Information Sheet on RAMSAR Wetlands (RIS)

Categories approved by Recommendation 4.7, as amended by Resolution VIII.13 of the Conference of the Contracting Parties.

Note for compilers:

1. The RIS should be completed in accordance with the attached *Explanatory Notes and Guidelines for completing the Information Sheet on RAMSAR Wetlands*. Compilers are strongly advised to read this guidance before filling in the RIS.

2. Once completed, the RIS (and accompanying map(s)) should be submitted to the RAMSAR Bureau. Compilers are strongly urged to provide an electronic (MS Word) copy of the RIS and, where possible, digital copies of maps.

1. Name and address of the compiler of this form:

FOR OFFICE USE ONLY.

DD MM YY

Designation date | Site Reference Number

Secretaria Regional do Ambiente e do Mar
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2. Date this sheet was completed/updated:

1 Mai 2005

3. Country:

Portugal

4. Name of the RAMSAR site:

' Fajãs' of Caldeira and Cubres Lagoons

5. Map of site included:

Refer to Annex III of the *Explanatory Note and Guidelines*, for detailed guidance on provision of suitable maps.

a) hard copy (required for inclusion of site in the RAMSAR List): yes

b) digital (electronic) format (optional): yes

6. Geographical coordinates (latitude/longitude):

Fajã of Caldeira Lagoon (east border of the area): 38º37'32,64"N / 27º55'45,31"W

Fajã of Cubres Lagoon (west border of the area): 38º38'30,12" N / 27º58'6,20"W

7. General location:

Include in which part of the country and which large administrative region(s), and the location of the nearest large town.

The site is located on the North Coast of the S. Jorge Island, one of Azores' nine islands, located in the North Atlantic, on the biogeographical area of Macaronesia, between 36º55º and the 39º 47º of latitude north and the 24º46º and the 31º16º of longitude west. It is part of the Municipality of Calheta of the Azores' Autonomic Region (Portugal).

8. Elevation: (average and/or max. & min.)	**9. Area:** (in hectares)
0,0 - 59 m	86,5

10. Overview:

Provide a short paragraph giving a summary description of the principal ecological characteristics and importance of the wetland.

The RAMSAR site is composed of 3 distinct geomorphological units, one on the west, the Fajã do Cubres (34ha), another one in the east, Fajã da Caldeira (35 ha) and a third one, connecting both the Fajãs, a narrow coastal area (17ha). The site consists of two brackish coastal lagoons, in the Fajã das Caldeiras, the "Fajã da Caldeira de Santo Cristo" lagoon, which we will name from hereafter as "Lagoa da Caldeira" (Caldeira Lagoon) and the Fajã de Cubres lagoon, which we will be referring to as the "Lagoa dos Cubres" (Cubres Lagoon). Both are separated from the ocean by a barrier of rolled rocks on a bed of gravel. The Lagoa da Caldeira, reaches the ocean through a channel formed during high tide (tidal inlet) on the Northwest side, and the Lagoa dos Cubres, communicates with the ocean only by percolation through the barrier.

The site is characterized by two dimensions that give it its relevance at a regional scale: the ecological and the socio-cultural. Ecologically it provides habitats for both local species, unique in the Portuguese territory, as well as for the breeding and passage of migratory birds. It is a place which throughout history has exerted a profound cultural effect on the local and island population, with one of the major religious celebrations of the Azores taking its place here, during the month of September.

11. RAMSAR Criteria:

Circle or underline each Criterion applied to the designation of the RAMSAR site. See Annex II of the *Explanatory Notes and Guidelines* for the Criteria and guidelines for their application (adopted by Resolution VII.11).

(1) • (2) • (3) • (4) • 5 • 6 • (7) • 8

12. Justification for the application of each Criterion listed in 11. above:

Provide justification for each Criterion in turn, clearly identifying to which Criterion the justification applies (see Annex II for guidance on acceptable forms of justification).

