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CONVENTION ON THE CONSERVATION OF EUROPEAN WILDLIFE
AND NATURAL HABITATS

Bern Convention Group of Experts
on European Islands Biological Diversity
/
Groupe d'experts de la Convention de Berne
sur la Diversité biologique des Iles européennes

Tenerife, Spain, (1-3 October 2009)
/
Ténérife, Espagne (1-3 octobre 2009)

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COMPILATION OF NATIONAL REPORTS ON ACTIVITIES RELATED TO BIOLOGICAL DIVERSITY ON EUROPEAN ISLANDS

- DRAFT -

Document prepared by
the Directorate of Culture and of Cultural and Natural Heritage

CONTENTS / SOMMAIRE

1. CROATIA / CROATIE

Written contribution on island biodiversity in Croatia for the 1st Meeting of the Bern Convention Group of Experts on European Island Biological Diversity, Tenerife (Spain), 1-3 October 2009

Prepared by the State Institute for Nature Protection and the Ministry of Culture, Nature Protection Directorate, September 2009

General characterictics

Even though Croatia is not an island state, it has 1 185 islands which are geographically classified into 718 islands, 389 islets (peak above sea level) and 78 reefs (peak below sea level). They all together represent just 5.8% of the Croatian territory, but they make up about 70% of the total Croatian coastline. Only 47 islands are inhabited, while 100 islands are considered to be occasionally inhabited. The 30 largest Croatian islands cover as much as 92.2% of the total island area. The largest islands are Krk and Cres (405.78 km^2).

Biodiversity and endemism

Plant species richness for all Croatian islands has been estimated to 1807 plant species on the basis of floristic study of 106 Croatian islands (Nikolić et al. 2008). On these islands there were 89 circum-Adriatic endemic and 35 narrow endemic plant taxa recorded. Some of the narrow endemics include taxa from genera *Asperula*, *Brassica*, *Centaurea*, *Limonium* etc. which are mostly confined to South-east Adriatic islets.

Regarding the vertebrate fauna, almost 200 species inhabit Croatian islands (Tvrtković (ed.) 1997). Of the mammalians especially interesting is the only island population of European mole (*Talpa* cf. *europaea*), which was found on the island of Cres and is considered to belong to a discrete taxon. It is classified as Endangered in Red Book of Mammals of Croatia (Tvrtković (ed.) 2006).

Croatian islands present important nesting place for many endangered bird species as Cory's Shearwater (*Calonectris diomedea*), Eleonora's Falcon (*Falco eleonorae*), Griffon Vulture (*Gyps fulvus*), Audouin's Gull (*Larus audouinii*) and Little Tern (*Sterna albifrons*).

Among reptiles, the most interesting are 13 endemic taxa of Dalmatian wall lizard (*Podarcis melliselensis*), each restricted to a single island.

Invertebrates as a whole are poorly researched in Croatia. Although data on some groups of invertebrates on particular islands exist, general surveys on all Croatian islands have not been conducted yet.

Threats and problems

Main threats and problems on Croatian islands include: littoralization (concentration of economic activities and population along the coast), lack of integrated coastal zone planning and management, illegal building, tourism and urban development (including infrastructure and recreational activities), depopulation (the most prominent process on some islands), land abandoning (abandoning of traditional extensive grazing and mowing), unsustainable fishing, poaching, inadequate use of speleological objects, untreated waste waters, fires etc. Invasive alien species (IAS) also present one of the major threats to islands' biodiversity. Silver-leaved nightshade (*Solanum elaeagnifolium* Cav.) on the island of Plavnik, eastern mosquitofish (*Gambusia holbrooki*) in ponds of several islands, small Indian mongoose (*Herpestes auropunctatus*) on some Dalmatian islands and wild boar (*Sus scrofa*), fallow deer (*Dama dama*) and mouflon (*Ovis aries musimon*) which have been introduced to some islands as game species represent just some of the most prominent IAS problems on Croatian islands. Furthermore, two invasive algae of the genus *Caulerpa* have been found in the Croatian part of the Adriatic Sea: *Caulerpa taxifolia* and *Caulerpa racemosa*.

Protection of island biodiversity

Legislation

The Regulation on Protected Coastal Area Development and Conservation (Official Gazette 128/04) defines 'protected coastal area' consisting of all the islands and a 1 000m wide mainland and a 300m wide marine belt measured from the coastline, which stands for tidal wave line on the coast.

The Islands Act (Official Gazette Nos. 34/99, 149/99, 32/02, 33/06) prohibits the introduction and breeding of alien game species, which do not inhabit the island naturally.

The Nature Protection Act (Official Gazette Nos. 70/05 and 139/08) does not address island biodiversity as a separate subject, but regulates the protection of species and habitats, as well as the protection and use of natural assets.

In the Strategy and Action Plan for the Protection of Biological and Landscape Diversity of the Republic of Croatia (Official Gazette No. 143/08) the following action plans specifically address the island biodiversity issues:

- Protection of ecosystems and habitats - Establish and implement protection of habitats on islands hosting endemic taxa and/or on nesting sites, resting places during migration, sand beaches, ponds and springs.
- Elimination of invasive species - Scientifically determine the population count of introduced game on the islands, develop and implement elimination programmes.

The Ordinance on Proclamation of Wild Taxa as Protected and Strictly Protected (Official Gazette No. 99/09) and the Ordinance on the Sorts of Habitat Types, Habitat Map, Endangered and Rare Habitat Types as well as Safeguard Measures for Conservation of Habitat Types (Official Gazette No. 07/06) contain the lists of protected species and habitats.

The Regulation on Proclamation of the Ecological Network (Official Gazette No. 109/07) established the Croatian Ecological Network on the 47% of the land and 39% of the marine territory. Ecological Network covers 86,88% of the total island area in Croatia.

