ECOSYSTEM PROFILE

MADAGASCAR AND INDIAN OCEAN ISLANDS

FINAL VERSION
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EXECUTIVE SUMMARY

The Critical Ecosystem Partnership Fund (CEPF) is designed to safeguard the world's biologically richest and most threatened regions, known as biodiversity hotspots. It is a joint initiative of l'Agence Française de Développement, Conservation International (CI), the European Union, the Global Environment Facility, the Government of Japan, the John D. and Catherine T. MacArthur Foundation and the World Bank.

A fundamental purpose of CEPF is to engage civil society, such as community and indigenous groups, nongovernmental organizations (NGOs), academic institutions and private enterprises, in biodiversity conservation in the hotspots. To guarantee their success, these efforts must complement existing strategies and programs of national governments and other conservation funders. To this end, CEPF promotes working alliances among diverse groups, combining unique capacities and reducing duplication of efforts for a comprehensive, coordinated approach to conservation. One way in which CEPF does this is through preparation of "ecosystem profiles"—shared strategies, developed in consultation with local stakeholders, that articulate a multi-year investment plan for CEPF, informed by a detailed situational analysis.

CEPF invested in the Madagascar portion of the Madagascar and Indian Ocean Islands biodiversity hotspot from 2001 to 2006, with a total of $4.25 million, followed by a consolidation phase which took place between 2009 and 2012 after being delayed due to the political events in Madagascar. Given the needs and opportunities highlighted by the civil society partners as well as representatives of donors, the CEPF Donor Council decided at the end of 2012 to ask the CEPF Secretariat to prepare a new phase of investment. The first ecosystem profile prepared in 2000 could no longer serve as a benchmark to guide CEPF investments, both because of changes in the region and because of the evolution of CEPF over its 13 years. The Council also asked the CEPF Secretariat to extend the profile to cover to the entire hotspot.

Ecosystem Profiling Process

The consultation process that informed this profile involved more than 200 individual stakeholders from about 130 organizations and institutions. National workshops were organized by Conservation International in Madagascar and by their partner Biotope in the Seychelles, Mauritius, the Comoros and La Réunion. These various meetings were supplemented by expert consultancies and specific interviews held by the profiling team. In addition, three meetings were held with a Regional Advisory Committee comprising 21 experts from 15 institutions. The outcome is this document, the Ecosystem Profile for the Madagascar and the Indian Ocean Islands Hotspot. It presents an overview of the hotspot in terms of its biological importance in a global and regional context; its socioeconomic, civil society and policy context; major threats to and root causes of biodiversity loss; and current conservation investments. Based on this overview and the consultations, the profile results in a common conservation vision for the hotspot and a five-year investment strategy for CEPF. This strategy comprises 10 investment priorities, grouped under four strategic directions. The successful implementation of this strategy will require time, persistence and, above all, a commitment to genuine and lasting partnership. The cooperation and common vision that has been witnessed through the ecosystem profiling process inspires confidence that such success will be achieved.

The Madagascar and the Indian Ocean Islands Hotspot

While the different islands of the hotspot share specific biogeographical features, they form a single unit characterized by a wide disparity in scale in terms of both land mass and human population. Madagascar, an island-continent, makes up about 95 percent of the hotspot's land area and is home to about 98 percent of the population, overwhelming the three island groups of Comoros, Seychelles, the Mascarene Islands (comprising La Réunion,Mauritius and Rodrigues) and other scattered islands in the Western Indian Ocean in those respects.

The hotspot has often been considered a priority among hotspots, because of its extreme diversity—with about 15,000 plant species, of which more than 12,000 are endemic—and because of the high-level taxonomic endemism, which demonstrates distinct evolutionary mechanisms related to the isolation of the hotspot. The area also qualifies as a hotspot due to a very high level of degraded natural ecosystems, illustrated by the massive deforestation of Mauritius or Madagascar, or the disappearance of many higher vertebrates, like the dodo, which has become the symbol of species extinction. The conservation outcomes (species, sites and corridors) represent the highest geographical priorities for biodiversity investments. Distribution data for 1,655 globally threatened species and 379 other patrimonial species (site endemics or species not yet assessed but considered endangered by experts) were used to identify 369 KBAs. In addition, 13 conservation corridors were identified on mainland Madagascar, containing clusters of KBAs with biophysical homogeneity that could serve to provide a geographical focus for investment.

For Madagascar, Conservation International's Moore Center for Science and Oceans analyzed the ecosystems services provided by the Key Biodiversity Areas. The pilot analysis used existing data on ecosystem services, covering provision of fresh water, disaster risk reduction/climate adaptation, climate mitigation, food provision and cultural services. This analysis highlighted the relative importance of some forested areas for irrigation and domestic use of water, as well as the relative importance of some coastal/marine areas for food provision, and was used to support the prioritization process that led to CEPF's investment strategy and niche.

The disparities across the hotspot are significant in economic terms and in public services and planning, which are related to the political situation: La Réunion and Mayotte, French departments included in the European Union (since 2014 in the case of Mayotte), have the level and quality of public services found in developed countries. Seychelles and Mauritius can be considered as emerging economies, while Madagascar and Comoros are catagorized by the United Nations as among the world's least developed countries. In these two countries, the economy relies mostly on subsistence agriculture and fishing, while the tertiary sector—and in particular tourism —dominates the economy of the more developed islands. Notwithstanding, tourism, fisheries and agriculture are all heavily dependent on natural resources and their preservation and sustainable management is critical for these countries.

While human well-being and economic development rely heavily on ecosystems, the environment of the hotspot is under immense threat. Humans have deeply disturbed ecosystems and biodiversity across the hotspot for centuries, but today enhanced anthropogenic pressures due to population growth and exacerbated by climate change seriously threaten the already

degraded and often fragmented ecosystems. Deforestation and habitat loss continue at an alarming rate in Madagascar and the Comoros, mostly as a response to the need for farmland and energy for the growing local communities. Wild species are overexploited for local consumption or international markets—a situation that is especially a concern in regard to coastal resources, which provide a majority of the protein for the hotspot's people. In Madagascar, the mining industry, while in a position to provide economic benefits to the country, could in the future threaten sites of high biodiversity value.

Civil society is engaged in the preservation of the hotspot environment, and has gained a lot of experience in developing new models for a better integration of the conservation and development challenges. Yet, the civil society landscape is still dominated by a small group of international organizations. Local and national organizations face difficulties in accessing funding and lack capacities needed to sustain their activities. At the local scale, community engagement has proven an effective way to improve the management of natural resources and the protection of biodiversity, but it is still hampered by the lack of organizational skills and continuous support that would allow success to be sustained. The profile also highlighted the great potential for enhanced regional cooperation, as the civil societies of the different islands have developed complementary skills and areas of expertise that have not yet been capitalized on across the hotspot. A regional conservation community has yet to emerge.

The conservation efforts of the hotspot's countries have been supported by the international community for a long time. France, Germany and the European Union are among the most active donors, providing more than $160 million of investment over the 2005-2011 period for biodiversity-related projects for Madagascar alone. Together with the World Bank and the GEF, the institutional donors have supported the Malagasy authorities to put in place a network of protected areas as well as some sustainable financing mechanisms to support conservation through the Protected Areas and Biodiversity Trust Fund, endowed with $50 million. Nevertheless, the funding gap is still huge and many smaller and unprotected Key Biodiversity Areas are largely underfunded. The level of investment in the other countries of the hotspot has been much lower—in particular in the Comoros, where the needs for conservation funding are extremely high. National and local civil society organizations across the hotspot experience difficulties gaining access to funding, limiting their capacity to develop their own long-term programs of action and to play a complementary role to national authorities.

CEPF Niche and Investment Strategy

The CEPF niche for investment has been formulated through an inclusive participatory process involving the national, subregional and expert consultations previously outlined. The niche is also based on a geographical prioritization process to reduce the number of KBAs and corridors to a level commensurate with the funding that is likely to be available. This process has involved the interplay of several criteria, namely biodiversity priority, past and current donor investment levels, protection status, significant threats and provision of ecosystem services.

The CEPF niche in the hotspot has been defined to take advantage of CEPF's ability to provide variable levels of funding, in particular with its small grants mechanism. In this context, the niche would enable CEPF to support the emergence and strengthening of local organizations that could work toward the implementation of site-based conservation actions, maximizing the

chances of local ownership, and work hand in hand with other economic sectors and government to support mainstreaming of biodiversity conservation in development policies and business practices. CEPF is also ideally positioned to support concrete regional collaborations among the civil society organizations of the hotspot, maximizing the wealth and diversity of experiences developed—so far in isolation—within the hotspot and using the heterogeneity of the regions to their benefit, fostering the emergence of a regional conservation community.

In terms of geographical focus, the consultations resulted in a plan to primarily focus on seven priority corridors or clusters in Madagascar, plus three other sites, totaling 38 priority KBAs in Madagascar, and 19, 9 and 12 priority KBAs for the Comoros, Mauritius and the Seychelles, respectively. Most of these sites focus on ecosystems that have extraordinary biodiversity but so far have been underfunded relative to other ecosystems: the wetlands and freshwater bodies, the dry forests, and coastal and near marine areas. French overseas *Départements* and territories (Réunion Island, Mayotte, and the Scattered Islands or *Iles Eparses*) were not included in the prioritization process as they are not eligible to receive CEPF funds.

The following four strategic directions and 10 investment priorities will guide CEPF's five-year investment in the region. The national workshops made initial suggestions for strategic directions that were reconsidered and prioritized during the subregional workshops and finalized through discussions based on the other considerations described above and detailed in the profile.

Strategic Directions	Investment Priorities
1. Empower local communities to protect and manage biodiversity in priority key biodiversity areas.	1.1 Provide the necessary technical and financial support in designing and implementing natural resources conservation and management measures adapted to the local context, taking into consideration local development needs. 1.2 Support the development of economic models to improve both livelihoods and biodiversity conservation. 1.3 Build the technical, administrative and financial capacity of local grassroots organizations and their partners.
2. Enable civil society to mainstream biodiversity and conservation into political and economic decision-making.	2.1 Support local research institutions to improve basic knowledge on biodiversity of priority KBAs and corridors. 2.2 Support civil society to disseminate biodiversity information and influence political and economic decision-makers in favor of biodiversity and conservation priorities. 2.3 Explore partnerships with private sector stakeholders to promote sustainable practices that deliver positive impacts for conservation.
3. Strengthen civil society capacity at local and regional levels through training, exchanges and regional cooperation.	3.1 Foster the emergence of a new generation of conservation professionals and organizations by small grants assistance for technical and practical training. 3.2 Encourage exchanges and partnerships between civil society organizations to strengthen conservation knowledge, organizational capacity, and management and fundraising skills.
4. Provide strategic leadership and effective coordination of CEPF investment through a regional implementation team.	4.1 Make operational and coordinate the allocation and monitoring process of the CEPF grants to ensure effective implementation of the strategy. 4.2 Foster the emergence of a conservation community beyond institutional and political boundaries to achieve conservation objectives.

Conclusion

The Madagascar and Indian Ocean Islands Hotspot is one of the biological wonders of the world, with globally significant levels of diversity and endemism. Its ecosystems provide millions of people with fresh water and other ecosystem services that are essential to their survival. Despite its wealth in natural resources, the pace of action in conservation appears insufficient to ensure the hotspot inhabitants will sustainably benefit from their environment for generations to come. CEPF will provide a source of funding in the hotspot that is designed to reach civil society in a way that complements funding going to government agencies and catalyzes innovative conservation actions, in particular those that demonstrate the link between biodiversity benefits and sound development. By using an integrated approach to pursue conservation and sustainable development goals, and by providing funds to mainstream biodiversity conservation into government plans and policies as well as private sector initiatives, CEPF will augment efforts to address the immediate threats of poverty and unsustainable development, and contribute to long-term conservation of the hotspot.

1. INTRODUCTION

It is clear today that natural ecosystems have multiple functions and provide economic benefits to mankind. However, natural resources continue to be depleted throughout the world. The current rate of plant and animal extinction on the planet due to human activities is more than 1,000 times higher than the average rates recorded in history (Pimm *et al.* 1995). Faced with this dilemma, several strategies and methodologies have been developed to preserve critical ecosystems and the environmental services they provide

The concept of "biodiversity hotspots" is one of these approaches to define priorities among the world richest regions in terms of biodiversity that are also the most threatened (Myers *et al.* 2000), and therefore concentrate investments in conservation on these high-priority areas. A recent analysis describes 35 biodiversity hotspots in the world, each containing at least 1,500 species of plants that are endemic—meaning they exist nowhere else—and having lost at least 70 percent of the area of its original habitat (Mittermeier *et al.,* 2004, Zachos and Abel, eds., 2011). The concept of biodiversity hotspots rallied much of the community conservation and sustainable development for action in the most threatened areas in the world.

Mankind is dependent on the planet's ecosystems and the essential benefits that they provide: clean air, fresh water and healthy soils. Founded in 2000, the Critical Ecosystem Partnership Fund (CEPF) has become a global leader in enabling civil society to influence and participate in the conservation of world's most critical ecosystems. CEPF is a joint program of l'Agence Française de Développement (AFD), Conservation International, the European Union, the Global Environment Facility, the Government of Japan, the MacArthur Foundation and the World Bank. CEPF provides grants to nongovernmental and private organizations to preserve biodiversity hotspots, the world's most biologically rich and most endangered regions. Critical areas for conservation are also often home to millions of poor who are heavily dependent on healthy ecosystems, and this convergence is most obvious in the hotspots.

The Madagascar and the Indian Ocean Islands biodiversity hotspot has often been considered a priority among hotspots because of its extreme diversity—with about 15,000 plant species, of which more than 12,000 are endemic, or found nowhere else—but also because of the high-level taxonomic endemism, witness to distinct evolutionary mechanisms related to the isolation of the hotspot. The area also qualifies as a hotspot because of its very high level of degraded natural ecosystems, illustrated by the massive deforestation of Mauritius and Madagascar, and the disappearance of many higher vertebrates, like the dodo, which has become the symbol of species extinction.

If the different islands of the hotspot share specific biogeographical features, they form a single unit characterized by a wide disparity. The three island groups (Comoros, Seychelles, the Mascarene Islands) and other scattered islands in the Western Indian Ocean, contrast with the mass of Madagascar, an island-continent which concentrates 95 percent of the land area and 98 percent of the population of the hotspot. The disparities are also significant in economic terms, in the development of public services and planning, which is linked with the political situation: La Réunion and Mayotte, French Departments included in the European Union (since 2014 in the case of Mayotte), have the equipment and quality of public services of developed countries, even

though the differences are significant when compared with a country like France. Seychelles and Mauritius can be considered as emerging economies, while Madagascar and Comoros are among the least developed countries.

The first phase of CEPF investment in the hotspot ran from 2001 to 2006, with a total of $ 4.25 million. It supported 40 projects undertaken by 18 organizations. At the end of this phase, and following a positive assessment, the CEPF Donor Council approved a consolidation phase of $1.4 million. The implementation, delayed partly because of the political situation in the country, took place between 2009 and 2012. Given the needs highlighted by the civil society partners as well as representatives of donors, the Donor Council decided at the end of 2012 to ask the CEPF Secretariat to prepare for a new phase of investment. The first ecosystem profile prepared in 2000 could no longer serve as a benchmark to guide CEPF investments—both because of changes in the region, and because of the evolution of CEPF in the previous 13 years. The Council therefore directed the CEPF Secretariat to expand the profile, to include the entire hotspot.

CEPF develops ecosystem profiles to identify and formulate an investment strategy for each targeted hotspot. Preparing the profile involves not only a review of the pertinent literature, but also the participation of regional stakeholders. Their knowledge of the region benefits the profile, and from their engagement encourages the stakeholders to take ownership of and use the final result. Each ecosystem profile reflects a rapid assessment of biological priorities and underlying causes of biodiversity loss in specific ecosystems. The profile combines these two elements with an inventory of existing conservation investments and other key elements of the current status of conservation. Thus, the greatest added value for CEPF investment is determined. Each profile highlights conservation priorities for the region, and the most relevant ones for the CEPF investment.

The most important step in the ecosystem profile is defining the conservation outcomes. These are the outcomes to be achieved in order to prevent biodiversity loss. The niche and the strategy of CEPF are based on these results, first to ensure that investments are properly targeted, then to assess the success of these investments because the goals also serve as benchmarks for monitoring.

Conservation outcomes are identified at three levels: (i) globally threatened species in the region, (ii) those sites that host these species (key biodiversity areas) and (iii) the landscapes that preserve ecological processes and changes that are necessary for these sites, called corridors. The results are respectively defined as: "extinctions avoided", "areas protected" and "corridors created." Taking into account the species, sites and corridors, CEPF wants to set quantitative, explainable and replicable targets. CEPF does not seek to achieve these results in each hotspot, but its niche and investment strategy target a priority subset.