Criterion 1: the wetland contains a representative, rare, or unique example of a natural or near-natural wetland type found within the appropriate biogeographic region.

The site contains a rare example of coastal lagoons of a complex nature. The "Fajãs", are plain areas arising from landslide processes the movements of coastal cliff detrital materials, deposited on the basis of the abrupt cliffs, with its morphology being shaped by the coastal morphodynamics and Man. These, have developed associated lagoon-systems, unique on this regions and highly uncommon on volcanic ocean islands, allowing for unique and rare wetlands with a high degree of biodiversity.

Criterion 2: A wetland should be considered internationally important if it supports vulnerable, endangered, or critically endangered species or threatened ecological communities.

The mentioned occurrence of three threatened species qualifies for the application of this criterion. The species are *Erica scoparia* L. subsp. *Azorica* (Annex II Habitats Directive), *Nyctalus azoreum* (IUCN Red List, VU), *Puffinus assimilis baroli* (Bird Directive Annex I), *Pterodroma feae* (IUCN Red List, EN), *Pyrrhula murina* (IUCN Red List, EN), *Dracaena draco* (IUCN Red List, VU), *Juniperus brevifolia* (IUCN Red List, EN), *Picconia azorica* (IUCN Red List, EN) and *Prunus lusitanica ssp. Azorica* (IUCN Red List, EN).

Criterion 3: The wetland should be considered internationally important if it supports populations of plant and/or animal species important for maintaining the biological diversity of a particular biogeographic region.

This area is included in a Site of Community Importance (Costa Nordeste and Ponta do Topo, code PTJOR0014), classified by the Habitats Directive 92/43/CEE, dated May 21st. It is an area that includes several prioritised conservation habitats, as well as some species included on the Attachment II of the Habitats Directive. Prioritised conservation habitats: Coastal lagoon (two lagoons), Mediterranean salty meadows (Cubres), bight and little deep bays, endemic macaronesian marshes (cliffs).

The Lagoa da Caldeira is considered a Special Ecological Area as well as Partial Natural Reservation. The Lagoon was classified as such in 1984 (Regional Decree n.º 14/84/A) based on several criteria, including its exclusive origin, its geological characteristics and the presence of clams (*Venerupis decussatus*). In 1989 it was also declared as Special Ecological Area, as to safeguard the reproduction of the clams (Regional Decree 6/89/A, dated July 18th) as well as to maintain the area's ecological balance.

According to the Coastal Management Plan of the S. Jorge's Island (POOC), besides this protection designation, the Fajã dos Cubres area is also classified as an Important Bird Area.

Criterion 4: The wetland supports plant and/or animal species at a critical stage in their life cycles, or provides refuge during adverse conditions.

The wetlands and adjoining areas, allow for unique and vital conditions of support to vegetable and animal species, both local and migratory. The lagoons are an important habitat for breeding and passage to migratory birds such as the *Calidris alba; Larus marinus; Larus ridibundus; Limosa limosa; Egretta garzetta. Numenius phaeopus.*. It provides habitat to the Aquatic/maritime local birds: *Anas crecca ; Anas platyrhynchos; Gallinula chloropus; Charadrius alexandrinus; Larus cachinnans.*

As to wild animal life, several other endemic species have to be mentioned, due to the extinction risk such as the Azores' bat, *Nyctaleus azoreum*, as well as the *Arenaria interpres* and other birds (feeding on the existing invertebrates). Due to its social importance, the presence of clams, *Venerupis decussatus*, in the Lagoa da Caldeira, occurring in none other place in the Azores islands, has to be registered. Unique also in the area is the *Themiste sp*, a faunal specimen which has nor been described anywhere else in the Azores' islands.

Criterion 7: The wetland supports a significant proportion of indigenous fish subspecies, species or families, life-history stages, species interactions and/or populations that are representative of wetland benefits and/or values and thereby contributes to global biological diversity.