On the COP9 of the Convention on Biological Diversity in 2008, the Republic of Croatia committed to GLISPA Partnership that brings together island nations and nations with islands to ensure the conservation and sustainable livelihoods on islands.

Croatia is also dealing with the island biodiversity issues in the scope of the activities and incentives under the Convention for the Protection of the Marine Environment and the Coastal Region of the Mediterranean (Barcelona Convention) (Barcelona, 1976, 1995) and the appertaining Protocol concerning Specially Protected Areas and Biological Diversity in the Mediterranean (Barcelona, 1995).

Protected areas

There are three National parks on islands (IUCN category II; Brijuni, Kornati, Mljet) and two island Nature parks (IUCN category V; Telašćica and Lastovo Archipelago), which consist of land territory and the adjacent sea.

Process of the permanent protection of the Lošinj-Cres archipelago as a Regional park (IUCN category V) is ongoing, since this area has been identified as one of the critical habitats for bottlenose dolphins (*Tursiops truncatus*) in the eastern Adriatic.

Croatian Ecological Network

Croatian Ecological Network was proclaimed in 2007 in accordance with the Nature Protection Act, with defined areas of national and international importance. It includes Areas important for wild taxa (except birds) and habitats, which correspond to NATURA 2000 proposed Sites of Community Importance (pSCIs), and Areas internationally important for birds, which correspond to NATURA 2000 Special Protection Areas (SPAs).

Areas important for wild taxa (except birds) and habitats comprise in total 27.49% of the island territory in Croatia while areas internationally important for birds cover as much as 81.26% of the island territory in Croatia.

Ongoing and planned projects

Project Blue Corridor

As a part of a large-scale Conservation planning project initiated by World Wildlife Fund for Nature (WWF) 12 hot spot marine biodiversity areas for conservation in the Mediterranean region have been identified. One of 12 sites is in the Adriatic Sea, Dalmatian coast and represents a 'blue corridor' for biodiversity conservation, which specifically recognizes islands Svetac, Brusnik, Biševo, Vis, Lastovo, Mljet, Sušac and Jabuka pit. WWF and Sunce (non-government organization from Split, Croatia) are advocating implementation of the *'blue corridor'* project that would help establish an MPA network in the Adriatic Sea.

Project COAST

The main goal of the UNDP/GEF project Conservation and Sustainable Use of Biodiversity in the Dalmatian Coast through Greening Coastal Development (COAST) is to ensure that the development path of the Croatian Coast is environmentally friendly, with the conservation of landscape and biological diversity central to that development path. Project areas are four Dalmatian counties rich with biological and landscape diversity, including the following islands: Pag, Mljet, Vis, Biševo, Svetac, Jabuka, Brusnik and Palagruža, identified as of national, Mediterranean and global values. The project is to remove barriers to mainstreaming and implementing environmentally friendly practices of the key economic sectors in Dalmatia: tourism, fisheries, mariculture, agriculture and banking/finance.

The project results so far are: inventory of fauna, inventory and mapping of flora, habitat mapping, inventory of coastal fisheries resources and recommendations for sustainable coastal fisheries in Vis aquatorium, creation of the technical/expert basis as prerequisites for management of the Biševo and SE Vis marine areas as a part of the Croatian Ecological Network. In the year 2008 the book "The flora of Adriatic coast and islands" has been published, also in the frames of COAST project.

Identification and setting-up of the marine part of Natura 2000 network in Croatia - Marine NATURA 2000 Republic of Croatia

This project aims at the identification of the marine part of NATURA 2000 network with the main goal – detailed program of work for finalizing marine NATURA 2000. The project will contribute to the existing draft proposal of marine NATURA 2000 by identifying the list of potential NATURA 2000 sites. This list is to be prepared through consultations with relevant stakeholders and scientific community with the purpose to contribute to further development of the national biodiversity monitoring system through capacity building for the inventorying of marine biodiversity and monitoring and reporting according to provisions of Habitats Directive.

WWF Thousand islands - Contribution to the implementation of NATURA 2000 in Croatia

As a follow up project of PHARE 2005 (Implementation of NATURA 2000 in Croatia) - The consultation process launched by the PHARE project was very successful but incomplete in a sense that it did not address the relevant sectors that take part in management and use of the sea (fisheries, maritime transportation, tourism, energy, etc.). The proposed project will assist the SINP in extending the NATURA 2000 consultation process to all public and private groups that have an interest in the management and use of marine resources and areas, in order to prepare the ground for the future effective management of the identified marine NATURA 2000 sites. The improvement of scientific knowledge on relevant marine biodiversity features provided by the IPA project should be coupled with a consultation process with all groups that have an interest and stake in the management of marine areas and resources (e.g. Ministry of Agriculture, fishery sector, etc.), both at national and county level.

Strategic Partnership for the Mediterranean Sea Large Marine Ecosystem - Pilot-project for Croatian marine protected areas (MedPan)

The aim of the project is to enlarge effectiveness of biodiversity conservation of valuable coastal and marine areas by crating coherent network of protected marine areas and development of management plans for selected marine parks: national parks Kornati, Mljet and Brijuni, as well as nature parks Telašćica and Lastovo archipelago.

2. ICELAND/ISLANDE

The 28 th meeting of the Bern Convention 2008 accepted several activities for 2009 including a –Group of Experts on Island Biodiversity.

Terms of reference:

Identify specific conservation problems of biological diversity in European islands, registering threatened endemics, identifying island species and habitat-types at risk from global change, networking regional experts and contributing to the CBD's agenda of work on island biodiversity, proposing special conservation solutions for European islands.

