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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)
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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

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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

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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. FRANCE / FRANCE

Bilan de la connaissance, des perturbations apportées à la biodiversité insulaire (France méditerranéenne), moyens de conservation appliqués à la Corse et propositions

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APERÇU DE LA RICHESSE SPÉCIFIQUE ET DE L'ORIGINALITÉ DU PEUPLEMENT :

La France métropolitaine présente trois façades maritimes importantes, en Méditerranée (1694 km), en Atlantique (2400 km) et en Manche-Mer du Nord (1759 km) et un espace maritime très vaste dont les îles et îlots constituent une composante non négligeable. En effet, on en dénombre plus de 600 de taille très variable, de quelques dizaines de m ² à 8700 km² pour la Corse (qui comprend elle même 123 îlots satellites).

La plupart de ces milieux insulaires ont subi ou subissent une anthropisation d'intensité variable, les îles d'une taille supérieure ou égale à 2 km² étant le plus souvent habitées. Le peuplement humain, parfois très ancien, a eu une influence considérable sur les habitats naturels, la flore et la faune présente. Il faut donc bien garder en mémoire que la situation actuelle résulte de pratiques anciennes et que l'abandon de certaines pratiques a pu contribuer au retour (certaines colonies d'oiseaux marins par ex.) ou à la quasi disparition de certains taxons.

L'insularité s'accompagne d'une faible diversité spécifique (problèmes spatiaux, limitation des échanges) mais est souvent synonyme d'originalité en raison de l'évolution de certaines espèces dans un contexte isolé, d'autant plus marqué qu'il est ancien. Ce phénomène qui se traduit par un endémisme spécifique ou sub-spécifique est essentiellement connu en Corse et dans ses îlots satellites, du fait de l'ancienneté de l'isolement (20 Millions d'années), de la distance par rapport au continent, de la taille relativement modeste de l'île et le relief très marqué (point culminant à 2700 m).

Ainsi, l'ensemble des milieux insulaires de France méditerranéennes , hors de la Corse, n'abrite que très peu d'espèces endémiques, alors que cette île et ses îlots satellites abritent 316 taxons endémiques (146 stricts à la Corse, Jeanmonod et Gamisans, 2007). Chez les invertébrés aquatiques, on note un endémisme de 25% sur les principaux groupes, ce taux s'élevant à 50% chez les trichoptères (Guidicelli, 1975 complété par Roché, 1993). Les scientifiques poursuivent leurs investigations, et la génétique permet maintenant de compléter, et parfois de consolider la connaissance sur l'histoire des faunes et des flores insulaires en découvrant par ailleurs de nouveaux taxons.

Ainsi, des recherches en cours sur le genre *Limax* (mollusques) en Corse tendent à valider la présence d'une dizaine de nouvelles espèces (Falkner et Régnier, en cours).

Chez les reptiles et amphibiens, la diversité est certes faible (18 taxons) mais on dénombre 8 espèces endémiques dont 3 spécifiques à la Corse.

Certains taxons du fait de leur extrême localisation sont particulièrement exposés : la Lunetière de Rotges (*Biscutella rotgesii*), le Centranthe à 3 nervures (*Centhrantus trinervis*) et l'Helix de Corse (*Tyrennaria ceratina*) constituent quelques exemples marquants.

Les milieux insulaires du littoral de France continentale et de Corse sont aussi des sites privilégiés de reproduction des oiseaux marins, qui par leur mode de reproduction, seraient trop exposés aux prédations

sur le continent. Sept espèces nichent sur les îles, milieux qui abritent l'essentiel de leur population nationale pour plusieurs d'entre elles comme le Puffin cendré (*Calonectris diomedea*), l'Océanite tempête (*Hydrobates pelagicus*), le Cormoran huppé de Méditerranée (*Phalacrocorax aristotelis subsp. desmaretii*). Cependant, au regard des populations européennes, les enjeux pour le maintien de la biodiversité restent modestes, exception faite du Cormoran huppé de Méditerranée.

Avec une seule espèce endémique d'oiseau stricte à l'île, la Sittelle corse (*Sitta whiteheadi*), qui vit dans les forêts de pins laricio fait exception. On note néanmoins plusieurs formes endémiques ainsi que la présence de la Fauvette sarde. Bien que non endémique, le Balbuzard pêcheur (*Pandion haliaetus*) mérite d'être cité car une trentaine de couples se reproduisent en Corse.

Ne pouvant évoquer les îles sans le milieu marin qui les entoure, nous noterons que la flore et la faune marine offrent une grande diversité spécifique, la plupart des espèces ayant une large distribution (ainsi sur les 412 espèces de poissons de Corse, aucune n'est endémique, selon l'ichtyologiste Roger Miniconi). Pour les mollusques, il y a l'exception de la Patelle géante (*Patella ferruginea*) localisée dans le bassin ouest méditerranéen et qui se fixe sur le substrat rocheux de l'étage supra littoral. Bien présente en Corse, la Patelle géante a disparu des côtes continentales françaises du fait de récoltes abusives. A l'exemple de la presqu'île de Scandola/golfe de Porto, les écosystèmes sont bien conservés.

LES PROBLÈMES MAJEURS AFFECTANT DE FAÇON SPÉCIFIQUE LA FAUNE ET LA FLORE INSULAIRE :

Il est difficile de hiérarchiser les problèmes qui affectent ou pourraient affecter la biodiversité insulaire, d'autant que de nouveaux problèmes, confidentiels aujourd'hui, peuvent surgir demain en raison de l'évolution des technologies et des loisirs.

Nous allons néanmoins présenter une liste d'activités pouvant impacter la biodiversité en Corse.

Nature	Impacts généraux susceptibles de s'exercer
Incendies (naturels ou criminels	Les surfaces parcourues par les feux en Corse restent très variables selon les années avec des extrêmes à plus de 30 000 ha en 1983 et moins de 500 ha en 2008. C'est une pratique séculaire qui affecte souvent les mêmes terrains. Il en résulte une modification des groupements végétaux, un appauvrissement considérable de la flore (Jeanmonod et Gamisans, 2007) des érosions du substrat, ainsi que des mortalités importantes sur les mollusques et les reptiles. Si le nombre de départ de feux et les surfaces parcourues diminuent significativement (lutte préventive et active en constante amélioration), la déprise agricole et le réchauffement climatique favoriseront de plus en plus les incendies. Certaines espèces en tirent cependant bénéfice (Fauvette sarde, *Sylvia sarda*…) La Sittelle corse (*Sitta whiteheadi*), qui vit dans des peuplements âgés de Pins laricio a été durement affectée en 2000 et 2002 (plusieurs dizaines de territoires ont été perdus pour un effectif mondial inférieur à 2000 couples). La tortue d'Hermann (*Testudo hermanni*) paye également un lourd tribut aux incendies.
Pompages, captages, aménagements hydrauliques	Les besoins en eau augmentent et les aménagements sont en hausse afin de répondre à une demande croissante de la population pour divers usages (consommation directe de l'eau, hydroélectricité). Dans certains cas, les habitats et la faune benthiquevont vont être affectés (débits amoindris, eutrophisation des barrages, obstacles aux migrations) ;
Exploitation forestière, pistes	L'exploitation forestière du Pin laricio ne constitue pas une menace immédiate dans la mesure où la majorité des peuplements sont localisés dans des forêts publiques (soumis au régime forestier) ou difficiles d'accès. La survie de la Sittelle corse dépend étroitement de la conservation de futaies âgées. La combinaison de la hausse des incendies et de l'intensification de l'exploitation constituerait une menace très forte pour la survie de l'espèce. La création de pistes peut favoriser l'accès à des zones sanctuarisées (zones de quiétude pour le mouflon, accès facilité aux têtes de bassin et en conséquence risques de braconnage affectant la truite…). Les pistes forestières sont aussi des corridors pouvant localement favoriser l'expansion vers l'amont d'espèces exotiques, dont plusieurs sont des invasives (Ailanthus par exemple). Une politique mesurée d'ouverture de pistes est conseillée.

Cueillette, ramassage abusifs	La cueillette de plantes du littoral, très localisées, aux vertus médicinales avérées ou supposées, (*Polygonum maritimum* et *Euphorbia peplis*) affaiblit les populations. Hors littoral, le même problème se pose pour des plantes médicinales ou aromatiques. Ce problème est cependant atténué par la mise en place d'une charte de la cueillette et des arrêtés préfectoraux en 2009 pour la cueillette de 3 espèces aromatiques : la criste (*Crithmum maritimum*), l'immortelle (*Helicrysum italicum)* et l'Euphorbe épineuse (*Euphorbia spinosa*)
Collection	La mode des collections est en partie passée mais il n'est pas exclu que des prélèvements ponctuels se pratiquent encore ; la Corse est en effet parcourue par beaucoup de naturalistes. Les lépidoptères sont particulièrement concernés. La Grande Nacre (*Pinna nobilis*) est également récoltée pour la décoration.
Urbanisation	Il s'agit d'un problème important sur la grande île de Corse. La demande est essentiellement orientée sur la frange littorale dans quelques pôles attractifs (Ajaccio, le grand Bastia, Calvi, Porto-Vecchio, St Florent, Propriano). Elle est plus souvent constituée de bâtis pavillonnaires diffus implantés sur de grandes parcelles, très consommateur d'espace (pour le tourisme résidentiel aisé). Les nombreux terrassements favorisent l'expansion d'espèces invasives de plus en plus nombreuses autour des villes. Le mitage favorise la propagation des incendies et déstructure le tissu pastoral. Néanmoins de plus en plus de communes sont munies d'un document d'urbanisme permettant de mieux cadrer le développement tout en respectant la biodiversité.
Désertification de l'intérieur	La très grande majorité de la population corse vit maintenant sur le littoral au détriment de l'intérieur qui a connu une désertification continue depuis 1920 (ce phénomène s'est aujourd'hui ralenti) ; ceci a de multiples conséquences, sur les pratiques pastorales (voir porcs), les incendies (disparition de l'entretien des terres, augmentation des masses combustibles).Ponctuellement, on soulignera les effets positifs sur les Chauves-souris qui ont profité de l'abandon des petits bâtis pour les coloniser (Petit Rhinolophe *Rhinolophus hipposideros*) ; il ne s'agit bien sur que d'impacts positifs temporaires (dégradation des petits bâtis en l'absence d'entretien).
Evolution des pratiques pastorales	Avec la désertification, des pratiques d'élevage en toute liberté se sont développées, favorisées par la mise en place de la prime à la vache. En conséquence, les troupeaux bovins errants se sont multipliés occasionnant du surpâturage à maints endroits. Sur le littoral, en broutant les oyats, le pacage « libre » des bovins peut favoriser les phénomènes de déflation éolienne (très nets dans les Agriate). Ce phénomène est accentué par la pratique relativement récente de l'élevage du porc coureur, y compris en forêt et sur les pozzines où la biodiversité est mise à mal par le museau fouisseur de ces animaux.
Fréquentation touristique des sites	Certains sites supportent mal l'accroissement de la fréquentation touristique. Ainsi, le piétinement sur le pourtour des lacs de montagne altère ces milieux très fragiles. Néanmoins les nuisances les plus irréversibles se concentrent sur certaines arrières plages du littoral, avec une hausse constante des demandes d'installations d'établissements de plage. Des dégâts irréversibles aux habitats littoraux et à la flore dunaire peuvent être ainsi commis ponctuellement. La politique d'acquisition du Conservatoire du littoral veille à réduire ces impacts.
Mauvaise gestion des déchets et des eaux usées	En Corse, la gestion des déchets est en constante amélioration mais reste encore, ponctuellement, un problème assez important . Certaines espèces en tirent profit, c'est le cas du Goéland leucophée *Larus michaellis* dont les effectifs se sont multipliés ces trente dernières années au détriment d'espèces patrimoniales comme le Goéland d'Audouin (*Larus audouinii*) qui a décliné fortement sur ces sites traditionnels de reproduction. De même, il est encore fréquent de voir des dépôts clandestins de gravats sur de petites zones humides. Les professionnels s'organisent de plus en plus pour le recyclage. Le mauvais traitement des eaux usées des Stations d'Epuration constitue également un problème. Les STEP, lorsqu'elles existent fonctionnent souvent mal. Il en résulte une dégradation de la qualité des eaux des récepteurs dans plusieurs fleuves de Corse. Les espèces benthiques en souffrent fortement.
Travaux génie civil routiers	Le développement économique et les aides apportées par l'Europe et la France pour rattraper le retard dans la qualité des infrastructures routières génèrent beaucoup de chantiers. Malgré les études d'impact, en constante amélioration dans leur contenu, les maîtres d'ouvrage ont quelquefois du mal à s'approprier une démarche patrimoniale et les atteintes au patrimoine naturel sont encore assez régulières.
Circulation des véhicules à moteur dans les espaces naturels	La Corse constitue une terre d'aventure pour les amoureux de sports mécaniques. Une économie touristique s'est mise en place autour des circuits quads ou 4x4 . A cela peut parfois s'ajouter le comportement peu civique de certains particuliers. Il peut en résulter des impacts importants, en particulier sur certaines plages (avec menaces de disparition d'espèces endémiques comme *Anchusa*

