pavo</strong></td>
<td></td>
</tr>
</tbody>
</table>

Important natural processes

Coastal systems have high ecological importance for the diversity of habitats that they support and the processes that occur there. The waters along the coastal areas are shallow and the substrate located near the surface enables the fixation of a series of plant and animal organisms. The nutrient transport processes generated in these coastal systems produce high local productivity, making them one of the most productive in the world. Additionally, the hydrodynamic forces acting along the sea-land interface generates highly oxygenated zones and complex substrates that constitute habitats rich in biodiversity. These coastal habitats are vital to many marine organisms during one
or more stages of their life cycles, serving as reproductive, nursery, settler and/or feeding areas. Diverse organisms, such as bacteria and algae that develop in coastal areas are capable of eliminating and recycling contaminants, thus helping to purify natural and anthropogenic toxic components and residues.

In open ocean areas, such as the Azores, coastal zones formed by islands produce habitats that would otherwise not exist, augmenting the archipelago’s importance both on a local and global scale. These ecosystems, acting as contact points, enable the genetic flux between populations of many organisms, otherwise genetically isolated.

The islets, due to their isolation and reduced interest for human activity, play an important role in offering nesting areas for marine birds and serving as a refuge for some rare and sensitive plant species.
## Main human impacts and relevant management practices

<table>
<thead>
<tr>
<th>Human activity</th>
<th>Real threats</th>
<th>Potential threats</th>
<th>Threat minimising and prevention measures</th>
</tr>
</thead>
<tbody>
<tr>
<td>Professional exploitation of coastal resources</td>
<td>Local over-exploitation of marine resources; Disturbance of marine birds and consequent territory abandonment; Cetacean disturbance and consequent area abandonment.</td>
<td>Prohibit the use of surface and bottom longlines, entangleing nets, seine and surrounding nets, traps and trawl nets; the capture, handfishing, harvest or death of specimens of any specie violating any protection measures in vigour, including the disturbance or destruction of their habitats; Reinforce vigilance and law enforcement of activities in the area; Improve the efficiency of marine exploitation licensing; Apply fishing quotas to the local marine resources; Monitor the main exploited marine resources; Assess the human activity impacts mentioned above; Prohibit the extraction of sand or other inert material; alteration of the sea bottom configuration by levelling or digging; Prohibit the intentional introduction or re-introduction of any non-autochthonous marine species, subspecies or varieties of the area; Prohibit the removal of any element that could be considered of geological value; Prevent the outflow of industrial, agriculture and domestic residual waters that are infraction with the legislation in vigour on collecting, treatment and discharge; deposit of solid residues and junk; Prevent the discharge of effluents of spillages from transport and other vehicles; Promote public interest in nature conservation and alert to the sensitivity of the area and ecosystems; Promote environmental education and awareness actions.</td>
<td></td>
</tr>
<tr>
<td>Recreational exploitation of coastal resources</td>
<td>Capture of marine birds for bait.</td>
<td>Local over-exploitation of marine resources; Disturbance of marine birds and consequent territory abandonment.</td>
<td></td>
</tr>
<tr>
<td>Human intervention</td>
<td>Introduced terrestrial predators, such as dogs and cats, could cause the death and abandonment of nesting birds from the cliff area; Exotic botanical species limit nesting of most marine birds on the cliff and reduce the available area for native species.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tourism</td>
<td>Bird disturbance, especially during the nesting season leading to area abandonment.</td>
<td>Cetacean disturbance and consequent area abandonment; Construction of tourist infrastructures, aggravating erosion.</td>
<td>Condition access on the islets, for all activities.</td>
</tr>
</tbody>
</table>
### 12.1.2. Main habitat/land cover types 2

**Ponta Branca - Regional**

The Core Area “Ponta Branca” is situated on the Southeast coast of Graciosa and incorporates a total area of 78 ha. It is a sea facing escarpment with pasture areas, located on the higher points, partitioned by small loose-fitting stone walls. The cliff, with a maximum altitude of 203 m, is difficult to access and exhibits clay areas with cavities and quantities of shingle along its coastal base. The area presents patches of important natural vegetation and constitutes an important nesting area for several marine bird species, in particular the roseate tern (*Sterna dougallii*).

According to the Natura 2000 Network classification, the most important habitat types included in this land cover are:

<table>
<thead>
<tr>
<th>Coastal and halophytic habitats</th>
<th>Temperate heath and scrub</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Perennial vegetation of stony banks</strong></td>
<td><strong>Vegetated sea cliffs with endemic flora of the Macaronesian coasts</strong></td>
</tr>
<tr>
<td>Plant community characteristic of rocky, lava or coarse deposits of gravel, composed by endemic species some rare, always with a low coverage density.</td>
<td>Communities of the coastal sea cliffs, dominated by the endemic species <em>Festuca petraea</em>.</td>
</tr>
<tr>
<td><strong>Endemic Macaronesian heaths</strong> *</td>
<td>Eniaceous formations with moderate height and density, with a great floristic and structural diversity, with wide ecological amplitude.</td>
</tr>
<tr>
<td><strong>Coastal sub-type:</strong> formations with moderate height and density, with a great structural horizontal and vertical diversity with great conservation interest. Develops under particular orographic conditions (recent lava flows).</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Characteristic species</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Vascular plants</strong></td>
</tr>
<tr>
<td><em>Asplenium marinum</em></td>
</tr>
<tr>
<td><em>Asplenium marinum</em></td>
</tr>
<tr>
<td><em>Ammi trifoliatum</em></td>
</tr>
<tr>
<td><em>Crithmum maritimum</em></td>
</tr>
<tr>
<td><em>Daucus azoricus</em></td>
</tr>
<tr>
<td><em>Calluna vulgaris</em></td>
</tr>
<tr>
<td><em>Euphorbia azorica</em></td>
</tr>
<tr>
<td><em>Euphorbia azorica</em></td>
</tr>
<tr>
<td><em>Daucus azoricus</em></td>
</tr>
<tr>
<td><em>Erica azorica</em></td>
</tr>
<tr>
<td><em>Euphorbia azorica</em></td>
</tr>
<tr>
<td><em>Festuca petraea</em></td>
</tr>
<tr>
<td><em>Festuca petraea</em></td>
</tr>
<tr>
<td><em>Myosotis maritima</em></td>
</tr>
<tr>
<td><em>Myosotis maritima</em></td>
</tr>
<tr>
<td><em>Spergularia azorica</em></td>
</tr>
<tr>
<td><em>Plantago coronopus</em></td>
</tr>
<tr>
<td><em>Lysimachia azorica</em></td>
</tr>
<tr>
<td><em>Plantago coronopus</em></td>
</tr>
<tr>
<td><em>Myrsine retusa</em></td>
</tr>
<tr>
<td><em>Silene uniflora</em></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Birds</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><em>Arenaria interpres</em></td>
</tr>
<tr>
<td><em>Oceanodroma castro</em></td>
</tr>
<tr>
<td><em>Larus cachinnans</em></td>
</tr>
<tr>
<td><em>Puffinus assimilis</em></td>
</tr>
<tr>
<td><em>Sterna dougallii</em></td>
</tr>
</tbody>
</table>

* Natura 2000 Network priority habitat
Important natural processes

The area in question is highly subjected and affected by natural erosion processes, forming fragile and shifting ecosystems. Landslides constitute important transport systems of matter to the coastal zones below, also influencing these coastal ecosystems. Due to the steep incline, soil water absorption is less than on other parts of the island, conditioning the type of vegetation coverage and creating a more aggressive landscape.

The cliff areas, due to their inaccessibility, play a fundamental role in offering nesting areas for marine birds. The natural vegetation that cover the cliffs help protected the planaltic soil formations.
<table>
<thead>
<tr>
<th>Human activities</th>
<th>Potential threats</th>
<th>Threat minimising and prevention measures</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agriculture and pastoralism</td>
<td>Disturbance of bird nesting areas;</td>
<td>Promote codes of good agriculture practices;</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Apply incentives for extensive agriculture in areas surrounding humid zones;</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Monitor bovine cattle;</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Define trampling interdict areas;</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Define grazing areas on the rest of the island;</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Support the maintenance of agriculture areas to preserve the cultural identity and island’s landscapes;</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Reinforce vigilance and law enforcement of activities in the area;</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Prohibit the intentional introduction or re-introduction of any non-autochthonous marine species, subspecies or varieties of the area;</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Prohibit the removal of any element that could be considered of geological value;</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Prevent the outflow of industrial, agriculture and domestic residual waters that are intransgression with the legislation in vigour on collecting, treatment and discharge; deposit of solid residues and junk;</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Prevent the discharge of effluents of spillages from transport and other vehicles;</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Promote environmental education and awareness actions;</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Promote public interest in nature conservation and alert to the sensitivity of the area and ecosystems;</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Evaluate the impact of the above human activities.</td>
</tr>
<tr>
<td>Human intervention</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Leisure and tourism</td>
<td>Destruction of natural vegetation by trampling;</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Disturbance of nesting areas;</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Erosion aggravation;</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Construction of tourist support infrastructures, aggravating erosion;</td>
<td></td>
</tr>
</tbody>
</table>
12.1.3. Main habitat/Land Cover Type 3

Praia Islet - Local

The Core Area “Praia Islet” has a emerged area of 11 ha and is situated about 1.5 km off the Vila da Praia coast, on the Southeast part of Graciosa. This Core Area is constituted by an abrupt islet located to the North, 57 m in height, with herbaceous vegetation that almost entirely covers the islet. A small area at sea level on the SE facing slope is covered with shingle. On a regional level, this islet constitutes one of the places with the highest diversity of marine nesting bird species, thus, possessing a unique status in the region.

Given the size of the islet, the entire area is considered as a single habitat type, and corresponds to the emerged area (not applied to the Natura 2000 Network habitat classification):

<table>
<thead>
<tr>
<th>Characteristic species</th>
<th>Emerged area</th>
</tr>
</thead>
</table>
| Vascular plants        | Festuca petraea  
|                        | Azorina vidalii   
|                        | Erica azorica    
|                        | Hypericum foliosum 
|                        | Tamarix sp.      |
| Terrestrial invertebrates | Agabus godmani     
|                        | Heteroderes azoricus  
|                        | Heteroderes melliculus 
|                        | Laparocerus azoricus |
| Birds                  | Calonectris diomedea|
|                        | Puffinus assimilis |
|                        | Oceanodroma castro |
|                        | Bulweria bulwerii  
|                        | Sterna dougallii   
|                        | Sterna hirundo     
|                        | Arenaria interpres |
|                        | Calidris alba      |
|                        | Motacilla cinerea  |

Important natural processes

The entire islet is heavily affected by coastal erosion, particularly evident on the SW and E areas, where the fine layer of soil has been completely removed by erosion processes. The zones where the natural vegetation has disappeared are more vulnerable to erosion. The islet most probably influences ocean circulation and the movement of inerts in the bay area of Vila da Praia, however, these processes have not yet been analysed.
<table>
<thead>
<tr>
<th>Human activity</th>
<th>Real threats</th>
<th>Potential threats</th>
<th>Threat minimising and prevention measures</th>
</tr>
</thead>
<tbody>
<tr>
<td>Professional exploitation of coastal resources</td>
<td>Local over-exploitation of marine resources;</td>
<td>Disturbance of marine birds and consequent territory abandonment;</td>
<td>Prohibit the use of surface and bottom longlines, entangling nets, seine and surrounding nets, traps and trawl nets; the capture, handfishing, harvest or death of specimens of any specie violating any protection measures in vigour, including the disturbance or destruction of their habitats;</td>
</tr>
<tr>
<td></td>
<td>Cetacean disturbance and consequent area abandonment.</td>
<td></td>
<td>Reinforce vigilance and law enforcement of activities in the area;</td>
</tr>
<tr>
<td>Recreational exploitation of coastal resources</td>
<td>Local over-exploitation of marine resources;</td>
<td>Disturbance of marine birds and consequent territory abandonment;</td>
<td>Improve the efficiency of marine exploitation licensing;</td>
</tr>
<tr>
<td></td>
<td>Capture of marine birds for bait.</td>
<td></td>
<td>Apply fishing quotas to the local marine resources;</td>
</tr>
<tr>
<td>Human intervention</td>
<td>Introduction of non-natural species (cats, dogs, rats, rabbits) endangering birds and natural vegetation;</td>
<td></td>
<td>Monitor the main exploited marine resources;</td>
</tr>
<tr>
<td></td>
<td>Introduction of non-natural vegetable species, leading to the disappearance of natural species and erosion aggravation.</td>
<td></td>
<td>Assess the human activity impacts mentioned above;</td>
</tr>
<tr>
<td>Leisure and tourism</td>
<td>Bird disturbance, especially during the nesting season leading to area abandonment;</td>
<td>Cetacean disturbance and consequent area abandonment;</td>
<td>Prohibit the extraction of sand or other inert material; alteration of the sea bottom configuration by levelling or digging;</td>
</tr>
<tr>
<td></td>
<td>Trampling on natural flora and soil disturbance.</td>
<td>Non-degradable waste abandonment and potentially dangerous food for birds.</td>
<td>Prohibit the intentional introduction or re-introduction of any non-autochthonous marine species, subspecies or varieties of the area;</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Prohibit the removal of any element that could be considered of geological value;</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Prevent the outflow of industrial, agriculture and domestic residual waters that are in violation with the legislation in vigour on collecting, treatment and discharge; deposit of solid residues and junk;</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Prevent the discharge of effluents of spillages from transport and other vehicles;</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Promote public interest in nature conservation and alert to the sensitivity of the area and ecosystems;</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Promote environmental education and awareness actions;</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Limit access on the islets, for all activities.</td>
</tr>
</tbody>
</table>
12.1.4. Main habitat/land cover types 4

Graciosa Island Caldeira - Local

The Core Area “Graciosa Island Caldeira” incorporates the oval volcanic depression area situated on the SE part of the island, encompassing a total area of 120 ha. The Caldeira constitutes the largest forest area on the island, generating a cool and very humid climate, different from the rest of the island. The highest point of the island is located on the Southeast edge of this caldera. The interior vertical slopes, sheltered from the winds, are covered with woods, predominantly consisting of dense populations of cryptomeria (*Cryptomeria japonica*), introduced for the production of wood, and other natural and exotica vegetation. The bottom of the caldera is occupied by pasture areas and a small lake in the Northern part.

The Caldeira consists of a geological structure of great importance, possessing various unique volcanic forms, in particular the several volcanic cavities, including the *Furna da Maria Encantada* (on the edge of the caldera), *Furna do Abel*, *Galeria do Forninho* and *Furna do Enxofre*, the islands geodiversity true *ex-libris* and one of the most outstanding cavities in the archipelago, unique on an international scale.

The most important specific habitats (not applied to the Natura 2000 Network habitat classification) include:
Mixed Forests | Herbaceous pasture formations
---|---
**Characteristic species**

**Vascular plants**
- *Erica azorica*
- *Juniperus brevifolia*
- *Laurus azorica*
- *Myrica faya*
- *Pittosporum undulatum*
- *Gramíneas forrageiras*
- *Buteo buteo*
- *Fringilla coelebs*
- *Motacilla cinerea*
- *Sylvia atricapilla*
- *Turdus merula*
- *Sturnus vulgaris*
- *Regulus regulus*
- *Serinus canaria*

**Birds**

**Mammals**
- *Nyctalus azoreum*
- *Oryctolagus cuniculus*
- *Oryctolagus cuniculus*  

**Important natural processes**

The Caldeira is a natural water concentration and collection zone, fundamental for the island’s hydric regime. The forest in the Caldeira’s interior generates a microclimate that plays an essential part in water retention, a large part being responsible for the maintenance of the relative humidity values of the air through natural retention and transpiration processes. Rainwater, at the base of the Caldeira, filters into the island’s natural aquifers. The natural vegetation reduces erosion processes and also play an important role in nutrient fixation.

The Furna do Enxofre constitutes an important degasification field, consisting of a fumarole and mud pool, with diffuse carbon dioxide emmisions.

The forest coverage represents one of the most important nesting areas for various bird species on the island, for its vegetation coverage and climate conditions.
### Main human impacts and relevant management practices

<table>
<thead>
<tr>
<th>Human activities</th>
<th>Real threats</th>
<th>Potential threats</th>
<th>Threat minimising and prevention measures</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Agriculture and pastoralism</strong></td>
<td>Chemical contamination of water and soils;</td>
<td>Reduction in the reproductive capacity of natural species</td>
<td>Promote the code of good agriculture practices;</td>
</tr>
<tr>
<td></td>
<td>Destruction of natural vegetation by trampling and grazing;</td>
<td>through isolation of populations;</td>
<td>Apply incentives for extensive agriculture in areas surrounding humid zones;</td>
</tr>
<tr>
<td></td>
<td>Destruction of habitats and natural species.</td>
<td>Water regime alterations.</td>
<td>Monitor bovine cattle;</td>
</tr>
<tr>
<td><strong>Silviculture</strong></td>
<td>Chemical contamination of water and soils;</td>
<td>Reduction in the reproductive capacity of natural species</td>
<td>Define trampling interdict areas;</td>
</tr>
<tr>
<td></td>
<td>Destruction of habitats and natural species;</td>
<td>through isolation of populations;</td>
<td>Define grazing areas on the rest of the island;</td>
</tr>
<tr>
<td></td>
<td>Increase of <em>Cryptomeria japonica</em> forest areas and the consequent loss of</td>
<td>Water regime alterations.</td>
<td>Support the maintenance of agriculture areas to preserve the cultural identity and island’s landscapes;</td>
</tr>
<tr>
<td></td>
<td>natural species.</td>
<td></td>
<td>Reinforce vigilance and law enforcement of activities in the area;</td>
</tr>
<tr>
<td><strong>Human intervention</strong></td>
<td>Introduction of exotic flora and fauna species and increase of the area</td>
<td></td>
<td>Prohibit the intentional introduction or re-introduction of any non-autochthonous marine species, subspecies or varieties of the area;</td>
</tr>
<tr>
<td></td>
<td>occupied by introduced species, with the consequent loss of natural species.</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Leisure and tourism</strong></td>
<td>Trampling on natural flora a soil disturbance; Collecting plants and</td>
<td>Intensification of car traffic with an increase of noise and chemical pollution.</td>
<td>Prohibit the removal of any element that could be considered of geological value;</td>
</tr>
<tr>
<td></td>
<td>geological elements of value;</td>
<td></td>
<td>Prevent the outflow of industrial, agriculture and domestic residual waters that are in fraction with the legislation in vigour on collecting, treatment and discharge; deposit of solid residues and junk;</td>
</tr>
<tr>
<td></td>
<td>Abandonment of non-degradable waste.</td>
<td></td>
<td>Prevent the discharge of effluents of spillages from transport and other vehicles;</td>
</tr>
</tbody>
</table>

12.1.5. Main habitat/land cover types 5
Ponta da Barca - Local

This unit, with 33 ha, is comprised of basaltic cliffs with iron deposits, conferring a red shade to the soil, and is located in the most arid part of the island, due to the soil types and exposure to predominant winds from the Northwest. Access to the Baleia (whale) Islet and cliffs are difficult, and the cliffs have several indentations and clay areas with cavities and, thus, constitute an exceptional habitat for some marine bird species. The Baleia Islet, apart from representing an important habitat for marine birds, is also an important geological structure (scoria and tuff cone chimneys).

Of the specific characteristic habitat types, according to the Natura 2000 Network classification, the most important habitat types include:
Coastal and halophytic habitats

<table>
<thead>
<tr>
<th>Perennial vegetation of stony banks</th>
<th>Vegetated sea cliffs with endemic flora of the Macaronesian coasts</th>
</tr>
</thead>
<tbody>
<tr>
<td>Plant community characteristic of rocky, lava or coarse deposits of gravel, composed by endemic species, some rare, always with a low coverage density.</td>
<td>Communities of the coastal sea cliffs, dominated by the endemic species Festuca petraea.</td>
</tr>
</tbody>
</table>

Characteristic species

<table>
<thead>
<tr>
<th>Vascular Plants</th>
<th>Characteristic species</th>
</tr>
</thead>
<tbody>
<tr>
<td>Asplenium marimum</td>
<td>Asplenium marimum</td>
</tr>
<tr>
<td>Crithmum maritimum</td>
<td>Daucus azoricus</td>
</tr>
<tr>
<td>Euphorbia azorica</td>
<td>Erica azorica</td>
</tr>
<tr>
<td>Festuca petraea</td>
<td>Euphorbia azorica</td>
</tr>
<tr>
<td>Myosotis maritima</td>
<td>Festuca petraea</td>
</tr>
<tr>
<td>Spergularia azorica</td>
<td>Plantago coronopus</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Birds</th>
<th>Characteristic species</th>
</tr>
</thead>
<tbody>
<tr>
<td>Arenaria interpres</td>
<td>Calonectris diomedea</td>
</tr>
<tr>
<td>Charadrius alexandrinus</td>
<td>Larus cachinnans</td>
</tr>
<tr>
<td></td>
<td>Puffinus assimilis</td>
</tr>
<tr>
<td></td>
<td>Oceanodroma castro</td>
</tr>
</tbody>
</table>

Important natural processes

Erosion processes are significant, and in particular, marine erosion, due to the coast’s exposure and strong ocean hydrodynamics, essentially during the Autumn and Winter months. The remote and aggressive nature of the cliffs confer important habits to sea birds and natural vegetation since these are protected from most predators and exotics species find it difficult to adapt to extreme conditions. This area is situated in the most arid part of the island, where the most elevated average temperatures are also experienced, limiting habitat availability and determining vegetation occurrence.
### Main human impacts and relevant management practices

<table>
<thead>
<tr>
<th>Human activities</th>
<th>Real threats</th>
<th>Potential threats</th>
<th>Threat minimising and prevention measures</th>
</tr>
</thead>
<tbody>
<tr>
<td>Human intervention</td>
<td>Os predadores terrestres introduzidos, como cães e gatos, podem causar mortalidade e abandono da área da falésia de aves nidificantes; Espécies botânicas exóticas limitam a nidificação da maioria das aves marinhas na falésia e diminuem a área disponível para as plantas autóctones.</td>
<td></td>
<td>Reinforce vigilance and law enforcement of activities in the area; Prohibit the intentional introduction or re-introduction of any non-autochthonous marine species, subspecies or varieties of the area; Prohibit the removal of any element that could be considered of geological value; Restore natural vegetation; Prevent the outflow of industrial, agriculture and domestic residual waters that are infraction with the legislation in vigour on collecting, treatment and discharge; deposit of solid residues and junk; Prevent the discharge of effluents of spillages from transport and other vehicles; Promote public interest in nature conservation and alert to the sensitivity of the area and ecosystems; Promote environmental education and awareness actions;</td>
</tr>
<tr>
<td>Leisure and tourism</td>
<td>Water and soil contamination</td>
<td>Destruction of natural vegetation by trampling; Disturbance of nesting areas; Erosion aggravation; the construction of tourist infrastructures increase erosion processes.</td>
<td></td>
</tr>
</tbody>
</table>
12.2.1. Main habitat/land cover types 1
Ilhéu de Baixo Islets - Restinga - Regional

This zone encompasses a marine area up to 0.5 km from the exterior limits of the Core Zone and includes a complex of islets known as “Ilhéu de Baixo” and the coastal area known as “Restinga”, an irregular land area in the South-eastern point of the island. The marine zone possesses the same general characteristics as the Core Area, with mixed substrates of sand and rock and several submerged and semi-submerged caves and arches of various sizes. The terrestrial area is covered by a combination of agricultural, pasture and unoccupied lands, traversed by the island’s by-pass road and several agricultural paths. This Buffer Zone extends Northwest, connecting with the Caldeira Buffer Zone.