The first meeting of the group is to be held in Tenerife, Spain in October 2009. Thirteen states will participate in the group: *CROATIA, CYPRUS, FRANCE, GREECE, ICELAND, IRELAND, ITALY, MALTA, NORWAY, PORTUGAL, SPAIN, TUNISIA, UNITED KINGDOM*

Before the meeting the member states are asked to report on the following (it is recognized that some of the issues are general for a island states):

1. Are there specific conservation activities focused on island biological diversity in your state ?

Iceland is an island situated in the middle of the North Atlantic Ocean, approximately 290 km east of Greenland and 970 km west of Norway.

The country is isolated from other landmasses, which makes it difficult for plants and animals to disperse to Iceland. It can therefore be said that all conservation activities are more or less focused on island biology in Iceland though the legislation on nature conservation does not specifically point this out. Biological diversity is not very high, and there are few endemic species of fauna and flora (see below). The country's northerly latitude and harsh climate prevent traditional large scale crop cultivation, limiting agriculture mainly to animal husbandry. The country is, however, endowed with an abundance living marine resources, and last but not least, a distinctive natural environment.

Specific activities focused on island biological diversity are more on case by case level. Surtsey for instance, an island that was created in volcanic eruption between 1963-1967, is strictly protected so succession can be followed and monitored without interference of unnatural dispersion to the island.

Conservation activities also concern eradication of certain IAS plants and animal species, see below.

To prevent that diseases can spread to the country (more than the protection of biological diversity) live stock animals that have been brought out of the country can not be imported again.

Experimental project for eradication of the American mink 2007–2009

The American mink (*Mustela vison*) escaped from mink-farms in the early 1930s and has since spread and become established in the entire lowlands of the country.

The Ministry for the Environment and the Environment Agency are engaged in a three year experiment, started in 2007, to establish the feasibility of eradication of mink from two geologically different areas–Eyjafjördur, a fjord with long valleys, in the north of Iceland and Snæfellsnes, a mountainous peninsula and small islands, in west Iceland. The results of this project will be used to evaluate the feasibility (effort and cost needed) of eradicating mink in the whole country.

Control of Nootka lupine and Cow parsley

The Nootka lupine (*Lupinus nootkatensis*) and cow parsley (*Anthriscus sylvestris*) are two of the worst alien plant species in Iceland. There are currently two projects focusing on these species: a) control of Nootka lupine in the Skaftafell National Park, southern Iceland, by sheep grazing and mechanical cutting, b) control of lupine and cow parsley in Hrisey-island, northern Iceland, by mechanical cutting and herbicide treatment

2. State of knowledge of threatened endemic island flora and fauna. (Are there list of threatened species for the different islands ? for which groups ?)

There are available lists for threatened species in Iceland for vascular plants (including mosses and lichens) and birds but not specifically for endemic species. There are few endemic species in Iceland and most of the islands around the country are so close to the main island (Iceland) that there have not been discovered any endemic species for particular islands. Two species of culex have been discovered and an endemic family of subterranean amphipods (Crustacea) has recently been discovered in Iceland, in addition to a new species of a previously known amphipod family. Iceland was covered by glaciers from about 2.6 million BP to about 10,000 BP and is isolated on the mid-Atlantic Ridge, far from the North American and European continents. This relatively short period of time since Iceland was covered by glaciers is probably one of the reasons for the few findings of endemic species.

3. Available information on island IAS and their effect on endemic species.

Iceland (The Icelandic Institute of Natural History), has remained active in the North European and Baltic Network on Invasive Alien Species (NOBANIS); in establishing the NOBANIS data base and in preparing fact-sheets for some of the worst alien species.

Revision of the Act on Import of Animals make applications for import of new animal species more difficult. Accordingly, every new application for import of life animals must include an assessment of environmental risks involving the possibility of the new animal is accidentally released into the wild. Further instructions on how this risk assessment is to be conducted will be detailed in a regulation made by the Minister of Agriculture under advice from the Minister of the Environment.

As stated above there are relative few endemic species in Iceland and research on the subject, effect of IAS on endemic species, can be described as not existing. There is a great need for research on this matter for instance on the effect of Nootka lupine on the diversity on Icelandic vascular plants.

4. Expected effects of climate change on island species (extinctions, new "natural" colonisations, new IAS ?)

(Reference for the text below is manly from the report ,,Signs of Climate Change in Nordic Nature“, TemaNord 2009:551)

The increase in temperature in Iceland is estimated to be on average 0.2 °C pr. decade in the first half of this century. The temperature increase could be op to 1,4 and 2.4 °C depending on emissions of green house gasses.

Some examples of observed and possible changes.

In the whole of the southern part of the Nordic countries, the spring starts considerably earlier now than in 1982. The most significant change is in the southern part of the region, with changes of up to two weeks. At the same time, the fall is delayed by one to three weeks for the whole of the area (including Iceland), apart from the most continental section of northern Scandinavia. In the mountains, there are a few places with a shortening of the season and – as a result of thicker snow cover due to an increase in winter precipitation. In general results show a pattern relating to vegetation zones (north to south) and vegetation belts (altitude). The length of the growing season and the timing of spring have a great impact on primary-production, the composition of the plant communities and the range of plant species.

All the glaciers in Iceland have diminished in the past decades. Spring meltdown of rivers starts earlier. If the climate changes continue in the speed as now some of the glaciers will disappear.

Insects

Already, several responses to climate changes have been observed among insects as butterflies and moths in Iceland. In Iceland moths have been monitored since 1995. Some species advance their flying time in early season and there are examples of a second generation individuals of the early flyers in the autumn, which are certainly not able to produce further. The same holds for a dipteran tipulid species (*Tipula rufina*), there is also indications of southern species becoming more numerous

and extending their range towards north. Moreover new species have successfully colonized the country during this time (E. Olafsson, pers. com.).