	crispa et *Linaria flava subsp sardoa* sur certains sites). En montagne, c'est surtout le dérangement de la faune qui est à noter. En Corse, la circulation des véhicules à moteur dans les espaces naturels demeure une préoccupation, que les autorités cherchent à combattre par le dialogue et des accords locaux.
Plaisance	La plaisance est en plein essor et les capacités d'accueil portuaires ne suffisent plus à accueillir le flux généré par cette activité. Il en résulte une forte augmentation des mouillages forains qui altérent les fonds marins (herbiers de posidonies, cymodocées, nacres). Parallèlement, certains sites côtiers sont maintenant plus régulièrement fréquentés, ce qui occasionne involontairement le dérangement de la faune, en particulier du Balbuzard pêcheur (*Pandion haliaetus)*. Des solutions alternatives comme les ports à sec, les mouillages organisés sont recherchés et le plan nautique régional permettra d'augmenter le nombre d'anneaux tout en préservant les fonds marins.
Activités de pleine nature	Leur développement a été spectaculaire depuis une quinzaine d'années : course en montagne, via ferrata, canyonning, escalade, randonnée en eau vive, parcours acrobatiques dans les arbres génèrent des emplois. Leur impact reste souvent très faible mais peut ponctuellement s'avérer très fort. On note que, jusqu'à maintenant, ces activités échappaient à une évaluation de leur impacts ce qui ne sera plus le cas avec la nouvelle réglementation dans le cadre de la loi sur la responsabilité environnementale.
Introduction d'espèces (Espèces envahissantes, poissons…)	Jeanmonod et Gamisans (2007) citent plus d'une trentaine d'espèces envahissantes pour la Corse, la plupart ayant le même statut sur les côtes méditerranéennes continentales. Sur le littoral, *Carpobrotus edulis et C. acinaciformis* se sont largement substituées à la flore insulaire. Leur éradication est devenue prioritaire et pratiquée avec succès sur certains sites. Pour la faune, l'introduction, très ancienne, de la truite fario atlantique et du Saumon de Fontaine (*Salvelinus fontinalis*) dans les lacs et ruisseaux d'altitude jusqu'alors dépourvus de peuplement piscicoles, a affaibli les communautés d'invertébrés et les populations d'Euproctes de Corse (*Euproctus montanus)*.Ces pratiques sont maintenant révolues. Par ailleurs, l'introduction d'espèces de poissons d'eau douce exogènes à la Corse sur des retenues artificielles a permis à certains parasites pathogènes de s'introduire en Corse, affectant les communautés de poissons insulaires. Enfin, comme dans les autres îles, l'introduction du Rat noir (*Rattus rattus*) reste un des exemples les plus spectaculaires de nuisances occasionnées à la faune, notamment les oiseaux. Heureusement, les expérimentations menées aux iles Lavezzi pour éradiquer l'espèce ont permis une hausse spectaculaire du succès de reproduction du Puffin cendré (*Calonectris diomedea*)
Introgression souches locales, pollution génétique	C'est un problème bien étudié pour la Truite fario *macrostigama* dont la souche ancestrale endémique de Corse a été introgressée par l'introduction depuis les années 1950 souches atlantiques. Actuellement plus de 70 % du réseau hydrographique est touché. La fédération de pêche de Corse porteuse d'un programme LIFE Nature (2003-2007) a pris conscience de ces problèmes et prohibe les alevinages. De nombreux végétaux pourraient être concernés avec un appauvrissement, de leur spécificité génétique mais une sensibilisation est initié auprès des professionnels (pépiniéristes…) .
Tirs illégaux, braconnage, dérangement,	Le Cerf de Corse avait disparu au début des années 1960. Un programme ambitieux de réimplantation est en cours et fonctionne bien (Parc Naturel Régional de Corse). Le tir illégal du Mouflon continuerait à être pratiqué, de manière marginale, mais c'est surtout le facteur « dérangement » lors des chasses au sanglier qui poserait problème. Le braconnage de la Truite fario (pêche électrique, fusil harpon, filets) constitue, avec les pêches abusives par les pêcheurs à la ligne, un facteur d'affaiblissement des populations de truites dans certaines micro-régions.

Ce bilan, sans être exhaustif correspond assez bien à la vérité quotidienne du terrain. Non cumulées, les activités impactantes ne constituent pas une menace très grave mais quand elles se conjuguent (par exemple pour la Truite *macrostigma* : introgression, pollution des eaux, réduction des débits, aménagement des cours d'eau, braconnage, le tout dans un contexte de réchauffement), elles pourraient provoquer à terme la disparition de certains taxons. Aux impacts humains in situ risquent de se conjuguer très rapidement les effets du changement climatique. Ces changements vont affecter de manière notable la flore et la faune de Corse. Si on prend l'exemple de l'Helix de Corse, la réduction du nombre de jours de pluie dans l'année (hypothèse probable) risque de lui être fatale.

La truite *macrostigma* (poisson des eaux froides) ainsi que le cortège des invertébrés endémiques aquatiques de montagne et des eaux froides aura du mal à s'adapter à une élévation des températures (risque élevé de disparition d'espèces endémaiques). A cela s'ajoutera un déficit croissant d'enneigement ne permettant plus de conserver des réserves d'eau pour l'été.

L'influence du réchauffement climatique n'épargnera pas la végétation avec un risque de disparition de certaines espèces et une atteinte marquée au couvert forestier.

LES MESURES DE GESTION FAVORISANT LA CONSERVATION DE LA BIODIVERSITÉ :

Un certain nombre d'outils et d'actions en cours permettent aujourd'hui de stopper cette perte de biodiversité, voire de la rétablir.

ENGAGEMENTS INTERNATIONAUX :

La France a mis en œuvre, en plus d'une réglementation relative aux espèces dans le cadre de ses engagements internationaux (convention de Berne, Convention de Washington , Convention de Barcelone, réseau Natura 2000, directive cadre sur l'eau…), diverses mesures juridiques, techniques et financières visant à préserver les biotopes et dont les milieux insulaires ont bénéficié. Concernant les zones humides, l'Etat poursuit avec les collectivités territoriales une politique d'inscription à la convention de RAMSAR des zones humides de Corse , au nombre de 4 actuellement. Ce réseau pourrait être complétées en 2010, si les critères d'éligibilité sont requis pour certains sites pressentis (tourbières, lacs de montagne). La Corse est concernée aussi par une réserve Man and Biosphère (MAB) en vallée du Fango.

MAÎTRISE FONCIÈRE ET D'USAGE :

Le Conservatoire des Espaces Littoraux et des Rivages Lacustres a été créé en 1975 et sa politique d'acquisition foncière ou d'aliénation de certains terrains du domaine public, a permis la maîtrise foncière et le maintien de la biodiversité, par une gestion déléguée planifiée, de nombreux espaces fragiles dont des îles et îlots. Sur l'île de Corse, cela concerne 17 800 ha sur 295 km de côtes (22,4% du linéaire de côtes). De nombreux îlots ont aussi été acquis sur la façade méditerranéenne continentale. Cette politique d'acquisition est confortée par l'appui des Conseils Généraux qui peuvent aussi acquérir des terrains au titre de la Taxe sur les Espaces Naturels Sensibles.

Les Conservatoires d'espaces Naturels (Trois sur la zone méditerranéenne française) jouent aussi un rôle important dans la maîtrise des terrains à forte valeur ajoutée au plan de la biodiversité.

Réglementation :

La loi « littoral » (1986) et son application à travers l'article L-146-6 du Code de l'Environnement a constitué un outil juridique précieux pour contenir l'urbanisation et préserver la biodiversité par le biais, notamment de l'inventaire des Zones Naturelles d' Intérêt Ecologique, Faunistiques et Floristique mis en place en 1985 par le ministère en charge de l'environnement (plusieurs jurisprudences en faveur de la protection). En Corse du sud, 71 % du linéaire côtier (417 km) relève de l'application du L-146-6. De nombreuses zones humides sont ainsi protégées ainsi que des plages. Il faut cependant souligner que l'effet de cette loi sur certains linéaires côtiers de France continentale a été modeste car trop tardif (Côte d'Azur en particulier), et que son effet protecteur a été plus significatif dans les îles dont le développement a été moins rapide.

D'autres outils réglementaires plus ciblés sur la faune et la flore existent en France. Neuf réserves naturelles s'inscrivent en totalité en milieu insulaire ou micro-insulaire dans la zone traitée (au moins une trentaine d'îlots concernés). Un gestionnaire étant désigné pour chaque réserve, la gestion de la biodiversité y est parfaitement contrôlée. Les Réserves des Bouches de Bonifacio (créée en 1999) et des Cerbicale couvrent 80 000 ha et englobent 54 îlots. Le Parc National de Port Cros, d'une taille relativement modeste (2000 ha) englobe plusieurs îles et îlots au cœur d'une des zones les plus touristiques d'Europe. Le Groupement d'Intérêt Public des Calanques entre Marseille et Cassis, préfiguration d'un futur parc marin, permet déjà une gestion adaptée des îles et îlots de cette région péri-urbaine très fréquentée. En Corse, deux réserves naturelles de montagne sont à l'étude. Elles concernent de nombreuses espèces endémiques.

Des arrêtés préfectoraux ou ministériels de Protection de Biotope ont été mis en place en Corse. Ils concernent, pour six d'entre eux, des milieux micro-insulaires pour lesquels l'accès est interdit (oiseaux marins et plantes endémiques), les 23 autres concernant des milieux terrestres, essentiellement pour les chauves-souris mais aussi pour des plantes et des mollusques endémiques. L'inconvénient de ce type de mesure est qu'elle ne s'accompagne pas automatiquement de la désignation d'un gestionnaire et d'une aide à la gestion. Il s'avère néanmoins que la plupart de ces sites sont inscrits au réseau Natura 2000 et peuvent par ce biais, bénéficier d'une gestion contractuelle.

D'autres mesures réglementaires contribuent au maintien de la biodiversité, en particulier le classement des sites au titre de la loi de 1930 qui limite l'urbanisation et les aménagements lourds.

LES POLITIQUES CONTRACTUELLES ET PARTENARIALES :

Pour la mise en place du réseau Natura 2000, la France a choisi la voie contractuelle. De nombreux sites insulaires sont concernés. En Provence Côte d'Azur, on en dénombre une dizaine et en Corse on en dénombre 88 couvrant près de 13% du territoire terrestre et micro insulaire de la Corse. Chaque site dispose d'un plan de Gestion (DOCOB). A cela s'ajoute la mise en place du réseau Natura marin. Les collectivités ont un rôle important dans la mise en œuvre du réseau Natura 2000 ainsi que les propriétaires, sur une base contractuelle

Les plans d'actions nationaux pour la sauvegarde des espèces les plus menacées constituent des outils d'orientations importants dont la légitimité a été renforcée dans le cade du Grenelle Environnement (gouvernement , 2007). Dans le document de synthèse, la lutte conte le réchauffement climatique et la lutte pour la préservation et la gestion de la biodiversité apparaissent en N° 1 et N° 2 des actions. La Corse, pour les plans nationaux d'action, est concernée par 20 espèces dont plusieurs endémiques.

L'Etat travaille en étroite partenariat avec différentes collectivités, en particulier la collectivité territoriale de Corse qui dispose de pouvoirs étendus en matière environnementale et gère la politique des réserves naturelles de Corse par son établissement public, l'Office de l' Environnement de la Corse (OEC). Cet établissement gère le Conservatoire Botanique National de Corse, labellisé depuis 2008 et intégré au réseau des Conservatoires Botaniques Nationaux. L'implication de l'OEC est important dans le réseau Natura 2000 et il anime également un observatoire des insectes. Il travaille, pour le compte de la Collectivité Territoriale de Corse, à la mise en place du Parc International des Bouches de Bonifacio qui renforcera la collaboration entre le parc de l'archipel de la Maddalena et la réserve (mise en place d'un groupement européen de gestion territoriale entre les deux structures) . Le Conservatoire Botanique National Corse (CBNC) contribue actuellement à la finalisation du tome du livre rouge de la flore menacée de France, tout comme le conservatoire botanique de Porquerolles pour la Provence et la côte d'Azur.

Le Parc Naturel Régional de Corse a été le pionnier de la protection de la nature en Corse. Il a initié la création de 5 réserves naturelles, mené une politique de protection des rapaces (succès important pour le Balbuzard) et poursuit un programme ambitieux de réintroduction du Cerf de Corse depuis 1985. Sa politique d'éducation à l'environnement a largement porté ses fruits. Les Conseils Généraux sont bien sûr des partenaires importants pour la gestion des terrains du Conservatoire du Littoral.

Toutes ces collectivités entretiennent des relations étroites avec l'Etat pour la mise en œuvre des politiques de conservation.

Les associations de protection de la nature sont en revanche peu nombreuses bien que relativement actives. Les Conservatoires d'Espaces Naturels interviennent par convention pour la gestion de la faune et la flore de certains îlots.