The marine Buffer Zone is essentially used for recreational purposes, in particular, activities related to fishing. The most common land-use in the terrestrial part is agriculture and pastoralism. The road has some traffic as it links the Carapacho locale to the Vila da Praia and Santa Cruz da Graciosa.

12.2.2. Main habitat/land cover types 2
Ponta Branca - Regional

This zone encompasses a marine area extending 0.5 km from the Core Area’s exterior limits and an irregular terrestrial area, located towards the interior of the island in relation to the limits of the Core Area. The marine zone consists of a rocky coastal area with mixed stone bottoms, with a maximum depth of 50 m. The terrestrial part consists essentially of pasture lands, traversed by several agricultural paths and limited north by the island’s by-pass road.

The marine Buffer Zone is essentially used for recreational purposes, in particular, activities related to fishing. The most common land-use in the terrestrial part is extensive bovine pastoralism.
12.2.3. Main habitat/land cover types 3

Praia Islet - Regional

This zone encompasses a marine area extending 0.5 km from the Core Area’s exterior limits. The sea bottoms in the Buffer Zone are constituted by lava flows and partially covered by rock boulders and small sand patches at hollow points. The shipwreck of the cargo vessel “Corvo” that occurred in 2000, is located near the islet and functions as an artificial reef.

The Buffer Zone is essentially used for recreational purposes, in particular marine-tourist activities (boat rides and scuba-diving) and fishing.

12.2.4. Main habitat/land cover types 4

Graciosa Island Caldeira - Regional

This Buffer Zone corresponds to the exterior slopes of the volcanic cavity known as “Caldeira” and mainly constituted by unoccupied lands and some pasture areas. The majority of the watercourses (streams) on the island, due to the tilt of the land, are located in this area, flowing downhill.

The Buffer Zone is essentially used for tourist activities, since the path that circumvents the Caldeira also give access to several other natural tourist attractions.
12.2.5. Main habitat/land cover types 5

Ilhéu da Baleia Islet and Ponta da Barca - Local

The Buffer Zone encompasses a rectangular marine area that encloses the Core Area’s exterior limits and a terrestrial area limited by relief and man-made structures. The marine substrate are composed of lava flows and are partially covered by rock boulders and small sand patches at hollow points. The terrestrial part is occupied by some agricultural lands, delimited by stone walls and essentially used for viniculture. The interior part is limited by the road that circles the island and traversed by several agricultural paths.
13 Conservation Function
Contribution to the conservation of landscape and ecosystem biodiversity
Graciosa’s coastline is jagged with many indentations, forming interesting bay areas, essentially rocky with some small sandy areas. The coastline also presents several, near offshore islets with high natural and landscape value for constituting important habitats for nesting marine birds. They also serve as staging areas for migratory bird species, in particular, the Praia Islet, which is one of the largest and exhibits the greatest diversity of nesting birds in the Azores.

Graciosa displays a diversified volcanic patrimony, including volcanic cavities, lava caves and pits, and a marked geodiversified landscape. Noteworthly, is the Caldeira, situated in the southeast of the island and constitutes one of the most interesting geological curiosities in the Azores. With a cool climate, it is the most humid and sheltered area on the island. The interior slopes are pronounced and steep and covered by woods. The highest point on the island, reaching about 405 m, is located on the edge of the Caldeira. The Graciosa Caldeira is included in the Caldeira Natural Regional Monument of Graciosa Island, integrated in the Regional Network of Protected Areas. This protected area encompasses the island’s largest forest area. Located in the interior of the Caldeira is the Furna do Enxofre, a volcanic cavity where the need for protection, preservation and sharing of biological, aesthetic, scientific and cultural values is most felt.

The Caldeira’s exterior coastal slopes present areas with a zonation of highly singular natural communities of high conservation importance. From which stand out the endemic coastal cliffs, where rare species in this kind of habitats can be found such as organisms associated to termal waters. Coastal meadows are also present, where some rare species arise, such as the *Azorina vidalii*. The landscape is characterised by the presence of mixed cultures surrounded by a mosaic of spontaneous formations of varying natural degrees. The small bay along the coast, as well as, the more sheltered slopes of the islets offer favourable conditions for nursery areas for fish communities. The strong hydrodynamics in the area induces a constant recycling of nutrients, generating an area with a high potential for feeding for marine species. The area exhibits a great diversity of ictiofauna, both pelagic and benthonic. The Azores is an important transition zone between the tropics and the temperate regions of the North Atlantic, functioning as a reproductive, growth and
resting area for many marine species.

Outstanding in Graciosa’s rural landscape, are the vine cultivations, especially in the North of the island, by the regular display of small parcels of land delimited by black stone walls over “biscoito” or solidified lava. Between Santa Cruz, Guadalupe and Victoria, lies a vast valley, occupying almost a third of the island and where there is a strong presence of agricultural and pasture lands, apart from the dense woods that cover the volcanic cones.

In respect to the less affected areas, noteworthy are the Serra Branca slopes, exposed to the Southwest and South of the island, where ample pasture fields predominate, partitioned by dry-stone walls, and extend towards the cliff’s limit. The Site of Community Interest of Ponta Branca is located in this area and is constituted, essentially, by the coastal cliff with singular geological matter and where the natural and semi-natural coastal cliff coverage predominate.

The centre of the island has a low population density with a significantly high presence of natural elements, namely, geological and vegetational. The sierras Dormida and das Fontes are located in this area, where the land’s relief is gentle and undulating. Between the Sierras Dormida and das Fontes and the Furna do Enxofre lies a valley that traverses the entire island. This valley is a fertile landscape, productive and sheltered from aggressive winds from the Atlantic, characterised by ample agricultural and pasture lands and a linear population occupation along the roads and pathways.

The high endemism of plant and animal species in the region are in part due to the volcanic origin of the islands in the archipelago of the Azores and the fact that these islands were never been directly linked to a continental region. Graciosa is exceptionally rich in endemic invertebrate species, which is also associated to the numerous volcanic cavities present. The high percentage of endemic terrestrial malacoфаuna, apart from constituting an important scientific patrimony and interesting study object, also represent a valuable indicator for conservation strategies. Invertebrates have high ecological importance, principal benefits of which include stabilising ecosystems, energy and nutrient transfers, trophic structure maintenance, pollination and plant protection and providing habitats for other organisms.
Besides these organisms, worth mentioning is the presence of various species of bryophytes, some very rare, and also associated to the volcanic cavities. The assemblage of all these values require an adequate management, clearly coinciding with the objectives of a Biosphere Reserve.

The Macaronesian region, in which the Azores is included, is considered one of the 25 biodiversity hotspots in the world. Taking into account the exceptional concentration of endemic species and the accelerated rate of habitat loss, this region deserves special attention in strategies and decision making processes for assuring effective conservation of global biodiversity.
13.2 Conservation of species biodiversity
Graciosa is significantly rich in endemic terrestrial flora, with 60 registered endemisms, 40 of which are endemic to the Azores Archipelago and 20 to the Macaronesia Region. The invertebrate fauna has 33 registered terrestrial arthropods endemic to the Azores and 13 to Macaronesia. Terrestrial molluscs represent 15 species endemic to the Azores and 2 to Macaronesia. With regards to nesting avifauna, 9 subspecies endemic to the Azores have been registered and 1 subspecies to Macaronesia. The proposed Biosphere Reserve also represents, on an international scale, important nesting areas for rare and sensitive bird species, many of which are cited in Annex I of the European Union’s Birds Directive. Additionally, two bat species are recorded, one endemic to the Azores and the other, endemic to Macaronesia.

A list of the most important species already identified on Graciosa is presented below. The Portuguese and English common names, when available, are presented in parenthesis following the scientific name. When relevant, additional notes are supplied.

13.2.1. FLORA

BRYOPHYTES

Endemic to Macaronesia (9)

- *Andoa berthelotiana* (- / -)
- *Brachymenium notarisii* (- / -)
- *Echinodium prolixum* (- / -)
- *Fissidens coacervatus* (- / -) species classified in the European Red List of Bryophytes with R status (rare taxa).
- *Fissidens luisieri* (- / -) species classified in the European Red List of Bryophytes with insufficient knowledge.
Heteroscyphus denticulatus (- / -)

Leucodon treleasei (- / -)

Radula wichurae (- / -) species classified in the European Red List of Bryophytes as status V (vulnerable taxa).

Tetrastichium virens (- / -) species classified in the European Red List of Bryophytes with R status (rare taxa).

**Endemic to Europe (13):**

Aphanolejeunea azorica (- / -)

Frullania azorica (- / -) species classified in the European Red List of Bryophytes as status V (vulnerable taxa).

Frullania microphylla (- / -) species classified in the European Red List of Bryophytes as status V (vulnerable taxa).

Frullania teneriffae (- / -)

Homalia webbiana (- / -) species classified in the European Red List of Bryophytes as status V (vulnerable taxa). Known on only 4 islands (Flores, Graciosa, São Jorge and Santa Maria).

Hypnum uncinulatum (- / -)

Marchesinia mackaii (- / -) species classified in the European Red List of Bryophytes as status V (vulnerable taxa).

Myurium hochstetteri (- / -) species classified in the European Red List of Bryophytes as status V (vulnerable taxa).

Porella canariensis (- / -)

Ptychomitrium nigrescens (- / -)

Radula carringtonii (- / -)

Saccogyna viticulosa (- / -)

Tetrastichium fontanum (- / -) species classified in the European Red List of Bryophytes as status R (rare taxa).
PTERIDOPHYTES

Asplenium hemionitis (feto de três bicos / -) the spleenwort is listed in Annex IV of the Habitats Directive and in Annex II of the Bern Convention. It is a macaronesian-iberian-maruritanian endemism. Species in Critical Danger. Has a rare status on the island.

Trichomanes speciosum (feto frisado / -) the fern is an indigenous species to the Azores, sited in Annex II of the Habitats Directive.

Endemic to the Azores (3)

Asplenium azoricum (- / -)
Dryopteris azorica (- / -)
Polypodium azoricum (- / -)

SPERMATOPHYTES

Endemic to Azores (27)

Ammi trifoliatum (Pé de pomba / -) Listed in Annex II of the Habitats Directive and protected by the Bern Convention.


Centaurium scilloides (- / Perenial Centaury)
Corema album ssp. azoricum (Camarinha / Portuguese crowberry)
Daucus azoricus (Salsa burra / -)

Erica azorica (Urze / Tree heath) the tree heath is listed in Annex II of the Habitats Directive and protected by the Bern Convention (1992). Species considered Vulnerable (VU) on a regional and local level. The Ilhéu do Baixo Islets has a high regional significant population, in an excellent conservation state.

Euphorbia azorica (Trovisco / Spurge)

Festuca petraea (Bracel da rocha / Fescue)

Gaudinia coarctata (- / -)

Hedera azorica (Hera ou Hédera / -)

Holcus rigidus (Erva caniça ou Canição / -)

Hypericum foliosum (Furalha ou Malfurada / St John’s wort)

Ilex perado Aiton ssp. azorica (Azevinho / Holly)

Juniperus brevifolia (Cedro do mato / Juniper)

Laurus azorica (Louro / Laurel)

Lysimachia azorica (- / Yellow pimpernel)

Myosotis marítima (Não me esqueças / -) the forget-me-not is listed in Annex II of the Habitats Directive and protected by the Bern Convention.

Myrsine retusa (Tamujo / -)

Pericallis malviflora (Malvavisco / -)

Platanthera micrantha (Conchelo do mato / -)

Scabiosa nitens (- / Scabious) the scabious is listed in Annex II of the Habitats Directive.

Selaginella azorica (- / -)
**Solidago sempervirens ssp. azorica** (Cubres / Golden rod)

**Spergularia azorica** (- / Spurrey) the spurrey is listed in Annex II of the Habitats Directive.

**Endemic to Macaronesia (6)**

**Carex peregrina** (- / -)

**Dracaena draco** (Dragoeiro / Dragon tree) the dragon tree is listed in Annex IV of the Habitats Directive and Annex I of the Bern Convention (1992). Considered in Critical Danger (CR) in the Azores, with an estimated population size of less than 250 adults. This species has been used as an ornamental plant, at least in the Canaries and Azores, which has in part contributed to its conservation.

**Festuca jubata** (Bracel / Fescue)

**Rumex bucephalophorus** ssp. **canariensis** (Bafo de boi ou Douradinha / Buttercup)

**Smilax canariensis** (Alegra-cão / Canary bindweed)

**Tolpis succulenta** (Visgo / -)

### 13.2.2. INVERTEBRATES

**ARTHROPODS**

**Terrestrial endemic to the Azores (33)**

**Aeolus melliculus moreleti** (- / -)

**Agabus godmani** (- / -)

**Aphrosylus calcarator** (- / -)
Argyresthia atlanticella (- / -)
Ascotis fortunata azorica (- / -)
Athous azoricus (- / -)
Cyclophora azorensis (- / -)
Dictyna acoreensis (- / -)
Ensina azorica (- / -)
Eudonia interlinealis (- / -)
Galumna azoreana (- / -)
Galumna rasilis (- / -)
Gibbaranea occidentalis (- / -)
Halophiloscia guernei (- / -)
Hermanniella incondita (- / -)
Heteroderes azoricus (- / -)
Humerobates pomboi (- / -)
Laparocerus azoricus (- / -)
Lasaeola oceanica (- / -)
Lithobius obscurus azorae (- / -)
Mesapamea storai (- / -)
Neomariania scriptella (- / -)
Noctua atlantica (- / -)
Nothrus palustris azorensis (- / -)
Orchestia chevreuxi (- / -)
Pardosa acoreensis (- / -)
Pieris brassicae azorensis (Borboleta branca ou lagarta da couve / Azorean white butterfly)
Pilocepheus azoricus (- / -)
Pisaura acoreensis (- / -)
Rugathodes acoreensis (- / -)
Scoparia aequipennalis (- / -)
Scoparia coecimaculalis (- / -)
Steganacarus hirsutus azorensis (- / -)
Terrestrial endemic to Macaronesia (13)
Anaspis proteus (- / -)
Atheta pseudolaticollis (- / -)
Blastobasis desertarum (- / -)
Blastobasis marrocanella (- / -)
Dicranomyia michaeli (- / -)
Litargus pilosus (- / -)
Monomorium carbonarium (- / -)
Palliduphantes schmitzi (- / -)
Philonthus ventralis (- / -)
Pseudophloeophagus tenax (- / -)
Thalassosmittia atlantica (- / -)
Theridion musivivum (- / -)
Xenillus discrepans azorensis (- / -)

MOLLUSCS
Terrestrial endemic to the Azores (15)
Acanthinula azorica (- / -)
Lauria fasciolata (- / -)
Leiostyla fuscidula (- / -)
Leiostyla rugulosa (- / -)
Leptaxis terceirana (- / -)
Napaeus delibutus (- / -)
Napaeus forbesianus (- / -)
Napaeus vulgaris (- / -)
Ovatella vulcani (- / -)
Oxychilus atlanticus (- / -)
Oxychilus miguelinus (- / -)
Oxychilus ornatus (- / -)
Oxychilus volutella (- / -)
Punctum azoricum (- / -)
Spermodea monas (- / -)

Terrestrial endemic to the Macaronesia (2)
Columella microspora (- / -)
Hydrocena gutta (- / -)
13.2.3. VERTEBRATES

FISH

Listed in the Red Book of Vertebrates in Portugal (1993)

*Coryphoblennius galerita* (Caboz de crista / Montagu’s blenny)

*Epinephelus marginatus* (Mero / Dusky grouper) the dusky grouper is listed as vulnerable; continues to have a special regime exploitation status. Has high commercial value.

*Gobius paganellus* (Caboz ou Joana / Rock goby)

*Mullus surmuletus* (Salmonete / Red mullet)

*Parablennius ruber* (Caboz lusitano / Portuguese blenny)

*Phycis phycis* (Abrótea / Forkbeard) the forkbeard is listed as commercially threatened. Has high commercial value.

Endemic to the Azores

*Centrolabus caeruleus* (Bodião verde / -) species with high commercial value registered in the surrounding marine area of Graciosa.

REPTILES – TURTLES

Listed in the Red Book of Vertebrates in Portugal (2005)

*Caretta caretta* (tartaruga careta / loggerhead sea-turtle) the loggerhead is a visitor in the waters of the archipelago. Endangered species (EN) in the Azores (Red List 2005). Protected on various levels (Bern: II; Bonn: I/II; CITES: I; Birds/Habitat Directives: II, IV).
BIRDS

Subspecies endemic to the Azores that nest on Graciosa

*Buteo buteo rothschildi* (Águia de asa redonda / Common buzzard) the common buzzard has a least concern status in the Azores Arquipelago (Red Book). Legal instruments: Bern: II; Bonn: II; CITES IIA.

*Columba palumbus azorica* (Pombo-torçados-Açores / Azores common wood-pigeon) the Azores common wood-pigeon is a priority subspecies included in Annex I of the Birds/Habitats Directives. Other legal instruments: Hunting legislation and regulation. Presents high abundances on the island, possibly due to the mild and temperate climate that is characteristic of Graciosa.

*Fringilla coelebs moreletti* (Tentilhão/ Azores chaffinch) the Azores chaffinch has a least concern status in the archipelago (Red Book 2005). Species included in Annex III of the Bern Convention.

*Larus cachinnans atlantis* (Gaivota / Atlantic islands gull) the Atlantic island gull has a least concern status in the archipelago (Red Book 2005). Species included in Annex III of the Bern Convention.

*Motacilla cinerea patriciae* (Lavandeira / Azores grey wagtail) the Azores grey wagtail has a least concern status in the archipelago (Red Book 2005). Species included in Annex III of the Bern Convention.

*Regulus regulus inermis* (Estrelinha-de-poupa / Western Azores goldcrest) the western Azores goldcrest has a least concern status in the archipelago (Red Book 2005). Legal instruments: Bern: II, Bonn: II.

*Sturnus vulgaris granti* (Estorninho / Azores common starling) the Azores common starling has a least concern status in the archipelago (Red Book).
Birds/Habitat Directives: Hunting legislation and regulation.

*Sylvia atricapilla atlantis* (Toutinegra / Island blackcap) the island blackcap has a least concern status in the archipelago (Red Book 2005). Species included in Annex II of the Bern and Bonn Conventions.


*Subspecies endemic to Macaronesia that nest on Graciosa*

*Serinus canaria canaria* (Canário da terra / Canary) the canary has a least concern status in the archipelago (Red Book). Species included in Annex III of the Bern Convention.

*Migratory/reproductive marine birds on Graciosa listed in Annex I of the Birds/Habitats Directives*

**Procellariiformes**

*Bulweria bulwerii* (Alma negra / Bulwer’s Petrel) the Bulwer’s petrel has a Endangered status in the archipelago (Red Book 2005). In the Azores, this species nests on the islands of Graciosa and Santa Maria with only 3 colonies, on 3 distinct islets: Ilhéu de Baixo Islets (Graciosa); Praia Islet (Graciosa) and Vila Islet (Santa Maria). In terms of threatened status on a European level, the species is considered Rare, although still provisionally (BirdLife International 2004). Other legal instruments: Annex II of the Bern Convention.

*Calonectris diomedea borealis* (Cagarro / Cory’s shearwater) Cory’s shearwater has a least concern status in the archipelago (Red Book 2005). Other legal instruments: Annex II of the Bern Convention. Most abundant marine bird in the Azores, where numbers
represent 74% of the world population. The decline in world numbers in the last decades led to this species being considered vulnerable. On a European level, this species is considered Vulnerable, although still provisionally (BirdLife International 2004).

*Oceanodroma castro* (Angelito / Band rumped storm petrel) the band rumped storm petrel has a vulnerable/endangered status in the archipelago (Red Book 2005). One of the largest colonies of this species is concentrated on Graciosa (of the cold and warm populations). Other legal instruments: Annex II of the Bern Convention.

*Pterodroma fea* (freira-do-Bugio / Fea’a petrel) Fea’s petrel is a extremely rare species, international important and occasionally observed on Graciosa. This species is globally threatened with only 1,200 couples in the world. Other legal instruments: Annex II of the Bern Convention.

*Puffinus assimilis baroli* (Frulho / Macaronesian shearwater) the Macaronesian shearwater has a vulnerable status in the archipelago (Red Book 2005). On a European level, the threatened status of this species is considered Rare, however, still provisionally (BirdLife International 2004). Other legal instruments: Annex II of the Bern Convention.