Pollen

The amount of wind-dispersed pollen in the air has been monitored for the past 20 – 30 years in Finland, Norway, Sweden, Denmark and Iceland (http://www. polleninfo.org/). The data shows that for many tree species, including birch, the pollen season now starts ever earlier. The birch pollen season in Denmark, Norway and Iceland starts 10 to 26 days earlier today than it did two decades back.

Birch

Research indicates that the tree line of mountain birch has shifted upwards over the last few decades in Iceland. This shift is considered to be an indicator of the effects of climate change.

Arctic fox

Data from Iceland show that the population of the arctic fox has been increasing (decrease have been seen elsewhere in the Nordic countries), and in 2003 the population was estimated to include at least 7,500 individuals (Hersteinsson 2006). There are no indications that global warming is affecting this population. The reasons for the different patterns in Iceland and Fennoscandia may be the stable food supply in Iceland and the absence of the red fox here and on other North Atlantic islands .

Seabirds

Large-scale decreases in reproductive success, survival rates and population

numbers for North Atlantic seabirds have been reported over the last decades. Experts consider it an indirect effect of climate change due to a decline in food source (small fishes). These small fish feed on cold water zooplankton that is decreasing, probably due to an increase in sea water temperatures

A study of seabirds in Iceland for the period from the 1980s to 2005 shows, for

Example, a long-term decrease in the population of the thick-billed murre (*Uria lomvia*) and fulmar (*Fulmarus glacialis*), a decline considered to be caused by large-scale changes in food supply. Thus, food availability and quality is directly linked to seabird survival and reproductive success.

Fish-zooplankton

Zooplankton species in the North Atlantic Ocean have expanded their range more than 1,100 km northwards over the last 50 years. Concurrent with the expansion northwards of these warm-water copepods, the cool-water copepod assemblages have retracted to higher latitudes. Increasing sea water temperatures and stronger north-flowing currents are possible causal factors.

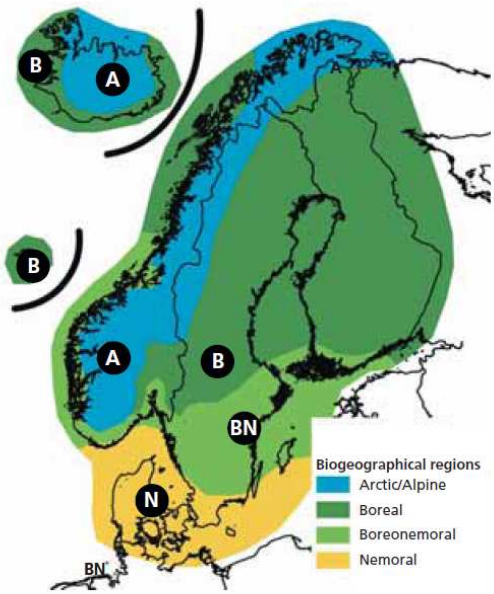
Fish species, including cod (*Gadus morhua*, the main fishing stock in Iceland) and haddock (*Melanogrammus aeglefinus*), have shifted north towards cooler waters in response to rises in temperature in the marine areas of the Nordic region. Climatic changes are expected to have major impacts on fishes range, reproduction etc.

Bio-geographical zones.

The Nordic countries can be divided into four bio-geographical zones: the Arctic/alpine, boreal, boreonemoral and nemoral zones. There are alpine regions mainly in the Scandinavian Mountains.

The other zones are found in parallel belts running east-west. The Arctic regions are in the north, including

Svalbard, Iceland and Greenland. The very southern coastline of Greenland shows boreal characteristics. The boreal zone consists of coniferous forests (coniferous forests are not natural for Iceland), while Denmark and the southernmost tip of Sweden lie in the nemoral zone, where deciduous forests naturally predominate. The most vulnerable regions to climate change are the Arctic, mountain areas and coastal zones (IPPC 2007).



A The arctic/alpine zones constitute areas above and north of the climatic tree border.

B The boreal zones are dominated by coniferous forests and experiences several months of temperatures well below 0 °C.

BN The boreonemoral region is a transition zone between the nemoral and boreal zones, with an increasing degree of deciduous trees running southwards.

N The nemoral region is characterised by deciduous trees, and a considerable milder climate than that of the boreal zone.

3. PORTUGAL (Azores)/PORTUGAL (Açores)

THE AZORES CONTRIBUTION

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Islands have long provided model systems in which ecologists and evolutionary biologists have developed, tested and refined models for species diversity (Whittaker & Fernández-Palacios 2007). Islands are also a major focus for global conservation efforts because they typically have a high proportion of endemic species (Borges & Hortal 2009). Human activities are increasingly altering the natural processes structuring ecological assemblages of island biotas and especially the rate of colonization, often introducing species at rates estimated to be orders of magnitude greater than historical levels (Gillespie & Roderick). The sudden influx, in ecological time, of non-native species has had profound consequences for island biodiversity. Many native taxa have been driven to extinction through increased predation, competition, alterations to pollination and dispersal networks, or hybridization (Whittaker & Fernández-Palacios 2007).

1. Conservation activities focused on island biological diversity in Azores

1.1 In the Azores we are using the ATLANTIS Tierra database as a tool for conservation managment. This software was written in Visual Basic, using a common database environment; it uses the SQL language to develop interrogation queries and has an easy interface with all GIS software. With this database it is possible to store detailed information about the taxonomy and georeferrenced distribution of all species on the surveyed geographical areas of interest ATLANTIS Tierra 2.0 was inspired on "Worldmap distribution analysis software". Most data is now available online throughout the Azorean Biodiversity Portal (www.azoresbioportal.angra.uac.pt/)

1.2 The Azores and Madeira archipelagos both have recent update lists of species:

Borges, P.A.V., Abreu, C., Aguiar, A.M.F., Carvalho, P., Jardim, R., Melo, I., Oliveira, P., Sérgio, C., Serrano, A.R.M. & Vieira, P. (eds.) (2008). *A list of the terrestrial fungi, flora and fauna of Madeira and Selvagens archipelagos*. Direcção Regional do Ambiente da Madeira and Universidade dos Açores, Funchal and Angra do Heroísmo., 438 pp.