Le partenariat ente ces différents acteurs s'est beaucoup développé ces dernières années grâce notamment au réseau Natura 2000 et à l'implication croissante de la collectivité territoriale de Corse. Il reste cependant beaucoup à faire, notamment à l'échelle des communes qui ont souvent peu de moyens ainsi que pour la sensibilisation des propriétaires.

Enfin, nous mentionnerons l'initiative pour les Petites Iles de Méditerranée (PIM), programme international pour la promotion et l'assistance à la gestion des petites îles de Méditerranée coordonné par le Conservatoire de l' Espace littoral et des Rivages Lacustres avec d'autres partenaires depuis 2006. Ce programme a pour rôle de mettre en réseau les actions de recherche, conservation et gestion des petites îles sur la base d'échanges d'expériences. Plusieurs pays sont associés à cette initiative (France, Maroc, Algérie, Italie…).

EN GUISE DE CONCLUSION :

QUELQUES PROPOSITIONS POUR POURSUIVRE LA POLITIQUE DE CONSERVATION DE LA BIODIVERSITÉ EN CORSE

La priorité N° 1 concerne la gestion des plages et arrières plages : toutes les plages offrant ou ayant offert une valeur patrimoniale devraient faire l'objet de plans d'aménagements pour la conservation de la biodiversité. L'exemple de plusieurs plages aménagées par le Conservatoire du Littoral montre que l'on peut concilier et améliorer l'accueil du public tout en protégeant la faune et la flore. La poursuite de la politique d'achat du conservatoire du littoral rejoint cet objectif et s'avère primordiale (objectif affiché = 32 000 ha acquis à l'horizon 2030 en Corse soit presque le double).

D'autres suggestions concernent des actions déjà engagées ou pressenties :

- établir pour la faune, une liste rouge régionale pour la Corse (demande déjà exprimée par le Conseil Scientifique Régional du Patrimoine Naturel de Corse)
- proposer, après expertise complémentaire et amender éventuellement l'annexe 2 de la directive habitats 92/43/CEE concernant la flore et les invertébrés pour l'ajuster à l'évolution de la connaissance sur la biodiversité insulaire,
- finaliser la caractérisation des habitats naturels d'intérêt communautaire dans le contexte spécifique de la Corse (en cours par le Conservatoire Botanique National Corse, CBNC)
- actualiser l'arrêté ministériel du 24/06/1986 relatif à la liste régionale de 1986 sur les espèces végétales protégées, sur la base des tomes 1 et 2 du livre rouge de la flore menacée de France,
- poursuivre les recherches (génétique en particulier) sur l'endémisme en Corse, notamment les invertébrés,
- mettre en place un schéma régional des activités de pleine nature,
- mettre en place pour chaque arrêté de biotope, une gestion active, par le biais de conventions partenariales (conservatoires d'espaces, propriétaires…),
- mieux maîtriser les pratiques d'élevage en plein air en développant des chartes de qualité avec la profession agricole,
- appliquer de manière rigoureuse la loi de 1991 sur la circulation des véhicules à moteur, en formant et fédérant toutes les forces de police (information, sensibilisation, répression)
- poursuivre les actions pour éradiquer *Rattus rattus* en zone micro-insulaire et certaines espèces invasives de flore (*Ludwigia peploides, Carpobrotus edulis.*…) et poursuivre les actions de sensibilisation auprès du public et des professionnels,
- renforcer éventuellement la protection, après étude de faisabilité, du golfe de Porto (sens large, site UNESCO du patrimoine mondial) et l'extension de la réserve de Scandola,
- poursuivre la réflexion vers la création d'un nouveau Parc Marin en Corse,
- consolider la collaboration entre le Conservatoire Botanique National Corse (CBNC) et les services en charge de la prévention des incendies pour une lutte préventive conciliant conservation de la flore et efficacité de la lutte contre les incendies.

- mettre en place, comme cela a été fait en région Provence Alpes-côte d'Azur, à l'initiative de la région et sous la conduite scientifique du Centre National du Machinisme Agricole, du Génie Rural et des Eaux et Forêts (CEMAGREF), un réseau insulaire méditerranéen de stations de mesure de l'évolution de la végétation forestière dans le cade du réchauffement climatique.

Enfin, il convient de maintenir et développer tous les réseaux d'échanges d'expériences au niveau méditerranéen et au delà (Parc international, réseaux conservatoires botaniques, partenariats inter-universitaires, PIM, Conservatoires Botaniques, programmes inter-îles etc…).

3. 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.

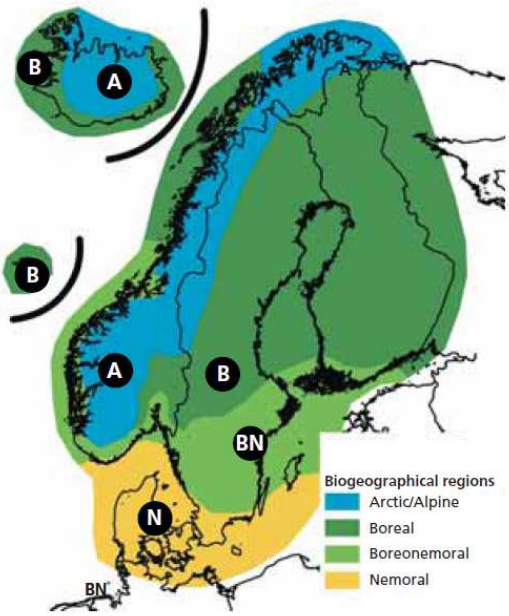
Fish species, including cod (*Gadus morhua*, the main fishing stock in Iceland) and haddock (*Melanogrammus aeglefinus*), have shifted north towards cooler waters in response to rises in temperature in the marine areas of the Nordic region. Climatic changes are expected to have major impacts on fishes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

4. IRELAND / IRLANDE

Island Biodiversity in Ireland

Background

Ireland's biodiversity is a product of its glacial history, complex geology and oceanic climate coupled with a long history of human influence. Owing to geographic isolation, Ireland has a depauperate flora and fauna by European standards, with few endemics (table 1). However, many of the habitats in Ireland are of international importance (e.g. machair, turloughs, raised bogs, limestone pavement) due to their scarcity and the unique species communities found on them (e.g. species characteristic of alpine and Mediterranean communities co-occurring in the Burren; species-rich Atlantic bryophyte communities in the south-west; hepatic mat communities in the uplands).

Table 1 – Species diversity for major groups, in Ireland.

Taxonomic Group	Approximate number of species	Number of legally protected species
Vascular plants	c. 900 native; c. 1,108 established aliens	68
Bryophytes	c. 584 mosses; 228 liverworts; 3 hornworts	19
Algae	700-1,000 freshwater; 579 marine	4
Lichens	c. 1,000	1
Lichenicolous fungi	150	
Fungi	>3,500	
Mammals	c.35 terrestrial; 2 seals; 24 cetaceans	26 terrestrial+ all seals & cetaceans
Birds	c.450 observed	All
Reptiles	2; 1 turtle, but 3 others occasionally observed	1 + all turtles
Amphibians	3	3
Freshwater fish	28	11
Invertebrates	c.18,107 documented	8

Ireland is an important staging post and destination for migratory birds of conservation importance (e.g. Greenland White-fronted Geese (*Anser albifrons flavirostris*), and holds significant populations of birds rare elsewhere in Europe as well as wetland bird communities.

Much of Ireland's biodiversity is in the marine environment, with important cetacean populations, cold water coral communities and many species at the northern or southern limit of their distributional range.

The 'All-Island' approach to biodiversity conservation is important in Ireland, as species and habitats do not observe political boundaries. Many projects are run as a co-operation between the National Parks and Wildlife Service (of the Department of the Environment, Heritage and Local Government) in the Republic of Ireland, and the Northern Ireland Environment Agency.

State of Ireland's Biodiversity

A recent comprehensive assessment of the conservation status within Ireland for the species and habitats listed on the EU Habitats Directive [92/43/EEC] showed that the majority of the island's important habitats have an unfavourable conservation status, including raised and blanket bogs, dune systems, fens and mires, natural grasslands and woodlands (figure 1). Many protected species have a moderately satisfactory status but some, particularly those that occur in wetland and aquatic environments, are also reported to be of bad conservation status, such as the Atlantic salmon and freshwater pearl mussel (figure 2).

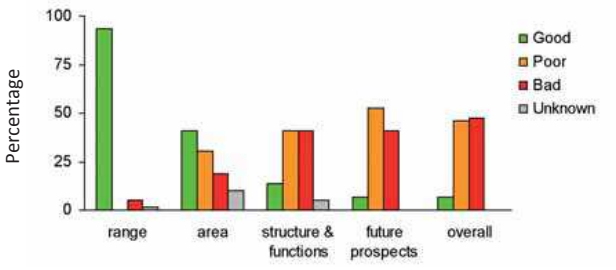


Figure 1 - Summary of conservation status for all Irish Habitats Directive habitats

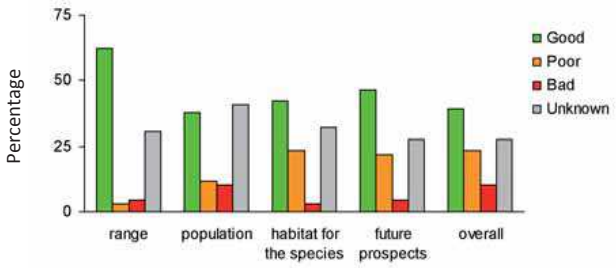


Figure 2 - Summary of conservation status for all Irish Habitats Directive species

These results can be taken as an indictor of the status of Ireland's biodiversity in general, as Habitats Directive listed habitats and species are found throughout Ireland, and cover most of Ireland's biodiversity hotspots. Indeed, the assessment is backed up by recent IUCN regional red list assessments for water beetles and non-marine molluscs, which also show that a relatively high percentage of wetland species are threatened.

The list of Birds of Conservation Concern for Ireland, which assesses species using a system similar to the IUCN, places 25 species on the red list (i.e. of most conservation concern), 85 on the amber list, with only 89 on the least concern green list. However, there is also evidence that many of the more common breeding birds in Ireland have fared quite well over the last ten years (figure 3).

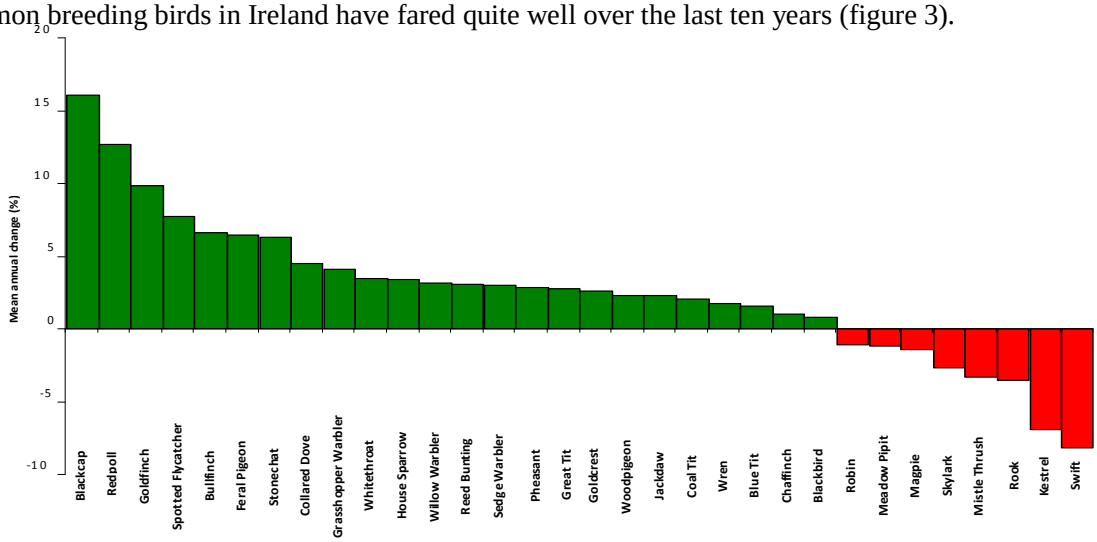


Figure 3 - Annual percentage change of selected countryside birds 1998-2007

Endemism

Ireland would have been rendered almost sterile biologically during the last glacial maximum, and virtually all of the island's species have colonised since the ice retreated (c. 10,000BP). As a result Ireland has much lower rates of endemism than would be expected on an island. However, there is increasing genetic evidence that some species may have survived the last glaciation *in situ*, and it is in these species that we primarily see some endemism (e.g. Irish Hare (*Lepus timidus hibernicus*), Killarney Shad (*Alosa fallax killarnensis*), Arctic charr species complex (*Salvelinus alpinus* agg.)). Endemic plant species are also found in the speciose Hawkweed (*Hieracium*), Dandelion (*Taraxacum*), Bramble (*Rubus*) and Whitebeam (*Sorbus*) genera. An endemic variety of Bumblebee (*Bombus muscorum* var. *allenellus*) is found on the offshore Aran Islands. The sea anemone (*Edwardsia delapii*) is an example of a marine endemic.