Each ecosystem profile recommends strategic directions of funding that the civil society can implement in order to protect biodiversity in a hotspot. In doing so, CEPF provides a mechanism that is flexible and that can be adapted to the civil society context. In addition, efforts are also deployed to complement the strategies and frameworks established by the local, regional and national governments. CEPF promotes alliances between community groups, nongovernmental

organizations (NGOs), government, academic institutions and the private sector, thus combining the competences specific to each entity and preventing redundancy to ensure that the approach to conservation is as complete and efficient as possible. CEPF promotes cross-border cooperation when areas rich in biodiversity are shared by countries, when a regional approach promises to be more effective than a national approach, or to encourage exchange of experiences between the neighboring countries

To maintain a regional dimension in this ecosystem profile, it covers the islands of the hotspot as a whole, including the French departments and territories. However, they do not qualify for CEPF funding at present, and therefore have not been considered in the definition of investment strategy, nor in the analysis of current conservation investments; these follow channels that are quite distinct. As a result, the current profile, for the French departments and territories, is only to be considered as a draft that can contribute to the future development of more exhaustive documents.

2. BACKGROUND

The Critical Ecosystem Partnership Fund first invested in the Madagascar and Indian Ocean Islands Biodiversity Hotspot in 2000 with the development of an ecosystem profile for the Madagascar portion of the hotspot. A five-year investment phase was launched in 2001 totaling $4.25 million, which was followed by a three-year consolidation phase implemented from 2009 to 2012, totaling $1.4 million. In December 2012, the CEPF Donor Council approved this hotspot for re-investment and directed CEPF to produce a new ecosystem profile for the region.
This chapter describes the development of the ecosystem profile for the Madagascar and Indian Ocean Islands Hotspot. The profile was prepared from June 2013 to January 2014, under the leadership of Conservation International Madagascar, with specific contributions by the Moore Center for Science and Oceans for the analysis of ecosystem services, and consultancy firm Biotope for the island nations and the French departments and territories, as well as overall supervision by the CEPF Secretariat. The process for drafting the profile is as important as the document itself, in that it offers the conservation community the opportunity to consult and reflect on the issues and objectives for biodiversity across the entire region. Therefore, significant emphasis was devoted to exchanges and consultations with many stakeholders working in the field of conservation and development throughout the hotspot.

2.1. Building on CEPF's Previous Investment

This ecosystem profile has been prepared to guide CEPF's third phase of investment in the Madagascar and Indian Ocean Islands Biodiversity Hotspot. While the investment strategy draws from current research and the many consultation workshops undertaken during the profiling process, it also builds upon the previous two phases of CEPF investment, taking into consideration the achievements and lessons learned since 2000 when investment commenced.

CEPF's initial investment period took place between December 2000 and December 2005, focusing exclusively on the island of Madagascar. CEPF awarded $4.25 million in 40 grants to 18 civil society organizations, supporting a diversity of projects addressing a broad set of issues, including biodiversity conservation corridor approaches, conservation planning initiatives, priority-setting activities, and the concerns and priorities of local communities. A second "consolidation" phase designed to secure the gains made in first phase was implemented from 2009 to 2012, with an allocation of $1.4 million.

At the start of investment in 2000, Madagascar's biodiversity faced an immense array of threats. Nearly 80 percent of the island's original forest cover had been lost. The population was estimated at 15 million, with a rate of increase of 3 percent per year. Poverty was extremely high, with the country being regarded as one of the most economically disadvantaged countries in the world. Key threats at the time included agricultural expansion (in particular for upland rice production resulting in a loss of about 2,000 square kilometers of forest per year); uncontrolled livestock grazing; unsustainable charcoal production, mining, hunting and timber exploitation; and unregulated international trade in plants and animals.

Compounding these threats was a civil society characterized by insufficient technical capacity and limited biodiversity information, alongside an inadequate government presence to manage

and protect natural resources, and ambiguous policies. Additional threats present on the island included poverty, and inadequate access to education. These factors presented a complex set of challenges to address if conservation for the people of Madagascar were to be achieved.

The CEPF 2000-2005 investment strategy for this region focused on a) filling the gaps between existing efforts and investments; b) defining the mechanisms to ensure the proper coordination among existing efforts; and c) providing civil society with the capacity to manage biodiversity conservation more effectively. CEPF's investment yielded significant results, including assisting with the gazettement of more than 1 million hectares of new protected areas, increasing the capacity and influence of local organizations, and improving the livelihoods of communities surrounding several protected areas by reinforcing the link between sustainable livelihoods and biodiversity conservation.

The 2009-2012 consolidation phase built upon the achievements and lessons of the initial five years and focused on three investment priorities: a) enable scaling up of the opportunities made possible by keystones (nodes) in support of community conservation action and sustainable livelihoods in priority corridors; b) improve the capacity of community-based natural resource management and local governance structures by sharing lessons learned both between sites in Madagascar, as well as examples of participatory forest management from elsewhere; and c) launch a social marketing and awareness campaign at local and national scales focused on a series of audiences and highlight the value provided and the importance of sustainable natural resource management and activities that have demonstrated socioeconomic and conservation impacts. CEPF's consolidation investment was designed to take advantage of the opportunities that arose as a result of implementing the Durban Vision and to complement the activities under phase 3 of the National Environmental Action Plan as well as other ongoing initiatives such as the GEF-UNDP small grants program.

Achievements

CEPF support filled a key niche by supporting local civil society and NGOs to participate in conservation, and in increasing the technical capacity of Malagasy staff. CEPF was also instrumental in supporting contributions to the Durban Vision and the implementation phase of it that is now underway. Support enabled the involvement of a wide range of actors, many of whom had never been given the opportunity to expand and strike out on their own, and also allowed better known entities to take risks to strive for conservation objectives where the future was uncertain.

Specifically, CEPF's investment in Madagascar achieved the following results:

- helped lay the groundwork for the Durban Vision, the policy that launches government support for biodiversity conservation and for inclusion of local communities in the conservation and management of newly established protected areas.
- helped identify more than 1 million hectares of biologically rich land leading to the president of Madagascar's official decree to protect these areas, and for some of them, helped undertake the planning phase required for their successful realization. During the consolidation phase, CEPF supported strengthened management on a total of 1,574,435 hectares of KBAs.

- significantly increased the role of local NGOs and community groups in biodiversity conservation.
- supported grantees to address the issue of financial sustainability of the current and future protected area system, and specifically supported CI-Madagascar in securing financing for the capitalization of a biodiversity trust fund that has a target of $50 million.
- supported local communities to manage and benefit from their natural resources, via community-based management contracts; during the consolidation phases six node programs awarded 339 micro-grants to 236 community associations.
- supported scientific surveys resulting in the discovery of 120 species new to science.
- increased the scientific and technical capacity of more than 60 individuals.
- focused on several flagship species, such as the Madagascar fish eagle, Madagascar teal, and Sakalava rail.
- improved the livelihood status of local communities surrounding several protected areas; during the consolidation phase a total of 790 communities were documented as showing socioeconomic benefits.

Lessons Learned

CEPF's experiences during the initial phase formed the basis for the focus of the follow-up consolidation investment, and in turn, the nearly ten years of funding and the lessons learned informed the strategy in the current ecosystem profile. The key lessons learned over the past decade are:

- Local conservation groups require capacity building, but once they are able to gain that capacity they can have significant impact.
- Training and capacity building of local communities is not only desired, it is mandated by law, and therefore efforts to engage local civil society are essential.
- Support to partner organizations who can provide micro-grants, coupled with close supervision, can deliver funds to community-based groups to make a difference on the ground.
- Linking conservation and livelihood activities is key to get communities' engagement.
- Engagement with the private sector is challenging and most local civil society groups do not have the expertise or experience to work with the private sector.
- Sustainability of conservation efforts in Madagascar is dependent on having a solid foundation of conservation actors with the skills and expertise to have an impact.

During the initial CEPF investment it was recognized that there was a paucity of national and local nongovernmental organizations in Madagascar and that civil society had limited capacity to implement CEPF funds directly. As a result, the majority of the funds were channeled through established international nongovernmental organizations. However, funds did reach community-based organizations on a site-by-site basis through Conservation International's pilot small grants program, the national nongovernmental organization Fanamby's pioneering efforts in Daraina and the BirdLife wetlands conservation projects in Mahavavy-Kinkony Complex. These examples demonstrated that community conservation could be achieved given the right level of support.

Further, the Durban Vision, which set the stage for integration of local communities into protected area management as well as some level of sustainable use within the limits of these

areas, opened up the possibility of expanded support for local community engagement in conservation, providing justification for scale up during the consolidation phase. Thus the keystone approach (or "nodes" as it is known in Madagascar), where locally based units managed by partner organizations provide funding for communities to undertake activities that integrate conservation and development around new protected areas, was viewed as a successful method that could be scaled up with additional funding.

Overall, Madagascar has experienced many positive and exciting conservation impacts during CEPF's decade of investment. CEPF projects built confidence in local NGOs and strengthened partnerships, as well as helped to increase collaboration amongst the many groups present in the country. It is, however, the rise of the local NGOs and local talent that CEPF regards as the most significant of impacts – many of the conservation achievements realized during CEPF's investment period were achieved by these Malagasy institutions and individuals.

2.2. Process and Approach to the Development of the Ecosystem Profile

The ecosystem profile was prepared by the Conservation International team with contributions from consultants from the region. The main stages of development of the ecosystem profile are described in Table 2-1.

For each of the descriptive chapters (1 to 10), a three-step approach has been followed: first a review of existing literature and data, and the drafting of the chapter, followed by consultations with stakeholders (either during consultation meetings or through specific requests and interviews), before finalization of the chapters by the profiling team. The consultations engaged more than 160 representatives from over 90 organizations (see list of contributors on pages i and ii of the profile).

Table 2-1: The Main Steps in the Development of the Ecosystem Profile

July 2013	Review of the literature and preparation of the work plans
August 2013	Launch and first national consultation in Madagascar; collecting Madagascar data
September 2013	Second national consultation in Madagascar. First draft of Chapters 3 to 7. Desk review for the Indian Ocean islands (Comoros, Mauritius, Seychelles and the French department and territories)
October 2013	Compilation of Madagascar data. Second draft of Chapters 3 to 10, for Madagascar
November 2013	First draft of the chapter on "KBA+" ecosystem services. Regional workshop in Antananarivo, validation of data in the descriptive chapters and consultations of the strategic directions
December 2013	Consolidation of chapters by including data on the entire hotspot. Definition of hotspot Key Biodiversity Areas
January –February 2014	Finalization of the profile for presentation to the CEPF Working Group

To set the biological priorities, the authors primarily used data from the Global Red List of Threatened Species (IUCN, 2013) endangered species. However, additional data were obtained from experts and specialized organizations when necessary. The Missouri Botanical Garden has greatly contributed to the identification of KBAs based on floristic criteria, on the basis of past

studies and analyses, some of which had been funded by CEPF. The prioritization of sites has been undertaken mainly through the consultative process (national and regional consultations). CEPF has sought to integrate data on ecosystem services to identify the key areas for CEPF investment. Conservation International's Moore Center for Science and Oceans also provided support to the CI-Madagascar team and the group of consultants to analyze the ecosystem services provided by KBAs in Madagascar – or the "KBA+" analysis.

The information and analysis for the chapters on socioeconomic context, politics and civil society context mainly comes from research and bibliography from the profiling team, together with targeted interviews and ad hoc consultations with representatives of the concerned government ministries (Ministries of Economy, of Agriculture, of Tourism). The national consultations allowed the team to fill the gaps in information and to analyze the skills and needs of the civil society organizations.

National and regional cconsultations have been used primarily to gather information about and prioritize the threats to biodiversity, as well as the indirect root causes and barriers to success. This chapter, of critical importance for the definition of CEPF niche and strategy, is mainly the result of the input of the stakeholders engaged during the consultations.

Finally, data on investment in conservation was gathered primarily by a desk review, but proved in some cases difficult to obtain. Upon request from the profiling team, several donors provided the necessary complementary information through direct interviews and exchange of documents. We would like to thank in particular Madagascar offices of the World Bank, European Commission and French Development Agency (AFD), the central services of the Global Environment Facility (GEF), European Commission (DEVCO) and AFD, the Helmsley and MacArthur foundations and the French Ministry of Foreign Affairs for their contribution to this chapter.

Regional Advisory Committee

An advisory committee created to provide technical support to the profiling team guided preparation of the ecosystem profile. Comprising 16 members from various national and international environmental and research organizations (see table 2-2), and GEF focal points for all countries in the hotspot, the advisory committee held its first meeting in May 2013, followed by meetings in August and November 2013.

Table 2-2: Regional Advisory Committee

Alliance Voahary Gasy	Andry Ralamboson Andriamanga
National Commission for Sustainable Development, Comoros	Idaroussi Hamadi
Indian Ocean Commission	Jean-Paul Gaudechoux
Conservation International – Madagascar	Léon Rajaobelina
Conservation International – Moore Center for Science and Oceans	Will Turner
Conservatoire botanique du Mascarin, La Réunion	Luc Gigord
Biology Departement, University of Antananarivo	Roger Edmond
Global Environment Facility (GEF), Focal point Madagascar	Edmée Ralalaharisoa
Global Environment Facility (GEF),	Ali Mohamed Soilihi

Focal point Comores	
Global Environment Facility (GEF), Focal point Mauritius	Xavier Luc Duval
Global Environment Facility (GEF), Focal point Seychelles	Maurice Loustau-Lalanne
Mauritian Wildlife Foundation	Vikash Tatayah
Muséum National d'Histoire Naturelle, Paris, France	Claude-Anne Gauthier
Nature Seychelles	Nirmal Jivan Shah
Vahatra	Steve Goodman
Wildlife Conservation Society - Madagascar	Christopher Holmes
World Wildlife Fund – Western Indian Ocean Office	Richard Hughes

The participation of the advisory committee members from islands off Madagascar has been difficult due to communication infrastructure making it difficult to organize teleconferences. However, the four island groups were represented at the committee meeting held in November 2013 in Antananarivo. All advisory committee members were consulted and provided feedback on the various drafts as the profile was being developed.

Consultation Process

As the development of the ecosystem profile must be conducted in a participatory manner, collective consultations were held with the participation of various ministries, national and international NGOs, associations, universities and research centers. Around 200 people participated to the consultation process, from 130 organizations and institutions (56 for Madagascar, 26 for Comoros, 12 for Mauritius, 16 for Seychelles and 23 for La Réunion, Mayotte and the Scaterred Islands).

National Consultations

Consultations with experts on each topic were made through the organization of small meetings, exchange of emails, and individual consultations.

Table 2-3: Chronology of the Consultation Workshops

Country	Date	Number of participants
Madagascar	21 August 2013	34
	4 September 2013	66
Comoros	8 October 2013	22
Seychelles	9 October 2013	30
Mauritius (Rodrigues)	15 October 2013	20
Réunion (Mayotte, Iles Eparses)	17 October 2013	60*
Regional workshop (Antananarivo)	15 November 2013	90

Notes: (*) 13 participants plus 47 participants in six bilateral meetings

For Madagascar, two consultation workshops were held due to the size of the country and the complexity of the administrative, organizational and technical contexts.

In La Réunion and Mayotte, the consultation was carried out in two ways:

- A workshop in La Réunion on October 17, 2013, in the presence of La Réunion actors and representatives of Mayotte
- A series of individual consultations and bilateral meetings with important stakeholders that couldn't attend the workshop, both in La Réunion and Mayotte.

For Mauritius, Seychelles and the Comoros, consultation workshops were followed by a series of individual interviews and information sharing by email.

Regional Workshop for the Validation of the Ecosystem Profile

A regional validation workshop was held in Antananarivo on November 15, 2013 to discuss the contents of the first draft of the ecosystem profile and to identify strategic directions and investment priorities for the Madagascar and Indian Ocean Islands biodiversity hotspot. In addition to stakeholders in Madagascar, consultants working in the islands and the representatives of the Advisory Committee (in particular those representing the island nations other than Madagascar) attended the regional validation workshop. A total of 90 participants representing NGOs and associations, research centers and government organizations attended the workshop.

Validation of the Ecosystem Profile

The ecosystem profile was presented to the CEPF Working Group for comment on April 7, 2014. Comments were addressed, and the final version of the profile was submitted to the CEPF Donor Council for review and approval; the profile was officially approved on July 15th, 2014.