The Lagoa da Caldeira, creates an habitat that have essential and vital functions for the protection of several marine life species, that use this lagoon as a nursery, such as the *Epinephelus marginatus* and the *Mycteroperca fusca*, amongst other species.

13. Biogeography (required when Criteria 1 and/or 3 and /or certain applications of Criterion 2 are applied to the designation): Name the relevant biogeographic region that includes the RAMSAR site, and identify the biogeographic regionalisation system that has been applied.

a) biogeographic region: Macaronesian

b) biogeographic regionalisation scheme (include reference citation): Natura 2000

14. Physical features of the site:

Describe, as appropriate, the geology, geomorphology; origins - natural or artificial; hydrology; soil type; water quality; water depth, water permanence; fluctuations in water level; tidal variations; downstream area; general climate, etc.

The site is comprised by a set of 2 Fajãs with lagoons, connected by a narrow coastal area, formed by beaches of rolled rocks and blocks, interrupted by some plain surfaces resulting from the accumulation of debris (little fajãs).

The Fajãs dos Cubres and Caldeira, are unique geomorphological units, because they have developed lagoon systems on the inside. They are mainly accumulation of debris, resulting from the mass movements of the nearby cliff (more than 600m high), of small slops and with a morphology with few dislocations. The "Fajãs" are separated from the Atlantic Ocean by a gravel barrier.

The physical and chemical properties of the lagoons' water is due mainly to the mixture of plain water with sea water (brackish-water), resulting from different sources. Both are fed through the infiltration of subterranean water, coming from the high plains of the central part of the S. Jorge's Island, infiltration and seepage of ocean water through the barrier as well as above the barrier during the storms. The Lagoa da Caldeira has also a tidal inlet, suffering in a more rough way the effects of the tides. The Lagoa da Caldeira has sediments formed mainly by sand, sand with some mud and gravel, while the Lagoa dos Cubres has other materials such as ooze.

The Azorean climate is maritime tempering climate, influenced for the hot current of the Gulf where the north-Atlantic anticyclones predominate. Characterized by a low thermal amplitude (average annual temperature: 18ºC, average annual thermal amplitude: 8ºC) and by a high rainfall (average annual between 1340 and the 1507) and humidity, with a strong marine influence. The high rainfall are justified mainly due to the increased relief, creating the necessary conditions for the existence of the Foehn effect, inducing an increase on the rainfall rate, creating clouds and mists, being also the reason behind the different humidity and temperature on the different altitudes. This effect is particularly noted on the north oriented cliffs. The dominant winds are of the west quarter, reaching higher speeds on the month of January (16.5 km/h) and minimal on June (9.5 km/h).

The two Fajãs have similar land use pattern, that is a markedly agricultural/pastures landscape, although more so on the Fajã dos Cubres, due to the demographic context and the higher accessibility. The Fajã da Caldeira, has a soil use dominated by abandoned natural pastures and a built habitation nucleus with a high degree of degradation. The Fajã dos Cubres has a paved access, and the pastures together with some agriculture are predominant. There is also a habitation nucleus, but in a rather better shape than the previous one.

15. Physical features of the catchment area:

Describe the surface area, general geology and geomorphological features, general soil types, general land use, and climate (including climate type).

Not applicable

16. Hydrological values:

Describe the functions and values of the wetland in groundwater recharge, flood control, sediment trapping, shoreline stabilization, etc.

According to Borges (2003) the Fajã dos Cubres has a lagoon system with a barrier entirely of gravel, with more than 4.3 m above sea level, 30 m width, stretching along 900 m, occupying a total area of 27.000 km2, with a volume of 58.000 m3. The sediment transport in the barrier is preferentially transversal. The lagoon body has aprox. 30.400 m2, with a volume of 29.000 m3 and a depth of 2.6 m below average level. The filling and emptying of the lagoon body is done exclusively through the infiltration and percolation, with the exception of the oceanic overflow. The amplitude of the lagoon tide is 0.03 m, with a renewal rate of the lagoon body around 3%. The migration of the barrier is done essentially through the

transversal transport associated with the overwash phenomena. This barrier has not been subjected to any type of man intervention, regarding its stabilization.