An unusual feature of some Irish species is the breadth of niche occupied here, the depauperate biota meaning that competition with con-generic species is often limited or even absent. For example the white-clawed crayfish (*Austropotamobius pallipes*), the only crayfish species in Ireland, occurs in both rivers and lakes here, but elsewhere in its range is limited to rivers. Similarly the common frog (*Rana temporaria*) is the only frog species in Ireland and occurs from sea-level to mountain tops. Elsewhere in its range, where this frog competes with several other frog species, this frog occupies a more confined niche.

Threats

Ireland has experienced nearly a century of commercial afforestation, some 40 years of agricultural intensification and a decade of economic boom, which has put extreme pressure on its native biodiversity. The key threats to Irelands' biodiversity have been identified as direct habitat damage, inappropriate grazing, water pollution, unsustainable exploitation, invasive alien species, and recreational pressure.

Invasive species

As is the case in any island state, the threat posed by alien invasive species is significant and the impacts are already in some cases almost irreversible (e.g. *Rhododendron ponticum* invasion of native forest; Zebra mussel (*Dreissena polymorpha*) in lakes and rivers). Most of the problematic invaders have arrived as escaped ornamentals, deliberate introductions for fisheries, or in ballast waters. Invasive species are a particular threat to aquatic habitats, especially rivers, lakes and canals.

An All-Ireland invasive species project has been in place since 2004. This project provides detailed information on the most unwanted species, as well as advice on how to deal with some of the established invaders. A web-based reporting tool provides an early warning system for dealing with new invaders as soon as they are identified. This project has already shown some success stories, with the eradication of chub (*Leuciscus cephalus*).

Climate change

The presence of so many species at the extreme of their range in Ireland, means that the island is uniquely placed for monitoring the impacts of climate change. The effects of climate change are already evident, such as the rapid spread of the warmth-loving little egret (*Egretta garzetta*), breeding first in Cork but now common and spread as far north as Louth. However there are contradictions, with the snowy owl (*Bubo scandiacus*), a species at home on the tundra, nesting in Donegal, and the great skua (*Stercorarius skua*), which nests in the Shetlands and far north, nesting recently in Ireland. The migrant hawker dragonfly (*Aeshna mixta*), which was first recorded in Ireland 2000, has now spread north and west along the coast (figure 4). Other species likely to benefit from include the lesser horseshoe bat (*Rhinolophus hipposideros*) and natterjack toad (*Bufo calamita*).

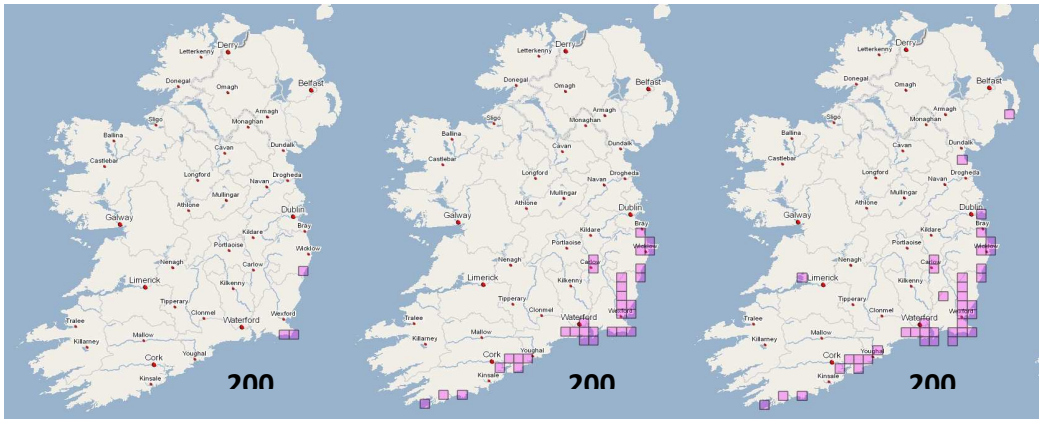


Figure 4 – Spread of the migrant hawker dragonfly across Ireland.

However, there are still no fully satisfactory models showing how climate change will impact on Irish biodiversity, given the complex range of habitats, geomorphology and the uncertainty over changes that will occur in the oceanic currents that drive the Irish climate.

Conservation measures

Biodiversity in Ireland is protected by national legislation (in particular the Wildlife Act, 1976, Wildlife (Amendment) Act, 2000, Flora (Protection) Order, 1999 and Whale Fisheries Act, 1937), EU directives (in particular the Birds Directive [79/409/EEC], Habitats Directive [92/43/EEC] and Water Framework Directive [2000/60/EC]) and numerous international agreements (e.g. Convention on Biological Diversity, RAMSAR Convention, Bern Convention, Convention on Migratory Species).

Biodiversity areas are protected by several designations, primarily Special Areas of Conservation (423 sites), Special Protection Areas (147 sites) and Natural Heritage Areas (148 sites designated; 600 sites under consideration). State owned lands are designated as National Parks (6 sites) and Nature Reserves (78 sites).

Conservation management plans are in preparation for designated areas. In addition, agri-environmental schemes and Native woodland schemes have been available for land managers to sign up to. An active programme of bog acquisition is underway, with the ultimate aim of reducing or eliminating turf-cutting, and expanding the programme of bog restoration.

A key goal of Ireland's National Biodiversity Plan is to integrate biodiversity concerns into all sectoral activities, and to increase public awareness of the importance and economic value of biodiversity. Ireland's public awareness campaign 'Notice Nature' was the winner of the 2007 EU award for best practice in communicating environmental issues.

The lack of an organised framework for the management of biodiversity data in Ireland, has been a key bottleneck for conservation programmes. However, a National Biodiversity Data Centre is now in place (since 2007) and acts as a central repository for handling biodiversity, and other relevant, data from a large number of sources and stakeholders (e.g. Government departments and agencies; NGOs, private collectors). The Data Centre is working to provide checklists for all species groups in Ireland, as well as compiling inventory data about their distributions and habitats. This improved access to biodiversity data will ensure that future policies and decision makers, that impact on biodiversity, have access to the best available information.

A red listing programme aims to assess the conservation status, using IUCN categories and criteria, for Irish species, particularly for those groups that are currently under-represented on the national legislation or EU Directives.

The islands of Ireland

Ireland has over 500 offshore islands, with the majority located on the western atlantic seaboard. Thirty-three of the islands are considered inhabited by Comhdháil Oileáin na hÉireann – The Irish Islands Federation. A large proportion of Ireland's offshore islands are protected either as Special Areas of Conservation or Special Protection Areas. Skellig Michael, in Kerry, is listed as a World Heritage Site.

The offshore islands have their own unique environments. A number of island specific biodiversity conservation projects are underway:

- Invasive species clearance on Clare Island
- Corncrake habitat restoration on the Donegal Islands
- Conservation of traditional thatch on the Aran Islands
- Clare Island survey – detailed island biodiversity inventory

5. ITALY / ITALIE

by: Antonio Di Croce, Technical Secretariat at
General Directorate of Nature Protection, Italian Ministry of the Environment

1. OVERVIEW ON BIOLOGICAL DIVERSITY IN THE MEDITERRANEAN AND ON ITALIAN ISLANDS

The Mediterranean Basin represents one of the main echo-regions of the planet and one of the most important hotspot of biodiversity of the world.

More than 5.000 islands are recorded with a coast line that extends for around 18.000 km (39% of overall Mediterranean coastlines)

Various factors have contributed to the flora biodiversity of the Mediterranean islands: the paleogeography (some of them have been isolated for long time), the distance from the continent, the size (inclusive among few square meters up to 25.700 km^2 of Sicily), the altitude, the substratum and the morphology. The widest islands represent important shelters, specifically for some species originated in the Tertiary that survived to the invasion of plants produced by the climatic changes of the Pleistocene era.

The local flora, despite has been impoverished in some measure by the long period of isolation, is increased because of the phenomena of species origin. Besides, different new species have been introduced.

1.1. Endemic Species

Eendemic Mediterranean species, esteemed between 20 and 30% of those present in the overall basin (Feral 1999; White & Morri 2000), it is decidedly very elevated and it represents a wealth whose protection results particularly important: on the greatest islands the rate of endemic species is generally around 10%, while is smaller in the smallest islands.

Numerous taxa are threatened, particularly on the small islands where some species are present as single population: this reduces the possibilities of genetic exchange and increases the vulnerability because of the limited abilities of adaptation to the environmental changes (Chart 1; from Delanoë *et al*. 1996).

The Italian avifauna species, shows almost the majority as regularly migrants (41%). The elevated number of species that compose the Italian avifauna demonstrates both the variety of habitat due to the north-south development of the peninsula and the strategic position that makes the Italian peninsula a natural bridge on the Mediterranean, frequented by the migrants in their moves among the districts of the north Europe and the Africa. However, the origin of the fauna populations and the levels of endemism of the different Mediterranean islands are almost never of easy interpretation, since different factors can play an important role.

Island	Endemic rate (%)	N. Taxa	Threatened Taxa (%)
Balearic Islands	7% (94 species)	1450	12%
Corse	12% (291 taxa)	2524	12%
Sardinia	10% (endemic & sub-endemic)	2054	8%
Sicily	10%	3000	6%
Dalmatia	9%	2700	-
Crete	10% (180 species & subspecies)	1820	13%
Malta	1,6% (16 taxa)	1000	28%
Cyprus	6% (95 species)	1570	4%

Chart 1 - Endemic Rate and threatened taxa in some Mediterranean Islands (modified from Delanoë et al. 1996)

Although the principal characteristics of the Mediterranean climate have been established around five million years ago, very marked climatic variations happened in the Pleistocene, decidedly contributing to the characterization of the Mediterranean biodiversity.

This variation fundamentally consisted in the alternation of glacial and brief inter-glacial periods, when climatic conditions were similar to those today's or warmer. During the inter-glacial era the sea water submerged the least elevated islands, determining the loss of endemic species;

As a consequence of the immersion during the *Calabrian* period, today some Italian islands (Volcano, Stromboli, Lampedusa, Zannone, Linosa) have a lower number of species that others (Pantelleria, Favignana, Ponza, Marettimo, Levanzo).

As regarding to endemic insular species, numerous examples can be reported in Italy:

1.1.1. SARDINIA

As regarding to the invertebrates of the *circumsardinian* islands, an Acridological investigation has been carried out (Baccetti *et al.*, 1990) and data on 73 endemic/different species have been collectedin 52 of 60 small islands surrounding Sardinia (some specimen of Isoptera, Blattodea, Mantodea, Phasmida and Orthoptera have been recorded). .

In the taxonomical part of the work, 5 new species have been described, endemic to one or more small islands: *Ectobius sardous* Bacc., *Odontura festai* Bacc., *Rhacocleis minerva* Bacc., *Rhacoclets grisea* Bacc., *Gryllotalpa vigintiunum* Bacc. Other species have been for the first time quoted in Sardinia, or in Italy; new synonyms and a new specific name (*Ctenodecticus harzi* Bacc.)

Among reptiles, endemic species of Sardinia are *Podarcis tiliguerta* (also found in Corse), *Euproctus platycephalus* (Gravenhorst, 1829), *Speleomantes flavus* (Stefani, 1969), S*peleomantes genei* (Temminck & Schlegel, 1838), *Speleomantes imperialis* (Stefani, 1969), *Podarcis tiliguerta ranzii* (Lanza, 1967), *Natrix natrix cettii* Gené, 1839, *Hyla sarda* (De Betta, 1853) (endemic species of Sardinia, Corse and Tuscany), *Discoglossus sardus* Tschudi, 1837 (endemic species of the Tirenian sea: Sardinia, Corse, Hyères Islands, Tuscan Archipelago, Monte Argentario).

Accipiter gentilis arrigonii (Kleinschmidt 1903), *Accipiter nisus wolterstorffi*, (Kleinschmidt 1901) and *Buteo buteo arrigonii*, are, among birds, three endemic species of Sardinia and Corse.

As regarding to mammals, *Crocidura russula ichnusae* (Festa 1901), *Eliomys quercinussardus* (Barrett-Hamilton 1912) and *Lepus capensis mediterraneus* (Wagner, 1758) are Sardinian endemic micro mammals; while the Sardinian long-eared bat (*Plecotus sardus* Mucedda et al., 2002), is the only Italian endemic species, with a distribution restricted to Sardinia. The species is found in woodland at low and medium altitudes. Roosts in caves, mines and buildings. There are no data about migrations, diet, reproductive behaviour, but the latter is presumably similar to the that of common long-eared bats.

The Corsican red deer (*Cervus elaphus corsicanus*) is an endemic species typical of the two islands Sardinia and Corse, once diffused in the whole island, now founded only in Sulcis, Sarrabus and Arburese forests. Recently it has been r-introduced in the Ogliastra area.