3. BIOLOGICAL IMPORTANCE OF THE HOTSPOT

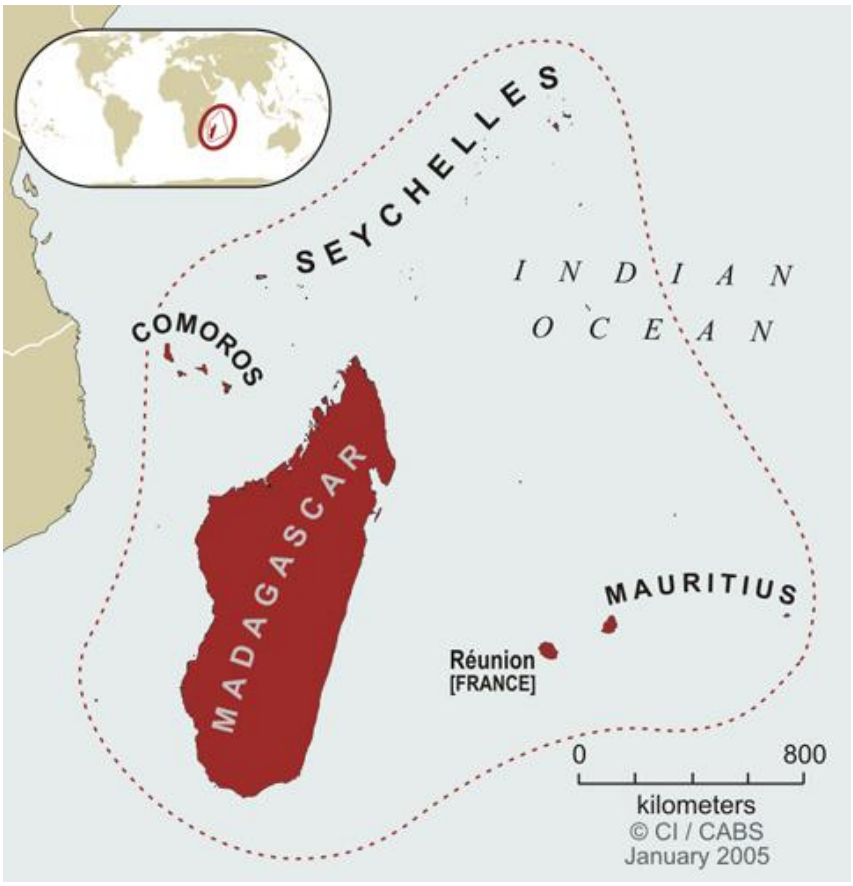
The Madagascar and Indian Ocean Islands Hotspot includes the nation of Madagascar and the neighboring islands and archipelagos of Mauritius, the Comoros (including Mayotte), the Seychelles, La Réunion and the Scattered Islands of the Western Indian Ocean (*Iles Eparses*). The land area of hotspot is estimated to be 600,461 km^2, of which 592,040 km^2 are represented by the island of Madagascar alone. Referred to as the "continent island," Madagascar is the fourth largest island in the world, isolated from the African continent 140 million years ago. Its original and distinctive flora and fauna, with a very high rate of endemism not only at the species but also the genus and family levels, have evolved over time. The terrestrial biodiversity of the islands is closely linked to that of Madagascar; the African influence is especially marked in the Comoros, whereas Asian footprints are observed in the Seychelles. Although they extend over a small land area compared to Madagascar, the smaller islands of the hotspot contribute significantly to the biological diversity of the hotspot, with a high level of island endemism. If hotspot is defined with respect to terrestrial biodiversity, the marine biodiversity of Madagascar and the Indian Ocean Islands is also exceptional, in regard to the level of endemism (corals, coastal species, and ocean trenches) and for the wide range of the globally important populations of some taxa, such as whales and turtles.

In terms of initial extent of habitats covered with local vegetation, Madagascar and the Indian Ocean Islands ranks 10th among 34 priority biodiversity areas identified by Conservation International (Mittermeier *et al*., 1997, Myers *et al*., 2000, Brooks *et al*, 2006). It ranks eighth in terms of habitat remaining intact (approximately 10 percent of the initial area), according to the most recent estimates of rainforest cover.

3.1. Geography, Geology and Climate

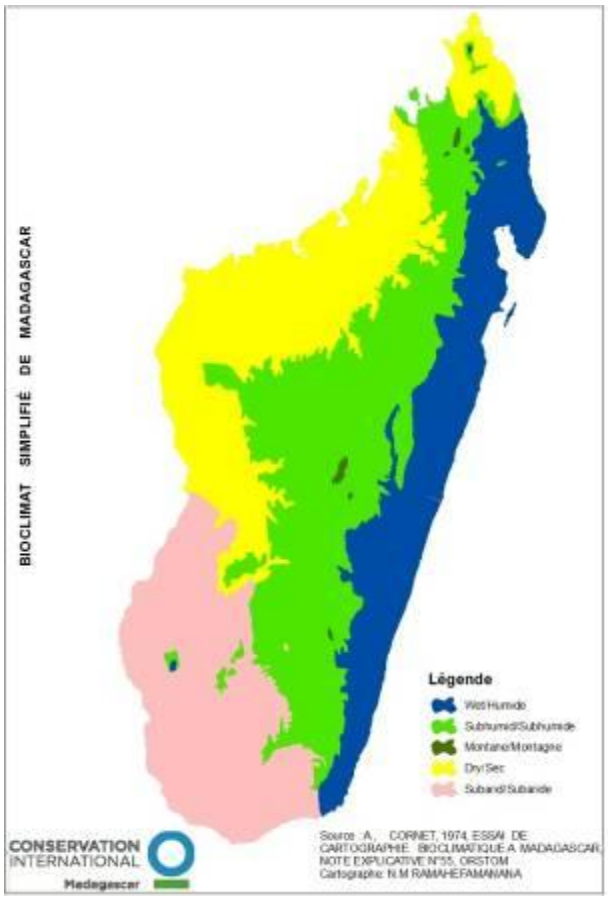
The hotspot includes a large group of islands in the southwest Indian Ocean, included within a quadrangle of about 1,700 km on each side whose peaks would be located in the northern coral islands of Denis and Bird in the Republic of Seychelles, in the west for the Comoros, in the east for Rodrigues in Mauritius, and in the south, the tip of Madagascar (see Figure 3-1). The Comoro Islands form the part of the hotspot that is the nearest to the continent. Located off the coast of Africa by less than 300 km, Madagascar lies off the African continent at a distance of about 400 km in its narrowest part. The distance from the other land masses is even larger on the other side of the hotspot: the Seychelles are located at about 2,000 km from the Maldives and at nearly 1,700 km from the Chagos Archipelago.

Figure 3-1: General Presentation of the Hotspot



The island of **Madagascar** covers an area of 592,040 km^2, extending over 1,500 km from north to south and 500 km from east to west at its widest point. The coastline stretches over 5,000 km. The basal bedrock of the island is formed of a Precambrian crystalline formation which constitutes the backbone of the central highlands covering two-thirds of the territory and peaking at 2,643 meters. This bedrock has a marked asymmetry between a steep cliff overlooking the narrow eastern coastal plain, while to the west, the altitude decreases fairly steadily as you go down to the sedimentary western and southern plains. The island is influenced by the monsoon and trade winds from the east, and the presence of the central ridge causes precipitation differential between the wetter East and the drier West. These elements are reflected in a wide variety of bioclimates: tropical warm to temperate cool, from subequatorial to marked mountain climate, from the semi-desert South to the soggy wet northeast coast (SNGDB, 2002). Five main bioclimatic zones have been identified (Figure 3-2), namely wet, subhumid, mountain climate, dry and sub-arid bioclimates (Ramananjanahary *et al.*, 2010). Each of these bioclimates corresponds to a natural formation with a fauna and flora biodiversity specific to each (SNGDB, 2002).

Figure 3-2: Simplified Bioclimatic Map of Madagascar



Situated 700 km west of Madagascar, **Réunion** is a 70 km long volcanic island with a northwest-southeast direction. It covers an area of 2,504 km² with a maximum altitude of 3,069 meters at the Piton des Neiges, the highest peak in the Indian Ocean. The emergence of the volcano about three million years ago is the origin of the formation of the island. Subsequent sink-hole processes resulted in the formation of three major cirques from the top: Cilaos, Mafate and Salazie. Piton de la Fournaise, located southeast of the island, rises at about 2,631 meters above sea level and it is still active. **La Réunion** enjoys a tropical climate, characterized by trade winds governed by the semi-permanent anticyclone of the Indian Ocean. The relief of the island contributes to very diverse microclimates, and the rainfall, much more pronounced in the east of the island (windward side), decreases from the *Hauts de La Réunion* or the *Piton de la Fournaise* down to the coast.

Mauritius, also in the Mascarene archipelago, is a volcanic island formed about 8 million years ago and covering an area of 1,865 km ². It is located about 170 km from La Réunion. Its relief is less rugged than its neighbor, and reaches 828 meters at Piton de la Petite Rivière Noire. The coastline stretches over 322 km and it is almost entirely surrounded by a fringing coral reef enclosing a lagoon. The climate is tropical to subtropical, with an average annual rainfall of 2,100 mm subject to strong variations (from 750 mm to 4,350 mm, Willaime 1984 and Padya 1989). The **Rodrigues Island** is the smallest island of the Mascarene archipelago with 109 km^2. Lying approximately 560 km east of Mauritius, Rodrigues determines the eastern boundary of

the hotspot. The island is surrounded by coral reefs which form a lagoon about double its surface area (200 km ²) and comprises 18 islets. Rodrigues has the largest caves and limestone deposits of the Mascarene islands. It has a maritime tropical climate with an average annual rainfall of 1,120 mm and a temperature averaging around 26 º C in summer and 22 º C in winter.

The Republic of Mauritius also includes **Agalega** Atoll with an area of 21 km², located 1,000 km north of Mauritius, and **St. Brandon** Atoll whose lagoon is comparable to Rodrigues' (190 km²), while the land surface covers only 3 km^2, distributed among 55 islands.

The **Seychelles Islands** are situated to the northwest of Madagascar. The land surface covers only 455 km^2 but the islands are scattered over a sea area of over one million km^2 (the Exclusive Economic Zone covers 1.4 million km^2). The central archipelago (about 244 km²) is located on the "Mahe Plateau", a mainly underwater microcontinent that used to be connected to the Indian sub-continent and Madagascar before they drifted apart, about 60-65 million years ago. On this plateau are the main 42 granitic islands including Mahe (152.5 km²), Praslin (27.6 km²) and La Digue (10.1 km²), as well as Silhouette (20 km^2) and its satellite, North Island, formed during a more recent volcanic period (60 million years) and composed syenite. As for the Seychelles external coral islands, they are atolls or sandbanks, largely derived from volcanic episodes; after their active phase, volcanoes slowly sink whereas corals rise up to the surface at a pace of about 1 mm per year, resulting in a ring-shaped formations, typical of coral atolls.. Three groups of islands can be identified: Amirantes (29 islands), the Farquhar group (13 islands) and the Aldabra group (67 islands). Seychelles have a tropical climate with an average annual rainfall ranging from 1000 mm in Aldabra to over 2400 meters in Mahe, and the temperature averages at 26 ° C. The Seychelles are rarely subject to cyclones. They enjoy a hot and humid climate all year round with slight daily temperature variations.

The **Comoros** Islands result from volcanic hotspots subsequent to the separation of Malagasy and African plates (Nougier et al., 1976). Based on oceanic basaltic bedrock, they are in fact the tip of sunken volcanoes. The archipelago features four main islands. **Grande Comore** has no significant bays; the coast is hardly indented. It has two mountain ranges, the Karthala whose peak rises at 2,361 meters above sea level and the Grid, in the northern part of the island, whose peak reaches 1,087 meters. The volcanic soils there are extremely porous, water rapidly seeps into rocks and the island has no rivers. **Anjouan** is a very mountainous island with steep slopes. Some rivers have carved into the sides of the mountain to create deep, narrow ravines and cirques into the steep walls separated by ridges. Two peaks can be found Ntrinji (1,595 meters) and Trindrini (1,474 meters). The coastal area has only a few small plains. **Moheli Island** rises to 790 meters above sea level. Its terrain is rugged, with deeply steep-sized valleys, carved out by many small rivers. It is lined with a 10 to 60 meters deep coralline plateau and is accompanied south by eight small mountainous islands. The island of **Mayotte** is the oldest island of the archipelago (about 8 million years old), and also the lowest: its summit peaks at 660 meters. The old volcanism has left a crater occupied by the lake Dziani Petite-Terre. The highly indented coasts present deep bays, rocky headlands, peninsulas, and one of the 10 lagoons with a coral double barrier in the world, after which Mayotte is called the Lagoon Island. The climate of the Comoros is characterized by a hot and wet season called "Kashkazi" extending from mid-November to mid-April, during which the rainfall is abundant, and a cool dry season called "Kuzi" characterized by the regular trade winds gusts.

Located in the southern hemisphere, between the Equator and the Tropic of Capricorn, the **Scattered Islands** (which will be referred to under their French denomination of *Iles Eparses***)** consist of five island territories in the southwest Indian Ocean situated in the southern hemisphere near the island of Madagascar: the Glorioso Islands, Europa, Juan de Nova, Bassas da India, and Tromelin. Of volcanic origin and coralline nature, they now form atolls. Their land area is limited (a cumulative area under 44 km^2, while the cumulative area of their lagoons is 493 km^2) and the altitude does not exceed 12 meters. Bassas da India is almost submerged in the sea at high tide.

3.2. Biomes, Habitats and Ecosystems

Hotspot refers to a set of highly diverse habitats, resulting from climate variability related to latitude, altitude, the steep hills which, combined with the effects of foehn associated with trade winds, concentrate the rainfall on the eastern slopes of the mountains. Geological and soil differences (granitic basement, old or recent volcanism, and atolls, sandy formation, sedimentary formations) contribute to the diversification of habitats. Simply put, we can find on most islands a succession of habitats, with grasslands and deciduous lowland forests, deciduous and evergreen forests of medium altitude mountain forests, ericoid vegetation of high altitude on the highest points, beyond 1,800 meters above sea level at least (La Réunion, Madagascar and Grande Comore).

In the **granitic or volcanic islands**, the relief has often isolated a number of natural areas in these ecosystems, creating conducive conditions for speciation and leading to the presence of species with very limited distribution and a highly localized endemism. This is the case in Madagascar (Raxworthy and Nussbaum, 1995, 1996, Raselimanana, 2000 Rabibisoa, 2008), but also in Seychelles inselbergs granitic islands, for instance (Stoddart, 1984).

The **reef islands of the hotspot**—the *Iles Eparses* and Seychelles "outer islands" in particular, with their low altitude and marine influences—mainly feature coastal vegetation (mangroves, halophytes herbaceous formations, brackish steppes, mediolittoral, herbaceous and shrub, herbaceous to shrub supralittoral formations). For the larger islands, these formations are found together with inland vegetation (adlittoral karst mangrove tree formations, adlittoral coconut tree formations in brackish, pond brackish herbaceous formations, CBNM, 2013). These islands are home to colonies of seabirds, and sometimes some spectacular species (such as the Aldabra tortoise) but generally speaking, the fauna is poorly diversified.

The **wetlands** (lakes, lagoons, marshes, mangroves, rivers and streams, bays, estuaries and deltas) are particularly important in terms of endemic biodiversity (fish, amphibians, waterfowl, shellfish, Odonata) and for the environmental services they provide. Malagasy wetlands occupy more than 3,000 km of rivers and streams, and about 2,000 km^2 of lakes are divided in 256 catchments. The surface area of lowland wetland of the Mascarene Islands has shrunk as a result of drainage and urbanization activities. Today, the Saint-Paul pool in La Réunion, classified as National Nature Reserve with its 447 hectares, is the largest Mascarene wetland.

Madagascar, by its size, features the greatest diversity of ecosystems. The island is divided into three major biomes (Figure 3-3) with five types of terrestrial ecosystems (Moat and Smith, 2007, see Table 2-1). The **East Biome** includes the eastern region with a hot and humid climate; it is subject to the permanent effects of winds from the Indian Ocean (Ramananjanahary *et al.*, 2010) and the central region, located at a higher altitude, with a more or less cool climate, includes the highlands comprising Tsaratanana, Ankaratra, Andringitra the Sambirano and Amber Mountains). The **West Biome** covers the western region with a dry tropical climate due to the effects of the monsoon with tropical distinct seasons, comprising the dry forests of the West and North. Finally, the **South biome** comprises the southern and south-western regions with arid or sub-arid climate, covered with thorny forests or xerophytic bush characterized by its *Euphorbia* (Table 3-1).

Figure 3-3: Madagascar Large Biomes

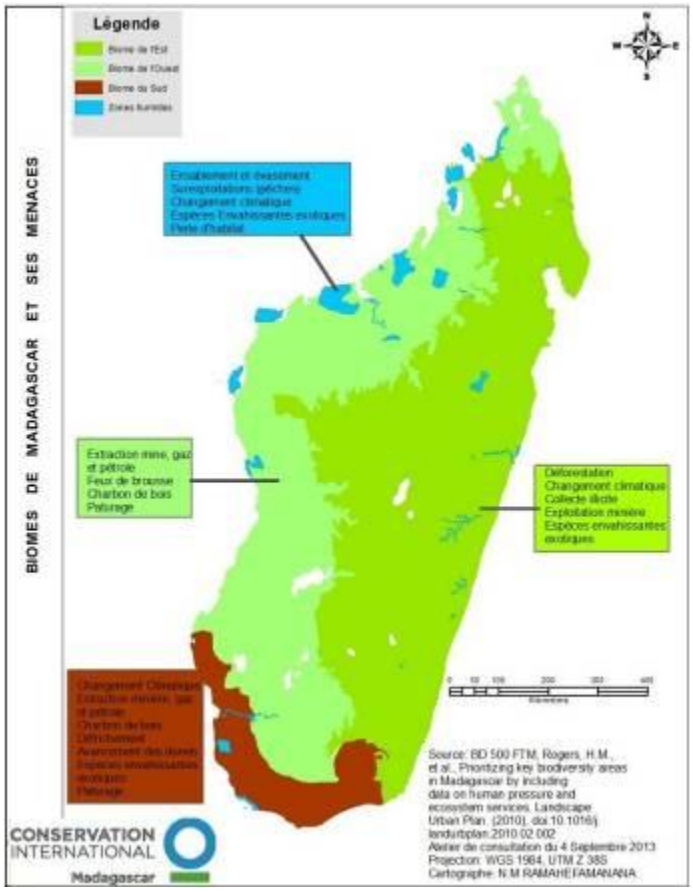


Table 3-1: Types and Surface Area of Ecosystems in Madagascar

Type of ecosystem	Overall area (km²) (2005)	Percent of land cover
1-Mosaic of grass formation / plateau grass wooded formation	246,687	41.67
2-Wooded grass formation /shrub formation	135,739	22.93
3-Degraded Humid Forest	58,058	9.81
4-Rain forest	47,737	8.6
5-Dry forest of the West	31,970	5.40
6-Farm crops	23,522	3.97
7-Dry spiny forest in the Southwest	18,355	3.10
8-Wetlands	5,539	0.94
9-Degraded spiny forest of the Southwest	5,427	0.92
10-Subhumid forest of the West	4,010	0.68
11-Mangroves	2,433	0.41
12-Coastal shrub formation of the Southwest	1,761	0.30
13- Tapia forest	1,319	0.22
14-Coastal forest	274	0.05
15-Rainforest of the West	72	0.01

Source: MBG, 2013

The coastal habitats include estuary and lagoon systems, mudflats, vegetation, pebble beaches, dunes, mangroves, etc. The sea levels are characterized by the importance of reef formations (about 3,450 km out of 5,600 km coast of Madagascar have reef formations, Cooke *et al*., 2012) and the presence of large seagrass beds. The representativity of these habitats varies with the topography and the system of marine and coastal currents, as evidenced by the comparison between Rodrigues and Mauritius (Table 3-2).