The Fajã da Caldeira has also a lagoon system with a gravel barrier with 740 m, an average width of 103 m, 3.6 m on average, above the sea level, with a surface of 75.900 m2 and a volume of 137.000 m3. The barrier has a tidal inlet with an amplitude of tide around 0.2 m (low tides) and 0.7 m (high tides), clearly dominated by the tide flood, that gives the lagoon an optimal efficiency on the retention of oceanic sediments. The lagoon body averages 66.000 m2, a volume of 210.000 m3, a maximum depth of 6.17 m, with a rate of water renovation between 6.3 (low tides) and 22% (high tides). Although with a tendency for generalized increased erosion, studies have revealed that the barrier has a pattern of erosion/seasonal accretion, with a tendency of evolution and accumulation oriented towards west, which will eventually cause the tidal inlet to close. This phenomenon has caused human intervention, in order to keep the tidal inlet permanently open, having this Fajã been subjected to an extensive anthropic intervention along all the barrier. It should also be noted that several sectors on the barrier are also subjected to oceanic overwash in a continuous form, whenever some extreme phenomena occurs.

17. Wetland Types

a) presence:
Circle or underline the applicable codes for the wetland types of the RAMSAR "Classification System for Wetland Type" present in the RAMSAR site. Descriptions of each wetland type code are provided in Annex I of the *Explanatory Notes & Guidelines*.

Marine/coastal: A • B • C • D • (E) • F • G • H • I • (J) • K • Zk(a)

Inland: L • M • N • O • P • Q • R • Sp • Ss • Tp Ts • U • Va • Vt • W • Xf • Xp • Y • Zg • Zk(b)

Human-made: 1 • 2 • 3 • 4 • 5 • 6 • 7 • 8 • 9 • Zk(c)

b) dominance:
List the wetland types identified in a) above in order of their dominance (by area) in the RAMSAR site, starting with the wetland type with the largest area.
J , E.

18. General ecological features:
Provide further description, as appropriate, of the main habitats, vegetation types, plant and animal communities present in the RAMSAR site.

According to the identification of the habitats that are part of the 2000 Natura Network (General Secretary for Conservation of Nature of the Regional Department of Environment), in the area the prioritized habitats for conservation are as follows:

- In both lagoons, the "coastal lagoon" habitat, mainly occupied by the species *Rupia marítima*, *Scirpus maritimus*, *Juncus acutus* and *Polypogon maritimus*;

- The bight and little deep bays habitats, with a great diversity of sediments and substracts, deeply stratified and well defined in terms of benthos communities, with an important biological diversity;

- In the Cubres there are also the "Mediterranean Salty Meadows", an habitat dominated by the species *Juncus maritimus and Juncus acutus,* and seldom *Solidago sempervirens;*

- In the area surrounding the cliffs, the habitat "Endemic Macaronesian marshes, coastal sub-type" can be found, with the following species: *Erica azorica ssp. azorica*, *Myrica faia*, *Juniperus brevifolia* as well as *Myrsine africana*, *Corema album*, *Silene uniflora* and *Crithmum maritimum*, with some herbaceous elements such as *Festuca petraea*, *Carex hochstetteriana*, *Daucus carota ssp. azorica*, among others;

As to the fauna, the RAMSAR site is a direct habitat to non-aquatic vertebrates, such as birds like *Charadrius alexandrinus* (resident), *Ardea cinerea* (migratory) and the endemic bat, *Nyctalus azoreum*, as well as

aquatic migratory birds such as *Anas platyrhyncos* and *Anas crecca* and sea birds such as *Stema dougallii*, *Calonectris diomeda* and *Puffinus assimilis baroli*.