Finally, the Mediterranean monk seal (*Monachus monachus*) represented, up to the nineties, a symbol of the wild fauna of the island; by now extinct because of the direct persecutionand habitat loss. On the Tavolara Island, the last documented reproduction goes up again to 1978, while in 1991 there were some sightings to Cala Gonone. Many sightings have also been made to the Asinara Island, where the feasibility of a re-introduction is evaluated.

1.1.2. SICILY

Among the reptiles, the Sicilian Lizard (*Podarcis wagleriana* Gistel, 1868), *Natrix natrix sicula* (Cuvier, 1829) are endemic species of the island, while *Discoglossus pictus pictus* (Otth, 1837) is distributed also in Maghreb (Morocco, Algeria, Tunisia), Malta, while small populations, probably introduced have been established in the south of Spain and France.

- ***Eolie Islands***

The reptile *Podarcis raffonei* (Mertens, 1952) and the mammal *Eliomys quercinusliparensis* (Kahmamm, 1960) are endemic species of Eolie Islands. *Crocidura russula cossyrensis* (Contoli, 1989) is endemic of Pantelleria, while *Crocidura sicula* is endemic of the Sicilian-Maltese archipelago, but to date could be extinct to Malta (Mitchell-Jones et al. 1999).

- ***Pelagie Islands***

Among the invertebrates, *Pamphagus ortolaniae* (Cusimano & Massa, 1977) is a wingless grasshopper species, endemic of Lampedusa Island, while *Podarcis filfolensis* is endemic of Pelagie Islands (and also found in Malta),

Lampedusa lopadusae (Calcara 1846) is an endemic gastropod distributed only on the Lampione and Lampedusa islands.

Among the vertebrates, some North African species as the lizard *Psammodromus algirus* abound. This species it is curiously located only in the microscopic island of the Rabbits, behind Lampedusa. Two other species, *Malpolon monspessulanus insignitus* and *Macroprotodon cuccullatus*, are present only here in Italian territory and, instead, relatively common in the North Africa.

1.1.3. TUSCAN ARCHIPELAGO

In this area the most representative endemism is the gastropods *Oxychilus pilula, Tacheocampylaea tacheoides* of Capraia Island and *Oxychilus gorgonianus* of Gorgona Island. There are, besides, relevant other endemic species among invertebrates, as the butterfly *Coenonympha elbana*, or the cricket *Rhacocleis tyrrhenica*.

Among the reptiles, endemic species present are *Phyllodactylus europaeus*, the lizard *Podarcis muralis colosii*, the *Vipera aspis francisciredi* (on the Elba Island), the lizards *Podarcis muralis insulanica* and *Podarcis muralis muellerlorenzi* to Pianosa Island, and *Vipera aspis montecristi* to Montecristo island.

Among the amphibian the tree frog tirrenica *Sardinian Hyla*, and *Discoglossus sardus* are recorded.

- ***Elba Island***

On the Elba Island some endemic species of the Amphipoda has been recovered, as the *Ilvanella inexpectata*, a Shellfish around 8 millimetres of lengths, or *Metacrangonyx ilvanus*, the only Italian representative of this family, endemic on the Elba island.

Among the Invertebrates two Grasshoppers endemic species are present as *Dolichopada schiavazzii* on the Elba and Pianosa Islands and *Phyllodromica nadigi*, on the Elba.

Among the Carabids, two endemic species must be remembered: *Typhloreicheia ilvensis* and the rare *Typhloreicheia maginii.*

2. THREATS - Main problems that affect specifically island biodiversity in Italy

The impact of human activities on the coasts and Islands of the Mediterranean sea, characterized by the exponential demographic and productive increase happened in the last century, brought to a progressive diminution of the biological diversity. The principal threats for species, habitat and whole ecosystems are the effect of the impact of the human activities such as: urbanization, the intensive use in agriculture of fertilizers rich in nitrogen and phosphorus and the consequent eutrophycation of the waters, the pollution caused by the waters of unloading containing heavy metals, the increasing tourist expansion, the hydrocarbons outflows, the introduction of alien invasive species, the overfishing.

2.1. Invasive Alien Species

Invasive Alien Species are the greatest threat to island biodiversity and invasive rodents are likely responsible for the greatest number of extinctions and ecosystem changes. Some examples of how IAS represent a threat, for endemic insular species in Italy, are given below:

- ***Ponziane Islands***

Some studies (Pretto *et al.* 2000) concluded that among the flora there is a discreet percentage of plants imported by the Cape region of the South Africa: of these the most invasive are *Carpobrotus acinaciformis* (L.) L.Bolus, *Carpobrotus edulis* (L.), *Oxalis pes-caprae* L., while *Opuntia ficus-indica* (L.) Mill. and *Agave americana* L., were introduced in the islands since 1700, as enclosure of the cultivated fields and as windbreak.

- ***Tuscan Archipelago National Park***

In Montecristo Island, the wild goat, *Capra aegagrus hircus* is causing sever problem at the ecosystem of the Island since years, as *Ovis musimon*, introduced to the Elba and Capraia Islands, causing more than few ecological problems.

On Mediterranean islands, the Black rat (*Rattus rattus*) is considered by far the major pest species, because of its impact especially on plant, seabird, and invertebrate communities.

In the last six years eradication or local control programmes have taken place on ten Tyrrhenian islands (Sposimo *et al.* 2008)

Eradication projects were carried out in eight islands with area ranging from 0.5 to 239 ha. Density of rat population was estimated on the larger island (Giannutri) by a removal trapping, where eradication activities are still ongoing. When eradication was considered unfeasible or a longer time was necessary, local control was performed in order to protect nesting of colonial seabirds. Reproductive success of colonial birds was assessed on five islands, showing the benefits deriving from both the eradication and local control of rat populations. Furthermore, lizard populations on some islands exhibited a sudden increase in density (Sposimo *et al.* 2008)

- ***Sardinia***

In the Tavolara Punta Coda Cavallo Marine Protected Area, as tool for conservation of nesting marine species, particularly for *Puffinus yelkouan*, the eradication of the Black rat (*Rattus rattus*) was completely concluded for Molara Island. It is still ongoing, also, the monitoring of status and distribution of the Ring-necked Parakeet (*Psittacula krameri*) and the Monk Parakeet (*Myiopsitta monachus*) (Mascia F., Grussu M., 1995)

- ***Sicily***

Eradication on 4 different aliens species (two animals and two plants) has been or have been carried out in a small islet very close to the main one (Isola delle Femmine) in the last six years.

Studies conducted from the beginning of 2005 shows *Xenopus laevis* range, invasiveness and impact. The first record of *Xenopus laevis* in Sicily is datable to 1999 (Lillo *et al*., 2005). It results, in Sicily, a well adapted species to the environmental conditions, with notable invasive ability and with a negative effect on the local species of amphibians. The future efforts must have assembled, over that in the information completion on the ecological and behavioural characteristics, in seeking compensatory strategies and eradication and control methods for which notable scientific and economic resources will be necessary.

3. BIODIVERSITY CONSERVATION ON ITALIAN ISLANDS: Activities and Projects

3.1. LIFE Project as tool for Biological Diversity management and conservation on Italian Islands:

LIFE Programme has made a significant contribution to implementing Natura 2000 in the Member States.

In Italy, since the year 1992, some projects, funding by the LIFE Program covering the period 1992 to 2009, were conducted as tool for Biological Diversity management and conservation on the Islands.

As regarding to the Italian Islands, the LIFE Programme (from 1992 to 2009) has co-financed a total of 21 Nature projects with a total budget of 12,398,326.12 Euro (see **Chart A, Annexe I**).

The projects were focused on habitat restoration in the Islands, achieving of favourable conservation status and ensuring the continued management of the area or on species protection, targeting a very significant share of the bird species listed in Annex I of the Birds Directive. In terms of coverage of species listed in the Annex II of the Habitats Directive about half of the animals species (especially mammals) have been targeted by LIFE projects, whereas the coverage for plants is lower.

3.2. Marine Protected Areas (MPAs)

Italy has assumed a very active position as regards to knowledge and management of the marine and coastal zones. The possible methodological programme provides for the following phases:

- identifying the types of "protected coastal areas";
- analyses of the physical, biological and human components;
- preparation of guidelines for integrated management and social-economic development of protected marine areas;
- set up of a clearing house for the integrated management of coastal zones.

Italy signed SPA Protocol (Barcelona Convention, 1995) concerning Specially Protected Areas and Biological Diversity in the Mediterranean, that establish Specially Protected Areas of Mediterranean Importance (ASPIM) taking into account biodiversity, habitats and presence of rare, threatened or endemic species. The authority on the defence of marine biodiversity, protected marine species and surrounding marine environment as a whole is committed to the Ministry of Environment, Department of Sea Defence. The current actions co-ordinated by this Department concern all the cetaceans occurring in the Italian waters, the turtles, the Posidonia prairies and the invasive alien species. The Department is also carrying out actions of monitoring of the marine and coastal environment, in agreement with 14 coastal Regions and Islands, touching approximately 6,000 km of coasts. Italy also takes part to the Regional Activity Centre of the Mediterranean Action Plan for the conservation of turtles, monk seals and cetaceans.

Italian Marine Protected Areas (MPAs) play a strategic role in the management and conservation of the biological diversity in the islands and the coastal band (UNEP 1995)

Actually, the Italian System of Marine Protected Areas is constituted by 27 protected areas related to marine ecosystems, of which 21 MPAs; 2 Underwater Archaeological Sites; 1 Cetaceans' Sanctuary (jointly with France and Monaco); 3 terrestrial National Parks (Tuscan Archipelago National Park, Asinara Island National Park, Archipelago de La Maddalena National Park), with jurisdiction on marine ecosystems, for a total of 640 km of coastline and 3.000.000 hectares of seabed protected (2.670.000 of which are within the Sanctuary) (see list below & Fig. 1)

List of major Italian ISLANDS & MPAs

21 Italian Islands are Marine Protected Areas
30 Italian Islands will be soon Marine Protected Areas (institution *in itinere,* **Chart B – Annexe II**)

- **Liguria**
  - Palmaria
  - Gallinara (Natural Regional Reserve)
  - Bergeggi Island (Marine Protected Area – D.M. 07/05/2007)
- **Sardinia**
  - *Maddalena Archipelago* (National Park – 1996 + Marine Protected Area – in institution)
    - Caprera
    - La Maddalena
    - Razzoli

  - Santa Maria
  - Santo Stefano
  - Spargi
  - Budelli
- *other islands*
  - Arcipelago Sulcitano
  - Sant'Antioco
  - San Pietro (Marine Protected Area – in institution)
  - Asinara (Marine Protected Area – L. 978/82)
  - Molara
  - Tavolara (Marine Protected Area – L. 394/91)
  - Mal di Ventre Island (Marine Protected Area – in institution)
  - Isola Piana (Marine Protected Area – L. 978/82)
- **Tuscany**
  - *Tuscan Archipelago* (National Park – 1996 + Marine Protected Area – in institution)
    - Capraria
    - Elba
    - Giannutri
    - Giglio
    - Gorgona
    - Montecristo
    - Pianosa
  - *other islands*
    - Formiche di Grosseto (Marine Protected Area – in institution)
- **Latium**
  - *Pontine Islands* (Marine Protected Area – in institution)
    - Palmarola
    - Ponza
    - Zannone
  - *Ponziane Islands* (Marine Protected Area – L. 978/82)
    - Santo Stefano
    - Ventotene
- **Campania**
  - *Flegree Islands* (Marine Protected Area – in institution)
    - Ischia
    - Procida
    - Vivara
  - *other islands*
    - Capri (Marine Protected Area – in institution)
- **Apulia**
  - *Tremiti Islands* (Marine Protected Area – L. 978/82)
    - San Nicola
    - San Domino
    - Caprara
    - Pianosa
- **Sicily**
  - *Eolie Islands* (Marine Protected Area – in institution)
    - Alicudi
    - Basiluzzo
    - Filicudi
    - Lipari
    - Panarea
    - Salina

- Stromboli
- Vulcano

o *Egadi Islands* (Marine Protected Area – L. 978/82)
- Favignana
- Levanzo
- Marettimo
- Maraone
- Formica

o *Pelagie Islands* (Marine Protected Area – L. 978/82)
- Lampedusa
- Lampione
- Linosa

o *other islands*
- Le isole dello Stagnone
- Ciclopi Islands (Marine Protected Area – L. 978/82)
- Mozia
- Ustica (Marine Protected Area – L. 978/82)
- Pantelleria (Marine Protected Area – in institution)
- Isola delle Femmine (Marine Protected Area – L. 394/91)

- **Veneto**

o *Venice lagoon Islands*
- Murano
- Burano
- Torcello

Fig. 1 - Italian Islands & the System of MPAs

3.2.1. INTERNATIONAL SANCTUARY OF THE MEDITERRANEAN CETACEAN

Also known as "Pelagos Sanctuary" for Mediterranean Marine Mammals, is a marine protected area instituted in Rome in 1999, by the Ministers of the Environment of Italy, France and Monaco. It's extending 96.000 km2 in the north-western Mediterranean Sea between Italy, France and the Island of Sardinia, encompassing Corsica and the Tuscan Archipelago and it represents the first transfrontier marine protected area of Mediterranean sea (Fig. 2). The Sanctuary waters include the Ligurian Sea and parts of the Corsican and Tyrrhenian Seas, and contain the internal maritime (15%) and territorial waters (32%) of France, Monaco and Italy, as well as the adjacent high seas (53%).