Table 3-2: Coastal and Marine Habitats: An Estimate of the Surface Area (ha) for Mauritius and Rodrigues

Coastal and marine habitats	Mauritius	Rodrigues
Beaches and dunes	2885	8
Seagrass beds	3279	17765
Mudflats	919	656
Mangroves	145	24*
Coral reefs	6303	7005

Source: NWFS & STEM 2008; Notes: mangroves in Rodrigues are not native (Tatayah V., com. pers.)*

Three large **marine ecosystems** are bordering the hotspot. The marine ecosystem of the Eels Current—or Algulhas Current—is characterized by warm waters (20-30 º C), low primary productivity, except for a few higher productivity points associated with small areas of upwelling of water and ocean turbulence. This marine ecosystem is spectacular for its marine biodiversity as it contains the majority of coral reefs in the Western Indian Ocean. Somali Current, the large marine ecosystem, is situated to the north; it is dominated by an intense upwelling system and seasonal cold water along the Somali coast, pushed by the northeast monsoon. This system is extremely productive, though less rich in species. To the east of these two ecosystems is the Mascarene Plateau, a distinctive granite ridge of continental origin extending between latitudes 2° S and 22º S, with an average depth of only 100 meters. The Mascarene Plateau connects the

Seychelles, Mauritius and Réunion Islands, and is considered to be a large marine ecosystem in itself. The Mascarene ecosystem is characterized by low productivity while its biodiversity seems high.

3.3. Species Diversity and Endemism: Terrestrial Biodiversity (Including Wetlands)

One of the hotspot features is the extremely high floral and faunal endemism. The threshold of endemism for a region to qualify is 1,500 endemic plants; the Madagascar flora alone comprises about 10,000 endemic species. Endemism in the hotspot is marked not only at species level, but also at higher taxonomic levels: for instance, eight plant families, five bird families, and five primate families are represented nowhere else in the world. The global importance of the hotspot is particularly high for mammals (95 percent endemism), plants (around 90 percent endemism for Madagascar) and reptiles (96 percent endemism).

Table 3-3: Number of Species Native to the Hotspot for a Selection of Taxa

	Madagascar	Comoros	Mauritius & Rodrigues	Seychelles	La Réunion	Total
Terrestrial mammals	200	7	5	6	4	**211**
Birds	297	165	133	258	110	**503**
Reptiles	406	7	32	36	17	**457**
Amphibians	295		2	12	2	**309**
Freshwater Fish	183	29	71	35	50	**213**
Plants (estimate)	*11,200*	*2000*	*700*	*700*	*900*	**13,000 To 14,000**

Sources: Mammals: Wilson et al, 2005, IUCN, 2013; Birds: BirdLife, 2013; Reptiles, Uetz and Hosek (eds), 2013; fish: Froese & Pauly (eds), 2013; Amphibians: AmphibiaWeb, 2013; plants: see references in Table 3.5.

Plants

Madagascar is known for its rich native flora, characterized by high species diversity and high endemism, both at the species level, with around 90 percent of vascular plants endemic to the island, and family wise (five are endemic). Over 11,200 species of vascular plants are currently known to occur on Madagascar (Callmander *et al.*, 2010) and it is estimated that at least 2,500 species remain to be discovered or to be described (MBG, 2013).

On the basis of the current knowledge, Madagascar has 243 families of vascular plants of which five are strictly endemic (*Asteropeiaceae, Barbeuiaceae, Physenaceae, Sarcolaenaceae and Sphaerosepalaceae* (Ramananjanahary *et al*., 2010)). Two additional families are also quasi-endemic: *Didiereaceae* with four genera endemic to Madagascar and three Africans genera and *Didymelaceae* endemic to the hotspot with one genus present in Madagascar and the Comoros Islands (Madagascar Catalogue, 2013).

Table 3-4: Number of Madagascar Plant Families and Genera

	Families Present	Endemic Families	Genera Present	Endemic Genera
Pteridophytes	29		123	1
Gymnospermes	2		2	
Angiospermes	212	5	1551	305
Total	**243**	**5**	**1676**	**306 (18.3%)**

Source: MBG, 2013

One hundred and three tree and large shrub families (four of which are endemic) are known, with a total of 490 genera (of which 161 are endemic) and 4,220 species (4,032 endemic). For Pteridophytes 123 genera are known, including one endemic genus, *Psammiosorus*. Of the 619 recorded species, 265 are endemic.

For palm trees (Arecaceae), Madagascar is considered as one of the world's richest places in the world. Among the 2,375 species recently inventoried in tropical and subtropical milieux (Govaerts and Dransfield, 2005), 194 species (Rakotoarinivo, 2008) spread in 16 genera (Madagascar Catalogue, 2013) are in Madagascar. This wealth is mainly characterized by endemism close to 100 percent, whether the generic or specific level (97 percent) (Rakotoarinivo 2008). Indeed, the palm flora of the island is dominated by the *Dypsis* genus, which is quasi-endemic with only a couple of species also occurring in Tanzania and the Comoros. In addition, the *Beccariophoenix, Bismarckia, Lemurophoenix, Marojejya, Masoala, Tahina* and *Voanioala* genera are all limited to the island.The floristic richness is also high on the other island groups, with significant levels of endemism.

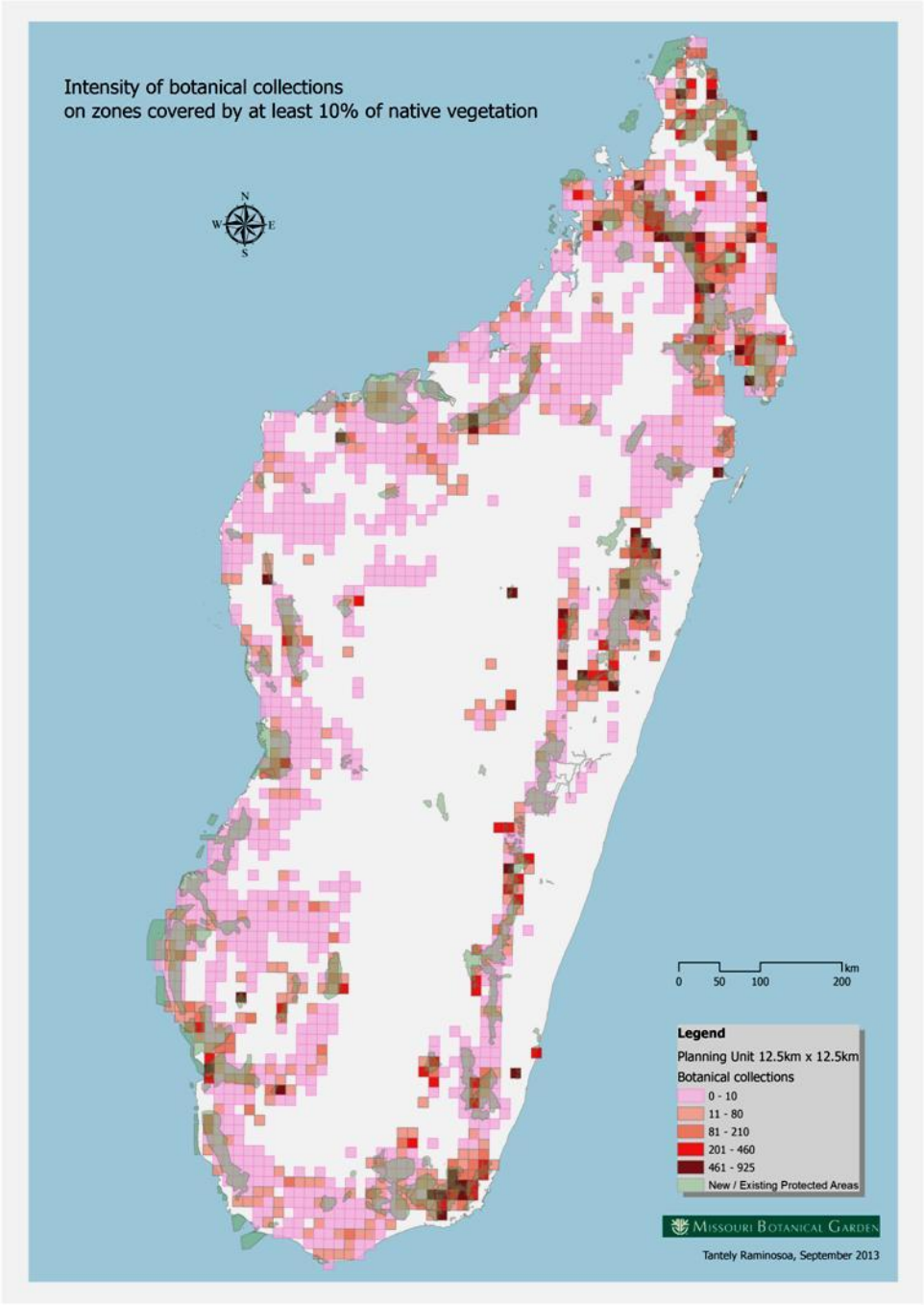
Table 3-5: Plant Diversity and Endemism on the Hotspot Islands

	Number of native species (estimate)	Number of endemic species	Endemism rate
La Réunion			
Tracheophytes	905	237	26.2%
Bryophytes	821	77	9.4%
Mauritius*	691	273	40%
Rodrigues*	150	47	31%
Comoros	2000		
Mayotte	622	55	9%
Seychelles	707	136	19.2%
Iles Eparses			
Europa	47	0	0%
Juan de Nova	79	1	1.3%
The Glorioso Islands	***72***	***0***	***0%***
Tromelin	5	0	0%
Madagascar	11200	10080	90%

Sources:
Madagascar: MBG, 2013
Mauritius: Florens, F.B.V. (2013); For Mauritius and Rodrigues: angiosperm data only.
Réunion: Gigord. L.D.B. (CBN-CPIE Mascarin)
Mayotte: Gigord L.D.B. (CBN-CPIE Mascarin) – Data on trachéophytes – Endemic species Comoros = 55 (9%) - Mayotte strict endemic species= 36 (6%).
Iles Eparses: Gigord L.D.B. (CBN-CPIE Mascarin)
Seychelles: Senterre et al. 2010 (Biodiversity metadatabase)

Systematic work is still incomplete, and field research frequently brings new discoveries—and rediscoveries of species presumed extinct. The survey effort is still largely insufficient for a major part of the Malagasy territory (see Figure 3-4), but also in other territories such as Comoros. The level of knowledge is higher for the Mascarene Islands and the Seychelles, but botanists continue to regularly make important discoveries there. In Mauritius, several endemic species of plants presumed extinct have been rediscovered, such as *Trochetia parviflora* (Florens *et al.*, 2001), *Pandanus iceryi* and *P.cf. macrostigma* (NWFS 2005), the endemic Acanthaceae *Dicliptera falcata* (Florens and Baider, unpubl.), while new species – such as such as *Cyathea borbonica var. sevathiani*, *Dombeya sevathianii*, *Eugenia marioalletti* - continue to be described (Le Péchon *et al*., 2011; Tatayah, *com.pers.*, 2013). The trend is similar in Réunion where species are rediscovered (six of them during these years through the implementation of the Emergency Plans), and new species are regularly discovered and described. Incidentally, the Mascarene Flora has not been completed for major groups such as Orchidaceae, Poaceae and Cyperaceae.

Figure 3-4: Botanical Data Collection Efforts in Madagascar

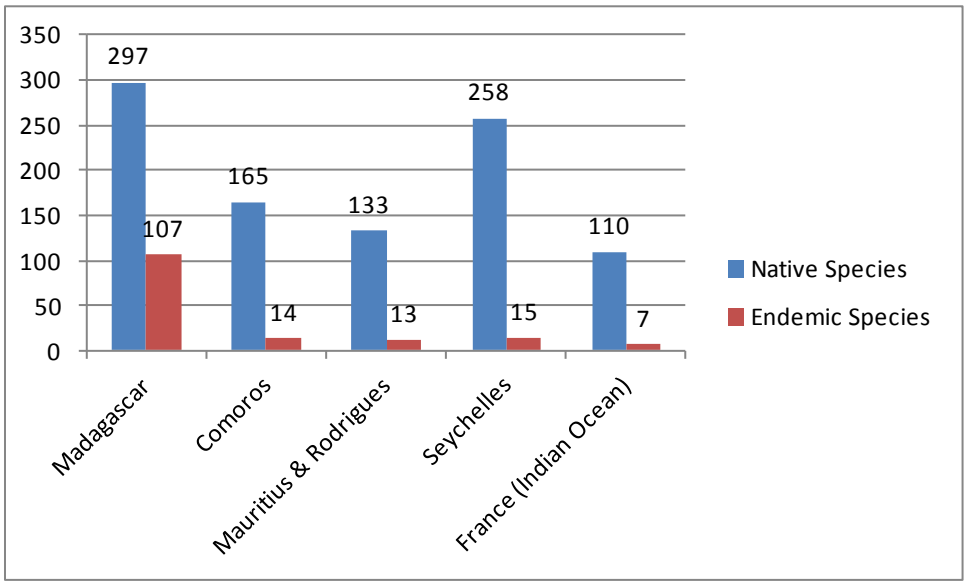


Source: Missouri Botanical Garden, 2013.

Birds

Madagascar and surrounding islands avifauna is characterized by low diversity but spectacular specific endemism. Of the 503 species found in the hotspot, nearly 60 percent are found nowhere else on the planet. In addition, four families and 42 genera are endemic.

Figure 3-5: Number of Native and Country-Endemic Bird Species



The avifauna includes some species of birds such as three extraordinary endemic families of Madagascar: Brachypteraciidae (ground rollers, five species), Philepittidae (four species) and Mesitornithidae (mesite, three species) whose order is endemic to Madagascar, or the Couinae subfamily (couas, Cuculidae, 10 species). Two other families are also represented only in Madagascar and the Comoros: Vangidae (Vangas, 14 species), and Leptosomatidae (Courol vouroudriou, *Leptosomus discolor*). La Réunion hosts four Procellariidae species (petrels and shearwaters), two of which are strictly endemic: the Bourbon black petrel (*Pseudobulweria aterrima*) and Barau petrel (*Pterodroma baraui).*

The birds in the region are seriously threatened: over 55 endemic species are endangered, and 32 have already disappeared, mainly in the Mascarene Islands. In Seychelles, the extinction of three endemic species is documented in the 20th century but it is likely that the actual list is longer (Cheke and Rocamora, *in litt*.). Réunion has witnessed the disappearance of at least 10 bird species since the 1500s and all but one of the endemic birds of Mauritius and Rodrigues are threatened. The famous Dodo (*Raphus cucullatus*), symbol of the extinction of species, disappeared from Mauritius towards 1600, in the years following the arrival of European sailors, like the Rodrigues Solitary (*Pezophaps solitaria*) that was extinct in the 1760s.

Mammals

Similar to birds, terrestrial mammal diversity of the hotspot is relatively low, but the level of species endemism is exceptional. Of the 211 native species of terrestrial mammals, 95 percent are endemic (see Table below). New species are being discovered in Madagascar at a rapid pace, especially lemurs and micro-mammals: in the past 15 years, 22 new species and subspecies have been described.

Table 3-6: Native Mammals in the Hotspot and Rate of Endemism

	MADAGASCAR	COMOROS	RÉUNION	MAURITIUS and RODRIGUES	SEYCHELLES	HOTSPOT	ENDEMIC (HOTSPOT)	% ENDEMIC
Rodentia	26					**26**	26	**100%**
Soricomorpha		1*				**1**	1	**100%**
Afrosoricida (Tenrecs)	30					**30**	30	**100%**
Primates	94	1*				**94**	94	**100%**
Carnivora	10					**10**	10	**100%**
Chiroptera	39	6	4	5	6	**50**	39	**78%**
Total	**199**	**8**	**4**	**5**	**6**	**211**	**200**	**95%**

*Sources: Wilson et al., 2005, IUCN, 2013 ; Note : * introduced*

The most fascinating mammals of Madagascar are the lemurs, represented by five families of primates unique to this island, comprising 104 species and subspecies, making the hotspot the world leader in the endemic primates. Madagascar lemurs are of great diversity, from *Microcebus berthae*, which weighs just 30 grams, to the indri (*Indri indri*). The unusual aye-aye (*Daubentonia madagascariensis*) has huge ears, shaggy fur, steadily growing incisors (like rodents), and the thin and stretched median finger on each hand, suitable for capturing wood-boring insect larvae and for extracting coconut. Madagascar also has many endemic rodents, such as giant jumping rat (*Hypogeomys antimena*, EN), and some carnivores, such as the fosa (*Cryptoprocta ferox*, EN), the main natural predator of lemurs. Endemic tenrecs, the one family of insect-eating mammals, fit in the same ecological niche as shrews and moles.