19. Noteworthy flora:

Provide additional information on particular species and why they are noteworthy (expanding as necessary on information provided in 12. Justification for the application of the Criteria) indicating, e.g., which species/communities are unique, rare, endangered or biogeographically important, etc. *Do not include here taxonomic lists of species present – these may be supplied as supplementary information to the RIS*.

We have only considered the species that are found inside the RAMSAR site. According to Barcelar et al. (2004), based upon the works of Morton et al. (1998) as well as the Coastal Management Plan of S. Jorges' Island, the following species and habitats can be found on this site:

The land margin of the Lagoa da Caldeira is the one of the most man-modified due to the introduction of some species such as *Aloe arborescense*, *Opuntia ficus-barbarica* and *Ficus carica*. The upper area of the margin is dominated by sea-radish, *Beta vulgaris maritima*, by the New-Zealand-spinach, *Tetragonia tetragonoides* as well as several coast mustards. The lower part has mainly *Atriplex hastate* and *Convolvulus arvensis*. In terms of seaweeds*, Cladophora prolifera* and *Padina pavonica* can be found here.

On the upper side of the lagoons' barrier the species *Crithmum maritimum*, *Campylopus introflexus*, *Trichostomum brachydontium*, *Trichostomum crispulum*, *Festuca petraea*, *Taraxacum officinale*, *Anagallis arvensis* and *Tetragonia tetragonoides*., can be found.

On the intertidal part of both lagoons, as well as in deeper areas permanently flooded, even in low tide, one can find large rocks pushed inside during stormy waves. On these rocks some seaweeds, such as *Mesophyllum lichenoides*, can be found. Macro-seaweeds are scarce both in species and bio-mass, which leads one to believe that primary production is based on the seaweeds thrown/washed into the lagoon. Nevertheless some species such as *Grateloupia sp*., *Codium sp.* and *Polysiphonia sp.* can be found.

The existence on the northeast sector of a small area that is filled with water during high tide (infiltration and percolation), draining and filling without large fluxes of water, has originated the accumulation of considerable amounts of mud, ooze and clays. These accumulated sediments are an important habitat for several marine species, specially those adapted to dig and by such is a rare habitat in the all archipelago. Several seaweeds exist here (vertically distributed according to their resistance to air exposure and which are the primary productivity source) such as the *Themiste sp.* (not described anywhere else in the Azores) and *Sagatina omata*, wich plays an important role on the trophic chain.

20. Noteworthy fauna:

Provide additional information on particular species and why they are noteworthy (expanding as necessary on information provided in 12. Justification for the application of the Criteria) indicating, e.g., which species/communities are unique, rare, endangered or biogeographically important, etc., including count data. *Do not include here taxonomic lists of species present – these may be supplied as supplementary information to the RIS*.

Following the previous criteria and according to the same sources, the existing fauna species are the following: *Melarhaphe neritoide* and *Littorina striata* (living on the large rocks on the margin), as well as *Ligia italica* and *Orchestia mediterranea*. Inside the lagoon a high number of species can be found. This increased biodiversity has an enormous conservation value. On the other hand it also performs important functions in terms of trophic chains that allow a good ecological balance, protecting also several marine species that use this area as a nursery, such as the *Epinephelus marginatus*, the *Mycteroperca fusca* and others.

The presence of the clams *Venerupis decussatus* has to be highlighted. Introduced in the lagoon probably for economical reasons, it has been widely used, with its presence being a valuable economic resource. There are no records of the time of the introduction of this species, but its presence is not registered anywhere else in the Islands'.

This lagoon is also important for several birds, in terms of nesting, as well as a passage zone for migratory birds, such as the royal duck *Anas platyrhynchos*, , *Anas crecca*, *Numenius phaeopus* and *Larus nidibundus*.

The most representative species found on the enclave are the *Arenaria interpres* and several birds (feeding on the existing invertebrates).

21. Social and cultural values:

e.g., fisheries production, forestry, religious importance, archaeological sites, social relations with the wetland, etc. Distinguish between historical/archaeological/religious significance and current socio-economic values.