The Sanctuary contains suitable habitat for the breeding and feeding needs of the entire complement of cetacean species regularly found in the Mediterranean Sea; these include *Balaenoptera physalus*, *Physeter macrocephalus*, *Ziphius cavirostris*, *Globicephala melas*, *Grampus griseus*, *Tursiops truncatus*, *Stenella coeruleoalba* and *Delphinus delphis*. Two such species, fin whales and striped dolphins, numerically predominate in the Sanctuary, and accounted for over 80% of all cetacean sightings made during summer cruises conducted in the area between 1986 and 1989. About 3,500 fin whales are found in the western Mediterranean, most of which concentrate in the Corsican-Ligurian-Provençal Basin in summer to feed on krill, although whales can be observed there year-round. Striped dolphins are the most abundant cetaceans throughout the Mediterranean offshore waters: in the Sanctuary their numbers are 20,000-30,000, and accounted for 60% of all cetacean sightings in 1986-89. The remaining species, although less important numerically, are also regular components of the Sanctuary's cetacean fauna; these include deep-diving *Teutophagous odontocetes* such as sperm whales, long-finned pilot whales and Risso's dolphins, frequenting both offshore and slope waters, and Cuvier's beaked whales, favouring specific areas overlying submarine canyons; now rare and endangered short-beaked common dolphins, found at intervals in offshore waters, often associated with striped dolphin groups; and predominantly coastal bottlenose dolphins, frequenting mostly the shelf areas surrounding Corsica, northern Sardinia, the Tuscan Archipelago, and continental France. The only other marine mammal found in the Mediterranean, the monk seal *Monachus monachus*, was extirpated from the Sanctuary area in the mid 20th century, but could theoretically re-colonise its shores in the future if population numbers were to increase in areas where this pinniped still exists (Notarbartolo di Sciara *et al.* 2008).

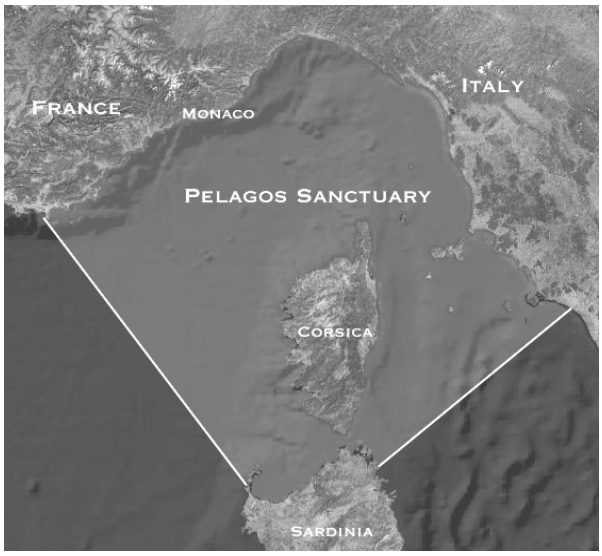


Fig. 2 - International Sanctuary of the Mediterranean Cetacean

3.3. Small Islands Project (Progetto Piccole Isole)

Ecological barriers represent the most challenging part of a migrant's journey. For terrestrial birds, crossing large stretches of sea implies the need for prolonged endurance flights. The Mediterranean acts as an important barrier for Palaearctic-African migrants heading north while moving towards their breeding quarters in spring (Moreau 1972, Alerstam 1990). Within the larger historical framework of migration

studies in Europe, spring movements have been less intensively investigated than the autumn flyways and migratory patterns. It has also become increasingly clear that bird populations breeding in Europe can be significantly affected by ecological factors acting on the African winter quarters. For these reasons, in 1988 the Italian Ringing Centre at ISPRA (formerly Istituto Nazionale per la Fauna Selvatica), has launched the 'Progetto Piccole Isole' (PPI) (Spina *et al*. 1993). The main aims of the project are to investigate spring migration across the Mediterranean through a network of ringing stations operating together on the basis of standardised field protocols. An important aspect is also to obtain sound scientific evidence of the conservation value of Mediterranean islands and coastal habitats for staging migrants during a particularly delicate phase of their annual cycle. This knowledge is needed in order to develop reliable policies for the conservation of migratory birds within the Mediterranean, with special reference to avian biodiversity on islands. During 22 years, a total of 48 sites in 7 different countries has been covered by over 600 ringers, offering a good sample for the central-western Mediterranean, while more scanty information has been collected eastwards in Greece and Israel. Over 800,000 birds have been ringed and examined belonging to 213 species, with biometrical data routinely collected together with details on their physical conditions at different stages of barrier crossing. Species richness within the communities of staging migrants confirms the unique role of Mediterranean islands for the conservation of a wide range of species distributed all across the Western Palearctic and even further to the east. (Fig. 3)

The network of Mediterranean islands and coastal sites where staging birds are monitored represents an important component of the migratory system of many species linked to largely variable habitats both on the breeding and wintering areas. The seasonality of passage, for instance, is a species-specific feature; the different species show a strong consistency in their migration timing in spring, and the inter-annual, within-species variability in the mean date of passage is significantly lower than the variation recorded among species (Rubolini *et al*. 2005). The general seasonal pattern of passage of trans-Saharan migrants across the Mediterranean has been found to be influenced by factors acting on the wintering and breeding quarters. The importance of Africa is confirmed by the earlier spring movements within the Mediterranean of species wintering in more northern quarters; equally, species overcoming a complete wing moult on the wintering grounds show delayed northward movements. As for the influence of the breeding quarters, we found that early migration is related to cavity nesting, a strategy which implies direct competition for limited nesting opportunities, hence a selective advantage for an early arrival on the breeding grounds (see Rubolini *et al*. 2005 for a detailed discussion).

The collection of biometrical data on all PPI stations allows also to infer on different populations of a same specie crossing different areas of the Mediterranean. In the case of the Garden Warbler, a progressive increase in wing length with longitude has been found (Grattarola *et al*. 1999), matching the W-E dimensional cline observed in breeding populations across Europe. This suggests similar migratory directions followed by birds heading towards the breeding areas, irrespective of the distance to be covered across the sea. Other species show concentrated frequencies of capture along the western or eastern Mediterranean, confirming how the basin acts as a crossroad of migratory routes, which implies the need for a large-scale integrated system of protected areas for migrants (Pilastro *et al*. 1998). A network of ringing stations also provides data on the daily distribution of catches at different stages of barrier crossing. In this case, by considering a general S-N pattern of movements across the Central Mediterranean, has been possible to confirm a progressive movement of fronts of migration, with a delayed arrival on islands at higher latitudes, as in the Garden Warbler (Grattarola *et al*. 1999). It is interesting to note that such daily patterns refer also to classical night migrants, suggesting that once they have embarked on sea crossing, birds perform prolonged endurance flights, given also the impossibility of stopping over when islands or coasts are not available. Based on the same model of progressive movements across the sea, it has been found a progressive depletion of energy reserves with increased duration of flight and distance migrated, as exemplified by the Garden Warbler both for standardized body mass and fat score (Grattarola *et al*. 1999). In the same species, the observed values on the PPI stations also match the predicted pattern of progressive decrease in body mass as estimated using Pennycuick's model (Pennycuick 1998). This suggests that in fact birds are able to cross the extended barrier represented by the Sahara and Mediterranean in spring without significantly refuelling en route; however they also need to find available habitats and resources on key staging areas like those represented by

Mediterranean islands. The network of Mediterranean islands is of crucial importance for birds regardless of physical conditions and including migrants still with very large energy reserves.

The most important variable in explaining the observed inter-specific differences in average physical conditions on Mediterranean islands as found in a large sample of trans-Saharan migrants (Pilastro & Spina 1997), is represented by the northernmost latitude of the preferred wintering habitat for each species in Africa. Hence, the crossing of the Sahara and the Mediterranean in spring is constrained by the distribution of preferred habitats south of the Sahara i.e. the overall width of the ecological barrier that the different species will cross without significantly refuelling is not necessarily the same for all species, as not all species are reaching their departure physical conditions in the same geographical area in Africa. This stresses again how important Mediterranean islands are for the conservation of large numbers of birds and species which are challenged with the crossing of a barrier which becomes increasingly wide due to the ongoing desertification of the Sahel and the progressive reduction of equatorial forests in Africa.

Fig. 3 – Islands and coastal sites involved in the project

The intense monitoring activities carried out by the PPI has also allowed to investigate the ecological role of islands habitats for staging migrants. An interesting and original approach has been followed in analysing the strong relationship between some of the Mediterranean plants blooming in spring and the nectar uptake by migrants belonging primarily to the genus Sylvia and Phylloscopus (Jenni *et al*.2000, Schwilch *et al*. 2001, Schwilch *et al.* 2002). Large numbers of birds survive their spring migration thanks to their plasticity in taking advantage of nectar offered by plants like Brassica or Ferula, again confirming the importance of Mediterranean vegetation for these birds and the positive outcome birds obtain while staging on the islands. Again this is an important component of the scientific knowledge which the PPI offers for large-scale coordinated conservation policies. This is particularly true within the larger context of the environmental effects of global change; data collected through the PPI have shown for the first time how the earlier arrivals of migrants at northern latitudes across Europe is related to an earlier departure from latitudes south of the Sahara (Jonzen *et al*., 2006, 2007). A strong influence of climate in Africa in influencing the seasonal passage of migrants across the Mediterranean has also been recently shown for the first time thanks to monitoring data collected through the Progetto Piccole Isole. The project represents the largest ornithological monitoring effort ever realised within the Mediterranean, thanks also to the support offered by the General Directorate of Nature Protection of the Italian Ministry of the Environment.

3.4. The “ITACA” project

Small Islands represents a precious cultural, natural, tourist and economic resource for Italy and for the whole Mediterranean. The project “ITACA” on the smaller islands was born in Ustica (Sicily) in

1998 to realize the net of the protected areas of all the Italian smaller islands and a lot of those of the other Mediterranean countries.

The principal aim has been to develop politics on the sustainability that faces the complex of the thematic tied up to the sea, to its use and management.

- ITACA tools:
- The *Convention for the sustainable development of the smaller islands of the Mediterranean,* has represented the document on the sustainable development of the smaller islands of the Mediterranean sea. It is the institutional tool to which the different actors join, both public then private.
- The *Action Plan for the sustainable development of the smaller islands of the Mediterranean,* has represented the coordination tool of reference for the realization of the principal planning actions.

3.5. Global Island Partnership (GLISPA) – Italy - (excerpt from http://www.cbd.int/island/glispa.shtml)

Italy is member of the Global Island Partnership (GLISPA), that assists islands in addressing one of the world's greatest challenges: to conserve and sustainably utilize the invaluable island natural resources that support people, cultures, and livelihoods in their island homes around the world.

Country/ Organization/Initiative	Commitments
Italy	Expand Island Initiative (with IUCN). Support GLISPA by providing facilities on Maddalena Island in Sardinia and the GLISPA coordination team and island programme (EU 500,000). Supporting UNEP-WCMC for the development of the Global Islands Information Portal and Database.