The hotspot is also a diversity center for bats, which were the only mammals naturally present in the Mascarene Islands and the Seychelles. Of the bat species found in the hotspot, 78 percent cannot be found anywhere else in the world. Comoros shelters, among others, the largest species of bat in the hotspot, the Livingstone flying fox (*Pteropus livingstonii*, CR), whose wingspan may reach 1 meter. Seychelles hosts the world's rarest bat, *Coleura seychellensis*, whose global population is fewer than 100 individuals.

Reptiles

The hotspot has a high species diversity and endemism: 96 percent of some 457 species of reptiles are found nowhere else in the world. Such endemism is especially found in lower taxonomic ranks (species and genera). One family of reptile (Opluridae) is endemic to the hotspot.

The region is a major center of diversity for chameleons, with dozens of species in Madagascar and one or two neighboring islands. The most emblematic reptile endemic to the Indian Ocean islands is undoubtedly the Aldabra giant tortoise (*Aldabrachelys gigantea*, VU), a native of this atoll and introduced into the granitic Seychelles and on some islands of Mauritius and Rodrigues to replace endemic species of the islands that are now extinct (Griffiths *et al.*, 2010). Green lizard of the Hauts (*Phelsuma borbonica*) and the Manapany green gecko (*Phelsuma inexpectata*) only located on an 11 km-long strip southeast of Réunion have probably experienced a strong depletion from human settlement (Sanchez and Caceres 2011).

Amphibians

Two families of amphibians are endemic to the hotspot: the Sooglossidae, Seychelles, and the Mantellidae, tree frogs whose skin contains toxic alkaloids, present in Madagascar and Mayotte. The specific amphibian endemism in the region is extraordinary, with only one species out of the 309 identified (*Ptychadena mascareniensis*) that is not endemic to the hotspot.

One of the most impressive amphibians would be the tomato frog (*Dyscophus antongili*). Bright red in color as its name suggests, it is encountered only in a very limited area of the northeast of Madagascar. Seychelles is home to seven species of caecilians (*Gymnophiona*), a legless burrowing amphibian order; other representatives are found in India and Africa, but none on the other islands of the hotspot.

Freshwater fish

In the small islands of the hotspot, fish species encountered in terrestrial wetlands are mainly diadromous species (living alternately in marine and freshwater medium), and have a wide distribution in marine areas; their diversity and endemism are limited. The few native freshwater species are widespread across the hotspot, like the “chitte” mullet (*Agonostomus telfairii*). Several species have been introduced by humans in the rivers and ponds of the islands, including rainbow trout (*Oncorhynchus mykiss*) for recreational fishing

By contrast, taxa of continental origin have evolved in Madagascar since it drifted away from the African and Indian plates, giving rise to an estimation of 183 species, out of which 62 (33.8 percent) are endemic to the country. Endemism is also important at higher taxonomic level, with 15 endemic genera and two endemic families (Sparks and Stiassny, 2008).

Invertebrates

The invertebrates in the region are not fully known yet. In Madagascar, the total wealth of known macroinvertebrates according to a recent review of the natural history of Madagascar species, would be about 5,800 species (and 2,500 pending description) 86 percent endemic to the island (Goodman, 2008). Table 3.8 gives an overview of the diversity and recognized rate for some of the best studied invertebrate groups for Madagascar endemism. Diversity is found on the other

hotspot islands—like in Seychelles where 3,795 species have been recorded, with an estimated total of more than 5,100 species and 60 percent estimated endemism (Gerlach, 2010 Senterre *et al*., 2010).

Table 3-7: Number of Species and Rate of Endemism for a Few Groups of Madagascar Invertebrates

Groups	Number of Species	Rate of Endemism
Terrestrial snails	651	100%
Scorpions	40	100%
Dragonflies and damselflies	181	73%
Chrysopes	163	73%
Beetles	148	100%
Lepidoptera	300	70%
Ants [(2)]	1 317	98%
Crawfish *Astacoides*	7	100%
Shrimps *Atyidae*	26	77%
Spiders	459	85%

Sources: Goodman, 2008, sauf (2) CAS, 2013

When taxa have been thoroughly surveyed, we come up with colossal findings in terms of diversity and endemism. Thus, 62 genera of ants are known to be in Madagascar, including two exotic genera and 60 endemic genera (Fisher, 2011) representing 1,292 endemic species, the last 25 ones being invasive (CAS, 2013). Among the flagship species of the hotspot, we can identify one of the largest insects in the world: the giant mealworm (*Polposipus herculeanus*, CR), endemic to Fregate Island, Seychelles. The region is also home to the world largest centipede (*Sechelleptus seychellarum*) and populations of the largest terrestrial arthropod in the world, the coconut tree crab (*Birgus latro*, DD). Madagascar is one of the few countries in the inter-tropical zones with native crayfish (Elouard *et al*., 2008) of the *Astacoides* genus comprising 7 endemic species.

3.4. Species Diversity and Endemism: Marine Biodiversity

Fishes

Over 10,000 shallow water marine species are identified in the Western Indian Ocean, including more than 2,000 species of fish.

The Western Indian Ocean is home to 174 species of elasmobranchs including 108 species of sharks and 66 species of skates (Kiszka *et al.*, 2009b) or about 9 percent of species globally. Eleven shark species are endemic to the Western Indian Ocean (Kiszka *et al.*, 2009b) (see Table 3-8).

The Indian Ocean is home to 2,086 species of fish that have to live in coral reefs (Allen, 2008). In the South West Indian Ocean, the number of species is between 600 and 800. One of the most remarkable species of fish in the region is the coelacanth (*Latimeria chalumnae*) whose morphology has changed very little over the past 350 million years, earning him the nickname of living fossil by the general public. It is present in abyssal areas, particularly in the Comoros archipelago.

Table 3-8: List of Sharks Endemic to the Western Indian Odean

Species	Marine area
Squalus lalannei	Seychelles
Centrophorus secheyllorum	Seychelles
Chiloscyllium caeruleopunctatum	Madagascar
Halaelurus clevai	Madagascar
Narcine insolita	Madagascar
Dipturus crosnieri	Madagascar
Fenestraja maceachrani	Madagascar
Rhinobatos petiti	Madagascar
Scyliorhinus comoroensis	Comoros

Sources: Compagno, 1984 ; Bauchot and Bianchi, 2004 ; BIODEV, 2008

Marine Turtles

Southwestern Indian Ocean is home to five of the seven species of the world's marine turtles—green turtle (*Chelonia mydas*), the hawksbill (*Eretmochelys imbricata*), olive ridley *(Lepidochelys olivacea*), loggerhead (*Caretta caretta*) and the leatherback (*Dermochelys coriacea*)—and is a major region worldwide for the breeding and feeding of these five species (IFREMER, 2013). Particularly important nesting sites exist in the Comoros and the Seychelles and the Iles Eparses.

Marine Mammals

The western Indian Ocean is an important area for marine mammals. The Mozambique Channel, the Seychelles plateau, and to a lesser extent, the Mascarene Islands, were identified in a prospective survey in 2012 as major areas for *Pseudorca crassidens, Grampus griseus* and *Globicephala macrorhynchus* (Tetley, Kiszka and Hoyt, 2012). Large populations of cetaceans attract tourists to several coastal regions of the hotspot such as Mayotte, Antongil Bay or Île Sainte-Marie in Madagascar which are important areas for breeding humpback whales (*Megaptera novaeangliae*).

The number of species of cetaceans in the Madagascar and Indian Ocean Islands Hotspot is presented in Table 3-9.

Table 3-9: Presence of Cetaceans in the Madagascar and Indian Ocean Islands Hotspot

		Delphinidae	*Ziphiidae*	*Kogiidae & Physeteridae*	*Balaeno-pteridae*	*Balae-nidae*	Total species
		Dolphins	Bottlenose whales	Sperm whales	Whales	Right whales	
Comoros	Grande Comore	8	1	1	1	0	11
	Mohéli	8	2	1	1	0	12
Mayotte		12	3	2	3	0	20
La Réunion		8	0	0	2	1	11
Republic of Mauritius		6	1	1	3	1	12
Seychelles	Mahé	6	2	2	3	0	13
	Aldabra	8	2	1	3	0	14
	Iles Sud	7	2	1	4	0	14
	Iles Nord	7	2	1	4	0	14
	Banc des Seychelles	7	2	1	3	0	13
	West	6	2	1	3	0	12
Madagascar	Toliara	7	0	2	1	1	11
	East coast	7	0	2	1	0	10
	Northeast coast	8	0	2	1	0	11
	West coast	7	0	2	1	0	10
	South coast	8	0	2	2	0	12
	Southwest coast	6	0	2	2	0	10

Sources: AIDE, 2008, Biodev, 2008

Marine Invertebrates

The most recent assessment of the Western Indian Ocean indicates that the region is home to at least 8,627 species of shallow water invertebrate macrofauna (Cooke, 2012). As well as for terrestrial invertebrates, there remain data gaps, for the species described with respect to their distributions or the trends in the evolution of the populations. In the absence of available synthesis, the few data below are made by way of illustration.

Surveys by Richmond (2001) report 419 species of echinoderms in the Western Indian Ocean of which 373 are distributed around East Africa and Madagascar; 81 species are endemic to the region. For the marine areas around Madagascar alone 1,400 species of marine gastropods, 306 species of sponges and cnidarians 650 species have been recorded (in Vasseur, 1981). In the reefs of the Toliara region, 779 species of crustaceans were identified in 1978 (Thomassin, 1978). In Seychelles, it is estimated that there are 450 species of molluscs, 350 species of sponges, 155 echinoderms and 165 species of marine crustaceans (John Nevill, pers. com.). Marine invertebrates represent an important economic resource (sea cucumbers, lobsters, crabs, octopus fishing activities, etc.).

4. CONSERVATION OUTCOMES

The ecosystem profile of Madagascar and the Indian Ocean Islands reflects the CEPF commitment to conservation outcomes.

CEPF uses conservation outcomes, or biological targets against which the success of conservation investments can be measured, as the scientific underpinning for determining its geographic and taxonomic focus for investment. Conservation outcomes can be defined at three scales—species, site and landscape or seascape—that interlock geographically through the presence of species at sites and sites in landscapes.

They are also logically connected: if species are to be conserved, the sites at which they occur must be protected; if these sites are to provide vital ecosystem services, ecological integrity must be maintained at the landscape scale. When these goals are achieved, there are measurable results: "extinctions avoided" (at species level), "areas protected" (at site level), and "corridors consolidated" (at landscape level).

CEPF alone cannot achieve all of the objectives identified for a region, but the profiling process ensures that investments contribute to the prevention of biodiversity loss and the results are monitored and assessed. Geographical and thematic CEPF investment in the hotspots is therefore based on these objectives.

Defining conservation outcomes is a bottom-up process, with species-level targets being set first. The process requires detailed knowledge of the conservation status of individual species. Although such information has been collected for nearly 50 years for the global Red List of Threatened Species developed by the International Union for Conservation of Nature (IUCN) and its partners, data on the status of the some of the populations that are most at risk is still missing, especially for plant species and invertebrates. The Red List is based on quantitative criteria and can be used to estimate the probability of the species to be extinct. The species listed as Endangered on the Red List have a high probability of extinction in the medium term. These are the species in the "Critically Endangered" (CR), "Endangered" (EN) and "vulnerable" (VU) categories.

The outcomes definition is a fluid process: when new data are available, the sites outcomes can be extended to other taxonomic groups as well as species with restricted ranges. Avoiding extinction means preserving globally threatened species in order to improve or at least stabilize their status on the Red List. Information on population trends is needed; for most of the threatened species, such information does not exist.

Due to the size and scope of the hotspot, the number of countries and the heterogeneity of information, the volume of data collected is important. The data come from scientific publications, plans for species recovery, strategies and national action plans for biodiversity (NBSAP), field guides, researchers' personal communication, and specific work carried out on some taxa—such as the inventory of important areas for plant conservation in Madagascar conducted with the support of CEPF during the previous phase.

4.1. Species Outcomes

Species outcomes include those species that are globally threatened according to the IUCN Red List. At present, 1,251 globally threatened species are identified in the hotspot—a figure that includes marine as well as terrestrial species (see Table 4-1). Based on available data, the level of threat to species seems very high, with almost 33 percent of species threatened—including 8 percent that are Critically Endangered (see Figure 4-1). In addition, 81 species have been already declared extinct.

Caution should be taken of course when analyzing the aggregated data, as the IUCN Red List for this region has both taxonomic and geographic gaps. Taxonomic gaps are pronounced for invertebrates and plants. There are geographical gaps with the Republic of Comoros, where few species have been evaluated. There are also national and regional Red Lists (Mayotte, La Réunion) that have not been reported in the global Red List, including endemic taxa. Because of these shortcomings, the data on threatened species are relatively reliable for terrestrial vertebrate species, and to a lesser extent for so-called higher plants and some marine species. Taxonomic groups included in the definition of species-related objectives are listed below.

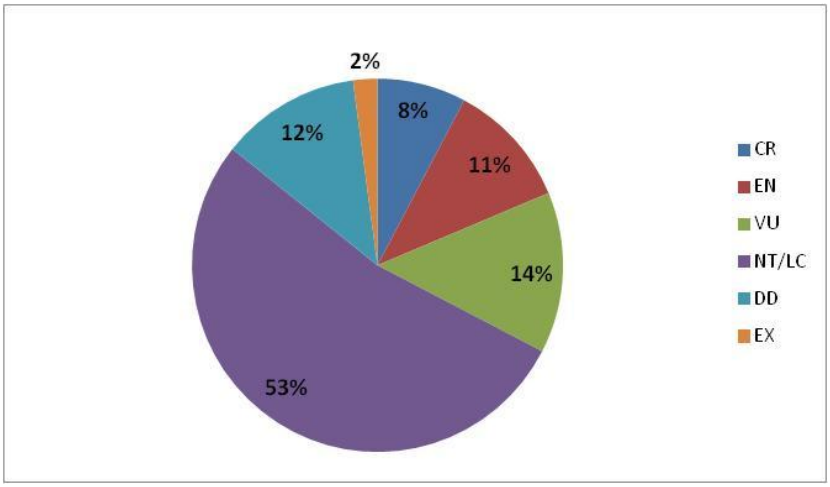
Table 4-1: Synthesis of the IUCN Red List Evaluation for the Hotspot, 2013

		CR	EN	VU	NT/LC	DD	EX	Total (assessed)	%
ANIMALIA	Animals	104	260	356	**1691**	442	77	2930	**25,2%**
AMPHIBIA	Amphibians	10	33	32	130	53		258	**29.1%**
REPTILIA	Reptiles	23	61	69	218	45	10	426	**36.8%**
AVES	Birds	9	22	30	258	2	31	352	**19.0%**
MAMMALIA	Mammals	9	31	32	101	67	5	245	**30.0%**
INSECTA	Insects	23	35	10	93	47	2	210	**32,7%**
MOLLUSCA	Molluscs	13	45	40	131	28	24	281	**38.1%**
MALACOSTRACA	Crustacians		3	2	78	35		118	**4.2%**
ACTINOPTERYGII	Finned fishes	14	15	34	354	74	3	494	**12.8%**
CHONDRICHTHYES	Cartilaginous fishes	2	3	24	24	26		79	**36.7%**
SARCOPTERYGII	Coelacanthe	1						1	**100%**
CNIDARIA	Cnidaria (incl.corals)		8	76	279	21		384	**21.9%**
ECHINODERMATA	Echinoderms		4	5	25	42		76	**11.8%**
PLANTAE	Plants	192	159	180	**344**	24	4	903	**59.1%**
TOTAL		296	419	536	2035	466	81	3 833	33.3%
Threatened species				**1 251**					

CR : Critically Endangered
EN : Endangered
VU : Vulnerable
NT : Near Threatened
LC : Least Concern
DD : Data Deficient
EX : Extinct

Source: IUCN Red List accessed on 12 December 2013
Note: Some groups for which data are extremely limited have been omitted—hence the differences in the totals.
Note: for the 1994 assessments, categories LR / cd and LR / nt have been combined with NT, and LR / lc with LC.
Note: the percent of threatened species is calculated as the sum of the species under criteria CR + EN + VU, in relation to the total number of species (without taking account of the extinct species)

Figure 4-1: Distribution of the Categories of Threat for Taxa Evaluated in the Hotspot



Plants

The global Red List, the data for which are presented in Table 4-1, does not adequately reflect the conservation priorities for the plants in the hotspot. Indeed, just over 900 evaluations have been formally incorporated into the global Red List, which are very few in view of the botanical diversity of the hotspot. Also, evaluations performed on several of the islands in the region are not as yet integrated into the global list, including for endemic species.