**Charadriiformes**

*Sterna dougallii* (Garajau rosado / Roseate Tern) the roseate tern has a vulnerable status in the archipelago (Red Book 2005). It is a priority species in Annex I of the Birds/Habitat Directives. On a European level, this species is considered Rare. Approximately 59% of the European population nest in the Azores. Other legal instruments: Annexes II of the Bern and Bonn Conventions.

*Sterna hirundo* (Garajau comum / Common Tern) the common Tern has a vulnerable status in the archipelago (Red Book 2005). In threatened status terms on a European level, this species is considered Not Endangered, although population declines in its European distribution area frequently occur. Other legal instruments: Annexes II of the
Bern and Bonn Conventions.

**Other Birds**

*Phaeton aethereus* (Rabo de palha / Red-billed tropic bird) Graciosa is the only occasional nesting area of this species known in Europe.

**Other birds that occur on Graciosa listed in the Red Book of Vertebrates in Portugal (2005)**

*Ardea cinerea* (Garça cinzenta / Grey heron) the grey heron is a visitor in the archipelago of the Azores. Annex II of the Bern Convention. Has a DD status (Data Deficient) in the Azores.

*Arenaria interpres* (Rola do mar / Ruddy turnstone) the ruddy turnstone is a visitor to the archipelago of the Azores. Annexes II of the Bern and Bonn Conventions. Has a DD status (Data Deficient) in the Azores.

*Charadrius alexandrinus* (Borrelho de coleira interrompida / Kentish plover) the Kentish plover is a resident in the archipelago. Annex I of the Birds/Habitat Directives and Annexes II of the Bern and Bonn Convention. Has a DD status (Data Deficient) in the Azores.

*Columba livia atlantis* (Pombo da rocha / Rock pigeon) the rock pigeon is a resident species in Macaronesia. Annex A of the CITES Convention, Annex II of the Birds Directive and Hunting legislation and regulation. Has a DD status (Data Deficient) in the Azores.

*Egretta garzetta* (Garça bioeira / Heron) the heron is listed in Annex I of the Birds Directive and uses Graciosa as a staging area. On a European level, the threatened status of this species is considered Not Endangered, although population declines in its European distribution area sometimes occur. Other legal instruments: Bern: II and CITES: A.
**Gallinago gallinago** (Narceja comum / Common snipe) the common snipe is a resident species in the Azores. Annex D.

**MAMMALS**

**Nyctalus azoreum** (Morcego dos Açores / Azorean bat) the Azorean bat is the only endemic mammal in the Azores and considered to be Critically Endangered (Red Book 2005). Presents an irregular distribution on Graciosa. Shelters in narrow cracks in edifices, rocks and many trees. Probably the species of microchiroptera most frequently seen hunting during the day. Species listed in Annex IV of the Habitats Directive, with rigorous protection status, in Annex II of the Bern Convention and Annex II of the Bonn Convention.

**Pipistrellus maderensis** (Morcego da Madeira / Madeira Pipistrelle) the Madeira pipistrelle is a chiropteran species considered in Critical Danger (CR) in the Azores (Red Book 2005). Endemic to Macaronesia and a resident species in the Azores having been registered on the islands of Santa Maria, São Jorge, Graciosa, Flores and Corvo. This species has low abundances in the Azores. It is assumed that population numbers in the Azores are extremely low, probably less than 300 individuals. Specie listed in Annex IV of the Habitats Directive, with strict protection status, Annex II of the Bern Convention and Annex II of the Bonn Convention.

**Listed in the Red Book of Vertebrates in Portugal (2005)**

**Delphinus delphis** (Golfinho comum / Common dolphin)

**Globicephala macrorhynchus** (Baleia piloto tropical / Tropical pilot whale)

**Kogia spp.** (Familia Kogiidae)

**Mesoplodon spp.** (Género Mesoplodon)

**Physeter macrocephalus** (Cachalote / Sperm whale)
Stenella coeruleoalba (Golfinho riscado / Striped dolphin)

Stenella frontalis (Golfinho pintado / Atlantic spotted dolphin)

Tursiops truncatus (Roaz / Bottlenose dolphin)

Other cetacean species occasionally occur.
13.3 Conservation of Genetic Biodiversity
A Biosphere Reserve has a dual role in guaranteeing genetic biodiversity conservation. On one hand, the conservation function of the reserve helps preserve genetic diversity by protecting rare natural values and on the other, the cooperation of local communities is essential in guaranteeing genetic variability in the reserve, enabling animals and plants to adapt to changes in their surroundings. This role should include the development and finance of genetic research, public awareness campaigns and implementing actions that guarantee genetic diversity.

In relation to terrestrial and marine natural species, Graciosa isolation, intrinsic to an island, could help in upholding genetic diversity by sheltering populations with slightly different characteristics than that of other locations. However, in the long run, isolation could lead to speciation and the loss of genetic diversity of a particular species. The Azores, and Graciosa in particular, are relatively recent islands and, although speciation processes have produced several endemic species, many species present are common to Eurasia and Asia, representing varieties or subspecies of these and thus, enriching genetic diversity.

Agriculture and livestock varieties used on Graciosa are overall varieties widely used on a European level and thus do not constitute great importance in terms of genetic biodiversity conservation. However, there are several exceptions such as the sweet potato (*Ipomoea batatas*), which was introduced in the Azores in the XVI century and probably still conserve original characteristics. In the same way, the taro (*Colocasia esculenta*), a rhizome or corm, native from the Canary Islands and widely used in cooking, substituting tubercles such as potatoes that are widely cultivated in the tropics. Due to the distinct climatic characteristics in the Azores, the cultivated varieties on the islands probably have some genetic characteristics that differ to those cultivated in other areas.

The proposed reserves special appetite for viniculture. The dominate vine varieties are the “Verdelho”, “Isabella”, “Arinto”, “Terrantez”, “Malvasia Fina” and “Fernão Pires”. The “Verdelho” grape is the most precious but also the most demanding of all the vines on the island. This variety is rarely used outside of the Azores and thus constitutes an valuable asset for genetic biodiversity conservation of vine varieties.
Graciosa is also distinguished in the production of birdsfoot trefoil seeds (“erva da casta”) and lupin. The principal markets for the seeds are the Central Group of islands of the archipelago. In a plan for the improving Azorean landscapes, which proposes to introduce a variety of species used for pastures, Graciosa is to produce the forage seeds.

Graciosa has the largest density of donkeys (*Equus asinus*) in the archipelago and represents one of the most important conservation sites for this species in Portugal. The majority of the ass livestock on Graciosa belongs to a variety that is distinct to others in Portugal, by possessing a marble patterned fur and, therefore, important for maintaining the genetic diversity of this species, which is suffering sharp declines in numbers in Europe.

Various flora species on Graciosa are not cultivated and rely on external propagation and grow in a natural or semi-natural regime. Several of these plants have therapeutic qualities and have been around since the arrival of the first settlers, and include:

- Diabelha (*Plantago coronopus*)
- Funcho (*Foeniculum vulgare* var. *dolce*)
- Hortelã (*Mentha viridis*)
- Língua-de-vaca (*Plantago major*)
- Macela (*Anthemis nobilisi*)
- Néveda (*Calamintha officinalis*)
- Oregão (*Origanum vulgare* ssp. *virens*)
- Poejo (*Mentha pulegium*)
- Quieró (*Calluna vulgaris*)
- Tomilho (*Thymus caespititius*)
Development Function
Potential for fostering economic and human development, which is socio-culturally and ecologically sustainable
Considerable potential exists in developing environmentally sustainable economic activities. The demand for goods produced in ecologically sustainable systems has increased significantly, creating the possibility of valorising certified goods. The small exploitations on Graciosa are, for the most part, unable to compete in traditional markets but could compete in specific markets by developing products with assured ecological quality. Product valorisation could occur in most of the main human activities on the island guaranteeing, in this way, an economically sustainable development while satisfying the objectives of a Biosphere Reserve.

**Fishing**

Fisheries in the Azores are still characterised by the use of mostly traditional technologies, regulated by a set of laws such as the three mile law and the prohibition of fishing gears such as trawling nets, deep-water trammel or entangling nets, drift nets and surrounding nets. Associated to the fishery sector, is a programme implementing a network of marine protected areas that encompass a wide variety of habitats and ecosystems in the Azores region, from coastal to deep-sea areas. Fishing activity is mostly artisanal with hook and line fishing gears dominating the various fisheries and facilitating its sustainability. A sustainable development policy in the fishery sector is also evident on Graciosa.

The fisheries domain, between the 12 and 200 mile zone from the coast, is regulated on a national level. Fisheries regulation up to the 12 mile zone (Territorial Sea) is under the competence of the Regional Government, with the Regional Office of Fisheries having the responsibility of orientating, coordinating and executing policies, while promoting and supporting all necessary measures for the sector’s development.

Commercial fishing in the Autonomous Region of the Azores is regulated by the Executory Decree no. 7/2000, 30 of May, which defines vessel characteristics and official fishing gears and methods. The Decree-Law no. 278/98, of 7 of July, establishes conservation, management and sustainable use measures for animal and plant resources in waters
under Portuguese jurisdiction.

The proposal "National Strategies for the Sea" was recently approved (4 of October 2006) and defines a set of strategic actions identifying transversal measures for generating favourable conditions and contributing to an improved sustainable practice of the sea.

**Agriculture and livestock farming**

The agriculture sector also has great potential for sustainable economic and environmental development. On Graciosa, this activity is still characterised by the use of artisanal methods and consists of small exploitations with low levels of production.

One of the agricultural management mechanisms implemented by the Programme Prorural in the Region is FEADER – European Agriculture and Rural Development Fund, which commences in 2007 and creates a single financial instrument for rural development policies. The main objectives include increasing competitiveness in the agriculture and forestry sectors, improving the environment and quality of life and, diversifying activities in rural areas. Prorural, through its “Axis 2” for rural development, foresees the importance of improving the rural environment and landscape by means of four measures: a) Maintaining agricultural activity in unfavourable areas; b) Agro-environment payments and Natura 2000; c) Non-productive investments and; d) Forest area management. Additionally, PROTA – Regional Territory Planning Plan for the Azores and the PDM – Masters Director Plan regulate areas and exploitation types on the island.

Agricultural training initiatives on the island also greatly contribute to implementing practices that allow for the sector's economic development while still preserving natural resources.

**Local products**

Graciosa produces several specific products that have considerable economic success,
such as the Graciosa Cream Pastry (popularly known as “queijadas da Graciosa”), brandies, wine, the island cheese and embroidery. The diversity and the wide-spread familiarity of these products offers considerable potential in developing these activities, that is, with the implementation of measures for maintaining them environmentally sustainable and guaranteeing environmental conformity.

**Tourism**

Graciosa, through its natural and cultural heritage, possesses a large diversity of solid bases for an adequate and varied tourist development without creating a dependence on a single tourism segment. Thus, the unification and interaction of the variants that constitute the island’s authenticity (natural and constructed heritage; traditions and customs; architecture; arts and crafts; ethnology; local products) should allow for a harmonious and sustainable growth, which will not only boost the local economy but also serve as an example for the tourist
industry development in other parts of the Region.

POTRAA – Tourism Planning Plan for the Autonomous Region of the Azores has the function of guiding these activities in ways as to develop sustainability on a social, cultural and environmental level, while valorising its heritage and singularity.

**Renewable Energy**

Early in 1992, the Graciosa Aeolic Park was inaugurated at Serra Branca, with an installed energy power of 200 kW and distributed by two aerogenerators. In 2002, the energy power increased to 300 kW, with a total capacity of 0.6 MW. This amplification, integrated in the first phase of the Aeolic Energy Development Plan for the Azores, increased aeolic energy contribution to 17% of the total electric energy consumed on the island. In 2005, aeolic energy represented 20% of the total energy produced on the island. Investing in aeolic energy for substituting fossil fuel energies could help the sustainable development of activities by reducing the ecological footprint that the necessary increase in energy consumption, associated with the socio-economic development brought on by the proposed Biosphere Reserve, would otherwise increase.
If tourism is a major activity
Considering the travellers that annually visit Graciosa and based on the reasons of travel, two key groups of tourists can be identified on Graciosa: Leisure Tourism (covering outdoor activities such as seaside, ecotourism, panoramic and cultural visits) and Common Interest Tourism (having a common interest between visitor and visited – Visiting Friends and Relatives – such as foreign emigrants and/or Portuguese mainland residents). Graciosa has witnessed an above average increase in the number of overnight stays in relation to the rest of the archipelago (occupation rates with a positive evolution), although the average duration of stays has decreased. Statistics for 2004, refer to 0.8 tourists per habitant. In 2005, a total of 3,660 guests were recorded, totalling 8,244 overnight stays and corresponding to an occupation rate of about 29.7%. In 2006, 5,183 overnight stays were recorded during the first half of the year (until July).

The average duration of stays in hotel establishments in 2004, was approximately three nights. However, the average duration and number of visitors, are in reality, much greater since the majority of the visitors are residents in foreign countries with Azorean ancestry staying with family and friends instead of using hotel establishments and thus, not accounted for. According to a study produced by SREA (Regional Statistics Service of the Azores) about 6% of all the tourists that visited the region in 2001, visited Graciosa and of these 26.7% were residents in Portugal, 53.3% oversees residents with Azorean ancestry and 20% were foreigners.

The classification that refers specifically to the number of tourists registered on the island is considered far from Mass Tourism. In fact, the Autonomous Region of the Azores’ Tourist Management Entities planning strategies includes controlling the number of entries, taking into account the carrying capacity of the island.

**Tourism growth**

In the Azores, during the month of April of 2006, overnight stays registered a homologous increase of 15.7%. Between January and April of 2006, overnight stays in the same
establishments registered a negative variation of 6.5% in relation to the same period the year before. A large portion of this reduction in overnight stays can be accounted for by the decrease of foreign residents (-16.3%). The islands that presented accumulated homologous increases were Graciosa (35.1%), Santa Maria (31.5%) and Faial (1.6%).

Although the number of tourists is not significantly high, tourism seasonality is evident on the island. The number of overnight stays begin to increase after June, reaching a peak in July, and decrease significantly after September. The Regional Government is wagering on an increase in the number of visitors, aiming at a demand growth rate of between 8.5 and 9.5% (mean values).

**Tourism Planning**

The Regional Territorial Planning Plan for the Azores takes into account two development scenarios for Graciosa, one for the North zone (parish of Santa Cruz da Graciosa), where a stabilising tendency of urban functions exists, and the other for the remaining territory, where a debilitating tendency of urban functions is observed.

The Municipal Master Plan is still in preparation phase but the available elements point in the direction of creating conditions for boosting local economic activities by means of the tourism sector.

Thus, the principal lines of development and ventures for tourism on Graciosa, included in the Tourism Sectorial Plan are:

- Thermalism
- Oenology
- Geological patrimony
- Constructed patrimony
- Nautical sports
Additionally, connections with Terceira are to be reinforced and, subsequently, with the islands of Faial, São Miguel and Pico.

14.2.1. Type(s) of Tourism

Graciosa assembles, on several levels, excellent conditions for tourism, such as climatic conditions, geography and natural heritage. Hence, the most common tourist activities on Graciosa are considered to be: Bathing Tourism, Nature/Ecotourism, Thermal and Adventure. However, as tourism exploitation on Graciosa is still in its early stages, neither one of these activities has any significant expression.

For a better understanding of tourism in the area, a brief definition of each of the main activities is given below.

*Bathing Tourism* – Visiting localities with natural or man-made bathing infrastructures exist and with good weather conditions, i.e. a lot of sun hours, reduced rainfall and high/
temperate temperatures, with the objective of partaking in outdoor leisure activities.

*Cultural Tourism* – Visits by strangers to the host community, motivated, in part or entirely, by historic, artistic or scientific interests or by the way of life/heritage of a community, region group or institution.

*Nature Tourism* – Visiting areas rich in Natural Heritage, with the purpose of admiring landscapes and areas of great scenic beauty, as well as partaking in cultural, agricultural and sporting activities.

*Ecotourism* – Visiting relatively intact natural areas with the single object of appreciating, studying and enjoying the beauty of the area, its wildlife and all its natural particularities.

*Thermalism* – Journey made outside of the normal place of residence or work, with the purpose of improving one’s state of health, integrating not only curative treatments prescribed by a medical doctor, but also preventive treatments by personal voluntary initiative.

*Adventure* – Leisure activities performed in exotic, remote or untamed places, usually in the open air, with high levels of involvement and action by the participants, inspired by extreme/radical sports in the second half of the XX century.

The main tourist activities include:

- Motor-boat and sailing trips;
- Recreational fishing and spearfishing;
- Scuba-diving;
- Hunting;
- Pedestrian walks;
- Bathing activities;
- Thermalism;
- Culture;
Places of interest

Volcanic Cavities: Ten volcanic cavities have been registered on Graciosa, one volcanic pit or algar and nine lava caves. The Caldeirinha de Pêro Botelho is the only volcanic pit known on the island, with 37 m in depth and located in the interior of a spatter cone crater implanted in Serra Branca. A significant number of the lava caves (5 in total) are set in the pahoehoe lava flow associated to the Caldeira’s lava lake. Noteworthy, is the sequence of cavities extending from Furna da Maria Encantada (with about 57 m in length), to Furna d’Água and onto Furna do Abel (98 m in length). When combined, this sequence totals over 500 m from the Caldeira’s rim, although in a discontinued manner and at some segments, as lateral crystals associated with flow movements and/or the collapse of lava tubes.

Furna do Enxofre: Is an enormous underground lava cavity, with a maximum length of 194 m, maximum height of about 80 m and is singularly characterised by a ceiling in the shape of a perfect dome. The Furna do Enxofre is located on the SE part of the central volcanic caldera. A tower approximately 37 m in height and a spiral staircase with 183 steps was built at the beginning of the XX century to access the cavity’s interior. A lake with a maximum depth of 22.5 m is located in the cavity’s interior, at the furthermost point from the staircase and at the deepest part of the cave. The interior also exhibits an important degasification field, constituted by a fumarole and mud pool from where, barley visible, carbon dioxide diffuse gasses are released from various points on the cave’s floor.

Caldeirinha de Pêro Botelho: a spatter cone (i.e. a cone formed by the accumulation of compound “sprinkled lava”), with a crater base of about 150 m in diameter and a volcanic pit that is still in a well preserved state.

Beco or Fragosos Domes: These two volcanic domes are the most well preserved and spectacular domes on Graciosa. These forms, displayed along a NW-SE alignment, parallel to the southern edge of the Caldeira, have a flat almost circular section with an average diameter of 275 m and height of 100 m.
Volcanic vein systems and chimneys: Several volcanic basalt veins (Ponta da Barca Lighthouse, Ponta da Restinga and Quitadouro) and trachyte veins (cf. Serra Branca) can be found along Graciosa’s coastline, areas that are mostly inaccessible by land. Coastal erosion sometimes reaches the monogenetic cones’ plumbing system, uncovering scoria and tuff chimneys. The most notable of these structures exist in the Porto Afonso and Ponta da Barca Lighthouse areas (ex. Pico Negro and Baleia Islet), in the NW part of the island and at Ponta da Restinga, on the SE extremity of the central volcano.

Carapacho and Ponta da Barca Lighthouses: These areas have both significant scenic and architectonic value. The islands ex-libris, Baleia Islet, can been seen from the Ponta da Barca Lighthouse.

Carapacho Hot Spring: The Carapacho spring, known since 1750, is captured in a well and used to supply a thermal resort that was re-inaugurated in 1993, after undergoing improvement works. The thermal waters are hypersaline, sodium chloride-bicarbonate and the temperature varies annually, ranging between 35 and 45º C and, are used to treat rheumatism, liver and skin diseases.

Santa Cruz Church: A church, constructed in the XVI century and reconstructed in the XVII century, exhibiting several important religious art pieces, including a retable painted on wood, painted tiles and XVI centaury images.

Mount Nossa Senhora da Ajuda: Overlooks the Vila de Santa Cruz, and is designated as a Sacred Mount. It amasses three chapels, pilgrim dwellings and pedestrian circuits that begin at the base and link the chapels of Ajuda, São João and São Salvador. A bull rink is also located in this area, at the bottom of the crater.

Islets: Various islets exist along the entire coastline and offer yet another area of interest to the island’s coastal landscape. Of the many islets, the ones that stand out because of their size are the Baleia or Whale Islet, named for its shape and located in front of the Ponta da Barca Lighthouse, the Ilhéu do Baixo Islets (located off the coast of Carapacho) and Praia Islet (located off the coast of Praia da Graciosa).

Beach: Bathing area situated in the parish of the same name (Praia), on the south
coast of Graciosa. It is the only sandy strand on the island.
14.2.2. Tourist facilities and description of where these are located and in which zone of the proposed biosphere reserve

Three Guesthouses are registered on the island, with a total capacity of 85 guests and an average of 14 employees. There is also a Rural Tourist accommodation site with 8 beds. Two Camping Sites complete the tourist accommodation supply on Graciosa. Several individuals rent out rooms or houses for holidays, usually during the Summer months when the influx of tourists increases substantially.

There are about a dozen restaurants/snack-bars on the island but the menus are lacking in variety, consisting essentially of fish and meat dishes (fried, grilled or stewed). Local products can be found in practically all the establishments, such as the Island cheese, sweet bread or sweet bread and the Graciosa Cream Pastry. The reduced offer is in most part due to the insignificant flow of tourists that the island receives and then, only during three months of the year, making investments in this area unprofitable.
### Existing infrastructures

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<td><strong>Thermal springs / Termas do Carapacho</strong></td>
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<td><strong>Lighthouse / Farol do Carapacho</strong></td>
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14.2.3. Indicate positive and/or negative impacts of tourism at present or foreseen

The Azorean Government has taken great care in planning the development of the tourist sector, imperative since natural resources are the most valuable asset of the archipelagos’ “tourist product”.