Before the people's departure, that affected the areas of the Fajã (mainly due to the high vulnerability risk for earthquakes and tsunamis, aggravated by the emigration that affected the all Island) these areas where highly wanted by the local populations not only for living but mainly as agriculture fields for vegetables such as cabbages, potatoes, wild yams, onions and garlic, for fruits such as grapes, figs, apples, bananas, nuts, plums and others, as well as for corn, aloe and animal production. In the present days, with the exception of some small farming, the vast majority of the land is either used for pasture or is completed abandoned.

This is an area with a remarkable historical and cultural value, of which some traces still exist in our days. On the site, besides the existence of old houses, there are also traditional watering hole systems, water fountains and some ruins of ancient watermills, which remain as records of traditional agriculture practice, as well as some small churches and chapels, most of them from the end of the XIX century or early XX century.

The Fajã de Santo Cristo (Holy-Christ Fajã) is also the stage of one of the most important faith practices of the all archipelago, which is the religious activities in honour of the Divine Holy Spirit, in which people from all the Islands are gathered together in the Fajã da Caldeira.

22. Land tenure/ownership:

(a) within the RAMSAR site: Part of the areas of the RAMSAR site are privately owned, nevertheless most of it falls under the State jurisdiction, because of being covered by several special protection status and specific plans, namely the coastal areas and the wetlands.

(b) in the surrounding area: The surrounding areas are mainly privately owned, although some areas are also covered by State jurisdiction.

23. Current land (including water) use:

(a) within the RAMSAR site: In the present days, in the Ramsar site, some areas of agriculture and pasture exist as well as some constructions. In the lagoon body, in the Fajã da Caldeira, there is a clam catching activity, which is an important local economic resource. There is also a seasonal use of the beaches.

(b) in the surroundings/catchment: There is some construction pressure, specially the renovation of existing housing buildings. There is also some modest agriculture practice as well as animal pasture. The beach and the high waves attract local surf practices.

24. Factors (past, present or potential) adversely affecting the site's ecological character, including changes in land (including water) use and development projects:

(a) within the RAMSAR site:

Some present and potential adverse factors are currently affecting, or will in a near future, the ecological characteristics of the site:

Present:

- Increased environmental vulnerability, namely the geomorphological hazards (mass movements, landslides, erosion, etc.), seismic hazards, amongst others;
- Inexistence of residual-waters treatment;
- Inexistence of officially authorized tourist lodgings;

- Unauthorized tourist camping on the Fajã da Caldeira;
- Inexistence of supervision by the local authorities of the fishing practices;
- The capture of clams as a negative impact on all the biotic communities of the lagoon;
- Inexistence of a clams' quality control;
- Inexistence of a quality control program on the lagoons' water;
- Deficient information for visitors.

Potential :

- Increased pressures on the fishing resources due to underwater captures;
- Lack of supervision of clam capture, by local authorities, may lead to the extinction of this species in the lagoon;
- Vulnerability to certain natural actions as well as anthropogenic, capable of increasing risks to populations, ecosystems and buildings;
- Loss of the Fajãs characteristics specificities (cultural and landscape values);
- Loss of human presence in the Fajãs;
- Lack of specific tourism planning;

(b) in the surrounding area:

With the exception of the activities that are directly connected with the lagoon's water-body, for example the clams capture practice, the existing and potential problems are the same for the surrounding area.

25. Conservation measures taken:

List national category and legal status of protected areas, including boundary relationships with the RAMSAR site; management practices; whether an officially approved management plan exists and whether it is being implemented.

- Site of Community Importance (NE Coast and Ponta do Topo, code PT22PE028), classified under the Habitats Directive 92/43/EEC, May 21st;

- The Lagoa da Caldeira has been classified as Special Ecological Area (Regional Decree 6/89/A, July 18th); and Partial Natural Reservation (Regional Decree 14/84/A, de 21/2).

