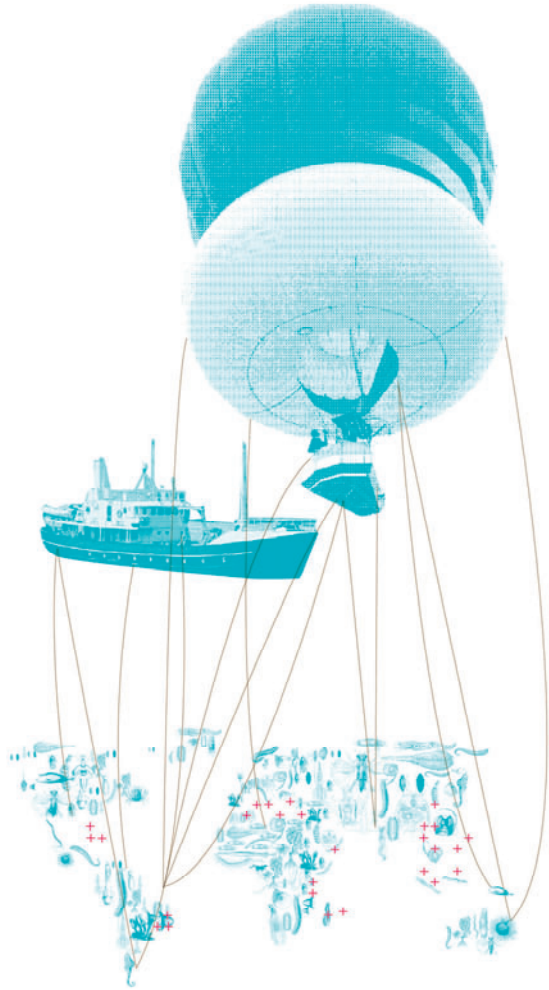




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our planet
enviewed

Taking a closer look at biodiversity hotspots



E x p e d i t i o n s

mozambique
madagascar

2008 - 2009



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Our Planet Reviewed

Taking a closer look at the Biodiversity Hotspots

“Our Planet Reviewed” is a new initiative for filling key gaps in our knowledge of the world’s major biodiversity areas. The new challenge for our project teams is to apply their scientific and technical knowledge in regions of the world where the most pressing issues of Biodiversity and Conservation converge. We will thus focus on areas that are recognized as global “hotspots” for biodiversity, but where numerous knowledge gaps constitute a serious impediment to sound conservation and resource management.

Filling gaps

Global conservation assessments and the establishment of conservation priorities require robust and reliable information on the distribution of biodiversity across the planet. Yet this information is often mapped at a very coarse spatial resolution relative to the scale at which most land-use and management decisions are made. Furthermore, most biodiversity mapping tends to focus selectively on better-known (and often more emblematic) elements, such as larger vertebrates. Despite significant efforts made over the last several decades, the biodiversity of our planet remains largely unknown and is disappearing many times faster than we discover it.

in key areas of the world

The National Museum of Natural History (MNHN) in Paris and Pro-Natura International, are now developing a new initiative to help address this issue, aimed at significantly boosting our knowledge of Earth’s biodiversity by filling gaps through the exploration and description of a carefully selected set of key sites.

In line with a recent multi-disciplinary expedition (Santo 2006, Vanuatu) and several earlier projects (New Caledonia, Panama, Philippines), we aim to sustain this effort and take full advantage of the experience we have gained by carrying out additional expeditions over the next decade that will focus on little-known sites and on neglected animal and plant groups, especially those whose study requires special organizational skills and logistical resources.

Identifying the most urgent hotspot for intensive inventory work



Given the limited financial and human resources available globally for biodiversity conservation, it is imperative that we focus our efforts on the richest and most threatened areas, and that these areas be selected with great care.