In order to reduce negative impacts deriving from tourism, the sector’s planning should be integral, pro-active and strategic, keeping in mind the basic principles of sustainable development, interpreted as “a development model that enables present generations to satisfy their needs without putting at risk the possibility of future generations satisfying theirs”.

Foreseen positive impacts

Boosting up the tourism sector on Graciosa will most certainly enhance the local economic situation, in particular through its multiplying effect, which is to say: more private investment and infrastructure development would create more jobs, becoming more attractive for new residents, especially younger generations and consequently offsetting the current ageing tendency of the population on the island. On the other hand, it would be necessary to improve accessibilities and modernise some existing infrastructures and services in order to offer better conditions to visitors and, which would also benefit the residents as they will be at their disposal as well, for example if there’s a market, air transport companies could increase the number of regular flights to the island.

Additionally, tourism would create the need and means to intervene in the rehabilitation and preservation of natural and constructed patrimony, which would otherwise be abandoned for want of utility or economic means. Examples of patrimony to be rehabilitated are the windmills
scattered throughout the island. On a cultural level, there will most certainly be a greater effort in preserving traditions, events and artefacts typical of Graciosa, differentiating its image and subsequently, strengthen and valorise the population’s identity and authenticity.

Environmentally, tourism could also intervene on a positive level by generating concern for the preserving of existing natural resources. This because nature is a large part of Graciosa’s tourist product and therefore increasing the area’s quality in terms of landscape and flora and fauna diversity and, consequently augmenting tourist products. In this way, the environmental quality of the island will be preserved, contributing to the valorisation and qualification of the “destination” Graciosa.

**Foreseen negative impacts**

No significant negative impacts are foreseen as tourism is already planned and regulated on several levels, namely when concerning natural resource use. In addition, it
is unlikely that the sector will have a growth of more than 10% in the next 15 years. Environmentally, an excessive or misuse of resources, lack of supervision, control and even awareness, could lead to the degradation of some areas.

Tourist activities on the offshore islets of Graciosa could bring about landscape de-characterisation, with the loss of habitats and native species.

On the other hand, nautical activities such as spearfishing and recreational fishing could disturb marine birds and over-exploit resources, reducing the amount of food available to nesting marine birds, which could bring about the abandonment of nesting territories and consequently, decrease population densities of some important species.

Several mechanisms, such as the Tourism Planning Plan for the Autonomous Region of the Azores, the Natura 2000 Network’s Sectorial Plan and the Regional Planning Plan for the Azores Territory have already identified possible negative impacts and measures in which to avoid them. Tourism development in the proposed Biosphere Reserve will take into account the possible negative impacts so as to minimise the effect that they may have on the environment.
Benefits of economic activities to local people
Natural resources and historic-cultural patrimony also constitute economic resources on the island, together with wine, cheese, crafts and ethnography in general, as these represent important ingredients of the “tourist product” of Graciosa, allowing for its exploitation and consequently, profit. No available data exists on the amount of profits generated by tourism on Graciosa. The preservation of these resources is vital, even economically, since they guarantee tourism potential, increasing its competitive value and consequently, profit from tourist activities.

These factors would lead to an increase in investment on Graciosa, while the classification of a Biosphere Reserve would project the island’s potential internationally.

Furthermore, balanced natural ecosystems confer many and vital benefits that directly or indirectly contribute to a higher standard of living, through resources (food, water, primary products, etc.), pollution mitigation, protection against natural disasters and economic activity development. In fact, the Regional Government’s investment in coherent environmental policies has greatly benefited the Azores, reflecting on the region’s “good image” in terms of landscape, nature and biodiversity.

Investing in Nature Tourism represents an economic asset, as it would attract many traditional customs and nature-loving tourists; socio-culturally, as it would permit restoring traditions and secular habits and environmentally, as it would increase the level of conservation and monitoring of natural areas.
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?

Taking into account the elaboration of a Global Support Management Tool for SCI and SPA, a Sectoral Plan for Natura 2000 Network in the Azores was drawn-up, providing the scope and legal framework for habitat and wildlife conservation essential for applying conservation objectives, equally allowing for social and economic development in the integrated areas.

The initial objective of the projects and foundation studies was the elaboration of a coherent and articulated management system for an assemblage of species and areas instead of isolated conservation measures applied to a certain area or species.

The Caldeira Natural Regional Monument of Graciosa Island, recently reclassified and integrated in the regional Network of Protected Areas, has now a more coherent and uniform juridical regimen. After the implementation of the Island Natural Park, a management plan will be created for this area.

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

Since a decade to this part Graciosa has served as a natural laboratory for experiments in biodiversity conservation and, due to the unique natural characteristics, is frequently visited by national and international scientific expeditions. Experiments underway and already finished in the scope of natural resources management, invasive species eradication and habitat restoration, as well as the infrastructures created, make the proposed Biosphere Reserve an ideal place for the development of research, demonstration and management projects for natural resources and for the training of researchers and technicians in those areas.
The proximity of the University of the Azores, with departments on the islands of Faial, Terceira and São Miguel, enables easy access to specialised researches, scientific equipment and installations. The University, which represents a research institution of excellence on a regional and international level, participates in several international research projects thus benefiting from know-how and knowledge exchange.

Research projects developed over the last few years in the proposed Biosphere Reserve have taken on a multi-disciplinary and integrated character in opposition to disarticulated activities. Many of the scientific works developed on Graciosa have been linked to regional research and management projects that attempt to characterise ecosystems and aspects of human resource use. These projects aim at developing coherent management systems and topics range from geological classification and dynamic studies to the biology and ecology of locally important species, covering socio-economic and cultural aspects as well.

A highly sensitive seismographic network, installed since 1980 and to which Graciosa is incorporated, has improved the seismic characterisation of the archipelago. In the last few years, several expeditions have been carried aimed at enhancing the knowledge of the islands geomorphology and, in particular, dating and characterisation of volcanic products and geological formations.

Between 1993 and 1994 a project under the Program DGXII, was developed to evaluate the natural risks, with special focus on the seismic and volcanic aspects. Between 1997 and 1998, in the sequence of the former project, the Project ENGIA was developed, with national financing, to study the gaseous natural emanations and the environmental impact on these in the Graciosa island.

As part of the Project “Conservation of the marine bird communities and habitats of the Azores”, under the EU Program Life Nature, between 1995 and 1998, a research program about the biology and ecology of marine birds of the Azores was developed and defined priority conservation measures, assuring the monitoring of the distribution and population trends.
With EU and regional funding an habitat restoring experiment was undertaken in the Special Protection Area “Ilhéu da Praia” between 1995 and 2002. The results of this experiment indicate a survival rate for the natural plant *Festuca petrae*, a clear increase in the number of reproducing pairs of common tern (*Sterna hirundo*) and roseate tern (*Sterna dougallii*) and the eradication of rabbits (*Oryctolagus cuniculus*) from the islet.

The MARÉ Project “Integrated Management of Coastal and Marine Zones in the Azores” – EU Life Nature Program had as a principal objective the definition of integrated management plans for these areas, incorporated in the Natura 2000 Network. This project, with a duration of 54 months (1998-2003), was coordinated by the Department of Oceanography and Fisheries of the University of the Azores in collaboration with the Regional Department of the Environment and the Regional Department of Fisheries.

During 2002 the Portuguese Society for the study of Birds (SPEA) characterized the most appropriated to the conservation of the populations of wild birds from the Annex I of the EU Habitats Directive, for the Azores archipelago, from which resulted the revision of the Special Protection Areas network of the Azores.

Integrated in the project “New Atlas of Birds that Nest in Portugal - Novo Atlas das Aves que Nidificam em Portugal” promoted by the Nature Conservation Institute (ICN), Portuguese Society for the study of Birds (SPEA), Azores Regional Department for the Environment and the Madeira Natural Park, censuses of birds on the island of Graciosa were undertaken for four consecutive years (2000-2003).

The Project OGAMP: Management of Marine Protected Areas, under the EU Program Interreg IIIb, was developed between 2001 and 2004 and had as main goal the definition of Management Plan proposals for the marine and coastal areas in the Azores included in the Natura 2000 Network. Besides the biotic and abiotic characterization of the selected sites, a socio-economic characterization and an environmental awareness program were developed, to attain the project’s goals.
Scientific expeditions

Graciosa 88: The Biology Department of the University of the Azores organized a scientific expedition to Graciosa, in the period between July 6 and 14 of 1988. In this expedition participated 26 Portuguese and international researchers and technitians.

Graciosa 2004: Project that intended to continue a multi-disciplinary study program in biology and geography, that are lectured and studied by the Biology Department of the University of the Azores. The scientific expeditions had the participation of a considerable number of researchers, technicians and students, from international, national and regional public and private superior education institutions, creating a wide cooperation and experience exchange in several studies and projects in those areas of knowledge.

PADEL/Graciosa (Natural Patrimony and sustainable development of the Azores littoral: the Graciosa island as a study case) 2006: This expedition was undertaken between June 20 and July 12, 2006, by researchers of the University of the Azores, adjudicated by the Regional Secretariat for the Environment and Sea of the Azores. The expedition had as main goal to characterize the main coastal biotopes based in the physical characteristics and the most representative communities, as well as to elaborate a biotope cartography of the island’s shoreline.

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

As referred above, continuous monitoring of seismic activity on the island exists, registered by automated equipment.

The Life IBAs Marine Project, integrated in the Life Nature Program is currently characterising territories appropriate for the conservation of wild bird populations cited in Annex I of the Birds Directive in the archipelago of the Azores, for the revision of the
SPA Network. In progress is a study, in the scope of a PhD thesis, on the ecology and association of habitats of Cory’s shearwater (*Calonectris diomedea borealis*).

The SOSTENP Project – “Sustainable Development Strategies in Nature Protection Areas in the Macaronesia” under the EU Interreg IIIb Program, besides studying the natural biologic and geologic natural values is also evaluating the touristic potential of these. Under this project the island known caves were explored and characterized.

The ecology of marine birds continues to be studied under different doctoral theses and post-doctoral programs, carried out by researchers of the IMAR Centre at the University of the Azores.

15.1.4. **Brief description of planned research and/or monitoring activities**

Due to the accumulation of work and the importance that Graciosa has in the natural context of the Azores archipelago and even in the North Atlantic, is it is expected that research will not only continue with the implementation of the proposed Biosphere Reserve but intensify, since the island will develop into a natural laboratory for the study of integrated and sustainable management model.

Research studies on the ecology and socio-economic aspects related to the implementation of the Biosphere Reserve are to be encouraged, these will not only give continuity to the works already developed or in progress but also help assess effects generated by the Reserve.

The Regional Secretariat for the Environment and Sea of the Azores, the University of the Azores and the IMAR institute (IMAR centre at the University of the Azores) celebrated a protocol to monitor the marine bird colonies around the Azores yearly including, by definition, the Graciosa island.

The University of the Azores and the Regional Environment Directorate have the intention
of creating a permanent laboratory dedicated to the research applied to conservation of marine birds in the Praia islet.

15.1.5. Estimated number of national scientists participating in research within the proposed biosphere reserve on:
- A permanent basis: 10.
- An occasional basis: 30.

15.1.6. Estimated number of foreign scientists participating in research within the proposed biosphere reserve on:
- A permanent basis: 2.
- An occasional basis: between 5 and 10.

15.1.7. Estimated number of master and/or doctoral theses carried out on the proposed biosphere reserve each year
- Between 1 and 2

15.1.8. Research station(s) within the proposed biosphere reserve

A highly sensitive seismic station with automated data collection exists on the island, integrated in the seismic network of the Azores.

The emanations of carbon dioxide in the interior of Furna do Enxofre are monitored daily.
by an automatic continuous monitoring station. That station has also meteorological sensors for atmospheric pressure, temperature, relative air and soil humidity.

At Praia islet, a small house with two chambers is in existence for more than a century and was recently rebuilt with financial support by the Regional Directorate for the Environment. This house is normally used by researchers and the nature warden during monitoring and research work of the surrounding area, and is not open to the public.

15.1.9. Permanent research station(s) outside the proposed biosphere reserve

The University of the Azores has Departments on three islands, São Miguel, Terceira and Faial, where several permanent research stations are located:

Bureau of Applied Vegetal Ecology;
Centre of Biotechnology of the Azores;
Centre of Climate, Meteorology and Global Changes of the University of the Azores;
Centre of Environmental Conservation and Protection;
Centre of Geographic Information and Territorial Planning;
Centre of Investigation and Agricultural Technology of the Azores;
Centre of Investigation of Natural Resources;
Centre of Social Studies;
Centre of the Sea Institute of the University of the Azores;
Centre of Volcanology and Geological Risks Evaluation;
DETRA –Oceanographic Remote Detection Satellite Station;
15.1.10. Permanent monitoring plots

Seismography – In the interior of Caldeira (main crater), using automatic equipment. Continuous since 1997.

Gaseous emanations – In the interior of Furna do Enxofre, initially using manual records and now using automatic equipment. Continuous since 1997.

Crustal deformation – in several geodesic points, using differential GPS, to evaluate the development of the volcanic systems and of the main fractures crossing the region. Annually since 2004.

Sea bird colonies monitoring – en several points around the island shore, and in Praia islet. Annually since 1995.

15.1.11. Research facilities or research station(s)

The facilities of the University of the Azores have several laboratories equipped to support the various research units, including chemistry, meteorology, oceanography, geo-sciences, microbiology, genetics and molecular chemistry laboratories. The region also has a vessel and an oceanographic research craft that are operated by the Department of Oceanography and Fisheries of the University of the Azores.

15.1.12. Other facilities

The Graciosa Eco-schools (Ecoteca) is developing efforts for the creation of support facilities for visiting researchers. Currently, most of the researchers set base in hotels or similar, and stay in the island only during the necessary time to collect the data needed, leaving data
processing and analysis to be done back at their origin places. Due to the conditions of some remote areas, visiting researchers also resource to camping, and the campsite serves the functions of accommodations and research facilities.

15.1.13. Does the proposed biosphere reserve have an Internet connection

As in all other island in the archipelago, Graciosa has internet access, either using mobile or fix providers. There are free internet access points at the public library and at the Eco-school.
Environmental education and public awareness
15.2.1. Describe environmental education and public awareness activities

Promotional and public awareness material, available in various formats throughout the archipelago, has been developed in the scope of several projects.

During the course of the EU Life Nature Project “Conservation of marine bird communities and habitats of the Azores” (1995-1998) environmental awareness actions on marine bird species that nest in the Azores were carried out, producing a variety of promotional and educational material.

Through the EU Life Nature Project “Integrated Management of Coastal and Marine Zones in the Azores” pamphlets, posters, brochures and other didactic material were produced. Informative and public awareness campaigns on conserving marine protected areas were also performed. Schoolteachers were given training and support material for integrating lessons on the natural environment of the Azores into the curriculum.

The OGAMP Project also developed several activities, such as disclosure sessions, environmental education activities and training actions. The target population ranged from children, students, teachers, professionals from diverse activities and the public in general.

Integrated in the MARMAC Project is the development of the “Virtual Marine Interpretation Centre - CIMV”, an innovating material in DVD multimedia format that simulates a virtual trip to coastal, pelagic and deep-sea ecosystems in the Atlantic Ocean (Figure 41).

A project designed to eradicate invasive species is in progress, based on public awareness and educational activities to prevent and revert species dispersal. This project proposed to alert to the threat of introducing exotic flora through the use of communication channels, public environmental educational activities and training of personnel involved in the project.
Every year a campaign named “SOS Cagarro” (SOS Shearwater), in existence for over 11 years, is undertaken and has as goal to engage the population in the recovery and safe release of juvenile Cory’s shearwaters (*Calonectris diomedea borealis*) that are found in or near the roads, particularly the drivers that circulate in areas where shearwaters occur regularly.

15.2.2. Indicate facilities for environmental education and public awareness activities

Graciosa Eco-school (*Ecoteca*), located in an old building that was restored in 1996, holding several educational activities that cover relevant environment issues, works during all year. This infra-structure has two computer rooms equipped also with some scientific equipment, an audio-visual room, a small library and a laboratory. A rehabilitation project for a neighbor building is underway, to support some of the Eco-school activities and to receive visiting researchers developing their work in the island.

A project for the creation of a visitors centre at Furna do Enxofre is underway, having the architectural project been finished this year. This centre will be used as an information centre for the visitors of that volcanic cavity but will also serve as an infrastructure for other environmental and cultural activities.
15.3 Specialist training
Various research studies developed in the proposed Biosphere Reserve area have an educational component and use acquired data in subsequent higher-level and advanced courses. The University of the Azores frequently organizes scientific expeditions with student participation to collect and analyze data as part of academic curriculum.

A Professional School is installed in Praia, where professional courses, equivalent to the official schooling secondary level, and requalification courses, for professionals from different sectors, are taught. This school can serve as an infrastructure to the creation and teaching of courses oriented to the qualification and valuing of professional activities developed within the proposed Biosphere Reserve.
Potential to contribute to the World Network of Biosphere Reserves
Cooperation on various international projects between the Regional Government and other institutions in the archipelagos of the Azores, Madeira and Canaries, has created strong ties that should facilitate information dissemination throughout the Macaronesia region. This potential could be further enriched by integrating the proposed reserve into REDEBIOS (Eastern Atlantic Network of Biosphere Reserves).

On a global level, the inherent challenges of designating an entire island as a Biosphere Reserve will most certainly enrich discussions on management issues for these types of reserves and the development of the MAB Program.

15.4.1. Collaboration with existing biosphere reserves at the national level

If the present submission is approved, the Regional Government of the Autonomous Region of the Azores plans to hold a workshop to create relations with other national and international Biosphere Reserves. Authorities from the Paúl do Boquilobo Biosphere Reserve and from all the Biosphere Reserve participating in the REDEBIOS network will be invited to this workshop, to discuss the better way of starting a cooperation between the proposed Biosphere Reserve and those referred.

15.4.2. Collaboration with existing biosphere reserves at the regional or subregional level

N/A.
15.4.3. Collaboration with existing biosphere reserves in thematic networks at the regional or international levels

Refer to point 15.4.1.

15.4.4. Collaboration with existing biosphere reserves at the international level

Refer to point 15.4.1.
16 Uses and Activities
16.1
Core area(s)
16.1.1. Describe the uses and activities occurring within the core area(s)

Core Area “Ponta Branca”

The Core Area, since it constitutes a cliff with its base located in a coastal area inaccessible by land, is not subjected to human use. However, some pasture fields for pastoralism can be found on the cliff’s top.

Core Area “Ilhéu de Baixo Islets - Restinga”

Some agriculture and pastoral activities occur in this area, which also has significant tourism importance, with diverse tourist activities taking place here, in particular pedestrianism, thermalism and summer holidaying. Several of the most important activities include:

- Landscape, fauna and flora watching;
- Bathing activities;
- Coastal recreational fishing (handharvesting and rod fishing);
- Snorkelling and scuba-diving;
- Nautical rides;
- Spearfishing.

Given its biological richness, this area is also greatly sought after by professional fishermen. The islets have difficult access, thus they are subjected to little human influence.

Core Area “Caldeira da ilha Graciosa”

Silviculture of cryptomeria (*Cryptomeria japonica*), introduced for wood production, occurs in this Core Area. Pastoralism occurs at the base of the Caldeira where pasture
areas exist. The area also attracts diverse recreational and tourist activities due to its speleological, biological, aesthetic, cultural and scientific richness. The Furna do Enxofre is highly sought after by visitors for its rare geological value. Other volcanic cavities in the area are also frequently visited. Bird watching and pedestrianism constitute other activities in the area.

Core Area “Ilhéu da Praia”

This area is essentially used by tourist, researchers, technicians and nature conservation wardens from the Regional Department of the Environment. The main recreational activities include bathing, coastal fishing, spearfishing and scuba-diving. Researchers, technicians and nature wardens use the area to promote scientific studies, environmental monitoring and habitat restoration activities.

Core Area “Ponta da Barca”

This Core Area is constituted by inaccessible cliffs and, except for a strip on the top of the cliffs, exhibits no human use. As it is a tourist attraction area, the cliff tops and some pebble and rocky beaches are used for leisure activities, especially during the Summer. The Ponta da Barca Lighthouse is located in this Core Area.

16.1.2. Possible adverse effects on the core area(s) of uses or activities occurring within or outside the core area(s)

Core Area “Ponta Branca”

The intense use of agriculture lands at the top of this cliff could lead, either brought on by erosion or soil contamination, the de-characterisation of the landscape with the subsequent loss of habitats and natural species and the progressive advancement of exotic species and erosion processes.
Core Area “Ilhéu de Baixo Islets - Restinga”

The intensification of recreational and tourist activities could lead to landscape de-characterisation and the loss of habitats and naturally occurring species with the progressive advancement of exotic species. An increase in resident and floating population numbers would also affect coastal areas through water and soil contamination, trampling on natural vegetation, aggravating erosion and the loss of natural habitats.

Intensified and uncontrolled natural resource exploitation could provoke an over-exploration of local marine resources. Human activities could lead to bird disturbance, especially during the reproductive season, increasing the unsuccessful reproductive rate. Concurrently, the development of fishing and marine-tourist activities could cause cetacean disturbance and, eventually, area abandonment.

Core Area “Caldeira da ilha Graciosa”

Pastoralism intensification could lead to the destruction of natural vegetation through animal trampling and grazing. Intensified pastoralism and silviculture could also cause soil and water contamination by the use of agriculture additives, animal waste and the loss of natural habitats.

Unplanned tourism intensification could lead to the destruction of natural vegetation through trampling and plant collection. Improper waste disposal could cause soil and water contamination and de-characterisation of the landscape. Collection of geological specimens could lead to a reduction of the geological patrimony and natural habitat destruction.
Core Area “Ilhéu da Praia”

Recreational fishing and marine-tourist activities could provoke the disturbance of marine bird colonies in the area, especially during the nesting season, increasing the unsuccessful reproductive rate. Intensification of recreational and tourist activities on the islet could cause trampling of natural flora and aggravate erosion with the subsequent loss of natural flora and marine bird habitats.