Borges, P.A.V., Cunha, R., Gabriel, R., Martins, A. F., Silva, L. and Vieira, V. (eds.) (2005). *A list of the terrestrial fauna (Mollusca and Arthropoda) and flora (Bryophyta, Pteridophyta and Spermatophyta) from the Azores*. Direcção Regional do Ambiente and Universidade dos Açores, Horta, Angra do Heroísmo and Ponta Delgada, 318 pp.

Both books have already become a key reference for Azorean and Madeira biodiversity research and it is an important tool for people working in the areas of taxonomy, ecology and nature conservation management;

We are presently working on a second edition of the Azorean Book:

Borges, P.A.V., Cunha, R., Gabriel, R., Martins, A.F., Melo, I., Silva, L. & Vieira, P., Vieira, V. (eds.) (in prep.). *A list of the terrestrial fungi, flora and fauna from the Azores.* Direcção Regional do Ambiente and Universidade dos Açores, Horta, Angra do Heroísmo and Ponta Delgada

1.3 The Azorean Government is investing money in removing several invasive plant species in all the nine islands, namely *Pittosporum undulatum* and *Hedychium gardneranum.*

1.4 The Regional Secretary of Environment and Sea, in cooperation with the University of the Azores, re-examined the Protected Areas Network of the Azores according to the IUCN criteria

and reclassified the reserves into the IUCN Management Category System. The new Protected Area Network of the ARA includes five of the six IUCN Management Categories which are: Strict Nature Reserve (Category I), Natural Monument (III), Nature Conservation Reserve (IV), Protected Landscape (V) and Resource Reserve (VI). All the previously existing protected areas of the Azores have been re-classified, according to the IUCN criteria.

1.5 It was concluded that based on the uniqueness of species composition and higher species richness, some conservation efforts should be focused on unmanaged Pico Alto region in the oldest island, S. Maria (Borges et al. 2005a). Based on these results, the Azorean Government was advised to create a new protected area in Pico Alto, and the area has since become a designated protected area using the **IUCN Management Category System (see above)**.

2. State of knowledge of threatened endemic island flora and fauna

2.1 The recent publication of two books dealing with the TOP 100 threatened (see Martin et al. 2008) and TOP 100 invasive (see Silva et al. 2008) species of Macaronesia, was an important effort towards obtaining important guidelines for future biodiversity conservation legislation for the Azores.

2.2 An excellent example in the Azores is the BALA project (Biodiversity of Arthropods from the Laurisilva of the Azores) (1998-2005), under the coordination of the Azorean Biodiversity Group (www.angra.uac.pt/gba)

Eighteen native forest fragments distributed across seven of the nine islands were sampled in this study (see Gaspar et al 2008). Altogether, they represent most of the native forest cover of the Azores, excluding highly fragmented, small patches (less than five hectares), located at low altitudes and/or strongly disturbed by exotic plants or cattle, which were not sampled.

During the summers of 1999 to 2004, transects 150 m long and 5 m wide were established in 100 sites (usually one transect per site).

All Araneae, Opilionida, Pseudoscorpionida, Myriapoda and Insecta (excluding Diptera and Hymenoptera) were assigned to morphospecies through comparison with a reference collection. Based on BALA project, the diversity and rarity of arthropods (including endemics) were analysed based on standardized sampling of soil and forest canopies (Borges et al. 2005a, 2006; Ribeiro et al. 2005; Gaspar et al 2008). It was concluded that based on the uniqueness of species composition and higher species richness, the conservation efforts should be focused on unmanaged Pico Alto region in the oldest island, S. Maria (Borges et al. 2005a). Based on these results, the Azorean Government was advised to create a new protected area in Pico Alto, and the area has since become a designated protected area (2008). Consequently, after 10 years of combining accurate delimitation of species (taxonomy) (Borges et al. 2005b; Borges & Wunderlich 2008), with an analysis of their spatial (biogeography) (Borges & Hortal 2009), and environmental (macroecology) patterns (Borges et al. 2006; Gaston et al. 2006; Cardoso et at. 2007), the GBA, with the cooperation from all the team members, is now targeting the generation of long-term ecological data of high conservation value for the Azorean islands.

2.3 I have a Post-Doc (Pedro Cardoso) doing his work in the Smithsonian Institution (Washington). We intend to propose redlisting criteria appropriate for invertebrate taxa. Building on current WCU (The World Conservation Union - formerly, IUCN) criteria we will amend existing criteria to reflect better the practicalities and realities of invertebrate data.

3. Available information on island IAS (Invasive Alien Species) and their effect on endemic species

Borges et al. (2006) showed that richness of endemic species is driven by abiotic factors such as a climatic axe (oceanic-type localities with lower temperatures and summer precipitations) and a binary variable CALD (location of sites in calderas or ravines), whereas richness of introduced species depends on disturbance related factors. However, after factoring out these major influences, there is strong correlation between endemic and introduced richness, suggesting that independently of the environmental and geographic factors that affect the distribution of native or introduced species, richest endemic assemblages are more prone to invasion due probably to a facilitation process.

In addition, Cardoso et al. (2007) obtained sites of high and low biotic integrity in the Azores based on exotic species abundance and other related metrics.