Some 34 biodiversity hotspots are currently recognized, based on available data on plant and vertebrate species richness, endemism and perceived threat. While there is broad consensus on the choice and geographical delimitation of these hotspots, the structure and dynamics of the biodiversity they contain and the ecological impacts of predicted biodiversity loss are poorly understood.

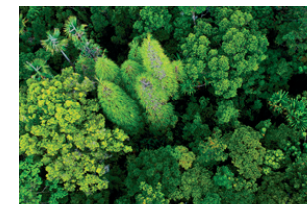
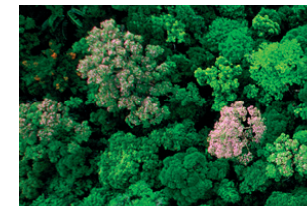
Those hotspots whose total remaining area of original vegetation has been most severely reduced are generally regarded as the highest priorities for immediate action. However, past rates and amounts of habitat loss are not necessarily the best indicators of likely future trends. But since it is difficult (if not impossible) to know with certainty how individual areas will be impacted in the coming years, the best option remains to focus our work first on the most threatened areas.

Among the 34 hotspots, we have ranked those within which no more than 10% of the original vegetation remains. Using this approach, we end up with 11 candidate priority hotspots for exploration in the coming years (as highlighted in red in the following map).

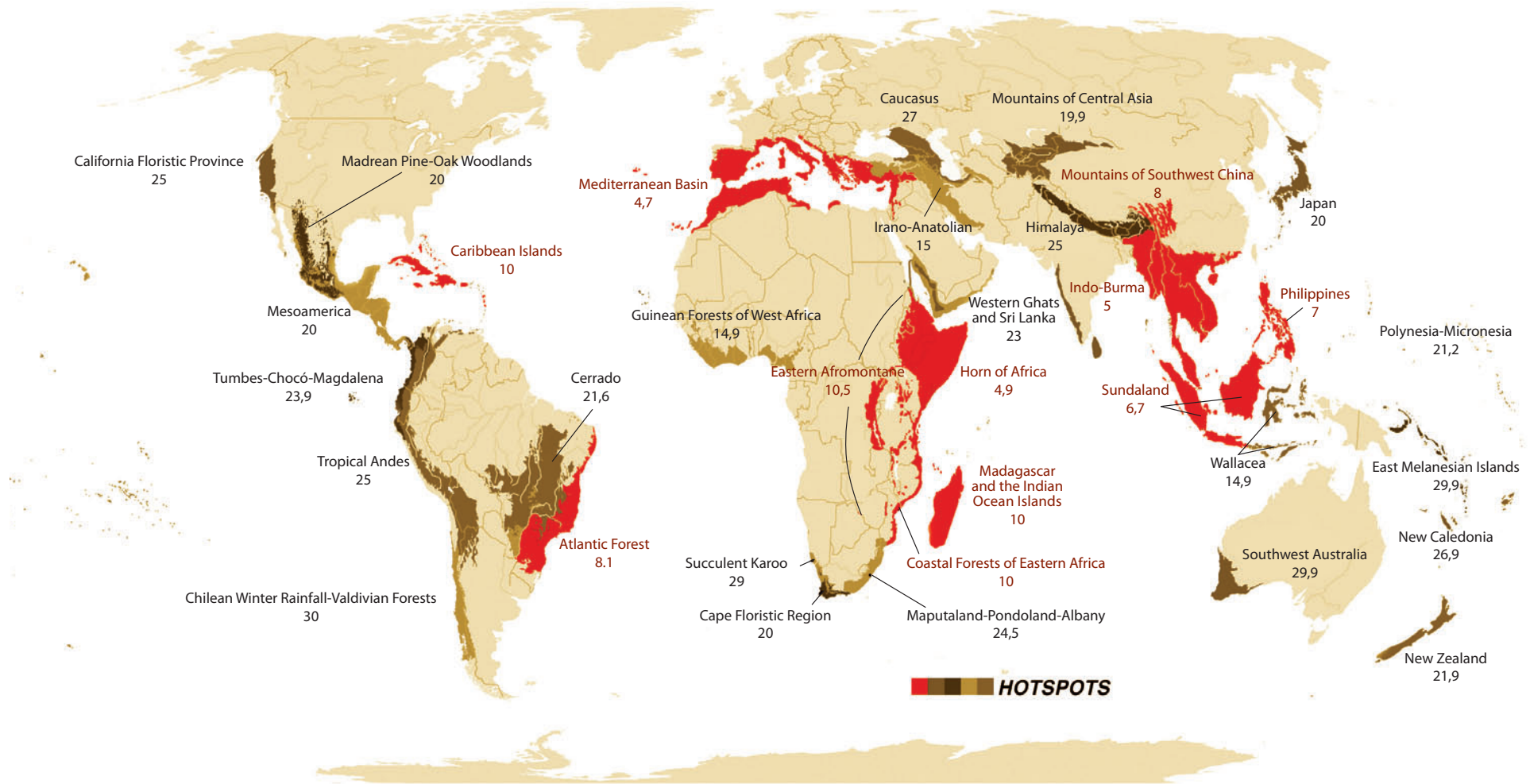
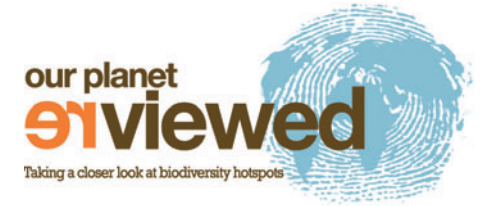
In the Oceans, some regions are more threatened than the others but it is more in terms of major types of habitat that vulnerability of marine species can be measured. Thus, coral reefs are often compared to tropical forests in terms of complexity of biological interactions, but also regarding conservation challenges. In the same way, mangroves are more or less everywhere in decline. When it comes to fishing, trawling is threatening the whole stock of commercial fish.