Core Area “Ponta da Barca”

Introduced terrestrial predators (dogs, cats and rats) could limit nesting for marine bird along the cliffs. Leisure activities could also cause some disturbances along the cliffs. Light from the Ponta da Barca Lighthouse could disturb nesting marine birds.
16.2 Buffer Zones(s)
16.2.1. Describe the main land uses and major economic activities in the buffer zone(s)

Buffer Zone “Ponta Branca”
The marine Buffer Zone is essentially used by recreational activities, in particular activities related to fishing. The terrestrial part is fundamentally used for extensive pastoralism.

Buffer Zone “Ilhéu de Baixo Islets - Restinga”
The marine part of this Buffer Zone is essentially used for recreational activities, in particular activities related to fishing. The most common land-use in the terrestrial part is agriculture and pastoralism. The road has some traffic since it links the Carapacho locale to Vila da Praia and Santa Cruz da Graciosa.

Buffer Zone “Caldeira da ilha Graciosa”
This Buffer Zone is essentially used by tourist activities as the path that circulates the Caldeira gives access to several natural tourist attractions.

Buffer Zone “Ilhéu da Praia”
The Buffer Zone is essentially used for recreational purposes, namely marine-tourist activities (boat rides and scuba-diving) and recreational fishing.

Buffer Zone “Ponta da Barca”
The most common land-use in this Buffer Zone is agriculture, especially viniculture. The area is also a tourist attraction site, namely the Ponta da Barca Lighthouse and several
pebble and rocky beaches. Recreational and professional fishing activities occasionally occur in the marine part of the area.

16.2.2. Possible short and long term adverse effects of uses or activities on the buffer zone(s)

Buffer Zone “Ponta Branca”

Due to the land-use regime it is unlikely that urban development will occur in the area thus, the possible pressures would befall from agriculture and pastoralism activities. The intensified use of agriculture areas on the cliff top could lead, through either erosion or contamination, to landscape de-characterisation and the loss of habitats and natural species with the progressive advancement of exotic species and aggravation of erosion processes.

Buffer Zone “Ilhéu de Baixo Islets - Restinga”

Intensification of recreational and tourist activities could lead to landscape de-characterisation and the loss of habitats and naturally occurring species with the progressive advancement of exotic species. An increase in resident and floating population numbers would also affect coastal areas through soil and water contamination, trampling on natural vegetation, aggravating erosion and the loss of natural habitats. Uncontrolled and intensified natural resource exploitation could provoke the over-exploitation of local marine resources.

Human activities could lead to bird disturbance, especially during the reproductive season, increasing the unsuccessful reproductive rate. Concurrently, fishing and marine-tourist activity development could cause cetacean disturbance and, eventually, could cause area abandonment.
Due to the land-use regime, it is unlikely that urban development will occur in the area but Carapacho lies immediately on the eastern limit of the Buffer Zone and holds tourist development potential. Development in this area could put some pressure on the Buffer Zone but this scenario is hypothetical and is very unlikely to take place.

**Buffer Zone "Caldeira da ilha Graciosa"**

This Buffer Zone corresponds to the exterior flanks of the volcanic cavity known as “Caldeira” and is constituted essentially by unoccupied lands and pasture fields. Due to the land-use regime it is unlikely that urban development will occur in the area thus, the possible pressures would befall from agriculture, pastoralism and tourist activities.

Some agriculture and pastoralism activities could occur along the lower lying parts of the Buffer Zone leading to soil and water contamination. Nonetheless, most of the Buffer Zone encompasses areas with steep inclines that prevent their use.

The path that circulates the Caldeira and gives access to various natural tourist attraction sites passes through this Buffer Zone. The increase of traffic could cause air and noise pollution and the trampling of wayside vegetation could cause soil instability and aggravate erosion processes.

**Buffer Zone "Ilhéu da Praia"**

Recreational activities concentrated on the sandy beach of Vila da Praia could increase disturbances in the Core and Buffer areas, in the case that tourism expands to a large extent. The growth of tourism could also bring about water contamination problems and the improper discarding of rubbish in the sea and along the coast.

The most important cargo port on the island is located at Vila da Praia and an increase in maritime traffic could bring about disturbances and aggravate water and noise...
pollution. Greater maritime traffic could also increase the probability of accidents and danger of pollution by oil spills and other chemical contaminants.

**Buffer Zone “Ponta da Barca”**

The main activity in this Buffer Zone is agriculture. Development of agricultural activities and the use of additives could cause aquifer and marine contamination and aggravate erosion processes, with subsequent habitat destruction.

Tourism development could also create water contamination problems and discarding of waste in the sea and along coastal areas.
16.3 Transition areas(s)
16.3.1. Describe the main land uses and major economic activities in the Transition Areas(s)

The following land and activity-uses occur in the proposed Biosphere Reserve’s Transition Area:

- Extensive Agriculture and pastoralism;
- Commerce and industrial activity;
- Tourist and recreational activities;
- Transport and communications: roads, airport and port;
- Habitation;
- Public and private services;
- Education;
- Training;

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

Bad tourism and recreational management practices, such as disrespect for territorial planning policies, could lead to degradation and de-characterisation of the proposed Biosphere Reserve. Agriculture and pastoralism intensification could lead to a decrease in biodiversity and the loss of important habitats. Industrial and human development could cause aquifer and marine contamination, the improper disposal of waste residues and habitat destruction. An increase in maritime traffic could aggravate air and marine pollution and augment the probability of accidents such as oil and other chemical substance spills and vessel stranding.
17 Institutional Aspects
17.1 State, Province, Region, or other administrative units

State
Portugal

Administrative region
Autonomous Region of the Azores

Autarchy
Santa Cruz da Graciosa municipality
Units of the proposed biosphere reserve
Core Area

The Core Areas consist of areas classified under the EU NATURA 2000 Network, special protection zones for marine resources and the Caldeira Natural Regional Monument of the Graciosa island.

Buffer Zone

The Buffer Zones comprise public and private lands or marine areas, with use regulations under different territory and activities planning acts, on a national, regional and local level.

Transition Area

The Transition Area consist of urban and rural lands, in public and private lands, with use regulations under different territory and activities planning acts.

17.2.1. Are these units contiguous or are they separate?

The Core and Buffer areas are separated in five distinct units:

- Ponta Branca
- Ilhéu da Vila
- Ilhéu de Baixo Islets – Restinga
- Ponta da Barca
- Caldeira

The Buffer Zones around the Core Areas “Ilhéu de Baixo Islets – Restinga” and “Caldeira” are united along a NW-SE axis, at the SE external slope of “Caldeira”. The Transition Area has both terrestrial and marine areas and surrounds all the Core and Buffer areas.
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 “Ponta Branca”, “Ilhéu de Baixo Islets – Restinga” e “Ilhéu da Vila” consist in areas under the Natura 2000 network, which constitutes the fundamental politic instrument respecting the preservation of nature and the biological diversity in the space of the European Union. The EU directives relating to the Natura 2000 Network were transposed to the internal Portuguese right by the Decree no. 140/99, April 24, with the alterations made by the Decree no. 49/2005, February 24, and transposed to the Azores Autonomous Region by the Regional Decree no. 18/2002/A, May 16.

The Natura 2000 site list for the Azores was published through the Resolution no. 30/98/A, February 05. The Site of Community Importance (SCI) to the Macaronesia biogeographic region (Madeira, Azores and Canaries) were published through the Commission Decision no. 2002/11/CE from December 28.

The Special Protection Areas (SPA) of the Azores were published through the Regulating Decree no. 14/2004/A, May 20. The Regional Decree no. 20/2006/A, June 6, approved the Sectoral Plan for the Natura 2000 Network for the Autonomous Region of Azores, which frames the conservation measures in the Natura 2000 Network areas in the archipelago.

The Core Area “Caldeira” is protected under the denomination of “Caldeira Regional Natural Monument of Graciosa Island” since 2004, through the Regional Decree no. 24/2004/A, of July 14.

The Core Area “Ponta da Barca” has been designated as “Important Bird Area“ (IBA) by BirdLife International. The EU recognizes the importance of this denomination. The criteria used for the identification of IBAs are clear, objective and compatible with the principles underlying the creation of Special Protection Areas (SPA) as defined in the Birds Directive. By this reasoning, all the IBAs identified in the Azores will be designated as SPAs. The designation of this area at a regional level will soon be done, through the clarification of its juridical regimen.
17.3.2. Buffer Zone

The use of land in the Buffer Zone is regulated by several territory management mechanisms, with special regard to the measures resulting from the FEADER – European Fund for Rural Agriculture Development 2007-2013 (agricultural good practice code), implemented in the Azores by the Prorural Program and the islands Municipal Master Plan. The bulk of the land in the Buffer Zone is part of the Agricultural Regional Reserve, which means that no urbanistic development may be undertaken with exception to the repair and maintainement of buildings existing previously and supporting the agricultural activities. Besides these instruments, other orienting instruments are in place or under development and apply to the Buffer Zone, such as the Regional Territorial Planning Act for the Azores, the Sustainable Development Regional Plan for the Autonomous Region of the Azores and the Tourism Planning Act for the Autonomous Region of the Azores.

The marine area to 12 nautical miles from the shore (Territorial Sea) is competence of the Regional Government of the Azores, and all the extractive activities are regulated through several legal instruments.
The Municipal’s Masters Plan for Santa Cruz da Graciosa regulates use in the Transition Area. Other territory and activity planning guidance instruments exist, namely the Regional Territorial Planning Act for the Azores, the Sustainable Development Regional Plan for the Autonomous Region of the Azores, the Management Plan for the Shoreline and the Tourism Planning Act for the Autonomous Region of the Azores.

17.4

Land use regulations or agreements aplicable to the transitional area
17.5 Land tenure of each zone
17.5.1. Core Area(s)
Almost all the terrains are coastal cliffs, public domain areas and marine areas, with some private terrains in the interior of Caldeira.

17.5.2. Buffer Zone(s)
Around 67% of the Buffer Zones are marine, and the remaining 33% are mostly private terrains used mainly for agriculture and grazing.

17.5.3. Transition Area(s)
Around 27% of the Transition Area is marine; the remaining area is composed by public and private terrains, including all the urban areas of the proposed Biosphere Reserve.

17.5.4. Foreseen changes in land tenure
No foreseen changes are planned nor any land acquisitions.
17.6 Management plan or policy and mechanisms for implementation
The management plan and implementation mechanisms already in existence are to be maintained. A strategic plan in reference to the proposed Biosphere Reserve, based on the cooperation of various partnerships, will be applied when approved.

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

In April 2006 a presentation about the proposal for submitting the Biosphere Reserve of Graciosa to the Programme MAB, was held and open to the entire population. Subsequently, several local institutional representatives were offered further information regarding the MAB Program and contacted with the intent of getting their collaboration on the proposal and establishment of the Biosphere Reserve. Detailed informative and debating sessions with the resident population or at least representatives of the community, relating to the candidature dossier are expected to take place prior to candidature submission.

In February 2007 a second public presentation about the Biosphere Reserve submission process was held and the submission dossier was put online to ensure public access and participation. A discussion list was created to enable the submission of commentaries and suggestions and the participation of the public was encouraged. As part of the campaign, a leaflet was produced containing information on the MAB Program and the candidature to Biosphere Reserve of the islands of Corvo and Graciosa. The leaflet had an edition of 1,000 copies that were distributed in both islands.

17.6.2. Main features of management plan or land use policy

It is expected that the implementation of the Biosphere Reserve ensures, in the long term, the preservation and promotion of the natural values, through the framing of the human activities by a rational management of the natural resources. This should
ensure the economic development and a better life quality for the Biosphere Reserve population, in a way that is both sustainable and continued.

The lines of action already in course will be maintained, namely those established by the Regional Territorial Planning Act for the Azores, the Sustainable Development Regional Plan for the Autonomous Region of the Azores, and the Tourism Planning Act for the Autonomous Region of the Azores, Sectoral Plan for the Natura 2000 Network in the Autonomous Region of the Azores. For the Buffer and Transition areas, besides the instruments mentioned above, the FEADER – European Agriculture and Rural Development Fund, implemented in the region by the Program Prorural, also applies.

In conjunction with the several stakeholders in the proposed Biosphere Reserve, a strategic and reference plan will be created, integrating the diverse goals of those instruments to reflect the conservation, development and logistic support functions of a Biosphere Reserve and creating new measures when and if needed. This strategic plan will be dynamic and as the work in the Biosphere Reserve evolves, it will be revised and reformulated, if necessary, to ensure it’s implementation.

The public participation and initiative of the local population will be encouraged to guarantee that they are the prime beneficiaries of the changes implemented and to ensure that they take interest in maintaining and developing the Biosphere Reserve.

As the activities developed and the public participation increase, the Biosphere Reserve will create the means to it’s own sustainability and the mutual benefits of preservation and balanced utilization of the natural and cultural resources will become clear, not only at a local level but also, through structured promotion actions in other similar communities, both at an archipelago as in an international level.
17.6.3. The designated authority or coordination mechanisms to implement this plan or policy

In the Azores, REAPA - Rede Regional de Áreas Protegidas da Região Autónoma dos Açores (Regional Network of Protected Areas of the Azores Autonomous Region), translates and implements the IUCN Protected Areas classification, adapting this classification to the geographic, environmental cultural and politic-administrative particularities of the Azores archipelago territory.

The following constitute the general goals of the Regional Network of Protected Areas of the Azores Autonomous Region:

• To achieve the recognition of the identity and value of each terrestrial or marine protected area;

• To establish the conservation and management mechanisms for the ecosystems, the biodiversity and the natural resources, landscape, scientific and spiritual values of the Azores;

• To contribute to the implementation of a core nature conservation network that link the existing defense regimes for the protection of natural resources and values;

• To create protected areas management units at the island level.

REAPA envisages the creation of an Island Natural Park (INP), constituted by the terrestrial classified areas in each island territory, and with the possibility of including marine areas to the external limit of the Territorial Sea (12 nautical miles), to include the categories described in the next section. The INP is the basic management unit of the Regional Network of Protected Areas of the Azores Autonomous Region and will be created through a Regional Legislative Decree.

The management system of the Regional Network of Protected Areas
of the Azores Autonomous Region will be published and implemented in 2008, after a public hearing process. Until it’s publication, the management of the proposed Biosphere Reserve will be assured by the Environmental Island Service, an operational unit of the Regional Government of the Azores, coordinated by it’s Nature and Sea regional Secretariat (Secretaria Regional do Ambiente e do Mar).

Each INP will have its own organic structure, integrating the following sections:

- Management Board, the executive division, integrating a Managing Director whose competence is to administer the specific interests of the INP, implementing the measures established by the management instruments and assuring the compliance of legal and regulatory instruments in place;

- Consulting Committee that will have a consulting nature in the appreciation of the activities developed inside the INP.

The Regional Legislative Decree published to create the INP will also define the competences, composition, number and way of designating the members of the Consulting Committee, as well as the structure and operation of the management units referred above.

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

The policy for the preservation of the natural patrimony in the Azores has been implemented through the designation of the most relevant areas for the protection of the natural values under diverse conservation figures, as is the case for the areas classified under the Natura 2000 Network. To make the management of these areas more efficient, the reclassification of these areas is underway, through the REAPA program mentioned above, which will adopt the IUCN nomenclature system and reorganize the management of the protected areas in a way to create a single administrative body in each island that
will have the competence to administer and manage the protected areas under it’s influence.

The management policies will be attained using the usual Portuguese legal means. In most cases the implementation of management measures is done after public consultation and discussion, to attain a balanced agreement between the interests of the stakeholders, conciliating the mutual use and conservation interests. Most of the areas already under some type of preservation figure are public owned, not requiring agreements with private users. In the cases where there is need to intervene in private owned land, an agreement will be sought, either through the payment of compensations or the creation of incentives to alter the uses and practices to achieve the management goals in a consensual way. In a few, rare cases, the expropriation may be used, whenever the values present or the complexity in attaining a consensus impose a quick or drastic action.

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

All changes to the legal territory management instruments must obey a public discussion period that precedes it’s implementation and in which all Portuguese citizens may participate.

The creation of a Consulting Committee with representatives of several stakeholders in the proposed Biosphere Reserve is predicted. This Consulting Committee will have a participation in the management of the reserve, although its form and participants is not yet defined. Nevertheless, the Consulting Committee shall include representatives from the Municipality, the most important economic activities, nature protection interests and other stakeholders relevant to the functioning of the proposed Biosphere Reserve. This panel will have, at the least, a consulting role, but it is expected that it will have an active participation in the management and stimulate the activities to be developed in the proposed Biosphere Reserve.

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

In 2006, measures were taken to implement management policies for the areas classified under the Natura 2000 Network by publishing the necessary legal instruments. It is expected that the strategic and reference plan of the proposed Biosphere Reserve will be concluded within a year after the candidature approval and implementation shall start immediately afterwards.
Financial source(s) and yearly budget

17.7
17.7.1 Financial Sources

The financing possibilities depend upon the typology of the actions to be promoted and their promoters:

*Research and Monitoring* – the investment to be assured is mostly related to the competent agencies in the management of protected areas, promoting the procedures necessary to the hiring of studies, and supporting the costs of the wardens body;

*Sustainable development and nature conservation promotion* – the investment to make in this scope will have a private initiative, in what respects to intervention over economic activities, and of a public/private scope in what concerns the management of species and habitats;

*Support to visitors and environmental promotion* – the investment to be secured in this scope will be public, mainly by initiative from the competent agencies in the management of protected areas.

Regardless of the nature of the promoters of the actions to be implemented in the scope of this proposal, the investment may be co-financed by several EU programs. For that, and taking into account the nature of the respective promoters, two main options may be defined:

*Promoters of a public nature* – EU co-financing through the programs QRESA (budget programming of FEDER, FEOGA) and/or Interreg (through conjunct submissions with other regions in the scope of the European cooperation), as well as through the respective budgets of the public institution;

*Promoters of a private nature* – EU co-financing through the programs QRESA (budget programming of FEOGA, IFOP, FEDER) or eventual resource to specific programs to finance interventions on economic activities, designed and financed by the competent entities in the management of the protected areas.
Finally, in what concerns the cost of the program, in function of the adopted option for the management board of the proposed Biosphere Reserve, the financing may be obtained from the budgets of the responsible institutions or, eventually, with the aid of an EU co-financing to ensure the investments planned in this proposal.

### 17.7.2 Predicted Budget

Starting with a strategic analysis of the management goals, the intervention plans for the proposed Biosphere Reserve were structured to allow the estimation of the implementation costs during the next five years.

The interventions were grouped accordingly with the following typology, which contents and computation assumptions will be further analyzed below:

a) Research and Monitoring;

b) Sustainable development and nature conservancy promotion;

c) Support to visitors and environmental promotion

**Research and Monitoring**

This goal is comprised by two parts, translated by the title. Monitoring also includes inspection and enforcement:

*Research* - With this goal to some information gaps detected to face threats, existing or potential, to the Core Areas. Research specially aimed to yield relevant data to support future management decisions will be developed under this goal, including geo-referentiation of hydric captation areas, negative impacts of existing and predicted human activities, etc.

*Monitoring and Inspection* - At this proposal phase, the monitoring tasks are identified as a priority. The need to reinforce the inspection and monitoring, especially in the Core Areas, shall be ensured by the nature wardens from
the Regional Nature Secretariat, since these areas are totally or at least partially included in existing protected areas of the Regional Protected Areas Network. As for the monitoring that species and habitats will need, this can be achieved as a cooperation between public and private entities (other organisms from the Regional Administration, NGOs, Universities, etc.), chiefly in what concerns the inspection and monitoring of marine areas, with the aid of the nature wardens.

Promotion of sustainable development and nature conservancy management

In this objective are included all the actions undertaken by public and private entities with the goal of an active management of the territory to obtain positive effects in the enhancement and preservation of habitats and species, grouped in two tasks.

Intervention on economic activities
- In this action are included the predicted costs to support private entities which economic activity
needs adjustments to meet the sustainable development objectives underlying the classification of the areas.

*Management of species and habitats* – This is intended to cover the actions taken by public and private entities, in terrestrial and marine habitats. The actions included are intervention on forests or bushy ecosystems, to recover or enhance their quality, both through the control/eradication of exotic species and the expansion or the areas covered by indigenous vegetation. It is also expected, with these actions, to benefit the hydrology of the targeted areas and to contribute to the recovery of the natural associated fauna.

**Support to visitors and environmental promotion**

The increase in the tourism in the Azores Region, fundamental for it’s economic development, will be felt also in the increase of visitors to the natural protected areas, many of which representing ex-libris of the island. Consequently, it is proposed that this goal is broken down in two actions:

*Visitors support facilities* – The aim in this action is to include all the interventions to channel the flux of visitors and avoid that the use of the protected areas, by residents and visitors, contributes to the degradation of their natural values. This includes not only signs, but also infrastructures to guide and condition the access such as elevated footpaths, pedestrian and cycle trails, fences on particularly sensitive areas, parking areas, etc.. In this action it’s also included the creation of infrastructures to visitors which configuration and/or position need special attention due to the proximity to priority habitats, and that can serve as an example to demonstrate the conciliation between economic interests and the nature conservation goals.