In Madagascar, the Madagascar Plant Specialist Group (MPSG)—including the *Département de Biologie et Ecologie Végétales* or DEBV (Plant Biology and Ecology, Faculty of Sciences), Missouri Botanical Garden (MBG), the Royal Botanical Kew Garden, the Botanical and Zoological Park of Tsimbazaza (PBZT) and the *Département de Recherche Forestière et Piscicole* or DRFP (Forestry and Fishfarming Research)—has so far evaluated 2,289 species over some 9,000 species of endemic documented plant species. This corresponds to approximately 25 percent of the diversity of known endemic plants. Of the 2,289 species, 18 percent are categorized as CR, 37 percent EN and 23 percent VU (MBG, 2013), with a general trend to decreasing populations. Based on this sampling of the flora, we can consider that almost 78 percent of Madagascar's plants are threatened with extinction (MBG, 2013). The situation is very worrying for some taxa such as the orchids (158 CR, 213 EN, 40 VU, for 850 known species) or palm trees (53 CR, 41 EN and 45 VU for 194 known species).

Among the conservation priorities for Madagascar plants, it is worth noting that of the 99 species belonging to five endemic families, 12 of these species have not been found in the system of protected areas (see Table 4 5). This indicates the need to better study such species and sites.

Table 4-2: Species of Endemic Families in Madagascar, Not Yet Included in the System of Protected Areas (2013)

Families	Species
Sphaerosepalaceae	*Dialyceras discolor* J.-F. Leroy
Sphaerosepalaceae	*Rhopalocarpus mollis* G.E. Schatz & Lowry
Sarcolaenaceae	*Leptolaena raymondii* G.E. Schatz & Lowry
Sarcolaenaceae	*Perrierodendron capuronii* J.-F. Leroy, Lowry, Haev., Labat & G.E. Schatz
Sarcolaenaceae	*Perrierodendron rodoense* J.-F. Leroy, Lowry, Haev., Labat & G.E. Schatz
Sarcolaenaceae	*Rhodolaena macrocarpa* G.E. Schatz, Lowry & A.-E. Wolf
Sarcolaenaceae	*Sarcolaena humbertiana* Cavaco
Sarcolaenaceae	*Schizolaena capuronii* Lowry, G.E. Schatz, J.-F. Leroy & A.-E. Wolf
Sarcolaenaceae	*Schizolaena milleri* Lowry, G.E. Schatz, J.-F. Leroy & A.-E. Wolf
Sarcolaenaceae	*Schizolaena raymondii* Lowry & Rabevohitra
Sarcolaenaceae	*Schizolaena viscosa* F. Gérard
Sarcolaenaceae	*Xyloolaena speciosa* Lowry & G.E. Schatz

Source: MBG, 2013, pers. comm.

Birds

Approximately 19 percent of bird species are threatened, of which 3 percent are considered Critically Endangered (see Table 4-1).

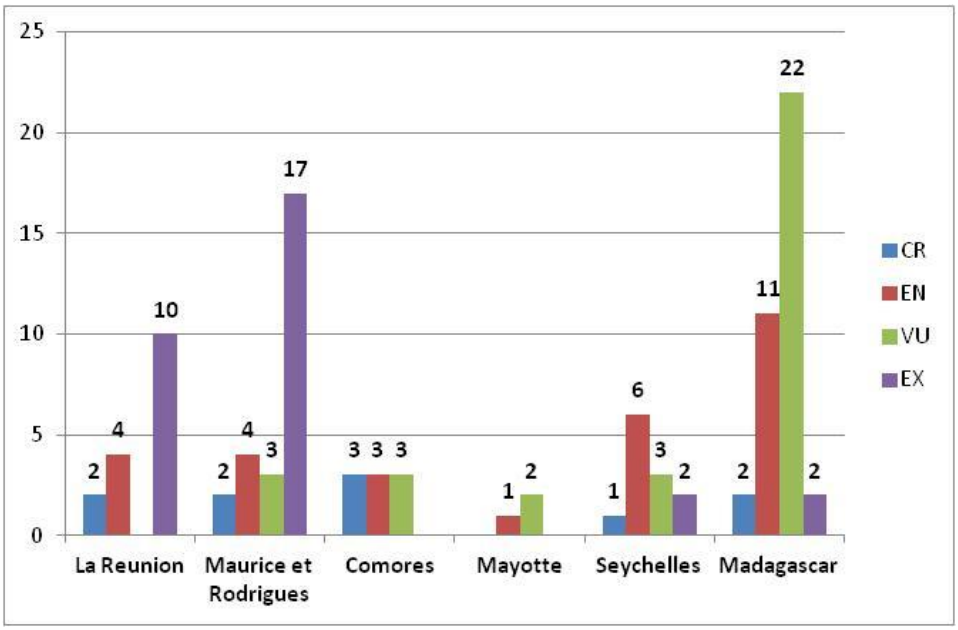
With 31 species extinct, this group was one of the most affected by human settlement, particularly in the Mascarene Islands. Mauritius represents a textbook case: out of the 28 species of terrestrial birds that existed on the island when it was discovered, 16 are extinct (i.e. nearly 60 percent), and nine are threatened, while in Rodrigues, 11 of the 13 endemic species are extinct (Cheke and Hume, 2008). In La Réunion, the *tuit-tuit* or Réunion cuckooshrike (*Coracina newtonii*, CR) is localized in an area of only 16 km^2 (Salamolard and Follower, *in press*), while the only endemic bird of prey of the island, the Réunion harrier (*Circus maillardi*, EN) is also faced with extinction (Grondin and Philippe 2011). The Barau's petrel (*Pterodroma baraui*, EN), a seabird that visits a large part of the Indian Ocean, nests only on the flanks of Piton des Neiges and is threatened by infrastructure and predation by rats and cats (Pinet 2012), while the population of the Mascarene's petrel (*Pseudobulweria aterrima*, CR) is estimated at tens of couples (Riethmuller, 2012).

In Comoros, three endemic species of owls are Critically Endangered: the screech-owls of Anjouan, Moheli and Grande Comore (*Otus capnodes, O. moheliensis* and *O. pauliani*). The population of Grand Comoro drongo (*Dicrurus fuscipennis,* EN), threatened by deforestation or by introduced predators, is not more than 100 individuals (Rocamora and Yeatman-Berthelot 2009). The Karthala white-eye (*Zosterops mouroniensis,* VU) is endemic to the heights of the mountain. The main threat to the species is volcanic activity that may deplete its habitat (Marsh, *in* IUCN, 2013).

In Madagascar, 35 species of terrestrial birds and wetlands are threatened (IUCN, 2013), including one (*Tachybaptus rufolavatus*) that is probably extinct and another one considered extinct even if the status is not as yet included in the Red List (*Coua delalandei*, Raherilalao and Goodman, 2011). The rainforests of eastern Madagascar have the largest number of threatened bird species, including the Madagascar Serpent Eagle (*Eutriorchis astur*, EN) and Madagascar Red Owl (*Tyto soumagnei*, CR). In the western part of the island, we note the presence of the

Madagascar Fish Eagle (*Haliaeetus vociferoides*, EN). The endemic water birds of the island are among the most threatened due to habitat loss linked with the expansion of rice farming. The establishment in 2004 of the System of Protected Areas of Madagascar (SAPM) helped secure some sites for threatened species with restricted distribution. However, 91 percent of Malagasy birds tend to be decreasing in number (IUCN, 2013).

Figure 4-2: Number of Bird Species Threatened or Extinct in the Hotspot Islands



Source: IUCN Red List, accessed on 13 December 2013. Note: For Mauritius and Rodrigues, the most recent compilations total 27 native terrestrial extinct birds out of the 32 initially present (Hume, 2013)

Mammals

All native mammals in the area have been evaluated by IUCN, although some taxa need updating, and data are as yet insufficient to assess the status of some taxa. Table 4-3 shows the synthesis of these data.

Table 4-3: Synthesis of the Red List Evaluations for Mammals in the Hotspot

Main groups	CR	EN	VU	EX	NT/LC	DD	Total
PRIMATES (*prior to the re-evaluation of lemurs in 2012*)	7	17	15	1	14	40	**94**
TENRECS		2	4		23	1	**30**
CARNIVORES		1	3	1	5		**10**
RODENTS		6	1		15	4	**26**
CHIROPTERA	2	2	7	1	30	8	**50**
SIRENIANS			1		0		**1**
CETACEANS		3	1	2	11	13	**28**
TOTAL	**9**	**31**	**32**	**5**	**98**	**66**	**239**

Source: IUCN Red List, accessed on December 12, 2013

Note: The two species of pygmy hippos of Madagascar, extinct more than 1000 years ago, and the pachyure of Madagascar, LC, are not included in the main groups, hence the difference in the totals.

Except for bats, all the hotspot mammals are limited to Madagascar. The two species of lemurs present in Comoros (*Eulemur mongoz* and *E. fulvus*) probably have been introduced by humans.

Following recent evaluations by specialists of Madagascar lemurs, the Red List was updated in 2012 and a conservation strategy published in 2013 (Mittermeier *et al.* eds., 2013) but the data are not included in the global databases of IUCN yet and were not included in the analysis and synthesis of this chapter. The new Red List (see Table 4-3) indicates a 94 percent rate of near threatened species, making lemurs the most endangered mammal group worldwide. The importance and term of conservation are further enhanced by the unique character of this primate group and its outstanding endemism: the 99 species (divided into 15 genera and five families) are all endemic to Madagascar.

Table 4-4: Comparison of the Red List Evaluations for Lemurs, 2008 and 2012

Category	2008		2012	
	species*	%	species*	%
CR	6	5.9	24	23.3
EN	17	16.8	49	47.6
VU	14	13.9	20	19.4
NT/LC	13	12.8	6	5.8
DD	42	41.6	4	3.9
NE	9	8.9	0	0
TOTAL	101		103	
% CR+EN+VU		74%		93.9%

Source: Mittermeier et al. eds., 2013
*Note: * figures combining species and sub-species*

Outside Madagascar, the only native mammals are bats (Chiroptera). Among the Mascarene species, *Pteropus subniger* has been declared extinct since the 1860s but may have survived into the early 1900s, while the Mauritian flying fox (*P. niger*, VU) can still be found in Mauritius (a small colony was recently located in La Réunion, where the species was considered extinct for at least 200 years, Cacéres 2011). Lastly, *P. rodricensis*, endemic to this island, is still under CR status, but the situation seems to be improving as a result of some conservation actions (Mickleburgh, *in* IUCN, 2013). *Mormopterus acetabulosus*, endemic to the Mascarenes, is also considered as VU; the populations from La Réunion and Mauritius could be considered to be distinct (Goodman, 2007). There remain some other unknown species in La Réunion: two new acoustic signals have been recorded. They could belong to a *Scotophilus* genus considered extinct on the island for more than 150 years (Barataud and Giosa 2009; Barataud *et al.* 2012; Biotope 2012). Out of the three endemic species of Seychelles, the *Coleura seychellensis* is the most endangered (CR) with less than 100 individuals (Rocamora and Joubert, 2004; Bambini *et al.*, 2006). In Madagascar, 13 species are present, including four CR, three VU and six for which data are deficient.

With regard to marine species, the dugong (*Dugong dugon*, VU) is still present in Madagascar (Alloncle *et al.*, 2008), in the waters of Seychelles and in Comoros (Poonian, 2006), but it has probably disappeared from the Mascarenes (Florens *pers. comm).* The Cetaceans recognized as Endangered (EN) and present in the region consist of three species of whales (*Balaenoptera*

borealis, *B. musculus*, *B. physalus*) with very large ranges, and the responsibility for preserving them does not lie with the hotspot alone.

Reptiles

Reptiles are the most threatened taxonomic group of the hotspot, with 153 Endangered species and 10 extinct, out of the 426 assessed in the hotspot. So the rate of threat to existing species would be 36.8 percent.

Madagascar is home to the overwhelming majority of these species, with 136 species of terrestrial reptile species, 24 CR, 51 EN and 61 VU. The two endemic tortoises of Madagascar are considered among the most threatened vertebrates in the world (Rhodin *et al.*, 2011). Two species of snakes are probably extinct (Jenkins *et al*, 2013): the *Pseudoxyrhopus ankafinaensis*, whose habitat is the plateau rainforest of medium to high altitude (Raxworthy and Nussbaum, 1994), and the *Compsophis vinckei*, represented by only two individuals found in the east-central Madagascar, outside protected areas.

In Mauritius, 18 species of native reptiles were identified in the past. There are currently only 13 species left, 12 of which are endemic. Seven of them are limited to residual populations on the islands. The Round Island Burrowing Boa (*Bolyeria multocarinata*) was last seen in 1975 and is considered extinct. This is the last recorded extinction of a vertebrate in Mauritius (Cheke and Hume, 2008; Cole, 2009). In Seychelles, five reptiles are classified as Endangered, and two are Vulnerable, including the Aldabra giant tortoise. In Réunion, three native species are highly threatened: Réunion Island ornate day gecko (*Phelsuma inexpectata*, CR), the Bouton's snake-eyed skinks (*Cryptoblepharus boutonii*, CR) and the Réunion Island day gecko (*Phelsuma borbonica*, EN).

The hotspot also has a global responsibility for the conservation of marine turtles. The *Iles Eparses* or Scattered Islands (Europa, Juan de Nova, Glorioso and Tromelin), as well as Saint Brandon and Agalega in the Republic of Mauritius and many uninhabited islands of the Seychelles, represent very important nesting sites for the green turtle, and play a crucial role for many young green and hawksbill turtles that find food and protection against predators there (Bourjea *et al*., 2011).

Table 4-5: Conservation Status of the Hotspot Marine Turtles

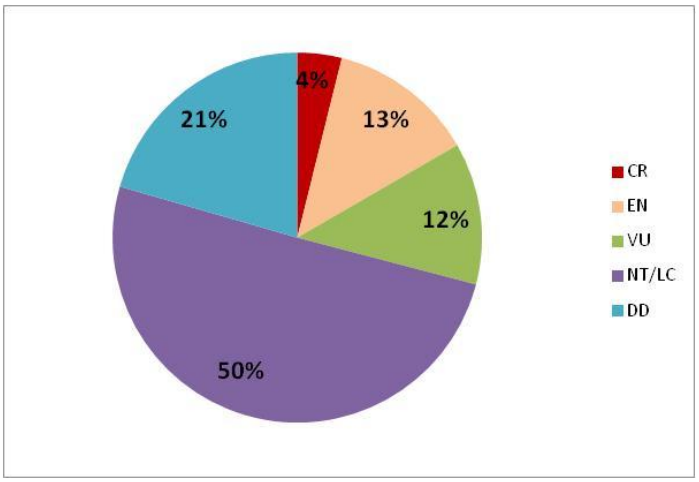
Common name	Scientific name	IUCN Category
Olive ridley	*Lepidochelys olivacea*	VU
Hawksbill turtle	*Eretmochelys imbricata*	CR
Green turtle	*Chelonia mydas*	EN
Loggerhead turtle	*Caretta caretta*	EN
Leatherback turtle	*Dermochelys coriacea*	VU

Amphibians

The assessments for amphibians were quite comprehensive in the region, even if the data remain insufficient for about one-fifth of the species assessed.

Almost all threatened taxa—and therefore the conservation priorities for amphibians—are found in Madagascar (eight of the 10 CR taxa in the region, 29 of the 33 EN taxa and all 33 VU taxa). Six AZE sites in Madagascar have been identified as such by the presence of amphibians at a critical high risk of extinction. Seychelles also has several endemic taxa at risk (four frogs and two caecilians). Neither the Mascarenes nor Comoros have any native amphibian taxon that is threatened.

Figure 4-3: Threat Status of Amphibians in the Hotspot

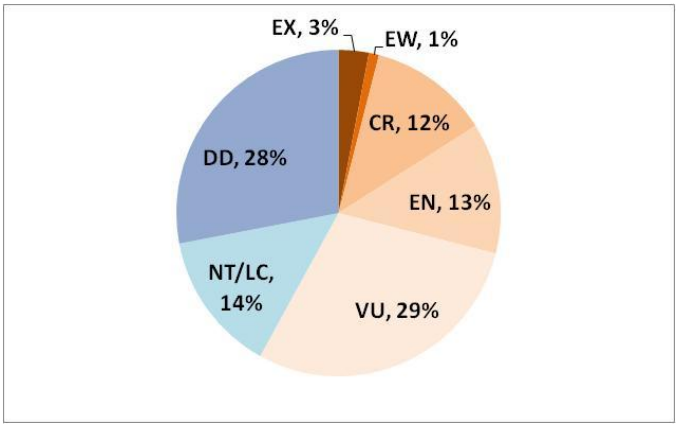


Source: IUCN, Amphibian Specialist Group

Freshwater Fishes

Freshwater fishes are a real priority for conservation in the hotspot. The last official assessment of the freshwater fishes status in Madagascar was conducted by IUCN in 2004 (see Figure 4-4). A re-evaluation was performed in 2007, but the findings have not been validated by a workshop and the results, although not included in the global Red List, do confirm the difficult situation in terms of conservation for the taxa considered, with a much higher threat level (75 percent of threatened species, and 4 percent extinct) compared with that of all the other taxa assessed, except for lemurs. The evaluation also points out the lack of information available: more than a quarter of the Malagasy species are in the category of Data Deficient (DD). The heightened level of threat is exacerbated by the poor protection of wetlands (Sparks and Stiassny, 2008).