We need further prediction of spatial patterns of exotic species invasion, which was recently performed for *Pittosporum undulatum* in São Miguel Island (Hortal et al. subm.).

4. Expected effects of climate change on island species (extinctions, new "natural" colonisations, new IAS (Invasive Alien Species)?

Several projects are currently running or about to start that will help to answer this question:

1. FCT- PTDC/BIA-BEC/100182/2008 – "Predicting extinctions on islands: a multi-scale assessment" (2010-2013)

Coordinator: Paulo Borges (Azorean Biodiversity Group) – Budget for the Azorean Biodiversity Group: 194.907,00€

2. FCT - Green Islands Project – "Use of woody plant biomass for energy production in the Azores Islands" – (2010-2012)

Coordinator: Luís Silva (CIBIO- Azores) – Budget for the Azorean Biodiversity Group: 13.348,00€ Euros.

3. DRCT - M.2.1.2/I/003/2008 "Consequências das alterações de uso de solo na fauna de artrópodes dos Açores - Objectivo 2010" (2009-2010)

Coordinator: Paulo Borges (Azorean Biodiversity Group) – Budget for the Azorean Biodiversity Group: 25.000,00€

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4. SPAIN (Balears) / ESPAGNE (Baléares)

LA DIVERSITE BIOLOGIQUE DES ILES BALEARES

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DIVERSITÉ BIOLOGIQUE INSULAIRE: ORIGIN ET HISTOIRE

Les Baléares sont un arxipel placé au centre de la Méditerranée occidentale, a quelques 110 km de l'Ibérie, 230 de l'Algérie et 330 du Midi de la France et de la Sardaigne. Il est constitué par quatre îles principales (Majorque, 3640 km2; Minorque 690 Km2; Eivissa 541 km2 et Formentera 98 Km2), et plus d'une centaine d'îles et îlots mineurs. La base géologique c'est le calcaire, et le relief modeste. Seulement Majorque a des vrais étages altitudinaux, avec une douzaines de sommets sur les 1000 m d'altitude.

Ces îles son géologiquement "continentales", car elles représentent la suite des Serres Bétiques, pliés lors de l'Orogenèse Alpine. Leurs peuplements biologique, et notamment le peuplement animale et humain, sont très conditionnés par l'haut niveau d'isolement de ces terres: en effet, l'arxipel était déjà isolé lors des grands changements biogéographiques européens dus aux glaciations; donc, faune et flore insulaires sont, en origine, pauvres en espèces et originales c'est a dire, riches en endémiques, sur une base générale d'espèces méditerranéennes anciennes, a l'écart des expansions postglaciales de faune et flore orientaux ou boréals.

Le peuplement humain est aussi relativement récent, en fait, les archéologues considèrent que les Baléares sont les dernières îles a être peuplés en Méditerranée: si diverses espèces *pre-sapiens* ont habité –et influencé- le continent européen, l'home moderne a peuplé les grandes îles et les arxipels orientaux beaucoup de millénaires avant C. Par contre, les Baléares ne sont étés occupés que quelques 2500 ans a.d.C, c'est a dire, même après la construction des Pyramides en Égypte!

Peuplement humain récent, certes, mais non moins impactant: de son arrivé, l'homme a exploité de façon directe les écosystèmes insulaires (chasse et récolte, bois, défrichement) et les a transformé en toute intensité. L'agriculture plus pastoralisme ont arrivé aux derniers coins des territoires. Ecosystèmes forestiers, plaines et montagnes on changé rapidement. Plus tard, ce sont les marais qui ont connu le drainage. Le littoral –dunes incultivables, maquis sur calcaire, de sols maigres-, a été pendant des siècles terrain de frontière –depuis Crist, plus de dix drapeaux nationaux on brandit aux Baléares, inclût celui de l'indépendance a des couts périodes-. Mais aux XXème siècle, le développement d'un tourisme estival de masse a bouleversé la société, l'économie et le territoire (Baléarisation c'est un mot connu).

Un autre facteur de changement de conséquences majeures a été l'introduction d'espèces: ce ne pas l'homme qui a occupé les îles, mais un vrai "andro-ecosistéme": faune et flore liée a *Homo sapiens*, son bétail, ses cultures, ses parasites, les espèces accompagnantes, les microorganismes qui y vivent... Un flux que s'initia avec les premiers peuplements, et qui c'est maintenu jusque a nos jours, en une intensité qui est fonction de la fréquence et l'amplitude du flux de voyageurs et des marchandises. L'espèce humaine représente un vrai pont entre les îles et le continent, et a ce moment (30 bateaux par jour, 13 millions de tonnes de marchandises et plus de 12 millions de touristes par année) ce "pont" est très large...

Si la transformation des habitats et des paysages est d'une totale évidence, très probablement les changements de la faune et la flore insulaire par effet des introductions, bien que moins visible, c'est encore plus important. Un exemple: la faune de mammifères terrestres pre-humaine (trois espèces) a totalement disparue, et la totalité des ceux qui peuplent aujourd'hui les îles ce le produit du transport humain, volontaire ou pas. L'évidence du changement dans ce groupe zoologique est due aux témoignage paléontologique; on peut seulement imaginer que le bouleversement des groups biologiques que fossilisent rarement (invertébrés, plantes...) a été similaire. Donc, a ce moment, on

n'a pas les moyens pour distinguer les espèces autochtones, qui on peuplé les îles par soi-même, des espèces introduites, sauf dans le cas d'origine biogéographique non paléarctique (espèces neotropicales, sudsahariennes...). Ça concerne, bien sur, les espèces sans capacité de vol ou dispersion aérienne (celles qui ont besoin d'un pont).