*Information and environmental promotion* – This action aims the organizing of meetings and other events of technical and informative nature, both with the resident populations and with political and economical deciders that comprise the
stakeholder universe conversing with the public entities with responsibilities in nature conservation and protected areas management. This action also includes seminars, colloquiums, round-tables and other activities that may attract the presence and attention not only of the resident population, but also or visitors that, having selected Graciosa as a touristic destination, look specifically for the island’s natural areas to visit. It is also predicted the conception and edition of a wide range of educational and promotional materials that allow a growing knowledge of the several components of the rich natural and cultural patrimony of the island, the activities undertaken and to undertake to preserve these components in a favourable preservation state and to recover and value the species and habitats that are degraded or at risk.
# Budget

<table>
<thead>
<tr>
<th>ACTIONS</th>
<th>Predicted costs (constant values in euros)</th>
<th>Total</th>
<th>Year n</th>
<th>Year n+1</th>
<th>Year n+2</th>
<th>Year n+3</th>
<th>Year n+4</th>
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<tbody>
<tr>
<td>a) Studies and Monitoring</td>
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<td>b) Nature conservation management &amp; sustainable development promotion</td>
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<td>897,500</td>
<td>196,500</td>
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<td>1 – Management of species and habitats</td>
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<td>34,500</td>
<td>6,500</td>
<td>7,500</td>
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<td>2 – Intervention on economic activities</td>
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<td>863,000</td>
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<td>c) Support to visitors and environmental awareness</td>
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<td>1 – Visitors infrastructures</td>
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<td>11,000</td>
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<td>2 – Information and environmental promotion</td>
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<td>3,200</td>
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<td>231,700</td>
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<td>195,950</td>
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<td>GRAND TOTAL</td>
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<td>1,144,550</td>
<td>254,870</td>
<td>254,870</td>
<td>215,545</td>
<td>210,320</td>
<td>208,945</td>
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</table>

Having as a base the computation shown and the predictable intervention areas, it is estimated that the budget for the activities directly related with the proposed Biosphere Reserve, has a total direct cost of € 1,144,550.00 to which a Program Management cost, estimated in 10% of the total cost, was added.
Authority(ies) in charge
17.8.1. The proposed Biosphere Reserve as a whole
Name: Regional Secretariat for the Environment and Sea; Autonomous Region of the Azores Government.

17.8.2. The Core Area(s)
Name:
Regional Secretariat for the Environment and Sea; Autonomous Region of the Azores Government.
Legal Powers:
Environmental legislation and law enforcement of the Autonomous Region of the Azores.

17.8.3. The Buffer Zone(s)
Name:
Regional Secretariat for the Environment and Sea; Autonomous Region of the Azores Government.
Legal Powers:
Environmental legislation and law enforcement of the Autonomous Region of the Azores
Name: Council-House of Santa Cruz da Graciosa
Legal Powers: Territory use and Planning.
Special Designations

(NO) UNESCO World Heritage Site;
(NO) RAMSAR Wetland Convention Site;
(YES) Other international Conventions:
  European Community Directive n.º 79/409/CEE – Birds Directive;
  European Community Directive n.º 92/43/CEE – Habitats Directive;
(YES) Long term monitoring site BIOMARE;
(YES) The proposed Biosphere Reserve is also in the process of proposing areas to be designated as RAMSAR sites.
19.1.1. General location map of Graciosa island
19.1.2. Proposed biosphere reserve zonation map
19.2
List of legal documents
19.2.1. Regional Documents

Fisheries and Related Activities

(1983) Portaria n.º 19/83 de 3 de Maio – Establishes the new protection regime for some crustaceans in the Region.

(1985) Decreto Legislativo Regional n.º 5/85/A de 8 de Maio – Establishes the juridical regime for spear fishing by amateurs in the Azores Autonomous Region.


(1993) Portaria n.º 43/93 de 2 de Setembro – Defines and regulates the harvesting of limpets for non commercial use, as an activity undertaken as a recreational activity.


in the Azores Autonomous Region.


Environment Conservation

(1993) Decreto Legislativo Regional nº 21/93/A de 23 de Dezembro – Applies to the Region the juridical regimen established by “Decreto-Lei n.º 19/93, de 23 de Janeiro” (National Network of Protected Areas).

(1998) Resolução n.º 30/98 de 5 de Fevereiro – Approves the list of Sites of Community Importance of the Azores Region (Phase 1).

(1998) Declaração n.º 12/98 de 7 de Maio – Corrects the document “Resolução n.º 30/98, de 05 de Fevereiro”, that approves the list of Sites of Community Importance of the Azores Region (Phase 1).


(2002) Decreto Legislativo Regional n.º 18/2002/A de 16 de Maio – Adapts to the Region the “Decreto-Lei n.º 140/99, de 24 de Abril”, that reviews the transposition to the internal right of the EU directives relative to the conservation of birds (Bird Directive) and the conservation of natural habitats and the wild fauna and flora (Habitats Directive).


**Territory management**


19.2.2. National Documents

Fisheries and Related Activities

(1987) Decreto Regulamentar n.º 43/87 de 17 de Julho – Defines the national measures for the conservation of the biological resources applicable in the exercise of fishery in oceanic and interior waters under Portuguese jurisdiction and sovereignty.


(2000) Decreto Regulamentar n.º 7/2000 de 30 de Maio – Changes the “Decreto Regulamentar n.º 43/87, de 17 de Julho”, that establishes the national capture sizes for the living resources by the fisheries in waters under Portuguese jurisdiction and sovereignty.


(2001) Portaria Nacional n.º 27/2001 de 15 de Janeiro – Fixes the minimum sizes for the captures of fish, crustaceans and moluscs, according to the predicted in the Article 48.o of the “Decreto Regulamentar n.º 43/87, de 17 de Julho”, in the redaction given by the “Decreto Regulamentar n.º 7/2000, de 30 de Maio”.

**Environment conservation**


(1993) Decreto-Lei n.º 19/93 de 23 de Janeiro - Establishes the rules regarding the National Network of Protected Areas.

(1999) Decreto-lei n.º 140/99 de 24 de Abril - Reviews the transposition to the internal right of the EU Directive no. 79/409/CEE, of April 2, (regarding the conservation of wild birds), and the Directive no. 92/43/CEE, of May 21 (regarding the conservation of natural habitats and wild fauna and flora).


**Territory management**

(1977) Lei n.º 33/77 de 28 de Maio – Fixes the width and limits of the territorial sea and establishes an exclusive economic zone of 200 miles for Portugal.


(2002) Decreto-Lei n.º 202/2004 de 18 de Agosto – Establishes the juridical regimen for the conservation, and exploitation of hunting resources, aiming its sustainable management, as well as the principles regulating the hunting activity.


19.2.3. European Documents

Fisheries and Related Activities


Environment Conservation


(1994) Directiva 94/24/CE do Conselho, de 8 de Junho – Changes the Annex II of
Directive no. 79/409/CEE, regarding the conservation of wild birds (Birds Directive).


(2002) Decisão da Comissão 2002/11/CE de 28 de Dezembro – Adopts the list of Sites of Community Importance to the biogeographic region of the Macaronesia, on the terms of the Directive no. 92/43/CEE.
19.3
Species List
19.3.1. Plantae Kingdom – 574 Species

Rhodophyta – 18 species

*Apoglossum ruscifolium* (Turner) J. Agardh, 1898
*Asparagopsis armata* Harvey, 1855
*Asparagopsis taxiformis* (Dellile) Trevis 1845
*Centroceras clavulatum* (C. Agardh) Montagne 1846
*Chondria* sp.
*Corallina elongata* J. Ellis & Solander 1786
*Corallina officinalis* Linnaeus 1758
*Corallina* sp.
*Cryptopleura ramosa* (Hudson) L. Newton 1931

Delesseriaceae spp.
*Jania* sp.
*Laurencia obtusa* (Hudson) J.V. Lamouroux 1813
*Mesophyllum lichenoides* (J. Ellis) M. Lemoine 1928
*Peyssonnelia rosa-marina* Boudouresque & Denizot 1973
*Peyssonnelia rubra* (Greville) J. Agardh 1851
*Peyssonnelia* sp.
*Plocamium cartilagineum* (Linnaeus) P.S. Dixon 1967
*Pterocodiella capillacea* (S.G. Gmelin) Santelices & Hommersand 1997

Phaeophyta – 14 species

*Colpomenia sinuosa* (Mertens ex Roth) Derbès & Solier 1851
*Colpomenia* sp.
*Cutleria multifida* (Turner) Greville 1830
*Cystoseira abies-marina* (S.G. Gmelin) C. Agardh 1820
*Dictyopteris membranacea* (Stackhouse) Batters 1902
*Dictyota adnata* Zanardini 1878
*Dictyota dichotoma* (Hudson) J.V. Lamouroux 1809

*Dictyota linearis* (C. Agardh) Greville 1830
*Dictyota fasciola* (Roth) M.A. Howe 1914
*Halopteris filicina* (Grateloup) Kützing 1843
*Padina pavonica* (Linnaeus) Thivy 1960
*Sargassum vulgare* C. Agardh 1820
*Stypocaulon scoparium* (Linnaeus) Kützing 1843
*Zonaria tournefortii* (J.V. Lamouroux) Montagne 1846

Chlorophyta – 8 species

*Anadyomene stellata* (Wulffen) C. Agardh 1823
*Bryopsis* sp.
*Chaetomorpha* sp.
*Cladophora* sp.

*Codium adhaerens* C. Agardh 1822
*Microdictyon calodictyon* (Montagne) Kützing 1849
*Ulva* sp.
*Valonia utricularis* (Roth) C. Agardh 1823
Bryophyta – 102 species

Andoa berthelotiana (Mont.) Ando
Anomobryum julaceum (P. Gaertn., B. Mey. et Scherb.) Schimp.
Aphanolejeunea azorica (V. Allorge et Ast) Pöcs et Bernecker
Aphanolejeunea sintensii Schimp.
Barbula unguiculata Hedw.
Bartramia stricta Brid.
Brachymenium notarisi (Mitt.) A. J. Shaw
Brachythecium plumosum (Hedw.) Schimp.
Brachythecium populeum (Hedw.) Schimp.
Brachythecium rivulare Schimp.
Brachythecium salebrosum (F. Weber et D. Mohr) Schimp.
Bryum capillare Hedw.
Bryum donianum Grev.
Calypogeia arguta Nees et Mont.
Calypogeia fissa (L.) Raddi
Campylopus flexuosus (Hedw.) Brid.
Campylopus fragilis Bruch et Schimp.
Campylopus pilifer Brid.
Cephaloziella divaricata (Sm.) Schiffn.
Ceratodon purpureus (Hedw.) Brid.
Chiloscyphus coadunatus (Sw.) J. J. Engel et R. M. Schust.
Chiloscyphus fragans (Moris et De Not.) J. J. Engel et R. M. Schust.
Chiloscyphus profundus (Nees) J. J. Engel et R. M. Schust.
Cololejeunea minutissima (Sm.) Schiffn.
Conocephalum conicum (L.) Dumort.
Didymodon luridus Hornsch.
Didymodon tophaceus (Brid.) Lisa
Diphasciwm foliosum (Hedw.) Mohr
Drepanolejeunea hamatifolia (Hook.) Schiffn.
Dumortiera hirsuta (Sw.) Nees
Echinodium prolixum (Mitt.) Broth.
Epiphterygium tozeri (Grev.) Lindb.
Eurhynchium hians (Hedw.) Loeske
Eurhynchium praerelongum (Hedw.) Warnst.
Eurhynchium pumilum (Wilson) Schimp.
Fissidens asplenioides Hedw.
Fissidens bryoideus Hedw. sensu latiore
Fissidens serratulatus Brid.
Fossombronia angulosa (Dicks.) Raddi
Fossombronia caespitiformis De Not. ex Rabenh.
Fossombronia pusilla (L.) Nees
Frullania azorica Sim-Sim et al.
Frullania microphylla (Gottsche) Pearson
Frullania tamarisci (L.) Dumort.
Frullania teneriffae (F. Weber) Nees
Grimmia laevigata (Brid.) Brid.
Grimmia lisae De Not.
Grimmia montana Bruch et Schimp.
Harpalejeunea molleri (Steph.) Grolle
Heteroscyphus denticulatus (Mitt.) Schiffn.
Homalia webbiana (Mont.) Düll
Hypnum cupressiforme Hedw.
Hypnum jutlandicum Holmen et E. Warncke
Hypnum resupinatum Taylor
Hypnum uncinulatum Jur.
Lejeunea eckloniana Lindemb.
Lejeunea lamacerina (Steph.) Schiffn.
Leucobryum juniperoides (Brid.) Müll Hal.
Leucodon treleasei (Cardot) Par.
Lunularia cruciata (L.) Lindb.
Marchantia paleacea Bertol.
Marchesinia mackaii (Hook.) Gray
Microlejeunea ulicina (Taylor) Gottsche et al.
Myurium hochstetteri (Schimp.) Kindb.
Nardia scalaris Gray
Riccardia latifrons (Lindb.) Lindb.
Saccogyna viticulosa (L.) Dumort.
Scleropodium purum (Hedw.) Limpr.
Scleropodium touretii (Brid.) L. Koch
Scorpium circinatum (Brid.) M. Fleisch. et Loeske
Semaphorophyllum substrumulosum (Hampe) Britton
Targionia hypophylla L. sensu latiore
Tetrastichium fontanum (Mitt.) Cardot
Tetrastichium virens (Cardot) Churchill

**Pteridophyta – 29 species**

Adiantum capillus-veneris L.
Adiantum hispidulum Sw.
Adiantum raddianum C. Presl
Asplenium adiantum-nigrum L.
Asplenium azoricum (Milde) Lovis, Rasbach & Reichstein
Asplenium hemionitis L.
Asplenium marinum L.
Asplenium obovatum Viv. ssp. lanceolatum (Fiori) P. Silva
Asplenium onopterus L.
Asplenium scolopendrium L.
Athyrium filix-femina (L.) Roth
Blechnum spicant (L.) Roth
Christella dentata (Forssk.) Brownsey & Jermy
Cyrtomium falcatum (L. fil.) C. Presl
Cystopteris diaphana (Bory) Blasdell

*Deperia* petersenii (Kunze) M. Kato
*Diplazium caudatum* (Cav.) Jermy
*Doodia caudata* (Cav.) R. Br.
*Dryopteris aemula* (Aiton) O. Kuntze
*Dryopteris affinis* (Lowe) Fraser-Jenkins ssp. *affinis*
*Dryopteris azorica* (Christ) Alston
*Nephrolepis cordifolia* (L.) C. Presl
*Polypodium azoricum* (Vasc) R. Fern.
*Polystichum setiferum* (Forssk.) Woyn.
*Pteridium aquilinum* (L.) Kuhn
*Pteris tremula* R. Br.
*Selaginella kraussiana* (Kunze) A. Braun
*Sphaeropteris cooperi* (Hook. & Mueller) Tryon
*Trichomanes speciosum* Willd.

**Spermatophyta – 403 species**

Alternanthera caracasana Humb., Bonpl. & Kunth
*Acacia melanoxylon* R. Br.
Agave americana L.

*Agrimonia eupatoria* L.
*Agrostis castellana* Boiss. & Reut.
*Agrostis congestiflora* Tutin & Warb. ssp. *congestiflora*
Agrostis gracililaxa Franco
Agrostis stolonifera L.
Ailanthus altissima (Mill.) Swingle
Aira caryophyllea L. ssp. caryophyllea
Alisma lanceolatum With.
Allium vineale L.
Amaranthus blitum L.
Amaranthus deflexus L.
Amaranthus hybridus L.
Amaryllis belladonna L.
Ammi seubertianum H. C. Watson
Ammi majus L.
Ammi trifoliatum (H. C. Watson) Trel.
Anagallis arvensis L.
Anagallis foemina Mill.
Anredera cordifolia (Ten.) Steenis
Anthemis cotula L.
Anthoxanthum aristatum Boiss.
Anthoxanthum odoratum L.
Antirrhinum majus L.
Aphanes microcarpa (Boiss. & Reut.) Rothm.
Apium graveolens L.
Aptenia cordifolia (L. fil.) Schwantes
Aquilegia vulgaris L. ssp. dichroa (Freyn) Díaz
Araujia sericifera Brot.
Arisarum vulgare O. Targ.-Tozz. ssp. vulgare
Arrhenatherum elatius (L.) P. Beauv. ex
J. Presl. & C. Presl ssp. bulbosum (Willd.) Schübl. & Mart.
Arum italicum Mill.
Arundo donax L.
Asparagus asparagoides (L.) W. Wight
Aster squamatus (Spreng.) Hieron.
Atriplex prostrata Boucher ex DC.
Avena barbata Pott ex Link
Avena sterilis L. ssp. ludoviciana (Durieu) Nyman
Beta vulgaris L. ssp. maritima (L.) Arcang.
Bidens pilosa L.
Brachypodium distachyon (L.) P. Beauv
Brachypodium sylvaticum (Huds.) P. Beauv.
Brassica oleracea L.
Briza maxima L.
Briza minor L.
Bromus catharticus Vahl
Bromus diandrus Roth
Bromus hordeaceus L. ssp. divaricatus
(Bon-nier & Layens) Kerguélen
Bromus madritensis L. ssp. madritensis
Calendula arvensis L.
Calendula officinalis L.
Callitriche stagnalis Scop.
Calluna vulgaris (L.) Hull
Campanula erinus L.
Canna indica L.
Capsella rubella Reut.
Cardamine hirsuta L.
Carduus tenuiflorus Curtis
Carex divulsa Stokes ssp. divulsa
Carex echinata Murray
Carex pairea F. W. Schultz
Carex pannicea L.
Carex peregrina Link
Carpobrotus edulis (L.) L. Bolus
Catapodium marinum (L.) C. E. Hubb.
Catapodium rigidum (L.) C. E. Hubb.
Centaurea melitensis L.
Centaurium erythraea Rafn ssp. grandiflorum (Biv.) Melderis
Centaurium scilloides (L. fil.) Samp.
Centranthus ruber (L.) DC.
Cerastium fontanum Baumg. ssp. vulgare (Hartm.) Greuter & Burd.
Cerastium glomeratum Thuill.
Chamaemelum mixtum (L.) All.
Chamaemelum nobile (L.) All.
Chelidonium majus L.
Chenopodium album L.
Chenopodium ambrosioides L.
Chenopodium murale L.
Chrysanthemum coronarium L.
Chrysanthemum segetum L.
Cichorium intybus L.
Cirsium arvense (L.) Scop.
Cirsium vulgare (Savi) Ten.
Clinopodium ascendens (Jord.) Samp.
Coleostephus myconis (L.) Rchb. fil.
Colocasia esculenta (L.) Schott
Consolida ajacis (L.) Schur
Convolvulus arvensis L.
Conyza albida Spreng.
Conyza bonariensis (L.) Cronquist
Conyza canadensis (L.) Cronquist
Corema azorica (L.) P. Silva
Coronopus didymus (L.) Sm.
Coronopus squamatus (Forssk.) Asch.
Crassula multicava Lem.
Crassula tillaea Lest.-Garl.
Crepis capillaris (L.) Wallr.
Crithmum maritimum L.
Cryptomeria japonica (L. fil.) D. Don
Cynodon dactylon (L.) Pers.
Cynoglossum creticum Mill.
Cynosurus cristatus L.
Cynosurus echinatus L.
Cyperus eragrostis Lam.
Cyperus esculentus L.
Cyperus longus L.
Cyperus rotundus L.
Cytisus scoparius (L.) Link
Dactylis glomerata L.
Datura stramonium L.
Daucus azoricus Franco
Daucus carota L. ssp. maritimus (Lam.) Batt.
Digitalis purpurea L.
Digitaria ciliaris (Retz.) Koeler
Digitaria sanguinalis (L.) Scop.
Ditrichia viscosa (L.) Greuter
Drosanthemum floribundum (Haw.) Schwantes
Duchesnea indica (Andr.) Focke
Ecballium elaterium (L.) A. Rich.
Echinochloa crus-galli (L.) P. Beauv.
Echium plantagineum L.
Eichhornia crassipes (Mart.) Solms-Laub.
Elaeagnus umbellata Thunb.
Elatine hexandra (Lapierre) DC.
Eleusine indica (L.) P. Gaertn. ssp. indica
Eragrostis ciliaris (All.) Vign. ex Janch.
Eragrostis multicaulis Steud.
Erika azorica Hochst. ex Seub.
Erigeron karvinskianus DC.
Erodium moschatum (L.) L’Hér.
Eucalyptus globulus Labill.
Euphorbia azorica Seub.
Euphorbia lathyris L.
Euphorbia maculata L.
Euphorbia peplus L.
Euphorbia prostrata Aiton
Festuca arundinacea Schreb. ssp. mediterranea (Hackel)
Franco & Rocha Afonso
Festuca jubata Lowe
Festuca petraea Guthn. ex Seub.
Ficus carica L.
Filago gallica L.
Foeniculum vulgare Mill.
Fragaria vesca L.
Frankenia pulverulenta L.
Fumaria bastardii Boreau
Fumaria capreolata L.
Fumaria muralis Sonder ex Koch ssp. muralis
Gaillardia aristata Pursh
Galactites tomentosa Moench
Galinsoga parviflora Cav.
Galium aparine L.
Galium mollugo L.
Galium murale (L.) All.
Galium parisienne L.
Gamochaeta claviceps Fern.) Cabrera
Gamochaeta pensylvanica (Willd.) Cabrera
Gamochaeta purpurea (L.) Cabrera
Gastridium ventricosum (Gouan) Schinz &Thell.
Gaudinia coarctata (Link) Durand & Schinz
Gaudinia fragilis (L.) P. Beauv.
Geranium dissectum L.
Geranium molle L.
Geranium purpureum Vill.
Gladiolus natalensis Hook.
Gymnostyles stolonifera (Brot.) Tutin
Hedera azorica Carrière
Hedychium gardneranum Sheppard ex Ker-Gawl.
Helianthus tuberosus L.
Heliotropium europaeum L.
Helminthotheca echioïdes (L.) Holub
Holcus lanatus L.
Holcus rigidus Hochst.
Hordeum murinum L. ssp. leporinum (Link) Asch. & Graebn.
Hydrangea macrophylla (Thunb.) Ser.
Hyoscyamus albus L.
Hypericum foliosum Aiton
Hypericum humifusum L.
Hypericum perfoliatum L.
Hypericum perforatum L.
Hypericum undulatum Schousb. ex Willd.
Hypochoeris glabra L.
Hypochoeris radicata L.
Ilex perado Aiton ssp. azorica (Loes.) Tutin
Ipomoea indica (Burm. fil.) Merr.
Iris foetidissima L.
Isolepis cernua (Vahl) Roem. & Schult.
Isolepis fluitans (L.) R. Br.
Isolepis setacea (L.) R. Br.
Juncus acutus L.
Juncus bufonius L.
Juncus effusus L.
Kickxia elatine (L.) Dumort. ssp. elatine
Kickxia spuria (L.) Dumort. ssp. spuria
Kyllinga brevifolia Rottb.
Lactuca serriola L.
Lagurus ovatus L.
Lantana camara L.
Lapsana communis L.
Lathyrus tingitanus L.
Laurus azorica (Seub.) Franco
Laurus nobilis L.
Lavatera arborea L.
Lavatera cretica L.
Leontodon taraxacoides (Vill.) Mérat ssp. longirostris
Finch & P. D. Sell
Leontodon taraxacoides (Vill.) Mérat ssp. taraxacoides
Lepidium virginicum L.
Lobularia maritima (L.) Desv.
Lolium multiflorum Lam.
Lolium perenne L.
Lolium remotum Schrank
Lolium temulentum L.
Lonicera japonica Thunb.
Lotus angustissimus L.
Lotus corniculatus L.
Lotus pedunculatus Cav.
Lotus subbiflorus Lag.
Lupinus albus L.
Luzula campestris (L.) DC.
Luzula multiflora (Retz.) Lej.
Lysimachia azorica Hornem. ex Hook.
Malva parviflora L.
Marrubium vulgare L.
Matthiola incana (L.) R. Br. ssp. incana
Medicago lupulina L.
Medicago polymorpha L.
Medicago sativa L.
Melilotus indicus (L.) All.
Melissa officinalis L.
Mentha pulegium L.
Mentha spicata L.
Mentha suaveolens Ehrh.
Mercurialis annua L.
Mesembryanthemum crystallinum L.
Metrosideros excelsa Sol. ex P. Gaertn.
Mirabilis jalapa L.
Misopates orontium (L.) Raf.
Muehlenbeckia sagittifolia (Ort.) Meissn.
Myoporoum tenuifolium G. Forst.
Myosotis maritima Hochst. ex Seub.
Myrica faya Aiton
Myrsine africana L.
Narcissus jonquilla L.
Narcissus tazetta L. ssp. tazetta
Nasturtium officinale R. Br. 