Figure 4-4: Threat Status of Freshwater Fishes, Madagascar (2004)



Source: Assessment of the Threatened Status of the Endemic Freshwater Fishes of Madagascar, IUCN, 2004

Paretroplus menarambo, an endemic cichlid, was considered extinct in the wild until it was rediscovered in Lake Tseny, northwestern Madagascar, in 2008 (Andriafidison *et al*, 2011). This species is to date declared as CR (IUCN, 2012), qualifying the site as a site of the Alliance for Zero Extinction (AZE).

4.2. Site Outcomes

Most species will be better protected if the sites where they are present are preserved. The Key Biodiversity Areas (KBAs) are the targeted sites. These are sites that are home to the populations of at least one globally threatened species, with restricted distribution, limited to a biome or forming large clusters.

The teams in charge of the ecosystem profile have identified 369 KBAs in the hotspot. The work has required the compilation of more than 5,500 data points on the presence of 1633 threatened (on the IUCN Red List) as well as information on additional 381 species (not yet assessed, locally important etc.), as shown on the Table below. Together, the 369 sites host 338 Critically Endangered species, 659 Endangered species and 667 Vulnerable species. Appendix 7 (downlodable from CEPF website) provides for the comprehensive list of species used for the identification of KBAs in the hotspot.

Table 4-6: Summary of the species data used for identification of KBAs

PHYLUM or CLASS	total	*VU*	*EN*	*CR*	*Other*
PLANTAE	**1311**	*376*	*450*	*239*	*246*
ARTHROPODA	**25**	*9*	*5*	*1*	*10*
CNIDARIA	**54**	*53*	*1*	*0*	*0*
ECHINODERMATA	**10**	*5*	*5*	*0*	*0*
MOLLUSCA	**97**	*26*	*32*	*9*	*30*
*PISCES**	**79**	*34*	*15*	*15*	*15*
REPTILIA	**169**	*62*	*50*	*28*	*29*
AMPHIBIA	**69**	*26*	*27*	*8*	*8*
MAMMALIA	**131**	*40*	*48*	*28*	*15*
AVES	**99**	*36*	*25*	*10*	*28*
TOTAL	**2044**	*667*	*658*	*338*	*381*

*Note: *the term pisces, despite being paraphyletic,has been used for practical purposes; it combines data for the region on cartilageneous fish (Chondrichtyes) and bony fish (Actinopterygii and Sarcopterygii (Coelacanth)).*

Additional data on the legal status, size, type of management, the name of the managing structure when it exists, has also been compiled when available. This work has been made possible thanks to the participation of a large number of experts, NGOs and authorities in charge of protected areas in the countries concerned. It is important to highlight the efforts made by all of these organizations who have shared their data—the list is presented on the first pages of this profile. The following sections provide guidance on the methodology and the main findings concerning the sites for each country in the hotspot. The complete list of KBAs for the region can be found in the Appendix 6.

Table 4-7: Distribution per Country of the Hotspot Key Biodiversity Areas

Number of KBAs		
Comoros	20	
Madagascar	212	
Mauritius	17	
Seychelles	57	
France	63	
La Réunion		*38*
Mayotte		*19*
Iles Eparses		*6*
TOTAL	369	

Madagascar

The data sources abounded for Madagascar, including: other assessments of KBAs conducted by Conservation International since 2006; assessments of areas important for bird conservation or IBAs (BirdLife International, 2013); assessments of areas important for plant conservation (ZICP) conducted by the Missouri Botanical Garden, initially with funding from CEPF (MBG, 2013); recent data on areas important for reptiles (Jenkins *et al.*, 2013); areas important for primates (Mittermeier *et al.*, 2013); the map of the national system of protected areas (SAPM, 2010); the ecological inventory data collected by a range of organizations working to increase protection (including Madagascar National Parks) and data provided by the experts during national workshops.

In Madagascar, this work led to the identification of 212 KBAs - an increase of almost 30 percent from the 164 sites identified as KBAs for the last assessment by CI in 2006. This increase mainly comes from new data on plants, from the identification of important marine and coastal areas, and from a greater attention to wetlands. The new dataset also takes into consideration recent extension or changes in protected areas boundaries. In several cases, former KBAs have been merged to reflect the fact that they now represent single management units.

All the protected areas of Madagascar (gazetted and under "temporary protection") qualify as KBAs, which is not surprising considering the level of threats and endemism. 80 KBAs (about 37 percent of the sites) are under temporary protection status. It is also useful to note that 80 of the identified KBAs, or 37 percent, are currently not protected, not even under a temporary protection status.

The Map next page presents the 212 KBAs identified for Madagascar, and Table 4-8 provides for the list of KBAs. The detailed maps for each region of Madagascar, and the complete list of KBAs (including managers and number of species) are presented in Appendixes 6 and 8.

Figure 4-5: Key Biodiversity Areas in Madagascar

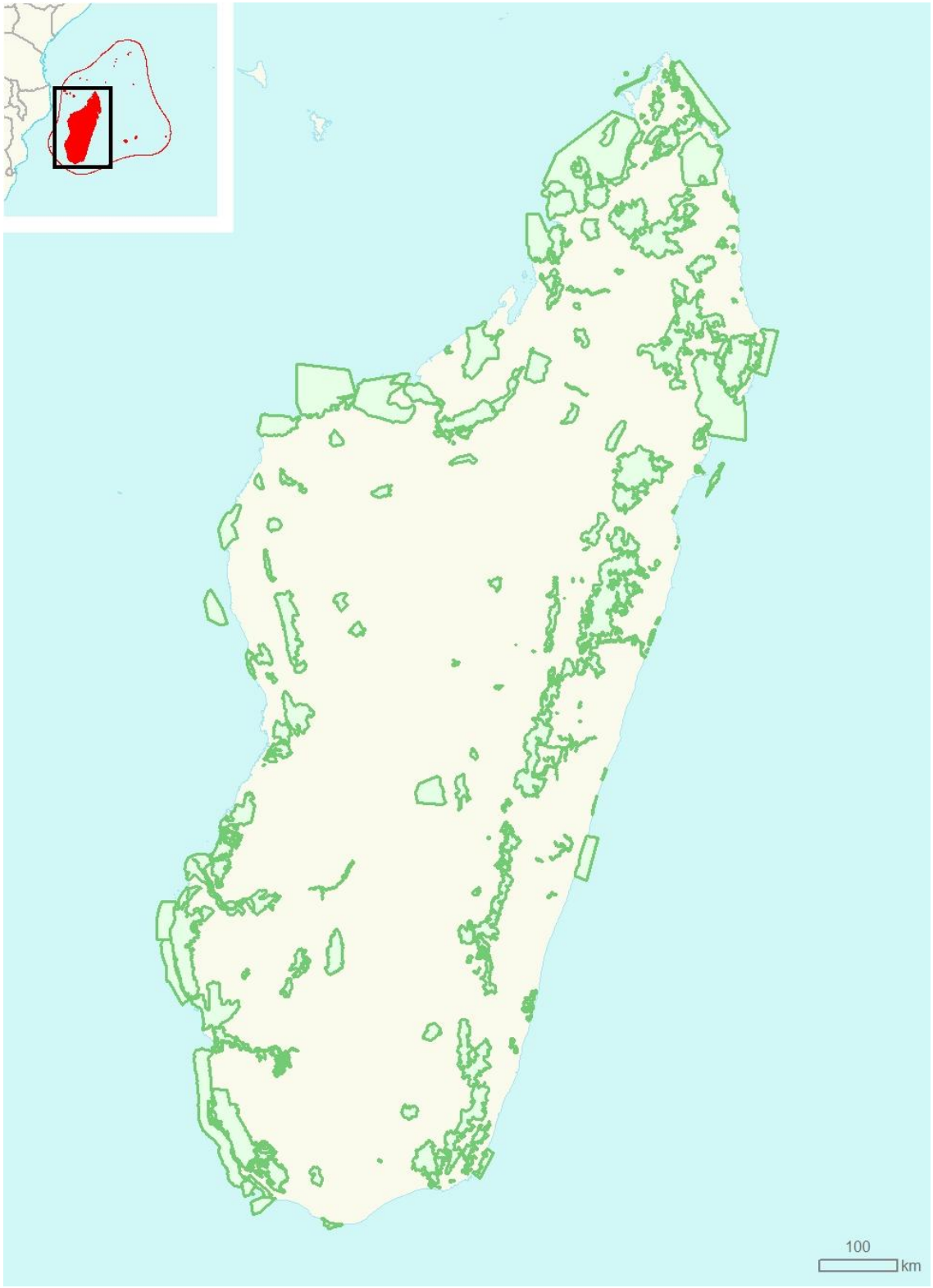


Table 4-8: List of KBAs in Madagascar, Including Protection Status and Number of Endangered Species

KBA ID#	ZCB (nom Francais)	KBA (English name)
MDG-1	Aire Protégée de Mikea	Mikea Protected Area
MDG-2	Ambalibe Menabe	Ambalibe Menabe
MDG-3	Ambanitazana (Antsiranana)	Ambanitazana (Antsiranana)
MDG-4	Ambato-Boeny	Ambato-Boeny
MDG-5	Ambatofinandrahana	Ambatofinandrahana
MDG-6	Ambereny	Ambereny
MDG-7	Ambondrobe (Vohemar)	Ambondrobe (Vohemar)
MDG-8	AMP de la Baie d'Ambodivahibe	Ambodivahibe Bay MPA
MDG-9	AMP de Nord Salary	North Salary MPA
MDG-10	AMP de Nosy Ve Androka	Nosy Ve Androka MPA
MDG-11	AMP de Tsinjoriake-Andatabo	Tsinjoriake-Andatabo MPA
MDG-12	AMP de Velondriake	Velondriake MPA
MDG-13	AMP des Iles Barren	Barren Islands MPA
MDG-14	AMP Iranja-Ankazoberavina-Baie des Russes	Iranja-Ankazoberavina-Russian Bay MPA
MDG-15	AMP Mitsio-Tsarabanjina	Mitsio-Tsarabanjina MPA
MDG-16	Ampombofofo	Ampombofofo
MDG-17	Andravory (Andrafainkona)	Andravory (Andrafainkona)
MDG-18	Anena (Beloha)	Anena (Beloha)
MDG-19	Angodoka-Ambakoa (Besalampy)	Angodoka-Ambakoa (Besalampy)
MDG-20	Ankafina (Ambohimasoa)	Ankafina (Ambohimasoa)
MDG-21	Ankarabolava-Agnakatriky	Ankarabolava-Agnakatriky
MDG-22	Antanifotsy Nord (Diana)	Antanifotsy Nord (Diana)
MDG-23	Antanifotsy Sud (Diana)	Antanifotsy Sud (Diana)
MDG-24	Baie d'Antongil	Antongil Bay
MDG-25	Baie de Diego	Diego Bay
MDG-26	Baie de Loza	Loza Bay
MDG-27	Beampingaratsy	Beampingaratsy
MDG-28	Belalanda	Belalanda
MDG-29	Bobakindro (Salafaina)	Bobakindro (Salafaina)
MDG-30	Cap d'Ambre	Cap d'Ambre
MDG-31	Cap Saint-André	Cap Saint-André
MDG-32	Complexe de la Baie de Mahajamba - Anjavavy	Mahajamba Bay - Anjavavy Complex
MDG-33	Complexe de la Baie de Rigny	Rigny Bay Complex
MDG-34	Complexe des Trois Baies	Three Bays Complex
MDG-35	Corridor Anjozorobe-Angavo-Tsinjoarivo	Anjozorobe-Angavo-Tsinjoarivo Corridor
MDG-36	Côte à l'Est d'Antsiranana	Coastal area East of Antsiranana
MDG-37	Côte d'Antalaha à Mahavelona	Coastal area between Antalaha-Mahavelona
MDG-38	Côte de Lokaro à Lavanono	Coastal area between Lokaro and Lavanono
MDG-39	Côte de Mananjary	Mananjary coast
MDG-40	Efatsy (Farafangana)	Efatsy (Farafangana)
MDG-41	Fanambana (Vohemar)	Fanambana (Vohemar)
MDG-42	Fleuve Mangoky	Mangoky River
MDG-43	Forêt Classée d'Onive	Onive Classified Forest
MDG-44	Forêt Classée de Bidia-Bezavona	Bidia-Bezavona Classified Forest

MDG-45	Forêt de Saint-Augustin	Saint Augustin Forest
MDG-46	Grand récif de Toliary	Toliary Great Reef
MDG-47	Ile Sainte-Marie (Ambohidena)	Sainte-Marie Island (Ambohidena)
MDG-48	Ilevika (Matsaborilava)	Ilevika (Matsaborilava)
MDG-49	Itampolo Ouest - Mahafaly	West Itampolo - Mahafaly
MDG-50	Lac Andranomalaza	Lake Andranomalaza
MDG-51	Lac Andrapongy et Rivière Anjingo	Lake Andrapongy and Anjingo River
MDG-52	Lac Itasy	Lake Itasy
MDG-53	Lac Tsarasaotra	Lake Tsarasaotra
MDG-54	Lac Tseny	Lake Tseny
MDG-55	Lacs Anony et Erombo	Lakes Anony and Erombo
MDG-56	Mahatsara (Mahambo Foulpointe)	Mahatsara (Mahambo Foulpointe)
MDG-57	Makay	Makay
MDG-58	Mandraka	Mandraka
MDG-59	Nankinana (Ambodibonara-Masomeloka)	Nankinana (Ambodibonara-Masomeloka)
MDG-60	NAP Allée des Baobabs	Avenue of the Baobabs NPA
MDG-61	NAP Ambakoana/Analabe	Ambakoana/Analabe NPA
MDG-62	NAP Ambatofotsy (Anosibe An'Ala)	Ambatofotsy (Anosibe An'Ala) NPA
MDG-63	NAP Ambatotsirongorongo	Ambatotsirongorongo NPA
MDG-64	NAP Ambohidray	Ambohidray NPA
MDG-65	NAP Ambohipiraka	Ambohipiraka NPA
MDG-66	NAP Ambondrobe (Belo sur Tsiribihana)	Ambondrombe (Belo sur Tsiribihana) NPA
MDG-67	NAP Amoron'i Onilahy et Rivière Onilahy	Amoron'i Onilahy and Onilahy River NPA
MDG-68	NAP Ampananganandehibe-Beasina (Andilanatoby)	Ampananganandehibe-Beasina (Andilanatoby) NPA
MDG-69	NAP Ampasindava - Baie de Rigny Est	Ampasindava - Rigny Bay (East) NPA
MDG-70	NAP Anadabolava-Betsimalaho (Anosy)	Anadabolava-Betsimalaho (Anosy) NPA
MDG-71	NAP Analalava Foulpointe	Analalava Foulpointe NPA
MDG-72	NAP Analalava-Analabe-Betanantanana (Ambatosoratra)	Analalava-Analabe-Betanantanana (Ambatosoratra) NPA
MDG-73	NAP Analavelona	Analavelona NPA
MDG-74	NAP Andrafiamena	Andrafiamena NAP
MDG-75	NAP Andreba	Andreba NPA
MDG-76	NAP Angavo Androy	Angavo Androy NPA
MDG-77	NAP Anjozorobe	Anjozorobe NPA
MDG-78	NAP Ankafobe	Ankafobe NPA
MDG-79	NAP Ankeniheny-Lakato	Ankeniheny-Lakato NPA
MDG-80	NAP Ankodida	Ankodida NPA
MDG-81	NAP Ankorabe (Antadonkomby)	Ankorabe (Antadonkomby) NPA
MDG-82	NAP Antoetra	Antoetra NPA
MDG-83	NAP Antrema	Antrema NPA
MDG-84	NAP Archipel Cap Anorontany	Cape Anorontany Archipelago NPA
MDG-85	NAP Baie de Bombetoka - Marovoay	Bombetoka Bay - Marovoay NPA
MDG-86	NAP Beanka	Beanka NPA
MDG-87	NAP Bemanevika (Zone Humide d'Ankaizina)	Bemanevika (Ankaizina wetlands) NPA
MDG-88	NAP Complex Ifotaky	Ifotaky Complex NPA
MDG-89	NAP Complexe Forestier Plateau Mahafaly	Mahafaly Plateau Forest Complex NPA
MDG-90	NAP Complexe Lac Ihotry - Delta du Mangoky	Lake Ihotry - Mangoky Delta Complex NPA
MDG-91	NAP Complexe	Makirovana-Ambatobiribiry