26. Conservation measures proposed but not yet implemented:

e.g. management plan in preparation; official proposal as a legally protected area, etc

- The area which is under the jurisdiction of the Management Plan of the Coast of S. Jorge's Island (POOC), indicates both lagoons bodies, as Important Bird Areas (IBA);

- Regional Special Ecological Area by Decret-Law N.º 6/89/A of 18th of July.

27. Current scientific research and facilities:

e.g., details of current research projects, including biodiversity monitoring; existence of a field research station, etc.

There are no research facilities on the S. Jorge's Island.

28. Current conservation education:

e.g. visitors' centre, observation hides and nature trails, information booklets, facilities for school visits, etc.

There is no visitors' centre or any physical structure with such vocation or use, although the SRAM has projected the construction of a centre for environmental education and interpretation on the Fajã da Caldeira. There is a trails' network in good conditions and reasonably marked. Some information signs on the Natura 2000 network do exist.

29. Current recreation and tourism:

State if the wetland is used for recreation/tourism; indicate type(s) and their frequency/intensity.

There are no studies related to the activities, frequency and intensity of leisure and tourism activities. Nevertheless some tourists are usually on the site following the pedestrian trails, as well as some beach users, sports' fisherman and surfers.

30. Jurisdiction:

Include territorial, e.g. state/region, and functional/sectoral, e.g. Dept of Agriculture/Dept. of Environment, etc.

State jurisdiction / Regional Secretariat for the Environment and the Sea (Secretaria Regional do Ambiente e do Mar).

The area is also managed at local /municipal level by the Calheta Municipality.

31. Management authority:

Provide the name and address of the local office(s) of the agency(ies) or organisation(s) directly responsible for managing the wetland. Wherever possible provide also the title and/or name of the person or persons in this office with responsibility for the wetland.

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32. Bibliographical references:

scientific/technical references only. If biogeographic regionalisation scheme applied (see 13 above), list full reference citation for the scheme.

Borges, Paulo, 2003. Ambientes Litorais nos Grupos Central e Oriental do Arquipélago dos Açores, Dissertação apresentada à Universidade dos Açores para a obtenção do grau de Doutor em geologia, Universidade dos Açores, Ponta Delgada, Cdrom.

Bacelar, J.; Lapão, L.; Pereira, S.; Carvalho, S.; Clara, T.; 2004. Proposta de Desenvolvimento e Conservação da Costa Norte I. Trabalho realizado no âmbito do Mestrado em Ordenamento do Território e Planeamento Ambiental. FCT- Universidade Nova de Lisboa, Monte da Caparica, Policopiado

European Environment Agency, 2005. Biogeographical regions, Europe 2001, in http://www.eea.eu.int/ (consultado em Julho de 2005)

Farinha, J. C, L. Costa, A. Trindade, P. R. Araújo & E.P. Silva 2001. Zonas Húmidas Portuguesas de Importância Internacioanl. Sítios Inscritos na Convenção de RAMSAR. Instituto da Conservação da Natureza.

Instituto da Água, 2002. Plano de Ordenamento da Orla Costeira de S.Jorge, Oficina de Arquitectura, Quaternaire Portugal, Vol.1.

Medeiros, C.A., 1999. A Ilha de S. Jorge (Açores). Evolução da ocupação humana. Actividades do sector primário. Estudos de Geografia Humana e Regional. Estudos Regionais e Locais - C17. Centro de Estudos Geográficos. Universidade de Lisboa, Lisboa.

MORTON, B. et al, 1998. Ecologia Costeira dos Açores. Sociedade Afonso Chaves -Associação de Estudos Açorianos, Ponta Delgada.

Sjögren, E., 2001. Plantas e Flores dos Açores. Espaço Talaza. Lajes do Pico.

Legislation:

Directiva 92/43/CEE do Conselho, de 21 de Maio de 1992, relativa à preservação dos habitats naturais e da fauna e da flora selvagens