L' ENDEMICITÉ INSULAIRE

Certes, on pourrai penser que les endémiques sont autochtones. Alors, quelques 140 plantes (sur une flore proche aux 3000 espèces), une centaine de coléoptères, plus de 45 mollusques terrestres et de 70 crustacés sont exclusifs des Baléares. Quelques uns y sont très répandus, et comptes avec des effectifs nombreux, donc pas de souci pour sa conservation. D'autres, par contre, ne vivent que sur un petit îlot, aux remparts d'une falaise ou dans une des nombreuses grottes calcaires que creusent le subsol.

On a aussi quelques vertébrés endémiques qui ont résistée (comme des irréductibles gaulois!) l'arrivé des continentaux: le lézard des Pitiuses (*Podarcis pityusensis*), celui des Baléares *Podarcis lilfordi* disparu des grands îles, existe toujours sur les îlots ; ou le Ferreret, *Alytes muletensis*, un discoglossidé archaïque et rélictuel dans les canons karstiques, inaccessibles aux serpents arrivés depuis l'époque romaine.

Si le cas est clair pour les bonnes espèces, bien différenciés des continentaux, ce n'est pas le même pour les sous-espèces, notamment de mammifères: la genette, la martre, le lérot ou le mulot, par exemple, présentent des sous-espèces endémiques, tout a fait valables point de vue systématique et biologique. Et, sans aucune doute, ce sont des espèces introduites, de seulement quelques millénaires d'isolement. Alors, la formule simple "espèce introduite – aucun valeur de conservation – éradication si possible" s'avère toute a fait fausse: ces introductions anciennes, d'espèces que aujourd'hui font partie des écosystèmes locaux et que y ont évolué de façon originale, voire unique, sont de tous point de vue, des espèces a conserver.

LA CONSERVATION DE LA BIODIVERSITÉ DES BALEARES

Conservation biologique: un paradigme nouveau qui conditionne la société et l'économie, un paradigme que caractérise nôtre génération. En effet, celle de nos parents –et toutes les antérieures- avaient ses rapports avec la nature avec le prisme de l'utilité directe: on conservait le gibier ou les arbres, mais on détruisait les "nuisibles" ou drainait les marais... Occuper massivent le littoral, construire sur les dunes, tuer le dernier phoque moine (ennemi irréconciliable des pêcheurs), la dernière aigle de Bonelli,etc, tout ça faisait partie du progrès. Ce sont de millénaires d'une culture fondé sur le message de Dieu: " **Creced y multiplicaos y poblad la tierra. Que teman y tiemblen ante vosotros todos los animales de la tierra, y todas la aves del cielo, y todo cuanto se mueve sobre la tierra: todos los peces del mar estan sujetos a vuestro poder. Y todo lo que tiene movimiento y vida os servira de alimento: . todas las cosas os las entrego, asi como las legumbres y la hierbas. (Génesis 9: 1-3).**

El bien, le changement ne peut pas être mois radicale: aujourd'hui les lois et même la morale sociale n'admettent pas la destructions des espèces ou de la vie sauvage. Conserver faune et flore, maintenir, voire restaurer les paysages, c'est impératif du niveau de les grands accords internationaux a celui de la conscience individuelle de la majorité des citoyens. Ce ne pas un mal résultat pour un demi siècle...

Les Baléares: des lois et des arrêts qui protègent un 90% des espèces de vertébrés, une vingtaine de plans de conservation ou récupération des espèces les plus menacés, un système d'espaces protegés avec quelques 90.000 ha distribués a dix parcs ou réserves naturels, 22% de la surface terrestre et plus de 100.000 ha de surface marine sous NATURA 2000, restrictions de développement urbanistique encore plus étendues. Ce le bilan, toujours provisoire, de la protection de la nature sur le territoire insulaire. Affaire a suivre, bien sur !

Joan Mayol
Septembre 2009

5. SWEDEN/SUEDE

Sweden welcomes the Bern Convention's initiation of the Island Biodiversity Group. The question of island biodiversity is important for Sweden as we have thousands of islands ranging from the large islands of Gotland and Öland, the large archipelago systems in the Baltic Sea, North Sea and numerous small islands and skerries in the large freshwater systems of *i.e*. Lakes Mälaren, Vänern, Hjälmaren. More than 530 areas, which include islands, are included in the Swedish *Natura 2000* network. Island biodiversity in Sweden has a unique value for biodiversity, the cultural environment and society. More than 187 red- listed threatened species have been identified as occurring in coastal and island habitats.

Island biodiversity is not only a question of terrestrial biodiversity, but is interconnected with the biodiversity of the surrounding waters of the sea/lake areas. If we are to be successful in conserving and safeguarding islands biodiversity, we need to have a holistic approach to island biodiversity and to consider relationships between ecosystems, habitats and species in both aquatic and terrestrial biomes, as well as society's role. We hope that the Bern Convention's working group on Islands Biodiversity will contribute to developing and implementing a holistic ecosystem approach in the work for halting the loss of island biodiversity.

Threats to island biodiversity in Sweden

Swedish island habitats, biotopes and cultural environments are often very small, fragmented, have a high preservation status for biodiversity and are very sensitive to many different pressures. Complex biological, climatic and geological factors, as well as human land use during thousands of years have contributed to the rich biodiversity of Swedish islands.

1. Exploitation pressure leads to habitat destruction

Exploitation for recreational use of land and water is a major pressure on island biodiversity. Construction of summer homes and tourist developments has contributed to destruction of many habitats, despite the Swedish laws which protect the shoreline from development. Islands within the archipelagos in the vicinity of Swedish cities, such as the Stockholm and Gothenburg archipelagos are especially affected. The intense seasonal pressure of tourists and seasonal inhabitants on islands leads to erosion and interferes with fauna, especially hatching birds. One example is the successful breeding of the Velvet scoter *Melanitta fusca* has declined in areas where noise from water scooters is prevalent. Release of untreated sewage waste from recreational boats and summer homes contributes significant amounts of nutrients to the surrounding water. Waste disposal has become an acute problem on some islands.