The countries / regions targeted in each hotspot will be those:

- Where few if any conservation actions are currently being taken, but where important habitat types are being overlooked;
- Where the conservation importance appears to be severely underestimated due to a lack of basic data.



The 11 regions targeted by the initiative



Map showing the original extent of the 34 hotspots recognized by *Conservation International* (2005) with the percentage of remaining habitat
 In red: "hotspots" whose total remaining area is no more than 10%

Focusing on the unseen side of biodiversity



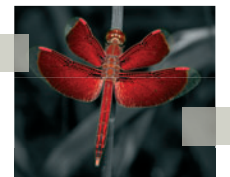
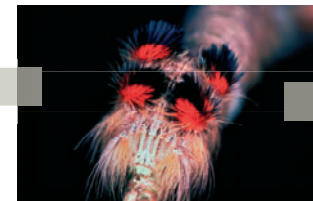
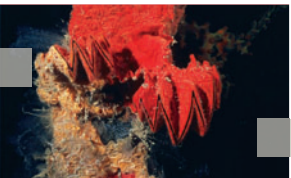
Current efforts to establish priorities for conservation and management are based on existing knowledge, and rarely if ever involve the painstaking process of acquiring adequate new information.

An unfortunate consequence of this approach is that we focus our efforts on learning more about what is already reasonably well known (e.g., charismatic mega-fauna, birds, etc.) while neglecting other equally important – and often much more important in terms of number of species – components of biodiversity (e.g. invertebrates, fungi, etc.), which are excluded altogether from consideration.

Research and exploration of these little-known components of biodiversity are severely handicapped by a lack of public visibility, and are further hampered by inadequate logistical means to access and inventory them, especially in difficult habitats.

The Canopy-Glider, Pro-Natura's innovative hybrid helium/hot-air dirigible, developed specifically to facilitate the study of forest canopies, will be used to reach the treetops to take comprehensive samples from all the forest strata.

For the present project, we are targeting those components of biodiversity that have been most neglected by earlier studies.