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- Piero Genovesi – Chair IUCN SSC Invasive Species Specialist Group - ISPRA (Institute for Environmental Protection and Research)
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ANNEXE I – LIFE Projects as tool for Biological Diversity management and conservation on Italian Islands:

REF (code)	TITLE	BENEFICIARY	ISLAND	TARGET SPECIES / HABITAT	BUDGET €
LIFE95 NAT/IT/000753	Riqualification and restoration of the natural habitat of wetlands in Mare e Pauli e Sali (Stagno di Cabras), ecological management and protection	Comune di Cabras	Sardinia	site related	200,000.00
LIFE95 NAT/IT/000804	Restoration project for environment and habitat in the coastal zone of Trapani and Marsala - Natural Reserve of Stagnone and Saline di Trapani - Paceco	Provincia di Trapani	Sicily	• Posidonia beds (Posidonion oceanicae) • Coastal lagoons	248,040.00
LIFE95 NAT/IT/000762	Proposal for the introduction of a monitoring integrated programme for environmental resources in vulnerable areas (NATURA 2000)	Regione Sardegna	Sardinia	site related	153,480.00
LIFE96 NAT/IT/003171	Conservation of the Site Natura 2000 Monte Lattias in Sardinia.	WWF Italia (NGO)	Sardinia	• Constantly flowing Mediterranean rivers with Paspalo-Agrostidion species and hanging curtains of Salix and Populus alba • Arborescent matorral with Juniperus spp. • Arborescent matorral with Laurus nobilis	145,193.40
LIFE96 NAT/IT/003106	GILIA (a hagiotoponym originating in the early Middle Ages and used to identify the Cagliari Wetlands in their entirety)	Comune di Cagliari	Sardinia	• *Larus genei* • Coastal lagoons • Mediterranean salt meadows (Juncetalia maritimi) • Mediterranean and thermo-Atlantic halophilous scrubs (Sarcocornetea fructicosi)	798,706.80
LIFE96 NAT/IT/003165	Urgent actions for the protection of the Sardinian steppic habitats.	WWF Italia	Sardinia	• *Tetrax tetrax* • Pseudo-steppe with grasses and annuals of the Thero-Brachypodietea	260,837.40
LIFE97 NAT/IT/004177	Prooject for S'Ena Arrubia Lagoon Conservation and Integrated management (Oristano, Sardegna)	Provincia di Oristano	Sardinia	• Coastal lagoons	507,070.08

LIFE97 NAT/IT/004153	Capraia and other small islands of the Tuscan Archipelago : biological diversity conservation	Regione Toscana	Capraia Cerboli Palmaiola	• *Calonectris diomedea* • *Larus audouinii* • *Pandion haliaetus* • Southern riparian galleries and thickets (Nerio-Tamaricetea and Securinegion tinctoriae) • Vegetated sea cliffs of the Mediterranean coasts with endemic Limonium spp. • Mediterranean temporary ponds • Pseudo-steppe with grasses and annuals of the Thero-Brachypodietea	135,500.40
LIFE98 NAT/IT/005093	Urgent safeguard actions for the SCI areas within the future Gennargentu N. P.	Provincia di Nuoro	Sardinia	• *Accipiter gentilis arrigonii* • *Falco eleonorae* • *Phalacrocorax aristotelis desmarestii* • Calcareous rocky slopes with chasmophytic vegetation • Quercus ilex and Quercus rotundifolia forests • Mediterranean Taxus baccata woods • Endemic oro-Mediterranean heaths with gorse • Arborescent matorral with Juniperus spp. • Pseudo-steppe with grasses and annuals of the Thero-Brachypodietea • Dehesas with evergreen Quercus spp	451,074.00
LIFE99 NAT/IT/006270	Reclamation and environmental remediation of the Capo Feto biotope	Provincia di Trapani	Sicily	• Coastal lagoons • Annual vegetation of drift lines • Salicornia and other annuals colonizing mud and sand • Mediterranean salt meadows (Juncetalia maritimi) • Mediterranean and thermo-Atlantic halophilous scrubs (Sarcocornetea fructicosi) • Mediterranean salt steppes (Limonietalia) • Embryonic shifting dunes	1,556,601.09

LIFE99 NAT/IT/006275	Protection of sea and coastline habitats in SCIs along the Southern Tyrrhenian Sea in Italy	WWF Italia (NGO)	Sicily	• Submerged or partially submerged sea caves • Olea and Ceratonia forests • Posidonia beds (Posidonion oceanicae) • Vegetated sea cliffs of the Mediterranean coasts with endemic Limonium spp. • Shifting dunes along the shoreline with Ammophila arenaria (white dunes) • Crucianellion maritimae fixed beach dunes • Brachypodietalia dune grasslands with annuals • Coastal dunes with Juniperus spp. • Cisto-Lavenduletalia dune sclerophyllous scrubs • Thermo-Mediterranean and pre-desert scrub • Pseudo-steppe with grasses and annuals of the Thero-Brachypodietea	398,436.00
LIFE99 NAT/IT/006217	EOLIFE99 - Conservation of priority plant species in Aeolian Islands	Comune di Lipari	Sicily	• *Bassia saxicola* • *Cytisus aeolicus* • *Ophrys lunulata* • *Silene hicesiae* • Calcareous rocky slopes with chasmophytic vegetation • Fields of lava and natural excavations	251,927.68
LIFE99 NAT/IT/006189	"JUNIPER DUNES" : Rearrangement and conservation SCI Monte Russu	Comune di Aglientu	Sardinia	• Crucianellion maritimae fixed beach dunes • Arborescent matorral with Juniperus spp. • Southern riparian galleries and thickets (Nerio-Tamaricetea and Securinegion tinctoriae) • Brachypodietalia dune grasslands with annuals • Low formations of Euphorbia close to cliffs • Vegetated sea cliffs of the Mediterranean coasts with endemic Limonium spp. • Cisto-Lavenduletalia dune sclerophyllous scrubs • Annual vegetation of drift lines • Wooded dunes with Pinus pinea and/or Pinus pinaster • Coastal dunes with Juniperus spp.	1,491,961.35
LIFE99 NAT/IT/006271	Urgent conservation measures of Caretta caretta in the Pelagian Islands	Provincia di Agrigento	Sicily Lampedusa Lampione Linosa	• *Caretta caretta*	548,303.00

LIFE00 NAT/IT/0 07228	Conservation of Abies nebrodensis (Lojac) Mattei in situ and ex situ	Parco delle Madonie	Sicily	• *Abies nebrodensis*	1,161,535.00
LIFE02 NAT/IT/0 08533	Conservation and improvement of habitats inthe SPA of Vendicari	Azienda Regionale Foreste Demaniali	Sicily	• Coastal lagoons • Coastal dunes with Juniperus spp.	831,180.00
LIFE03 NAT/IT/0 00163	Reduction of the impact of human activity on Caretta and Tursiops and their conservation in Sicily	Provincia di Agrigento	Sicily	• *Caretta caretta* • *Tursiops truncatus*	2,236,865.00
LIFE03 NAT/IT/0 00148	Activities for the protection of cetaceans in the international sanctuary	Consorzio Mediterraneo s.c.a.r.l.	Sardinia	• *Tursiops truncatus*	549,740.00
LIFE04 NAT/IT/0 00182	Preservation and extension of priority habitats damaged from agriculture activity	Provincia di Agrigento	Sicily	• Mediterranean salt meadows (Juncetalia maritimi) • Halo-nitrophilous scrubs (Pegano-Salsoletea) • Mediterranean temporary ponds • Pseudo-steppe with grasses and annuals of the Thero-Brachypodietea	1,725,162.00
LIFE04 NAT/IT/0 00172	Tuscan Islands: new actions towards sea birds and habitat	Regione Toscana	Tuscan Archipelago	• *Calonectris diomedea* • *Hydrobates pelagicus* • *Larus audouinii* • *Phalacrocorax aristotelis desmarestii* • *Puffinus yelkouan* • Mediterranean temporary ponds • Arborescent matorral with Juniperus spp. • Pseudo-steppe with grasses and annuals of the Thero-Brachypodietea	566,000.00
LIFE04 NAT/IT/0 00187	Tartanet, a network for the conservation of sea turtles in Italy	CTS (NGO)	Sicily Sardinia	• *Caretta caretta* • *Tursiops truncatus*	3,032,175.00

Chart A) - Life Projects on Italian Islands, since 1992 to 2009; **TOTAL BUDGET (€): 12,398,326.12**

ANNEXE II – Chart B) - Next of Institution Marine Protected Areas in Italy

Chart of new Marine Protected Areas (**institution *in itinere***)		
Next of institution Marine Protected Areas	**Region & Province**	**Law of reference**
Maddalena Archipelago: Caprera, La Maddalena, Razzoli, Santa Maria, Santo Stefano, Spargi, Budelli	**Sardinia**, Sassari	L. 394/91 (DPR 17/5/96)
Tuscan Archipelago: Elba, Capraia, Giglio, Giannutri, Pianosa, Gorgona, Montecristo	**Tuscany**, Livorno, Grosseto	L. 979/82 (DPR 22/7/96)
Eolie Islands: Lipari, Vulcano, Salina, Filicudi, Alicudi, Panarea, Stromboli	**Sicily**, Messina, Trapani	L. 979/82
Pantelleria Island		L. 394/91
Gallinara Island	**Liguria**, Savona	L. 394/91
Pontine Islands: Ponza, Palmarola, Zannone	**Latium**, Latina	L. 979/82
Capri Island	**Campania**, Naples	L. 394/91
Regno di Nettuno (or Flegree) Islands*:* Ischia, Vivara, Procida		

6. PORTUGAL (Azores)/PORTUGAL (Açores)

THE AZORES CONTRIBUTION

by:
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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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7. SPAIN (Balears) / ESPAGNE (Baléares)

LA DIVERSITE BIOLOGIQUE DES ILES BALEARES

Preparé pour la réunion du GROUPE D'EXPERTS SUR LA DIVERSITE BIOLOGIQUE DES ILES EUROPEENNES. CONVENTION DE BERNE. TENERIFE 2009

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

8. SPAIN / ESPAGNE

Primera reunión del Grupo de expertos de la Convención de Berna en diversidad biológica de islas europeas

Tenerife 1-3 de octubre de 2009

PRINCIPALES PROBLEMAS QUE AFECTAN ESPECIFICAMENTE A LA BIODIVERSIDAD EN ISLAS

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Introducción al hecho insular

La biodiversidad de este planeta está en regresión. Esto ha ocurrido varias veces a lo largo de su dilatada historia y por diferentes motivos. En la situación presente, la causa principal de la llamada sexta extinción (Leakey & Lewin, 1997) es la expansión e incremento en biomasa de una especie en particular –los humanos– a costa de las demás. Haciendo uso de la tecnología aparejada a su evolución cultural, nuestra especie viene compitiendo por terreno y recursos con éxito, a la vez que introduce cantidades significativas de energía adicional en los sistemas naturales. Como consecuencia, los ecosistemas se rejuvenecen, se simplifican, y pierden biodiversidad. Tal como lo resume Margalef (1997), la humanidad devora biodiversidad y oxida la biosfera.

En las últimas décadas del siglo pasado, hemos tomado conciencia del problema. No nos gusta. No nos conviene. Y si, por razones termodinámicas, esta situación no es reversible ni evitable, sí está en nuestras manos el reducir el fenómeno y mitigar sus efectos. Surge una nueva tecnología en la que esta audiencia está implicada: la conservación (de la naturaleza), con sus luces y sus sombras.

La alteración y pérdida de la biodiversidad, aún siendo un problema global, no tiene la misma incidencia en todos los territorios. Primero, porque la presión humana varía según las culturas y desarrollo tecnológico alcanzado, y, segundo, porque la resiliencia del medio frente a esta presión, no es geográficamente uniforme.

En este contexto destacan los territorios insulares, y las estadísticas que vamos obteniendo son, cuanto menos, preocupantes. En las más de 2000 islas significativas[1] registradas por Naciones Unidas (Dahl 1991), que suponen alrededor del 3 % de las tierras emergidas (Nunn 1994) se ha producido el 35 % de las extinciones conocidas de plantas, el 45% de insectos, el 61% de mamíferos, el 81% de aves y el 95% de reptiles (Baillie et al. 2004, Alcover et al. 1998). Por otra parte, casi un tercio de las especies amenazadas de mamíferos, aves y anfibios a nivel mundial, se encuentran en islas (da Fonseca et. al. 2006). La evidencia nos señala, pues, que las sociedades isleñas, aún siendo más pequeñas, se enfrentan a un problema de conservación relativamente mayor que las sociedades continentales. Y para afrontar el reto –que de eso se trata– debemos empezar por comprender qué tienen de peculiar las islas que hacen de la conservación un problema, en gran medida, diferente, específico y más acuciante.

Para iniciar este análisis voy a recurrir a dos parámetros que explican buena parte del hecho insular, y que son bien conocidos por quienes se dedican a la Biogeografía. Se trata del tamaño de la isla y de la distancia que media a tierras continentales, parámetros que vamos a extender luego a los tres ámbitos que se conjugan en cuestiones de conservación: el científico, el técnico y el político. También marca el hecho insular, el origen continental u oceánico de la isla, siendo este último, el carácter oceánico, una suerte de amplificador ecológico de lo que en ellas acontece.

[1] Excluidas las de superficie menor de 0,1 km^2 y las mayores que Nueva Guinea.

La vulnerabilidad de las biotas insulares

El hecho insular lo define el aislamiento. Las islas *sensu stricto*[2] son ecosistemas con mayor o menor clausura en función de los vectores de dispersión y la distancia que medie con otras tierras, pues el mar constituye una barrera infranqueable para muchas especies terrestres. Lógicamente, esto tiene menor trascendencia en las islas que al desgajarse de la masa continental, parten con una dotación biológica más o menos completa, pero es un hecho conocido que las biotas de las islas surgidas del fondo oceánico son disarmónicas (Carlquist, 1974), faltando especies o grupos enteros que fueron incapaces de superar el brazo de mar para colonizar el suelo insular. Como consecuencia de este filtro selectivo, las comunidades biológicas de islas oceánicas se estructuran con pocos elementos; suelen ser pobres en especies, tanto más, cuanto mayor es la distancia al continente, y menor el tamaño de la isla.). Además, el tamaño de la isla, si es reducido, coarta la estructura trófica de las biocenosis terrestres, faltando los niveles superiores (p.ej. grandes herbívoros o carnívoros). Y de estas peculiaridades ecológicas surge la permeabilidad de las comunidades naturales insulares ante la irrupción de especies introducidas por parte del hombre (v. Whittaker et al. 2007).