Nothoscordum gracile (Aiton) Stearn
Oenothera glazoviana Micheli
Opuntia ficus-indica (L.) Mill.
Origunum vulgare L. ssp. virens (Hoffm. & Link) Ietsw.
Ornithopus perpusillus L.
Ornithopus pinnatus (Mill.) Druce
Oxalis articulata Savigny
Oxalis corniculata L.
Oxalis corymbosa DC.
Oxalis pes-caprae L.
Oxalis purpurea L.
Papaver dubium L.
Papaver pinnatifidum Moris
Papaver rhoes L.
Papaver somniferum L. ssp. somniferum
Parentucellia viscosa (L.) Caruel
Parietaria judaica L.
Paspalum dilatatum Poir.
Paspalum distichum L.
Paspalum notatum Flüggé
Pennisetum villosum R. Br. ex Fresen.
Persea indica (L.) C. K. Sprengel
Petasites fragrans (Vill.) C. Presl
Petroselinum crispum (Mill.) Hill
Phormium tenax J. R. Forst. & G. Forst.
Physalis peruviana L.
Phytolacca americana L.
Pinus pinaster Aiton
Pittosporum undulatum Vent.
Plantago coronopus L.
Plantago lanceolata L.
Plantago major L.
Platanthera micrantha (Hochst. ex Seub.) Schlecht.
Poa annua L.
Poa trivialis L.
Polycarpum tetraphyllum (L.) L.
Polygonum aviculare L.
Polypogon maritimus Willd.
Polypogon monspeliensis (L.) Desf.
Polypogon viridis (Gouan) Breistr.
Populus alba L.
Populus nigra L.
Portulaca oleracea L. ssp. oleraceae
Potamogeton polygonifolius Pourr.
Potamogeton pusillus L.
Potentilla anglica Laich.
Prunella vulgaris L.
Pseudognaphalium luteo-album (L.) Hilliard & Burtt
Psidium littorale Raddi
Pulicaria paludosa L.
Ranunculus muricatus L.
Ranunculus trilobus Desf.
Raphanus raphanistrum L. ssp. microcarpus (Lange) Thell.
Raphanus raphanistrum L. ssp. raphanistrum
Rapistrum rugosum (L.) All. ssp. orientale (L.) Arcang.
Rapistrum rugosum (L.) All. ssp. rugosum
Reseda luteola L.
Rhopaloe lis umbellata Makino.
Rhus coriaria L.
Ricinus communis L.
Rosmarinus officinalis L.
Rostraria cristata (L.) Tzvelev
Rubia agostinii Dans. & P. Silva
Rubus ulmifolius Schott
Rumex acutissima L. ssp. pyrenaicus (Pourretex Lapeyr.)
Akeroyd.
Rumex australis (Willk.) A. Fern.
Rumex bucephalophorus L. ssp. canariensis (Steinh.) Rech. fil.
Rumex conglomeratus Murray
Rumex crispus L.
Rumex obtusifolius L. ssp. obtusifolius
Rumex pulcher L. ssp. pulcher
Sagina apetala Ard.
Sagina maritima G. Don fil.
Sagina procumbens L.
Salpichroa origanifolia (Lam.) Baill.
Sambucus nigra L.
Scabiosa atropurpurea L.
Scolymus hispanicus L.
Senecio cineraria DC. ssp. cineraria
Senecio elegans L.
Senecio mikanioides Otto ex Walp.
Senecio vulgaris L.
Serapia cordigera L.
Setaria parviflora (Poir.) Kerguélen
Setaria pumila (Poir.) Roem. & Schult.
Setaria verticillata (L.) P. Beauv.
Sherardia arvensis L.
Sibthorpa europaea L.
Sida rhombifolia L.
Silene gallica L.
Sillybum marianum (L.) P. Gaertn.
Sisymbrium officinale (L.) Scop.
Smilax canariensis Brouss. ex Willd.
Solanum nigrum L.
Solanum pseudocapsicum L.
Soleiroliia soleirolii (Req.) Dandy
Solidago sempervirens L.
Sonchus asper L. ssp. Glaucescens (Jord.) P. W. Ball
Sonchus oleraceus L.
Sonchus teterrimus L.
Sorghum halepense (L.) Pers.
Spartina versicolor Fabre
Spartium junceum L.
Spergula arvensis L.
Spergularia azorica (Kindb.) Lebel
Spergularia bocconei (Scheele) Asch. & Graebn.
Spergularia marina (L.) Griseb.
Sporobolus africanus (Poir.) Robyns & Tournay
Stachys arvensis (L.) L.
Stellaria media (L.) Vill. ssp. media
Stenotaphrum secundatum (Walter) Kuntze
Tamarix africana Poir.
Tanacetum parthenium (L.) Sch.-Bip.
Taraxacum officinale Weber sensu latiore
Teline monspessulana (L.) K. Koch
Tetragonia tetragonioides (Pall.) Kuntze
Tetrapanax papyriferus (Hook.) K. Koch
Thymus caespititius Brot.
Tolpis barbata (L.) P. Gaertn.
Tolpis succulenta (Dryand.) Lowe
Torilis arvensis (Huds.) Link ssp. arvensis
Torilis arvensis (Huds.) Link ssp. neglecta (Schult.) Thell.
Tradescantia fluminensis Vell.
Trifolium arvense L.
Trifolium campestre Schreb.
Trifolium dubium Slbth.
Trifolium glomeratum L.
Trifolium ligusticum Balb. ex Loisel.
Trifolium pratense L.
Trifolium repens L.
Trifolium subterraneum L.
Tropaeolum majus L.
Ulex europaeus L. ssp. europaeus
Ulmus procera Salisb.
Umbilicus horizontalis (Guss.) DC.
Umbilicus rupestris (Salisb.) Dandy
Urospermum picroides (L.) Scop. ex F.W. Schmidt
Urtica membranacea Poir.
Verbascum thapsus L. ssp. crassifolium (Lam.) Murb.
Verbena bonariensis L.
Verbena officinalis L.
Veronica anagallis-aquatica L.
Veronica arvensis L.
Veronica officinalis L.
Veronica persica Poir.
Veronica serpyllifolia L.
Vicia benghalensis L.
Vicia hirsuta (L.) Gray
Vicia sativa L. ssp. nigra (L.) Ehrh.
Vicia sativa L. ssp. sativa
Vicia tenuissima (M. Bieb.) Schinz & Thell.
Vinca difformis Pourr.
Viola odorata L.
Vulpia bromoides (L.) Gray
Vulpia myuros (L.) C. C. Gmel.
Xanthium strumarium L. ssp. italicum (Moretti) D. Löve
Zantedeschia aethiopica (L.) Spreng.
19.3.2 Animalia Kingdom – 543 species

**Porifera – 12 species**

- *Chondrosia reniformis* (Nardo, 1847)
- *Clathrina clathrus* (Schmidt, 1864)
- *Clathrina coriacea* (Montagu, 1818)
- *Cliona celata* Grant, 1826
- *Cliona viridis* (Schmidt 1862)
- *Haliclona* sp.
- *Hamigera hamigera* (Schmidt, 1866) (Boury-Esnault 1976)
- *Hymedesmia* sp.
- *Oscarella lobularis* (Lévi & Porte 1962)
- *Petrosia ficiformis* (Poiret, 1789)
- *Sycon ciliatum* (Fabricius, 1780)
- *Terpios fugax* Duchassaing & Michelotti, 1864

**Cnidaria – 14 species**

- *Actinia equina* Linnaeus, 1758
- *Aglaoephina* sp.
- *Anemonia sargassensis* Hargitt, 1908
- *Caryophyllia inornata* Duncan, 1878
- *Caryophyllia smithii* Stokes and Broderip, 1828
- *Corynactis viridis* Allman, 1846
- *Diphasia* sp.
- *Madracis pharensis* (Heller, 1868)
- *Nausithoe punctata* (Werner, 1973)
- *Octocorallia* sp.
- *Pelagia noctiluca* (Forsskal, 1775)
- *Physalia physalis* (Linnaeus, 1758)
- *Tamarisca tamarisca* (Linnaeus, 1758)
- *Telmatactis forskali* (Ehrenberg, 1834)

**Polychaeta – 4 species**

- *Hermodice carunculata* (Pallas, 1766)
- *Megalomma vesiculosum* (Montagu, 1813)
- *Sabellapavonina* (Nicol, 1930)
- *Sabella spalanzani* (Viviani, 1805)

**Molusca – 72 species**

- *Acanthinula azorica* Pilsbry, 1926
- *Arion lusitanicus* Mabille, 1868
- *Assiminea eliae* Paladilhe, 1875
- *Blea heydeni* Maltzan, 1881
- *Berthellina edwardsi* (Vayssière, 1896)
- *Calliostoma zeyphinum* (Linnaeus, 1758)
- *Caracollina lenticula* (Michaud, 1831)
- *Carychium ibazoricum* Bank & Gittenberger, 1985
Carychium minimum Müll., 1774
Charonia lampas (Linnaeus, 1758)
Chromodoris britoi Ortea & Pérez, 1983
Chromodoris purpurea (Risso in Guérin, 1831)
Cochlicella barbara (Linnaeus, 1758)
Cochlicopa lubrica (Müller, 1774)
Cochlicopa lubricella (Porro, 1838)
Columella adansoni Menke, 1853
Columella microspora (Lowe, 1852)
Dero ceras caruanae (Pollonera, 1891)
Dero ceras reticulatum (Müller, 1774)
Discus rotundatus (Müller, 1774)
Epitonium sp.
Euconulus fulvus (Müller, 1774)
Haliotis coccinea Reeve, 1846
Helicella apicina (Lamarck, 1822)
Helix aspersa Müller, 1774
Hydrocena gutta Shuttieworth, 1852
Hyps edor dis pica azorica Ortea, Valdes & Garcia-Gómez, 1996
Hyps edor dis tricolor (Cantraine, 1835)
Jujubinus sp.
Lauria anconostoma (Lowe, 1831)
Lauria fasciolata (Morelet, 1860)
Lehmania valentiana (Férrussac, 1823)
Leiostyla fuscidula (Morelet, 1860)
Leiostyla rugulosa (Morelet, 1860)
Leptaxis terceirana (Morelet, 1860)
Limacus flavus (Linnaeus, 1758)
Limax maximus Linnaeus, 1758
Lunatia sp.
Luria lurida (Linnaeus, 1758)
Melarhaphe neritoides (Linnaeus, 1758)
Microxeromagna armillata (Lowe, 1852)
Milax gagates (Draparnaud, 1801)
Mitra sp.
Myosotella myosotis (Draparnaud, 1801)
Napaeus forbesianus (Morelet & Drouët, 1857)
Napaeus vulgaris (Morelet & Drouët, 1857)
Nesovitrea hammonis (Ström, 1765)
Oestophora barbula (Rossmässler, 1838)
Ovatella vulcanaí (Morelet, 1860)
Oxychilus cellarius (Müller, 1774)
Oxychilus draparnaudi (Beck, 1837)
Paludinella littorina (Delle Chiaje, 1828)
Patella candei candei D’Orbigny, 1840
Patella ulyssiponensis áspera Röding, 1798
Pedipes pedipes (Bruguiera, 1879)
Pinna rudis (Linnaeus, 1758)
Poly cera elegans (Bergh, 1894)
Pseudomelampus exigus (Lowe, 1832)
Punctum azoricum De Winter, 1988
Spermodea monas (Morelet, 1860)
Stramonita haemastoma (Linnaeus, 1767)
Tambja ceutae García-Gómez & Ortea, 1988
Tambja sp.
Testacella maugei Férrussac, 1819
Theba pisana (Müller, 1774)
Tol tecia pusilla (Lowe, 1831)
Truncatella subcylindríca (Linnaeus, 1758)
Turritella sp.
Vallonia costata (Müller, 1774)
Vallonia pulchella (Müller, 1774)
Vertigo pygmaeae (Draparnaud, 1801)
Vitre a contract a (Westerlund, 1871)
Arthropoda – 325 species

Achaearanea acoreensis (Berland, 1932)
Achaearanea simulans (Thorell, 1875)
Acherontia atropos (Linnaeus, 1758)
Acleris variegana (Denis & Schiffermüller, 1775)
Acrogalumna longipluma longipluma (Ber-lese, 1904)
Acupalpus dubius Schilsky, 1888
Adalia decempunctata (Linnaeus, 1758)
Aeolus melliculus Moreleti Tarnier, 1860
Agabus godmani Crotch, 1867
Aglossa caprealis (Hübner, 1809)
Agonum marginatum (Linnaeus, 1758)
Agonum muelleri muelleri (Herbst, 1784)
Agrius convolvuli (Linnaeus, 1758)
Agrotis ipsilon (Hufnagel, 1766)
Agrotis segetum (Denis & Schiffermüller, 1775)
Aleochara bipustulata (Linnaeus, 1761)
Amara aenea (De Geer, 1774)
Amerobelba decedens Berlese, 1908
Amischa analis (Gravenhorst, 1802)
Anaspis proteus Wollaston, 1854
Anax imperator Leach, 1815
Anisodactylus binotatus (Fabricius, 1787)
Anisolabis maritima (Bonelli, 1832)
Anotylus complanatus (Erichson, 1839)
Aphaenogaster senilis senilis Mayr, 1853
Aphrosylus calcarator Frey, 1945
Apis mellifera Linnaeus, 1758
Aproaerema anthylidella (Hübner, 1813)
Areezetes altimontanus Hammer, 1961
Argiope bruennichi (Scopoli, 1772)
Argyresthia atlanticaea Rebel, 1940
Argyrodes nasicus (Simon, 1873)
Armadillidium vulgare (Latreille, 1804)
Ascotis fortunata azorica Pinker, 1971
Atheta acuicollis (Sharp, 1876)
Atheta coriaria (Kraatz, 1856)
Atheta dilutipennis Motschulsky, 1858
Atheta divisa (Märkel, 1844)
Atheta pseudolaticollis Erber & Hinterseher, 1992
Atheta ravilla (Erichson, 1839)
Atheta sordida (Marsham, 1802)
Athous azoricus Platia & Gudenzi, 2002
Attalus lusitanicus Erichson, 1840
Bedelia somnulentella (Zeller, 1847)
Blaps gigas (Linnaeus, 1767)
Blastobasis desertarum (Wollaston, 1858)
Blastobasis marrocanella Amsel, 1952
Bradycellus distinctus (Dejean, 1829)
Calcinus tubularis Holthuis, 1977
Calliphora vicina Robineau-Desvoidy, 1830
Callosoma olivieri Dejean, 1831
Camisia segnis (Hermann, 1804)
Campiglossa producta (Loew, 1844)
Canace nasica (Haliday, 1839)
Carpelimus corticus (Gravenhorst, 1806)
Carpophilus fumatus Boheman, 1851
Carpophilus hemipterus (Linnaeus, 1758)
Carpophilus marginellus Motschulsky, 1858
Carpophilus nepos Murray, 1864
Carpophilus quadrisignatus Erichson, 1843
Cercyon haemorrhoidalis (Fabricius, 1775)
Cercyon lugubris (Olivier, 1790)
Cercyon nigriceps (Marsham, 1802)
Cercyon quisquilius (Linnaeus, 1761)
Cerodontha denticornis (Panzer, 1806)
Chironomus cingulatus Meigen, 1818
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<td>Chrysolina hyperici (Forster, 1771)</td>
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<td>Chrysoperla agilis Henry, Brooks, Duelli &amp; Johnson, 2003</td>
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<td>Chrysoperla lucasina (Lacroix, 1912)</td>
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Galumna azoreana Pérez-Íñigo, 1992
Gibbaranea occidentalis Wunderlich, 1989
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Lotophila atra (Meigen, 1830)
Macaroeris cata (Blackwall, 1867)
Macroctenonyx perforatus (Fallén, 1813)
Macroctenonyx unipuncta (Haworth, 1809)
Microctenonyx subitanuus (F. P.-Cambridge, 1875)
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Monomorium carbonarium (O. P.-Cambridge, 1877)
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Mythimna unipuncta (Haworth, 1809)
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Nanhermannia nana (Nicolet, 1855)
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Phoronis hippocrepia Wright, 1856

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Antedon bifida (Pennant, 1777)  
Arbacia lixula (Linnaeus, 1758)
Arbaciella elegans Mortensen, 1910
Centrostephanus longispinus (Philippi, 1845)
Coscinasterias tenuispina (Lamarck 1816)
Hacelia attenuata (Gray, 1840)
Holothuria forskali Chiaje, 1841

Tunicata – 6 species
Clavelina lepadiformis (Müller, 1776)
Cystodites dellechiajei (Della Valle, 1877)
Didemnum maculosum (Milne-Edwards, 1841)

Piscis – 46 species
Abudefduf luridus (Cuvier in Cuvier and Valenciennes, 1830)
Apogon imberbis (Linnaeus, 1758)
Balistes carolinensis Gmelin, 1789
Blennius sp.
Boops boops (Linnaeus, 1758)
Centrolabrus caeruleus Azevedo, 1999
Chelon labrosus (Risso, 1827)
Chromis limbata (Valenciennes, 1833)
Coris julis (Linnaeus, 1758)
Coryphoblennius galerita (Linnaeus, 1758)
Dasylabrus pastinaca Linnaeus, 1758
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Epinephelus marginatus (Lowe, 1834)
Gobius paganellus (Linnaeus, 1758)
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Diplosoma listerianum (Milne-Edwards, 1841)
Distaplia corolla Monniot, 1974
Eudistoma angolanum (Michaelsen, 1915)
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Synodus saurus (Linnaeus, 1758)
Thalassoma pavo (Linnaeus, 1758)
Thorogobius ephippiatus (Lowe, 1839)

Thunus thynus thynus (Linnaeus, 1758)
Trachinotus ovatus (Linnaeus, 1758)
Trypterygion delaisi delaisi Cadenat & Blache, 1970
Xyrichtys novacula (Linnaeus, 1758)

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Caretta caretta Linnaeus, 1758
Lacerta dugesii Milne-Edwards, 1829

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Ardea cinerea Linnaeus 1758
Arenaria interpres (Linnaeus 1758)
Bulweria bulwerii (Jardine & Selby 1828)
Buteo buteo rothschildi (Linnaeus, 1758)
Calonectris diomedea borealis (Cory, 1881)
Charadrius alexandrinus Linnaeus, 1758
Columba livia (J. F. Gmelin, 1789)
Columba palumbus azorica Hartert, 1905
Egretta garzetta (Linnaeus, 1766)
Fringilla coelebs moreletti Pucheran 1859
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Motacilla cinerea patriciae Vaurie, 1957
Oceanodroma castro (Harcourt, 1851)
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Puffinus assimilis baroli (Bonaparte 1857)
Regulus regulus inermis Murphy & Chapin, 1929
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Sternula dougallii Montagu, 1813
Sternula hirundo Linnaeus, 1758
Sturnus vulgaris granti Linnaeus, 1758
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Balaenoptera musculus (Linnaeus, 1758)
Balaenoptera physalus (Linnaeus, 1758)
Bos taurus Linnaeus, 1758
Delphinus delphis Linnaeus, 1758
Equus asinus Linnaeus, 1758
Globicephala macrocephalus Gray, 1846
Grampus griseus (Cuvier, 1812)
Hyperoodon ampullatus (Forster, 1770)
Kogia breviceps (de Blainville, 1838)
Kogia simus Owen, 1866
Megaptera novaeangliae (Borowski, 1781)
Mesoplodon bidens (Sowerby, 1804)
Mesoplodon europaeus Gervais, 1855
Nyctalus azoreum (Thomas, 1901)
Orcinus orca (Linnaeus, 1758)
Oryctolagus cuniculus Linnaeus, 1758
Physeter macrocephalus (= catodon ) Linnaeus, 1758

Pipistrellus maderensis (Dobson, 1878)
Pseudorca crassidens (Owens, 1846)
Stenella coerulealba (Meyen, 1833)
Stenella frontalis (Cuvier, 1829)
Tursiops truncatus (Montagu, 1821)
Ziphius cavirostris Cuvier, 1823
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CANDIDATURA DA ILHA GRACIOSA A RESERVA DA BIOSFERA

Na perspetiva de encontrar modelos que garantam o bem-estar ecológico, contribuindo o desenvolvimento económico, a Ilha Graciosa encontrou algumas soluções que aliam o bem-estar social com a conservação da natureza. Esta perspetiva é permanentemente reforçada através da Ecotéca da Graciosa, das diversas Eco-escoras e das actividades que delas resultam. Talvez por esta razão, as actividades de observação da natureza tenham já uma expressão muito interessante na totalidade das actividades económicas da Ilha e cativam tanto os locais como quem visita a Ilha. O Monumento Natural Regional da Caldeira da Graciosa é o maior símbolo ambiental desta ilha, sendo área classificada através da Directiva Habitats e tem a candidatura a área Ramsar em preparação, mas a qualidade ambiental é, de facto, extensível a todo a ilha.