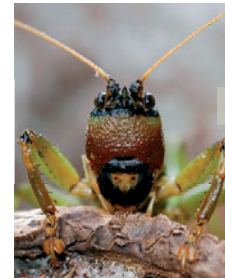
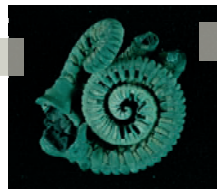
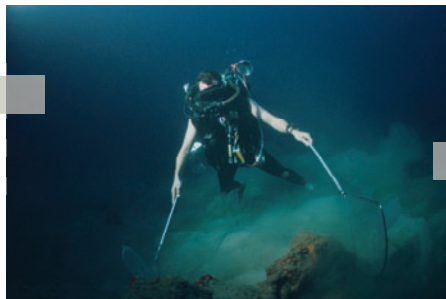
A novel, integrated approach to biodiversity assessment



The most widely used biological survey methods are 'Rapid Assessments', which focus on gathering easily obtained data from many locations. Such Rapid Assessments can be useful for developing an image - a snapshot - of biodiversity patterns at the global scale. However, they also present some serious limitations, most notably:

- Recent research demonstrates that the vast majority of biodiversity is comprised of rare and small species;
- By definition, Rapid Assessments have a coarse geographical and biological resolution that is poorly suited for developing and implementing management of conservation activities at a local level.

Experience gained over the last several years, including through the recent expeditions we have conducted, clearly shows that large-scale inventories incorporating teams specifically focused on 'difficult' groups of organisms are both necessary and feasible.



We have shown that such an approach delivers exceptionally valuable results: thanks to the skilled teams we have assembled and the novel technological approaches we have developed for these large scale surveys, thousands of species were collected that would otherwise have been totally neglected, hundreds of which were new to science. In this way, we have made a significant contribution to meeting one of the most important challenges facing the scientific and conservation communities by adopting and perfecting meticulous and exhaustive survey methods.

Beyond science: a communication strategy



The issue is about explaining why the biodiversity inventories are vital for understanding the global crisis due to the loss of biodiversity and the modification of natural habitats.

Through a coherent communication, transverse and international, we are willing to:

Take into account neglected areas of biodiversity;

Inspire conservation policies;

Mobilize all potential actors through a high visibility.

A wide range of actions will be helping institutional, scientific and general public communication. The educational dimension will be prominent, especially regarding teachers and pupils.

A national and international press, radio/TV coverage will be implemented, a TV documentary, a book for the general public, posters and leaflets will be produced.

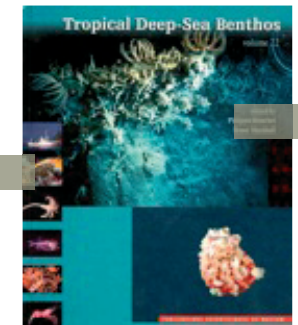
Following the success of the 'Santo-2006' expedition, similar communication tools will be developed. In a constant desire to share the results of our scientific activities with the world at large, we will rely on the potential of the networks and the programs with which we collaborate - Census of Marine Life, BarCoding of life in the USA, EDIT Network (European Distributed Institute of Taxonomy) in Europe. The partner Institutions will also contribute in mobilizing scientific communication.

In a constant effort to complement our core scientific activities we will seek collaboration with other initiatives to spread the outcomes of the expeditions and attract the general public audience to the issue of the biodiversity global crisis.

As an example of synergy with ongoing project in this field, two artists (one photographer and a wildlife artist) currently undertaking a visual exploration of biodiversity around the world will be embedded in future expeditions. The result of their exploration will be produced in spectacular and inspiring books, a superb documentation of biodiversity as felt by two visual artists, commented by

scientists, philosophers and writers.

Planned communication activities will include media reports in the national and international press and radio/TV, a website, a TV documentary, a book, publication of posters and brochures. Communication tools for such expeditions are similar to what was achieved for the 'Santo-2006' expedition.