Por otro lado, el factor aislamiento, conjugado con el tiempo, la historia geológica, y la compartimentación ambiental de la isla, propician la formación de endemismos locales (neoendemismos), siendo este hecho, quizás, el más distintivo del fenómeno insular, sobre todo, en islas de origen oceánico. Y de nuevo, aquí la distancia y el tamaño, además de la edad, juegan a favor de una biodiversidad de corte exclusivo, aunque frágil. Tampoco hay que olvidar que muchas islas continentales, debido a que las grandes fluctuaciones climáticas les afectan de modo amortiguado, han actuado de refugio para muchas especies continentales que, en caso de extinguirse en el Continente, devienen en paleoendemismos insulares. En ambos casos, el resultado final es que las islas suelen estar preñadas de endemismos.

La especificidad de los problemas de conservación

El alto número y la concentración de endemismos tan característico de las islas, siendo un hecho a celebrar desde la óptica del patrimonio natural, constituyen, sin embargo, la raíz de buena parte de los problemas si se compara con territorios continentales de dimensiones equivalentes. Tal es así, que problemas ordinarios de conservación revisten más virulencia en los ambientes insulares (v. Baillie et al. 2004).

- La sobre-explotación de las poblaciones animales insulares incide sobre efectivos usualmente reducidos, y, por tanto, con mayor riesgo de llevarlas directamente al exterminio o de rebasar sus umbrales de recuperación, lo que conduce al mismo resultado.
- El cambio climático empujará a no pocas especies a un desplazamiento sin escapatoria, con lo que las islas se constituyen en potenciales "sumideros" de especies. Por fortuna, la radicalización de los extremos climáticos parece que será más atemperada en muchas islas por el efecto tampón que ejerce el mar. Con todo, los pronósticos son también sombríos, o incluso nefastos, si consideramos la subida del nivel del mar y el destino de los atolones o aquellas islas de escasa altitud.
- La ocupación o alteración de los hábitats en islas conlleva un potencial de impacto mucho mayor que en el continente, toda vez que sus dimensiones suelen ser reducidas –a veces, muy reducidas– y además, no es infrecuente que alberguen endemismos localizados en unas pocas hectáreas (*spot-endemics* s. Schlacher et al. 1998). Quiere esto decir, que obras importantes de infraestructura que en ambientes continentales tienen a lo sumo un impacto cuantitativo sobre la biodiversidad, en las islas tienden a adquirir relevancia cualitativa, disminuyendo la integridad de los ecosistemas por pérdida de alguno de sus elementos singulares.
- Con todo, el principal problema de conservación que afrontan las biotas insulares y que es casi una "especialidad insular", es el provocado por la introducción de especies exóticas invasoras. Su impacto es bárbaro debido a la invasibilidad caracte-rística de las biocenosis insulares ya comentada, y tanto mayor cuanto más alejada y pequeña sea la isla. A ello se suma la biología del

[2] En sentido ecológico amplio se emplea también el término de isla para hacer referencia a hábitats concretos aislados, tales como una serie de lagos, cuevas no conectadas, o las cimas de las montañas tropicales.

invasor, con los depredadores, grandes fitófagos y las plantas que forman matorral de cobertura densa, a la cabeza de las calamidades. Sobre este particular se ha escrito mucho, y no viene al caso extendernos aquí (Machado et al. 1994, Sadler 1999, Veitch et al. 2002).

Hay que resaltar, sin embargo, que estos problemas no son independientes entre sí y que existe una sinergia perniciosa que los agudiza. Las islas en general –si exceptuamos a las continentales y muy grandes– suelen ejercer un particular atractivo en los humanos, y es habitual que se encuentren superpobladas. Ello conduce, aparte de a una elevada proporción de ocupación y transformación territorial, a la necesidad de importar los recursos que la isla no provee, con lo que las puertas a la introducción voluntaria o involuntaria de animales y plantas exóticas quedan abiertas al comercio multi-origen. Tampoco es infrecuente encontrarnos con que los primeros colonizadores de islas remotas trajeran consigo el "kit-biológico" (animales, semillas, etc.) propio de su cultura, de nefastas consecuencias para la biota nativa. En casos como las Hawaii, donde la colonización fue multicultural, el problema se agravó aún más. No es un problema nuevo.

Además, este mismo y poderoso atractivo que ejercen las islas en las personas, ha sido el motor de la floreciente industria turística, que –vinculada al sector de la construcción y especulación inmobiliaria– se ha convertido en el mayor factor de transformación de muchas islas, además de incrementar las importaciones y agudizar así el problema de la introducción de especies exóticas. El turismo de sol y playa se puede considerar también como una "especialidad insular", al menos en aquellas islas que disfrutan de un clima amable. Las Canarias son un ejemplo paradigmático de cómo una actividad económica deseable, en dosis excesiva y por lo difícil que resulta de controlar, acaba convirtiéndose en un desatino ecológico (Machado 1990).

Como conclusión de todo lo expuesto, podemos afirmar que: a igual presión antrópica, la naturalidad[3] de los ecosistemas se ve más comprometida en islas que en el continente. Este empirismo debería tener implicaciones, al menos de cautela, en cualquier planteamiento de desarrollo en territorios insulares. Los modelos continentales no se pueden transponer sin más a las islas.

Analizada, pues, cuál es la raíz del problema de la conservación de la biodiversidad en islas, corresponde ahora repasar brevemente la segunda parte del problema, el cómo afrontarlo. Este es, lógicamente, el reto de la conservación, y también tiene alguna especificidad que otra en los tres ámbitos implicados: el científico, el técnico y el político.

El reto científico

El conocer las biotas insulares en toda su extensión y con detalle distributivo, es una tarea de tales proporciones –no titánicas, desde luego- que supera, por lo común, a los recursos científicos autóctonos. Y aquí vuelven a tener importancia el tamaño de la isla y la distancia que la separa del continente, si bien esta última adquiere menor relevancia en sentido geográfico a medida que los sistemas de transporte se desarrollan y llegan a todos los confines del planeta. Es más la distancia cultural, o mejor dicho, el aislamiento cultural, lo que marca la diferencia. Por ello, y a pesar de Internet, no cabe asimilar islas como las europeas, que están dotadas de universidades y centros de investigación de primera fila, a muchas islas del Pacífico o Caribe, por ejemplo, donde la capacidad de investigación local es muy precaria, y ha de ser importada. Por suerte, los científicos tampoco son inmunes al "atractivo insular", y, por su condición de laboratorios de evolución y albergar biotas endémicas, las islas han sido siempre territorio preferente de expediciones de los grandes centros de investigación del primer mundo. Gracias a ello, se conocen peor o mejor su fauna y flora, pero el reto sigue ahí. En Canarias, sin ir más lejos, se ha descrito en las últimas décadas un promedio de un taxón nuevo para la Ciencia, cada seis días (Martín Esquivel et al. 2005). Además, es necesario someter a revisión el conocimiento acumulado, pues la experiencia viene revelando que hasta un tercio de las especies citadas pueden haber sido determinadas incorrectamente.

El reto técnico

La conservación de la naturaleza es una tecnología que, como todas, se fundamenta en diversas disciplinas (la teoría) y se nutre de la experiencia acumulada (la praxis). Se trata, pues, de una

[3] La naturalidad se emplea aquí como descriptor de sistemas (v. Machado 2004).

actividad relativamente nueva en la sociedad, que aún está en proceso de maduración. La capacidad de las instituciones dedicadas a la conservación varía mucho de un país a otro, y, lógicamente, entre los archipiélagos o islas en particular. Existen algunas Administraciones bastante rodadas y especializadas en gestionar el tipo de problemas que nos ocupa –e.g. Australia, Nueva Zelanda o Hawaii–, pero es más frecuente encontrar ejemplos de clara inmadurez, en parte justificada por la escasez de técnicos cualificados, incluso en el primer mundo. A esta insuficiencia –relacionada en buena medida con el tamaño y distancia de las islas– se añade la ínsita a la propia doctrina de la conservación, que sólo últimamente está reconociendo la especificidad de la problemática insular y afrontándola de modo convincente. Las categorías de amenaza establecidas por la UICN, por ejemplo, y tal como se han desarrollado, no sirven para ser aplicadas en las islas (v. Martín, 2009). Éste, como otros tantos instrumentos metodológicos, necesita ser adaptado a la escala y circunstancias insulares.

El reto político

La conservación de la biodiversidad no es un ejercicio académico, sino una actividad de la sociedad que ha de conjugar intereses contrapuestos y que, en definitiva, requiere de instrumentos jurídicos específicos que legitimen cualquier limitación de los derechos privados en beneficio del interés común. Lo contrario sería puro ecofascismo. Se trata, por tanto, de una gestión reglada y no caprichosa, que requiere de la acción política, tanto para obtener los instrumentos jurídicos necesarios, como para impulsar su aplicación. Existen muchos estados insulares soberanos e independientes, mientras que otras islas se integran en jurisdicciones más amplias, disfrutando de mayor o menor grado de autonomía. No se puede asimilar un sistema político insular que cuente con parlamento propio, a otro que no. Pero lo primero, aunque confiere la capacidad, no es garantía de que el reto político de la conservación se afronte con realismo y responsabilidad. De hecho, es un principio aceptado en cuestiones restrictivas –y la conservación lo es– que cuanto más lejos se sitúe la autoridad reguladora, menos influenciada estará por los intereses locales y del corto plazo. Otra cuestión es que la gestión, en sí, se pueda ejercer mejor desde la proximidad que desde la distancia.

La acción estructurada que requiere toda política de conservación, rara vez emana desde las propias islas, y la mayor parte de los isleños no suele ser muy consciente de los valores conservacionistas que atesora su entorno. La Unión Europea se ha dotado de una política de conservación común −que ahora incluye el mar−, y es gracias al pulso que introducen las directivas y programas de acción comunitaria, que la preocupación –léase normativa y financiación− por la biodiversidad llega hasta las islas europeas próximas, incluida la Macaronesia, y ojalá que pronto, a los territorios insulares de ultramar. Ahora solo falta ajustar el dial de la conservación a la especificidad de los problemas insulares y abordar asuntos espinosos como pudiera ser la introducción de especies exóticas y lo que su control implica en la libre circulación de productos de todo tipo en el mercado interior, sin olvidarse del trasiego entre las propias islas. Los europeos estamos en el buen camino. Este seminario es, sin duda, reflejo de ello.

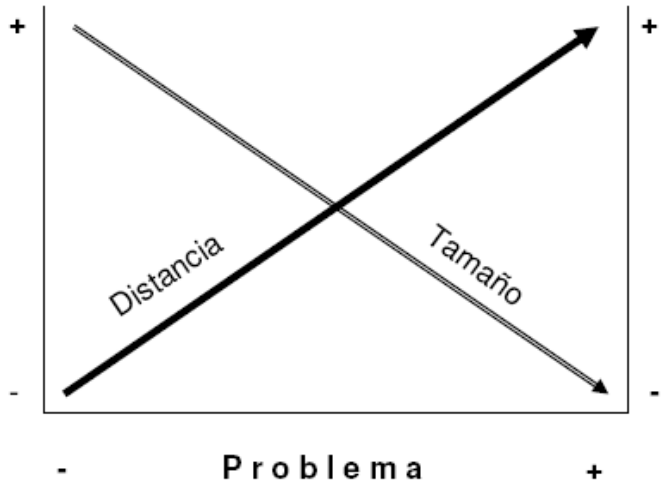

Figura 1. Relación entre el tamaño de la isla y su distancia al continente con los problemas de conservación de su biodiversidad. En este modelo el término problema puede ser sustituido por:

(1) vulnerabilidad, (2) Conocimiento precario, (3) Falta de capacitación técnica o (4) Falta de compromiso político.

El mensaje insular

Las biotas insulares, por su fragilidad ecológica, han sufrido un impacto muy severo con la presencia de nuestra especie. Una buena parte del daño causado se justifica en las necesidades del bienestar humano, otra parte es resultado de nuestra torpeza o avaricia, y una tercera parte, la que suele pasar inadvertida, la provocan las especies invasoras introducidas involuntariamente. Es prácticamente imposible revertir la situación, y a lo sumo podemos aspirar a reparar algo del daño causado. Lo que, en principio, sí está en nuestras manos, es no sacrificar más biodiversidad y evitar los impactos innecesarios de cara al futuro. Este es el reto del desarrollo sostenible en cualquier sociedad moderna, sólo que en las islas adquiere un matiz especial. En cierta ocasión, y refiriéndome a mi tierra, escribía: "*Canarias no puede ser homologada a un territorio cualquiera. Desarrollar en Canarias es como jugar a la pelota en una tienda de porcelana. Es una cuestión de ciencias naturales, no de chauvinismo*" (Machado, 1992). La metáfora es aplicable a cualquier isla oceánica y su mensaje algo que los isleños deberían tener siempre presente, y los políticos no olvidar jamás.

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9. 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.