Tendo em conta esta intenção de garantir as perspetivas de desenvolvimento sustentável, que se foram dadas pela história, com as necessidades de conservação da natureza, o Governo Regional dos Açores apoia a candidatura da Ilha Graciosa à Reserva da Biosfera e coloca todo o empenho para que esta tenha sucesso e que seja consequente nos objectivos que lhe estão subjacentes. A certificação e a garantia da manutenção da qualidade ambiental, patrimonial e cultural inerente a uma Reserva da Biosfera são importantes para a Ilha Graciosa e para o Arquipélago dos Açores.

O PRESIDENTE DO GOVERNO REGIONAL DOS AÇORES

CARLOS MANUEL MARTINS DO VALE CÉSAR

CÂMARA MUNICIPAL DE SANTA CRUZ DA GRACIOSA
9880-352 SANTA CRUZ DA GRACIOSA - AÇORES
Telefone 295730010 - Fax 295730200

Exmº Senhor
Diretor Regional do Ambiente
Rua Cônsul Dabney
Colónia Alemã
9900-014 HORTA

Sua referência: 4078
Sua comunicação: 17-5-2007
Nosso referência: 01037
Data: 2007-04-09

ASSUNTO:

Para conhecimento de V. Exª, a seguir transcrevo parte da acta da reunião ordinária desta Câmara, realizada em 05 de Abril corrente:

"---8) Candidatura a Reserva da Biosfera da Ilha Graciosa - A Câmara deliberou apoiar a candidatura acima referida tendo em conta que esta poderá colaborar para o desenvolvimento sustentável da Ilha Graciosa, bem como promove-la internacionalmente."

Com os melhores cumprimentos,

O Presidente da Câmara,

José Ramos de Aguiar

Endereço Correio Electrónico e Home Page
gerallesc-graciosa.pt
www.cm-graciosa.pt
ASSUNTO: "Candidatura a reserva da Biosfera da ilha Graciosa"

Venho deste modo acusar a recepção do ofício de V. Exé. acerca do assunto em epígrafe e informar que, tendo levado esta informação à reunião da Assembleia Municipal, realizada no dia 30 do passado mês de Abril, uma grande maioria dos seus membros se manifestaram favoravelmente a esta candidatura.

Junto remeto a V. Exé. cópia da minuta da acta da referida reunião.

Com os melhores cumprimentos

O Presidente da Assembleia Municipal

Luís Manuel de Lemos Reis

Minuta da acta da reunião ordinária da Assembleia Municipal de Santa Cruz da Graciosa, realizada aos trinta dias do mês de Abril do ano dois mil e sete, Nesta data pelas vinte e uma horas, na sala de reuniões dos Paços do Concelho de Santa Cruz da Graciosa, reuniu esta Assembleia com a seguinte ordem de trabalhos:

5. Ponto cinco – Eleição de um Presidente de Junta de Freguesia e de um substituto para participar no XVII Congresso da Associação Nacional de Municípios Portugueses.
ASSEMBLEIA MUNICIPAL DE SANTA CRUZ DA GRACIOSA


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Também presentes o Presidente da Câmara Municipal José Ramos de Agual, o Vice Presidente João Manuel Ávila Picanço e os Vereadores José Gregório Oliveira de Sousa, José Manuel Gregório de Ávila e Manuel Avelar Cunha Santos.

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Aberta a sessão o Presidente da Mesa da Assembleia deu conhecimento da correspondência recebida.

---

No período de "antes da ordem do dia" foram prestados os esclarecimentos solicitados.

---

Terminado o período de "antes da ordem do dia" deu-se início ao período da "ordem do dia" com a respectiva ordem de trabalhos.

---

Ponto um – Apreciação das Atividades e da Situação Financeira da Câmara Municipal.

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Ponto dois – Candidatura a Reserva da Biosfera da ilha Graciosa – Os membros da Assembleia Municipal pronunciaram-se, majoritariamente, a favor desta candidatura.

---

Ponto três – Proposta para a Implementação do Conselho Local de Educação de Santa Cruz da Graciosa. Posto à votação foi aprovado por unanimidade.

---

Ponto quatro – Eleição de três membros da Assembleia Municipal para integrarem o Conselho Local de Educação. Pelos dois grupos parlamentares com assento na Assembleia, foi apresentada uma lista única composta por Valdemiro Adolfo dos Santos Vasconcelos, José Manuel Silva Gregório e António Manuel Ramos Reis. Posto à votação, por escrutínio secreto, foi aprovado por unanimidade.

---

Ponto cinco – Eleição de um Presidente de Junta de Freguesia e de um substituto para participar no XVII Congresso da Associação Nacional de Municípios Portugueses. Por escrutínio secreto, foi feita a votação para o Presidente efectivo verificando-se onze votos para o Presidente da Junta de Freguesia de São Mateus e oito votos para o Presidente da Junta de Freguesia de Santa Cruz. Para o substituto verificou-se onze votos para o Presidente da Junta de Freguesia do Guadalupe e oito votos para o Presidente da Junta de Freguesia de Santa Cruz, ficando assim como efectivo o Presidente da Junta de Freguesia de São Mateus e como substituto o Presidente da Junta de Freguesia do Guadalupe.

---

Ponto seis – Apreciação e votação dos documentos de Prestação de Contas e Relatório de Gestão de 2006. Depois de um breve esclarecimento por parte do Presidente da Câmara foi posto à votação e aprovado por unanimidade.

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Ponto sete – Primeira Revisão Orçamental. Depois de uma breve explanação por parte do Presidente da Câmara e prestados os esclarecimentos solicitados, foi este ponto posto à votação e aprovado com onze votos a favor do Partido Social Democrata e oito abstenções do Partido Socialista.
ASSUNTO: Candidatura à Reserva Biosfera da Ilha Graciosa.

Rotativamente à candidatura à Reserva da Biosfera da Ilha Graciosa, da vossa Secretaria Regional do Ambiente e do Mar – Direcção Regional do Ambiente, vimos manifestar a V. EXC.ª a grande satisfação pela apresentação deste projeto, o qual, no nosso entender, é de vital importância para a conservação dos nossos ecossistemas e para o desenvolvimento económico e humano de forma sócio-cultural e ecológicamente sustentável.

A criação de a Reserva da Biosfera nesta ilha presupõe o cumprimento de várias tarefas. Por um lado, o estabelecimento de mecanismos apropriados de gestão e monitorização ambiental. Por outro o reconciliamento dos interesses peculiares e coordenar todas as actividades a desenvolver na ilha.

Facendo o exposto, registamos com agrado a apresentação deste candidatura, vimos manifestar todo o nosso apoio na sua consecução, desejando os melhores sucessos na sua aprovação e implementação nesta Ilha Graciosa.

Com os melhores cumprimentos.

Diretor da Museu da Graciosa.

[Assinatura]

Jorge Cunha
Face ao exposto, consideramos que a concessão do título de Reserva da Biosfera à Graciosa é uma oportunidade vitoriosa de proteção ambiental, de criação de empregos e de preservação dos valores culturais e patrimoniais para a ilha.

O desafio é traçar um curso para o desenvolvimento que seja motivado pelo idealismo mas sustentado por resultados.

O desafio está na mobilização construtiva da população integrada por uma liderança motivada para o desenvolvimento de ações fundamentais a concretizar no âmbito de um ou mais projectos estruturantes de desenvolvimento sustentado da sociedade graciosense.

Com os melhores cumprimentos e elevada consideração

A Directora da Ecotea

Luídes do Carmo C. S. Valério e Cunha
REGIÃO AUTÓNOMA DOS AÇORES
SECRETARIA REGIONAL DO AMBIENTE E DO MAR
SERVIÇOS DE AMBIENTE DA GRACiosa

Exmo Sr.
Directar Regional do Ambiente
Secretaria Regional de Ambiente e do Mar
Rua Cânsul Dubney, Colónia Alemã
Apartado 140
9900-014 Horta

Sua referência:
N.º SAT/BRA/2007/1078
Data: 31/03/2007

Assunto: CANDIDATURA A RESERVA DA BIOSFERA

Exemplarmente Senhor Director Regional,

Tendo presente a iniciativa da SRAM de propor a ilha Graciosa para Reserva da Biosfera, no âmbito do programa "O Homem e a Biosfera" da UNESCO, somos de informar não só a nossa total anuência a tal diligência como, desde já, dar da nossa total disponibilidade para colaborar em tudo o que julgar por conveniente para levar a bom porto esta tão bela iniciativa.

Enquanto serviços operativos afectos à Secretaria Regional do Ambiente e do Mar, não podemos deixar de essaltar que, incontornavelmente, a ilha Graciosa, elemento singular de um arquipélago caracterizado pelo seu encantador desenho, destaca-se das demais pela sua particular beleza paisagística, existência de um património natural significativo e representativo, curiosas cavidades vulcânicas, quais se destacam a Fuma da Enxofre pela sua raridade e reconhecimento internacional, peculiar arquitetura doméstica e exclusiva "arquitetura da águas", uma vivência social essencial sustentada por práticas culturais "amizades do ambiente", e uma inesquecível e excepcional feição subaquática.

Fato ao exposto não só nos congratulamos com a presente candidatura como, mais uma vez, manifestamos a nossa alegria pois entendemos que a Graciosa é um exemplo de um território que se enquadra perfeitamente no conceito das Reservas da Biosfera.

Com os melhores cumprimentos,

O Director dos Serviços

Pedro Manuel Lopes dos Santos Reis

Rua Victor Cordes, n.º 11 * 9830-390 Santa Cruz da Graciosa
Telefone: 295 403 870 * Fax: 295 403 871
Também no campo do combate às alterações climáticas, estas duas ilhas ao seu lar, reconhecendo uma importância mundial podendo representar um bom modelo de desenvolvimento sustentável, pelo que esperamos ver-se associado e o objectivo de, a muito curto prazo, emissões zero, apostando na eficiência energética e nas energias renováveis.

É neste contexto que esperamos que esta candidatura tenha o melhor sucesso, não só pelos méritos dos seus objectivos directos mas também pelo exemplo e impacto social que terá na evolução cultural das nossas populações e responsáveis políticos.

Grazie pela Vossa atenção e disponíveis para dar o nosso melhor apoio e acompanhar este processo, atentamente.

Hélder Spinola
Presidente da Direcção Nacional da Quebrac

________________________
Hélder Spinola

Quercus. Associação Nacional de Conservação da Natureza
Centro Associativo da Califra - Rua do Carroços
7680-015 Lisboa
Tel. 217 86 414, Fax 217 787 154
Email quercus@quercus.net

ASSUNTO: Candidatura a reserva da Biosfera das Ilhas do Corvo e Graciosa.

Vimos por este meio reiterar a importância que reveste a candidatura à reserva da Biosfera das ilhas do Corvo e Graciosa; porém, em nosso entender, tal classificação só será benéfica se a partir deste estatuto houver consequências reais para o desenvolvimento sustentável destas ilhas.

Sem mais assunto, com os melhores cumprimentos,

Saudações ambientalistas,
A Presidente da Direcção.

Isabel de Ornelas Burgues Armás.

________________________
Isabel de Ornelas Burgues Armás
Assunto: Apoio desta Associação ao Processo de Candidatura a Reserva da Biosfera da Ilha Graciosa

Relacionado com o assunto em epígrafe, vimos dar o total apoio à Candidatura a Reserva da Biosfera da Ilha Graciosa. Achamos de tal importância a Reserva da Biosfera, que toca a espécies marinhas pois é a área que nos toca em especial. pois esta Associação dos Pescadores Graciosaenses, preocupada em proteger as espécies existentes tanto à costa, afirmamos que são os mais desprotegidos. Verificamos que é um aumento de embarcações de Náutica e de Recreio, assim como alguns marginalizados de ocasiões, muitos destes não respeitando a sustentabilidade dos recursos marinhos.

Para tal Apoio na integral deste Projecto, desde que, estas Reservas sejam respeitadas, nos afilias “piloto” os Locais de Conservação e Reprodução da vida marinha, para um melhor desenvolvimento sustentável das espécies existentes, e assim contribuir para um futuro económico das gerações vindouras desta pequena e pacata Ilha Graciosa.

Com os nossos melhores cumprimentos,

Presidente da Direção

O PRESIDENTE DA DIREÇÃO

JOSÉ GABRIEL CUNHA MARTINS
Exmo Senhor

Director Regional do Ambiente
Rua Consul Dabney, Colonia Alemã
9500 - 014 PORTA


No nosso entender, a aprovação desta candidatura trará muitas vantagens para esta ilha, nomeadamente:

1. A conservação das paisagens e ecosistemas locais.
2. O desenvolvimento económico e humano de forma sócio-económico-cultural e sustentavelmente sustentável.

Assim, de acordo com os princípios da candidatura e do seu alcance, vemos manifestar a V. Exª, todo o nosso apoio na concretização deste projecto, desejando os melhores sucessos na sua aprovação e implementação nesta ilha.

Com os melhores cumprimentos,

O Presidente

[Assinatura]

[Data]

Comunicações

Fone Senhor
Director Regional do Ambiente
Av. Antero de Quental, nº 9 - 2º
9500-160 Ponta Delgada

Seu nome e assinatura

Seu cargo

Seu endereço

Data

Comunicado

Assunto: Candidatura a Reserva da Biosfera - Ilha da Graciosa

23/04/2007

Exmo Senhor,

A PT Comunicações, através da sua Direcção Operacional de Negócios – Açores, reúne a importância da classificação pela UNESCO da ilha da Graciosa como reserva da Biosfera. Tal distinção acarreta para aquela ilha inúmeras vantagens, ao preservar a biodiversidade e ao reconhecer a melhoria na qualidade de vida, das condições sociais, económicas e culturais como um caminho para a sustentabilidade.

Com os melhores cumprimentos,

O Director Operacional de Negócios – Açores

[Assinatura]

[Data]

PT Comunicações, S.A.
Direcção Operacional de Negócios - Açores
Av. Antero de Quental, nº 9 - 2º
9500-160 Ponta Delgada
PONTA DELGADA

Tel.: (295) 294 500 001
Fax: (295) 296 500 101

Fone Senhor:
Director Regional do Ambiente
Av. Antero de Quental, nº 9 - 2º
9500-160 Ponta Delgada

[Assinatura]
2C Addresses
Contact address of the proposed Biosphere Reserve

Secretaria Regional do Ambiente
Rua Cônsul Dabney - Colónia Alemã
Apartado 140
9900-014 HORTA
PORTUGAL

Telephone: + 351 292 207 300
Fax: + 351 292 292 004
e-mail address: info.sram@azores.gov.pt
Annex to the Biosphere Reserve Candidature File

MABnet Directory of Biosphere Reserves

Description of the Biosphere Reserve

Administrative Details

Country: Portugal

Name of proposed BR: Graciosa Biosphere Reserve / Graciosa Island Biosphere Reserve

Year designated: 2007

Administrative authorities: Regional Directorate of the Environment (Regional Secretariat of the Environment and the Sea, Autonomous Region of the Azores)

Contact address:
Secretária Regional do Ambiente
Rua Cônsul Dabney - Colónia Alemã
Apartado 140
9900-014 HORTA
PORTUGAL

Telephone: + 351 292 207 300
Fax: + 351 292 292 004
e-mail address: info.sram@azores.gov.pt

Related links (web sites)

www.azores.gov.pt
**Description**

**General Description**

Graciosa is the most northerly of the Central Group of islands in the Azores Archipelago and, with an area of only 60.7 km² and 38.9 km of coastline, it constitutes the second smallest island in the region (after Corvo). Graciosa is also the flattest of the islands, with its highest point reaching 405 m. With a maximum length of 12.6 km and maximum width of 7.0 km, the island extends along a NW-SE orientation and is distanced by 56.8 km from Ponta da Serreta, on the Island of Terceira and 36.5 km from Fajã do João Dias, on the Island of São Jorge.

Presently, Graciosa has approximately 4,800 inhabitants (estimation for 2004 was 4,777 inhabitants), distributed throughout the municipality of Santa Cruz da Graciosa’s 4 parishes: Guadalupe, Luz, Praia and Santa Cruz. Graciosa’s population continues to be strongly linked to the primary sector as a principal source of income and as a secondary activity.

The proposed Biosphere Reserve displays the following zonation:

**Core Areas:** 4 non-contiguous Core Areas are defined (Ponta Branca, Ilhéu de Baixo Islets–Restinga, Caldeira and Vila Islet). These constitute sites classified under the European Union’s NATURA 2000 Network, marine resource special protection areas and the Caldeira Natural Regional Monument of Graciosa Island.

**Buffer Zone:** The Buffer Zones that surround the Core Areas “Ilhéu de Baixo Islets–Restinga” and “Caldeira” unite along a NW-SE axis, at the exterior SE flank of the “Caldeira” cone. The remaining two zones surround the Core Areas “Ponta Branca” and “Vila Islet”. The Buffer Zones consist of public and private lands or marine areas, with land/sea-use practices according to several different territory and activity planning schemes, on a national, regional and local level.

**Transition Area:** The Transition Area encompasses both terrestrial and marine zones and surrounds the entire Core and Buffer Zones. The Transition Area includes urban and urbanizable areas, in public and private lands, with land/sea-use practices in accordance to several territorial and activity planning measures.
**Major ecosystem type:** Average altitudes, coastal cliffs, caves and volcanic pits, shallow coastal areas.

**Major habitats and land cover types:** Coastal islets (Ilhéu de Baixo Islets, Praia Islet and Baleia Islet); Coastal zones (regional); Marine zones (regional); Coastal cliffs (local); Graciosa Island Caldeira (local); Urban zone (local).

**Location (latitude & longitude):** 39º 03’ N - 028º 00’ W (Northern Limit: 39º 06’ N; Southern Limit: 38º 59’ N; Western Limit: 028º 05’ W; Eastern Limit: 027º 55’ W)

**Area (ha)**
- **Total:** 12.172, 5 ha
- **Core Area(s):** 474 ha
- **Buffer Zone(s):** 1.023 ha
- **Transition Area(s):** 10.674,5 ha
Different existing zonation:

Altitudinal range (meters above sea level): 405 m
Research and Monitoring

Brief description

The island of Graciosa has served, for over a decade now, as an experimental laboratory for biodiversity conservation and, due to the island's unique natural characteristics, is frequently visited by national and international scientific expeditions. Past and ongoing experiments in resource management, eradication of introduced species and natural habitat restoration, as well as, the existing infrastructures, contribute to the proposed Biosphere Reserve as being an ideal site for executing research projects, natural resource demonstrative and management actions and for training researchers and technicians in the field.

Specific variables

Abiotic

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<td>Meteorology</td>
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<td>Modeling</td>
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<tr>
<td>Air temperature</td>
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<td>Monitoring/methodologies</td>
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<td>Physical oceanography</td>
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### Biodiversity

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## Integrated monitoring

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### Part I: Summary

#### 1. Name

#### 2. Country

#### 3. Fulfilment of the three functions of biosphere reserves

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<td>3.1. Conservation</td>
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<tr>
<td>3.2. Development</td>
<td>13</td>
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<tr>
<td>3.3. Logistic support</td>
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<tr>
<td>4.1. Encompass a mosaic of ecological systems representative of major biogeographic regions, including a gradation of human intervention</td>
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<tr>
<td>4.2. Be of significance for biological diversity conservation</td>
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<tr>
<td>4.3. Provide an opportunity to explore and demonstrate approaches to sustainable development on a regional scale</td>
<td>26</td>
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</table>
4.4. Have an appropriate size to serve the three functions of biosphere reserves

4.5. Through appropriate zonation

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

4.7. Mechanisms for implementation

5 Endorsements

5.1. Signed by the authority/authorities in charge of the management of the core area(s):

5.2. Signed by the authority/authorities in charge of the management of the buffer zone(s):

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:

5.4. Signed by the authority/authorities, elected local government recognized authority or spokesperson representative of the communities located in the transition area:

5.5. Signed on behalf of the mab national committee or focal point

Part II: Description

Location (latitude and longitude)
10.3. Transition area(s) 61
10.4. Brief description of local communities living within or near the proposed biosphere reserve (ethnic origin and composition, minorities...) 62
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16 Uses and activities

16.1. Core area(s) 192
Institutional aspects

17.1. State, province, region, or other administrative units
17.2. Units of the proposed biosphere reserve
17.3. Protection regime of the core area(s) and, if appropriate, of the buffer zone(s)
17.4. Land use regulations or agreements applicable to the transition area
17.5. Land tenure of each zone
17.6. Management plan or policy and mechanisms for implementation
17.7. Financial source(s) and yearly budget
17.8. Authority(ies) in charge

Special designations

16.2. Buffer zones(s)
16.3. Transition zone(s)
Supporting documents

19.1. Maps
19.2. List of legal documents
19.3. Species list
19.4. List of main bibliographic references
19.5. Official letters of support

Addresses

20.1. Contact address of the proposed biosphere reserve

Annexes