Communicating results after the end of the project: examples of support used for the Santo-2006 expedition (DVD, book, scientific publications)

Expeditions 2008 - 2009

mozambique madagascar



At a local level, **Madagascar** is an excellent example of a country where massive conservation efforts have been made over the last two decades but where particular habitat types have nevertheless been overlooked because they are less 'trendy' or lack the charismatic organisms that attract most donors and conservation operators. Coral reefs and rainforests have long received nearly all the attention of conservation organizations, while cold waters (i.e., deeper ocean environments) and dry forests are largely off their radar screens.



At a regional level, **Mozambique** is representative of countries where the conservation potential is badly underestimated due to a lack of basic data, despite the fact that it shares several major biomes with nearby countries (including the Eastern Arc Forests and Coastal Dry Forests) that are recognized elsewhere for their high conservation value (such as in Tanzania and Kenya).

Selected target areas and themes

The first 2 years of our program will concentrate on gathering data and acquiring new knowledge from 3 selected target areas:

The Coastal Dry forests of Northern Mozambique

Conservation organizations have recently recognized the Coastal Forests of Eastern Africa, which extend from Kenya through Tanzania into Mozambique, as major area of biodiversity importance for both plants and animals. These forests are now ranked among the 25 top priority sites globally for conservation. However, they comprise a highly heterogeneous assemblage of forest types which have hitherto eluded a comprehensive description. Most of the remaining areas of coastal forest occur in Northern Mozambique, yet they remain biologically unknown. Data gathered from previous surveys in Kenya and Tanzania provide only a partial basis for estimating what might be found in Mozambique, and offer no indication of where priority sites for conservation action might be located within the country.

Offshore trawl-exploration in the Mozambique Channel

A large flotilla trawls for shrimp on the continental shelf and edge off the Mozambique shore, with most of the catch being exported to Europe. However, the biodiversity of these marine environments has never been inventoried, other than as part of classic assessments of commercially exploitable resources. This offers a very promising and cost-effective situation for making important new discoveries.

The shore and shallow water of southernmost Madagascar

Scientists and conservation organizations focus most, if not all, of their attention on marine areas in and around Madagascar on coral reefs, even though work done in the last decade strongly suggests that exceptional species richness can be found in the region's cold-water areas. The market for collectible seashells has yielded many unexpected discoveries as a by-product of rock lobster fishing in coastal areas off southern Madagascar. Season upwelling around Ft. Dauphin generates a belt of brown algae and produces a coastal landscape reminiscent of the upwelling zones along the coast of Oman, but which is completely different from the rest of the Indian Ocean.

Marine expedition: Southern Madagascar cold waters



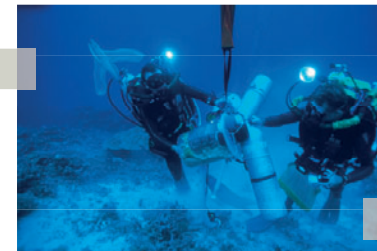
In terms of marine biodiversity, the Southwest of the Indian Ocean is neither entirely unknown nor well known. When placed in the broader context of the Indo-Pacific region there are considerably fewer new species being discovered, named and described from Madagascar, Mozambique, Tanzania and Kenya than from the Red Sea, southern Japan, Taiwan or the Great Barrier Reef.

While this imbalance partly reflects actual differences in levels of species richness we believe that it mainly reflects differences in exploration and sampling intensity.



We envisage a total of 50 scientists during 50 days, in April and May 2009.

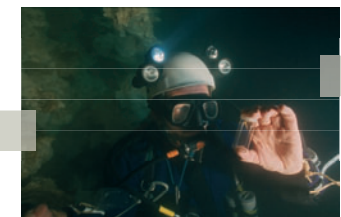
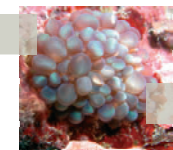
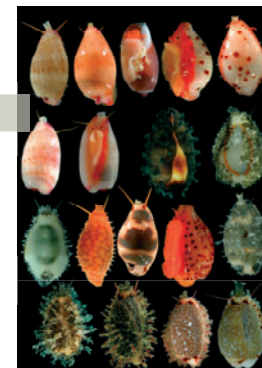
The South Madagascar cold water eco-region will be explored by deploying teams of divers, researchers, students and technicians combining vacuum cleaner, brushing baskets, visual collecting in intertidal areas, diving as well as dredging.