Exploitation of natural resources on and in the vicinity of islands affects island biodiversity both directly and indirectly. The fishing sector affects island biodiversity through overfishing and fishing practices such as trawling, which have profound effects on sea bottoms and affects the entire island nutrient web. Changes in fish and zooplankton due to fishing and eutrophication directly affect birdlife. Competition for fish between the fishing sector and animals, such as seals and cormorants, has lead to direct controls in population levels of these species.

Changes in ownership structure of islands and the shift of forestry practices to modern, large scale timber extraction is having profound effects on the biodiversity of small islands. Aquaculture is at present not a large industry in Swedish water, but there is interest to increase this sector in coastal waters and lakes.

2. Exploitation for energy and shipping

The development and construction of windfarms on islands, skerries and shallow banks is exerting an increasingly large pressure on island biodiversity. The construction of underwater cable systems for energy and communication and constructions on land and water to support these cable systems, is a growing threat to island biodiversity through direct physical disturbance. Construction and maintaining these developments is also a vector for the introduction of invasive alien species, as

boat transports and machinery used in these projects often come from other regions and are difficult to disinfect. The physical structure also provides a new surface and biotope for alien and translocated species.

The physical construction and maintenance of shipping lanes for the large number and size of cargo ships in international trade and cruise ships in the Baltic, affect island biodiversity, especially in Stockholm's archipelago. Shipping lanes are in places quite narrow and the enormous size of ships, large numbers and close proximity to land cause significant coastal erosion, noise and visual pollution and greatly affect both terrestrial and aquatic biodiversity.

3. Introduction of invasive alien species

The introduction of invasive alien species is a particularly great problem for Swedish island biodiversity because of the endemic and sensitive nature of island flora and fauna. The current state of the Baltic Sea with the problems of eutrophication, overfishing, organic pollutants and large amounts of shipping facilitate the introduction and establishment of invasive alien species. The resilience of the ecosystem may be reduced by overexploitation of marine resources and cause a major shift in trophic interactions and imbalance in the ecosystem which enables alien species to establish and spread. Often invasions are not detected until quite far into the process, which makes eradication and control efforts difficult and expensive and likelihood for success is greatly diminished.

Predatory invasive alien species are particularly a large threat to Swedish island biodiversity. The introduction of the mink via escapes and releases from fur farms is a great threat to ground nesting birds on islands. Programs for eradication of mink have largely failed. Control of mink populations in areas of especially high value for biodiversity is an ongoing and long-term effort with mixed results. The recent and ongoing invasion of the raccoon dog to northern Sweden and the islands in the Haparanda archipelago has been identified as a high risk for biodiversity in the area and a monitoring and eradication program is now in place.

Ballast water is an important vector for the introduction of invasive species to islands. The macroalgae *Gracilaria vermiculophylla* is now spreading in the intertidal zone of Gothenburg's archipelago and competing with indigenous vegetation. The invasive common cord grass *Spartina anglica* has now spread to an island near Gothenburg, where it may potentially alter the habitat. The spread of the Japansese rose *Rosa rugosa* has become very rapid along the coasts and on islands throughout Sweden. *Rosa rugosa* is very successful in outcompeting indigenous flora and is a nuisance for human use of beaches. Efforts in controlling this plant are time-consuming, expensive and thus occur only in protected areas such as national parks and nature preserves.

The introduction of parasites such as the eel swimbladder nematode *Anguillicola crassus* threaten the existence of the eel and disrupt the nutrient web of island biodiversity.

4. Eutrophication

Eutrophication of inland waters and the Baltic Sea has profoundly altered the ecosystems of the archipelagos. Anthropogenic sources of nutrients are decreasing through efforts to reduce excess nutrients release by improved agricultural and forestry practices, improved sewage treatment, construction and restoration of wetlands etc. but much remains to be done.

5. Pollution

The release of oil, chemicals and other pollutants from shipping threatens to radically increase as the amount shipping and size of ships in the Baltic continues to increase with the growing importance of global trade and the development of the Russian oil export through the Baltic. Both large scale releases of oil and smaller, diffuse release from *i.e.* engines are a very large threat to life on islands.

Marine litter causes the death of birds and fish and is a very big threat for island biodiversity. In recent studies, it has been seen that in some areas no marine animals lack traces of plastic particles from marine litter in their internal organs.

6. Climate change

Climate change will lead to changes in the environment *i.e.* amounts and regime of precipitation and runoff, water levels, storm frequencies, which will directly and indirectly affect island

biodiversity. Increased surface runoff from land together with altered oceanic currents and wind systems are expected to lead to a reduction in salt content of the Baltic Sea, which will have a profound effect on biodiversity.

Climate change may also result in changes in land and water use. There will most probably be an increased demand for developing windfarms on and near islands and skerries.

7. Social change

Island human communities are often rural and relatively isolated. Stringent climatic conditions contribute to difficulties in maintaining year round physical and social infrastructures, which has consequences also for biodiversity. Changes in land use, such as the disappearance of small farms with the traditional animal husbandry has lead to the degradation of valuable habitats. Grazing by livestock and/or cultivation is necessary for the preservation of a number of habitats *i.e.* sea meadows which in turn affect vegetation, insects and birdlife. The practice of fencing in livestock to deny their access to water, for sanitary reasons in order to prevent the spread of pathogens from the animals to bathing water, is a threat to the preservation of aquatic meadows.

The migration of younger people to urban areas has left a significant weaker and smaller population who can be engaged in year round work in nature conservation of islands.