The South Madagascar eco-region lacks the infrastructures necessary to large shore-based expeditions. The teams will be using a vessel that can host a group of divers and scientists to conduct the researches.

The Southeast coast of Madagascar has two outstanding characteristics: Its richness in endemics and thus a high scientific and conservation value; Under-explored and under-sampled due to its peripheral position and often difficulty of access.

It is expected that the exploration of this area will reveal numerous new species and contribute to a better understanding of geographical patterning within the vast Indo-Pacific province.



Marine expedition: Offshore trawl-exploration in the Mozambique channel

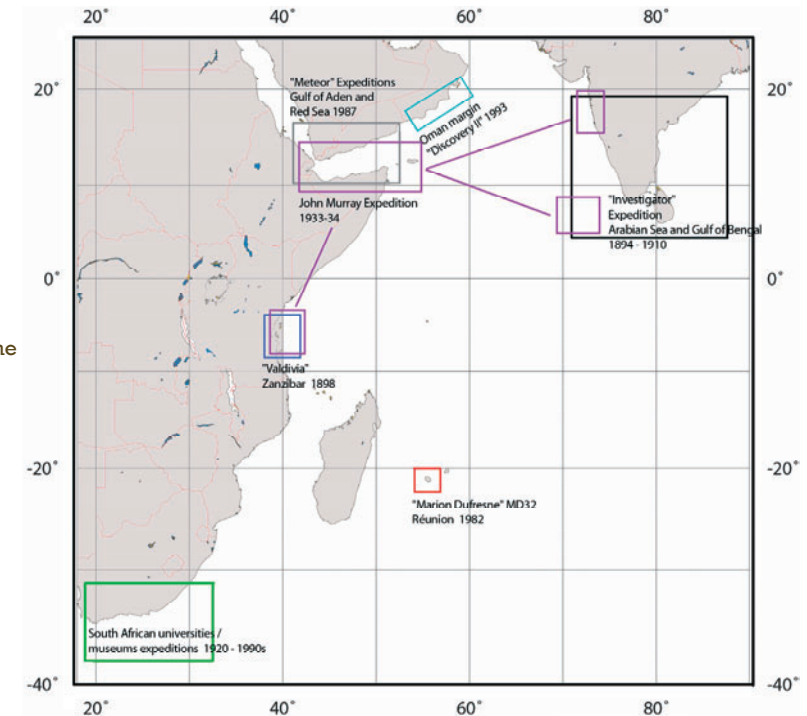


Previous expeditions in the Mozambique Channel remain references for much of our knowledge on the deep-sea benthos of the tropical Indian Ocean. Portugal never sent out oceanographic expeditions to its Mozambique colony and knowledge on its biota has suffered from an almost total lack of attention that has lasted after colonial times.

Extensive deep-sea fishing was conducted by Soviet trawlers in the 1980s to early 1990s with no baseline studies of the non-catch species. In the case of Madagascar, although no dedicated deep-sea exploring expedition was carried in this country, surveys for shrimp stocks conducted in 1970-1980s generated a discrete by-product of new species discoveries.

Being remote from fleet bases of northern countries, operating essentially in the Atlantic and North Pacific, the Mozambique Channel remains to date a backwater of the exploration of deep-water fauna. However, both sides of the channel have offshore shrimp fisheries harvested for the European market.

Location of the major historical and recent expeditions to sample deep-water slopes (100-1500 meters) of the western Indian Ocean. (excluding abyssal expeditions).



Equipment will be deployed to reach soft and hard sea bottoms up to 1,800 meters depth.

These activities will not have any environmental impact, as the equipment used will be leaving a limited footprint compared to the giant nets operated commercially.



Two expeditions of 20 days each will be carried out in 2009 on each side of the Mozambique Channel and at comparable depths.

Terrestrial expeditions in Northern Mozambique



The world Conservation organizations have recently recognized the Coastal Forests of Eastern Africa as major areas of biodiversity for both plants and animals. These forests are now ranked among the 25 forest sites in the world for conservation.

However these forests consist of highly heterogeneous assemblages of forest types that have hitherto eluded a comprehensive description. Most of the Coastal Forests are laying in Northern Mozambique and are still biologically unknown. Data gathered from previous surveys in Kenya and Tanzania give only scarce information on what could exist in Mozambique, and on what would be the priority sites for conservation action.

The Coastal forest of eastern Africa can be characterized as an archipelago of highly fragmented lowland forest habitat, occurring up to 300 km inland from southern Somalia to Mozambique. These forest are surrounded by cultivation, fallow and scrub, or fire-maintained woodland and wooded grassland.

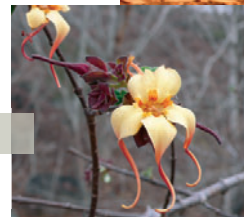
Most of the known patches of Coastal Forest are less than 15 Km² in area and the full extent of the surviving remnants of Coastal Forests in Northern Mozambique is unknown.

Despite that this area is believed to contain a high number of endemic species with a very restricted distribution, fauna and flora are still poorly known, and most records are derived from the collection of a few biologists.

The project will address these issues by: 1) undertaking a vegetation survey in Cabo Delgado in order to assess the extent of the remaining patches of Coastal Forest in this part of Mozambique, 2) undertaking biological surveys (field trips planned late 2008 and in 2009) for filling the gap in knowledge on the highly endangered Coastal forests.



The Coastal forest were until recently overlooked by the Conservation community, but are currently recognized to be one of the top ten priority ecosystems in Africa.



Dry forest and rock outcrops (Inselbergs) in the Quirimbas National Park (Cabo Delgado, Northern Mozambique)

Expeditions 2008-2009



Main partners



The Prince Albert II of Monaco Foundation



The Total Enterprise Foundation for biodiversity and the marine environment



The Stavros Niarchos Foundation

Some International / Regional scientific partner organizations

The **International Union for Conservation of Nature - IUCN** - has formally expressed its interest and support to the 2008-2009 expeditions conducted in Mozambique and Madagascar by the MNHN and Pro-Natura International.

The **Royal Botanical Gardens, Kew**- London, UK

The **South African Institute for Aquatic Biodiversity - SAIAB**

The **Instituto Oceanografico Espanol**, Spain

The **Raffles Museum of Biodiversity Research**, University of Singapore

The **National Taiwan Ocean University**, Keelung

The **Naturhistoriska Riksmuseet**, Stockholm

In-country scientific partner organizations

Madagascar

The **Wildlife Conservation Society in Madagascar**, an international NGO worldwide renowned in science-based conservation, currently managing a marine conservation program in Madagascar,

the **Institut d'Halieutique et des Sciences Marines - IHSM** - Tuléar.

Mozambique

Instituto de Investigação Agraria de Moçambique - IIAM

Universidade do Lurio (Nampula & Pemba)

Universidade Eduardo Mondlane (Maputo)

Planning

Phase 1: November/December 2008

Terrestrial biodiversity survey of the dry forests in Northern Mozambique

Phase 2: March 2009

Marine biodiversity survey of the eastern part of the Mozambique Channel

Phase 3: April & May 2009

Marine biodiversity survey of Southern Madagascar

Phase 4: November / December 2009

Terrestrial biodiversity survey of the dry forests in Northern Mozambique & marine biodiversity survey of the western part of the Mozambique Channel