	Makirovana-Ambatobiribiry	Complex NPA
MDG-92	NAP Complexe Mangoky-Ankazoabo	Mangoky-Ankazoabo Complex NPA
MDG-93	NAP Complexe Tsimembo-Manambolomat-Bemamba	Tsimembo-Manambolomaty-Bemamba Complex NPA
MDG-94	NAP Complexe Vohipaho	Vohipaho Complex NPA
MDG-95	NAP Corridor Ambositra-Vondrozo (COFAV)	Ambositra-Vondrozo Corridor NPA (COFAV)
MDG-96	NAP Corridor Ankeniheny-Zahamena (CAZ)	Ankeniheny Zahamena Corridor NPA (CAZ)
MDG-97	NAP Corridor Central de Menabe	Menabe Central Corridor NPA
MDG-98	NAP Corridor Forestier d'Analamay-Mantadia (CFAM)	Analamay-Mantadia Forest Corridor NPA (CFAM)
MDG-99	NAP Corridor Forestier Fandriana-Marolambo (COFAM)	Fandriana-Marolambo Forest Corridor NPA (COFAM)
MDG-100	NAP Corridor Tsaratanana-Marojejy (COMATSA)	Tsaratanana-Marojejy Corridor NPA (COMATSA)
MDG-101	NAP Cratère de Nosy Be	Nosy Be Crater NPA
MDG-102	NAP Daraina-Loky-Manambato	Daraina-Loky Manambato NPA
MDG-103	NAP Fierenana	Fierenana NPA
MDG-104	NAP Forêt Classée d'Andavakoera	Andavakoera Classified Forest NAP
MDG-105	NAP Forêt Classée de Bongolava (Marosely)	Bongolava Classified Forest (Marosely) NPA
MDG-106	NAP Forêt Classée de Manombo	Manombo Classified Forest NPA
MDG-107	NAP Forêt Classée de Vohibola	Vohibola Classified Forest NPA
MDG-108	NAP Forêt Classée de Vondrozo	Vondrozo Classified Forest NPA
MDG-109	NAP Forêt Classée de Zafimaniry	Zafimaniry Classified Forest NPA
MDG-110	NAP Forêt de Menarandra/Vohindefo	Menarandra Forest/Vohindefo NPA
MDG-111	NAP Forêt de Sahafina (Anivorano-Brickaville)	Sahafina Forest (Anivorano-Brickaville) NPA
MDG-112	NAP Ibity	Ibity NPA
MDG-113	NAP Itremo	Itremo NPA
MDG-114	NAP Kianjavato	Kianjavato NPA
MDG-115	NAP Lac Alaotra	Lake Alaotra NPA
MDG-116	NAP Lac Sahaka-Analabe	Lake Sahaka-Analabe NPA
MDG-117	NAP Mahabo Mananivo	Mahabo Mananivo NPA
MDG-118	NAP Mahialambo	Mahialambo NPA
MDG-119	NAP Mandena	Mandena NPA
MDG-120	NAP Mangabe-Ranomena-Sasarotra	Mangabe-Ranomena-Sasarotra NPA
MDG-121	NAP Massif de Manjakatompo-Ankaratra	Manjakatompo-Ankaratra Massif NPA
MDG-122	NAP Montagne des Francais	Montagne des Francais NPA
MDG-123	NAP Oronjia	Oronjia NPA
MDG-124	NAP PK32-Ranobe	PK32-Ranobe NPA
MDG-125	NAP Pointe à Larrée	Pointe à Larrée NPA
MDG-126	NAP Sainte-Luce - Ambato Atsinanana	Sainte-Luce - Ambato Atsinanana NPA
MDG-127	NAP Sept Lacs	Seven Lakes NPA
MDG-128	NAP Tampolo	Tampolo NPA
MDG-129	NAP Vohibe-Ambalabe (Vatomandry)	Vohibe-Ambalabe (Vatomandry) NPA
MDG-130	NAP Zone Humide de Mahavavy-Kinkony	Mahavavy-Kinkony wetlands NPA
MDG-131	NAP Zone Humide de Nosivolo	Nosivolo wetland NPA
MDG-132	NAP Zone humide de Port-	Port-Bergé wetlands NPA

	Bergé	
MDG-133	NAP Zone Humide de Tambohorano	Tambohorano wetland NPA
MDG-134	Nosy Foty	Nosy Foty
MDG-135	Nosy Manitse Future SAPM Marine et zones humides ajacentes	Nosy Manitse Future SAPM Marine and surrounding wetlands
MDG-136	Nosy Varika	Nosy Varika
MDG-137	Pangalane Nord	North Pangalane
MDG-138	Parc National d'Andohahela - Parcelle I	Andohahela National Park - Section I
MDG-139	Parc National d'Andohahela - Parcelle II	Andohahela National Park - Section II
MDG-140	Parc National d'Andringitra	Andringitra National Park
MDG-141	Parc National d'Ankarafantsika et Ampijoroa	Ankarafantsika National Park and Ampijoroa
MDG-142	Parc National de Kirindy Mite et extension	Kirindy Mite National Park and extension
MDG-143	Parc National de la Baie de Baly	Baly Bay National Park
MDG-144	Parc National de Mananara-Nord	Mananara-North National Park
MDG-145	Parc National de Mantadia et Réserve Spéciale d'Analamazaotra	Mantadia National Park and Analamazaotra Special Reserve
MDG-146	Parc National de Marojejy	Marojejy National Park
MDG-147	Parc National de Masoala	Masoala National Park
MDG-148	Parc National de Masoala - Parcelle II	Masoala National Park - Section II
MDG-149	Parc National de Masoala - Parcelle III	Masoala National Park - Section III
MDG-150	Parc National de Midongy-Sud	Midongy South National Park
MDG-151	Parc National de Nosy Mitsio	Nosy Mitsio National Park
MDG-152	Parc National de Nosy Tanihely	Nosy Tanihely National Park
MDG-153	Parc National de Ranomafana et extension	Ranomafana National Park and extension
MDG-154	Parc National de Tsimanampetsotsa et extension	Tsimanampetsotse National Park and extension
MDG-155	Parc National de Zombitse-Vohibasia et extension	Zombitse-Vohibasia National Park and extension
MDG-156	Parc National d'Isalo	Isalo National Park
MDG-157	Parc National du Tsingy de Namoroka	Tsingy de Namoroka National Park
MDG-158	Parc National et Réserve Naturelle Intégrale de Zahamena	Zahamena National Park and Strict Reserve
MDG-159	Parc National et Réserve Naturelle Intégrale du Tsingy de Bemaraha	Tsingy de Bemaraha National Park and Strict Nature Reserve
MDG-160	Parc National et Réserve Spéciale de la Montagne d'Ambre	Montagne d'Ambre National Park and Special Reserve
MDG-161	Parc National Marin Sahamalaza-Iles Radama	Sahamalaza-Radama Islands National Marine Park
MDG-162	Parc Naturel de Makira	Makira Natural Park
MDG-163	Réserve Communautaire d'Anja	Anja Community Reserve
MDG-164	Réserve Naturelle Intégrale de Betampona	Betampona Strict Nature Reserve
MDG-165	Réserve Naturelle Intégrale de Lokobe	Lokobe Strict Nature Reserve
MDG-166	Reserve Naturelle Integrale Tsaratanàna et extension	Tsaratanana Strict Nature Reserve and extension
MDG-167	Réserve Spéciale d'Ambatovaky	Ambatovaky Special Reserve

MDG-168	Réserve Spéciale d'Ambohijanahary	Ambohijanahary Special Reserve
MDG-169	Réserve Spéciale d'Ambohitantely	Ambohitantely Special Reserve
MDG-170	Réserve Spéciale d'Analamerana	Analamerana Special Reserve
MDG-171	Réserve Spéciale d'Andranomena	Andranomena Special Reserve
MDG-172	Réserve Spéciale d'Anjanaharibe-Sud et extension	South Anjanaharibe Special Reserve and extension
MDG-173	Réserve Spéciale d'Ankarana	Ankarana Special Reserve
MDG-174	Réserve Spéciale de Bemarivo	Bemarivo Special Reserve
MDG-175	Réserve Spéciale de Beza Mahafaly	Beza Mahafaly Special Reserve
MDG-176	Réserve Spéciale de Bora	Bora Special Reserve
MDG-177	Réserve Spéciale de Kalambatritra	Kalambatritra Special Reserve
MDG-178	Réserve Spéciale de Kasijy	Kasijy Special Reserve
MDG-179	Réserve Spéciale de Mangerivola	Mangerivola Special Reserve
MDG-180	Réserve Spéciale de Maningoza	Maningoza Special Reserve
MDG-181	Réserve Spéciale de Manombo	Manombo Special Reserve
MDG-182	Réserve Spéciale de Manongarivo et extension	Manongarivo Special Reserve and extension
MDG-183	Réserve Spéciale de Marotandrano	Marotandrano Special Reserve
MDG-184	Réserve Spéciale de Nosy Mangabe	Nosy Mangabe Special Reserve
MDG-185	Réserve Spéciale de Tampoketsa-Analamaintso	Tampoketsa-Analamaintso Special Reserve
MDG-186	Réserve Spéciale du Cap Sainte-Marie et extension	Cape Sainte Marie Special Reserve and extension
MDG-187	Réserve Spéciale du Pic d'Ivohibe	Pic d'Ivohibe Special Reserve
MDG-188	Rivière Ankavia-Ankavanana (Antalaha)	Ankavia-Ankavanana River (Antalaha)
MDG-189	Rivière Antaimbalana-Andranofotsy (Maroantsetra)	Antaimbalana-Andranofotsy River (Maroantsetra)
MDG-190	Rivière Bemarivo	Bemarivo River
MDG-191	Rivière de Maevarano	Maevarano River
MDG-192	Rivière de Mahanara	Mahanara River
MDG-193	Rivière de Mananjary	Mananjary River
MDG-194	Rivière de Mangarahara-Amboaboa	Mangarahara-Amboaboa River
MDG-195	Rivière de Sambava	Sambava River
MDG-196	Rivière de Sofia	Sofia River
MDG-197	Rivière Ivoloina	Ivoloina River
MDG-198	Rivière Sud de Mananara	Mananara South River
MDG-199	Rivières Mangoro et Rianala	Mangoro-Rianila rivers
MDG-200	Rivières Namorona-Faraony	Namorona-Faraony rivers
MDG-201	Sahafary (Andranomena Antsiranana)	Sahafary (Andranomena Antsiranana)
MDG-202	Sorata	Sorata
MDG-203	Station Forestière d'Angavokely	Angavokely Forest Station
MDG-204	Station Forestière d'Anjiamangirana	Anjiamangirana Forest Station
MDG-205	Tarzanville (Moramanga)	Tarzanville (Moramanga)
MDG-206	Tsinjoarivo	Tsinjoarivo
MDG-207	Tsitongambarika NAP	Tsitongambarika NPA
MDG-208	Zone humide d'Ambavanankarana	Ambavanankarana wetland
MDG-209	Zone humide d'Ambila-	Ambila-Lemaintso wetland

	Lemaintso	
MDG-210	Zone humide d'Ankobohobo	Ankobohobo wetland
MDG-211	Zones humides de Maevatanana-Ambato-Boeny	Maevatanana-Ambato-Boeny wetlands
MDG-212	Zones humides de Torotorofotsy	Torotorofotsy Wetlands

Currently, even if biodiversity inventories are far from complete or up to date across Madagascar, it seems that most sites that can qualify as Key Biodiversity Area in Madagascar have been identified. It is nevertheless sure that the richness in species of some sites is certainly underestimated, which may make the prioritization exercises difficult. Some additional KBAs might still be identified in the future, in particular on the marine and coastal environment, with some sites including coral reefs still largely under-inventoried. Another gap identified by the Missouri Botanical Garden is the fact that some sites appear to be relatively preserved on satellite images, but for which field data do not exist or are very limited. Those sites that may be described as KBAs in the future are presented in Table 4-9.

Table 4-9: Areas Important or Potentially Important for Plant Conservation, with Fewer than 100 Data on Plant Species.

Site	Number of plants collected	Site	Number of plants collected
Tsitanandro	0	Herea	10
Ambereny	0	West Itampolo Mahafaly	11
Maniry	0	Ambalimby Menabe	14
Andravory	1	Ambanitazana (basalt table)	17
Kamoro	1	Angodoka	26
Bobakindro	3	Anena	50
Ilevika	5	Antanifotsy Sud	56
Mangoky	7	Ambohipiraka	98

Sources: Missouri Botanical Garden, 2013, pers. com.

Comoros

In Comoros, the inventories and the mapping of natural sites are extremely patchy, with many old data, often not geo-referenced (in most cases, species occurrences are at best defined at the island level, not at site level); therefore KBAs identified should be regarded as a first attempt, in the present state of knowledge.

Six important sites, relatively well documented, were identified initially as KBAs and fulfilled easily the methodological requirement to qualify as KBAs. These sites are presented in Table 4-10. In addition to these sites, important coastal and marine areas for each island were also identified, all of which include sea turtle nesting sites and extensive coral reefs that appeared important to local stakeholders during the consultations, even if they have not been inventoried yet.

With these limitations, 20 KBAs have been identified, with only six strictly terrestrial ones, and 14 for coastal and marine areas. However, the number of sites and their biogeographical distribution clearly indicates an incomplete identification, and some smaller, lesser-known sites of biological importance would certainly be identified as KBAs should more field research and inventories be done.

Currently, only one site—the Moheli Marine Park—is under a protected status, and only a couple of other sites have received international support (see chapters 7 and 10). The government of the Comoros, with support from AFD and the GEF among other donors, is currently starting a project to set up a network of protected areas for the country.

The Map next page presents the 20 KBAs identified for the Comoros, and Table 4-11 provides the complete list of KBAs, including the number of Endangered species (following the Global Red List) they host.

Table 4-10: Details on the Most Important KBAs for the Republic of Comoros

Mount Karthala. The Karthala Volcano, on Grande Comore, is famous for its 3-kilometer caldera, the largest crater of the active volcanoes in the world. There are several spontaneous vegetation depending on exposure and altitude: evergreen rainforest, dry forest, mountain mist bushes of heath (*Philippia spp.*) and alpine prairies at highest altitudes. Some of these ecosystems are very rich biodiversity reserves and home to several endemic and/or threatened species, some of which limited to the Karthala. Among them, there are five species of endemic and threatened birds, the Karthala zosterops (*Zosterops moroniensis*), the Karthala scops owl (*Otus pauliani*), the Karthala flycatcher (*Humblotia flavirostris*), the Grande Comore drongo (*Dicrurus fuscipennis*) and Mayotte drongo (*Dicrurus waldenii*), and some endemic subspecies such as Comoros blue pigeon (*Alectroenas sganzini*), which are very rare and threatened by hunting. An endemic butterfly, Levasseur's swallowtail (*Graphium levassori*, EN) depends on the forest for its survival. The site is also home to several species of endemic tree ferns and dwarf palms on the western slope. Among the tree species, *Khaya comorensis*, a threatened species that provides a valuable wood, is still present in the high altitude forest of Karthala, although it has become very rare (Hachime Abderemane, *com. pers.*). Mount Karthala, which covers 13,000 ha, was registered in the list of wetlands of international importance in 2006.
The Coelacanth Area. Beyond the importance of the ecosystem (coral reefs), the marine and coastal area southwest of Grande Comore is a site of global importance, as the seabed and volcanic caves near the coast are home to the famous coelacanth (*Latimeria chalumnae*), "living fossil" of global ecological and scientific interest. The value of this site is also linked to the presence of whales and dolphins. In Dolphin Bay, the most frequently observed species are *Stenella longirostris*, *Tursiops truncatus* and *Stenella attenuata*. A portion of this area is also recognized as one of the important sites of concentration of whales in the Comoros, with at least 12 species.
Mount Ntringui. Originally Anjouan was covered with forests. Today only a few remnants of forest are located on steep and inaccessible slopes. Residual Anjouan forests, including those of Mount Ntringui, have a high biological interest, with numerous species of orchids, spikemosses, ferns and tree heath (*Philippia* spp). The area is home to two endemic species of giant fruit bat (*Pteropus livingstonii* and *Pteropus seychellensis var. comorensis*). The Dzialandzé Lake sits atop mountain ridges. The lake and its surroundings provide habitat for grebes, freshwater fish and many other forest species. Until now, these sites have been preserved because of their reduced accessibility. They are currently under pressure from deforestation and expansion of agricultural and grazing land, lack of management, research on precious woods and the introduction of exotic species. With an area of 3,000 ha, Mount Ntringui has been registered in the list of wetlands of international importance since 2006.
Bimbini area. The marine and coastal zone of the Bimbini Peninsula in Anjouan has a rich biodiversity, with a variety of ecosystems (mangroves, fringing coral reefs, developed beaches once used by turtles as nesting sites, seagrass). The area presents a strip of fragmented mangroves which extends over 7 km from the southwest coast. The seagrass beds are developed and provide habitat and a feeding site for many species, including marine turtles *Chelonia mydas* and the dugong *Dugong dugon*.
Moheli Marine Park. This first marine protected area was created in 2000, and includes the Nioumachoua Islets. The site is an important place for reproduction of migratory and endangered species such as sea turtles and marine mammals. The park area is home to different types of habitats: beaches, pebbles, mangroves and coral reefs, as well as some adjacent terrestrial ecosystems, including **Lake Dziani-Boundouni**. This crater lake was classified as a wetland of international importance under the Ramsar Convention, in particular due to a large population of grebes (*Tachybaptus ruficollis*). The development of agriculture has led to the destruction of the forest that covered the lake's watershed. The slope erosion and loss of water retention capacity of the soil significantly reduced the supply of the lake, gradually leading to drying out.
Mont Mlédjélé. This evergreen humid forest is situated on the west- and south-facing slopes of the central ridge of Mlédjélé. It hosts rare species of precious woods such as *Weinmania comorensis* and *Khaya comorensis*. The forest is classified as globally important for bird conservation (Safford, 2001). It is home to endemic and endangered species such as the Livingstone fruit bat (*Pteropus livingstonii*), the Moheli little duke (*Otus moheliensis*) and Moheli warbler (*Nesillas mariae*), as well as several species of endemic birds in the archipelago and reptiles and endemic insects.

Figure 4-6: Key Biodiversity Areas in the Comoros

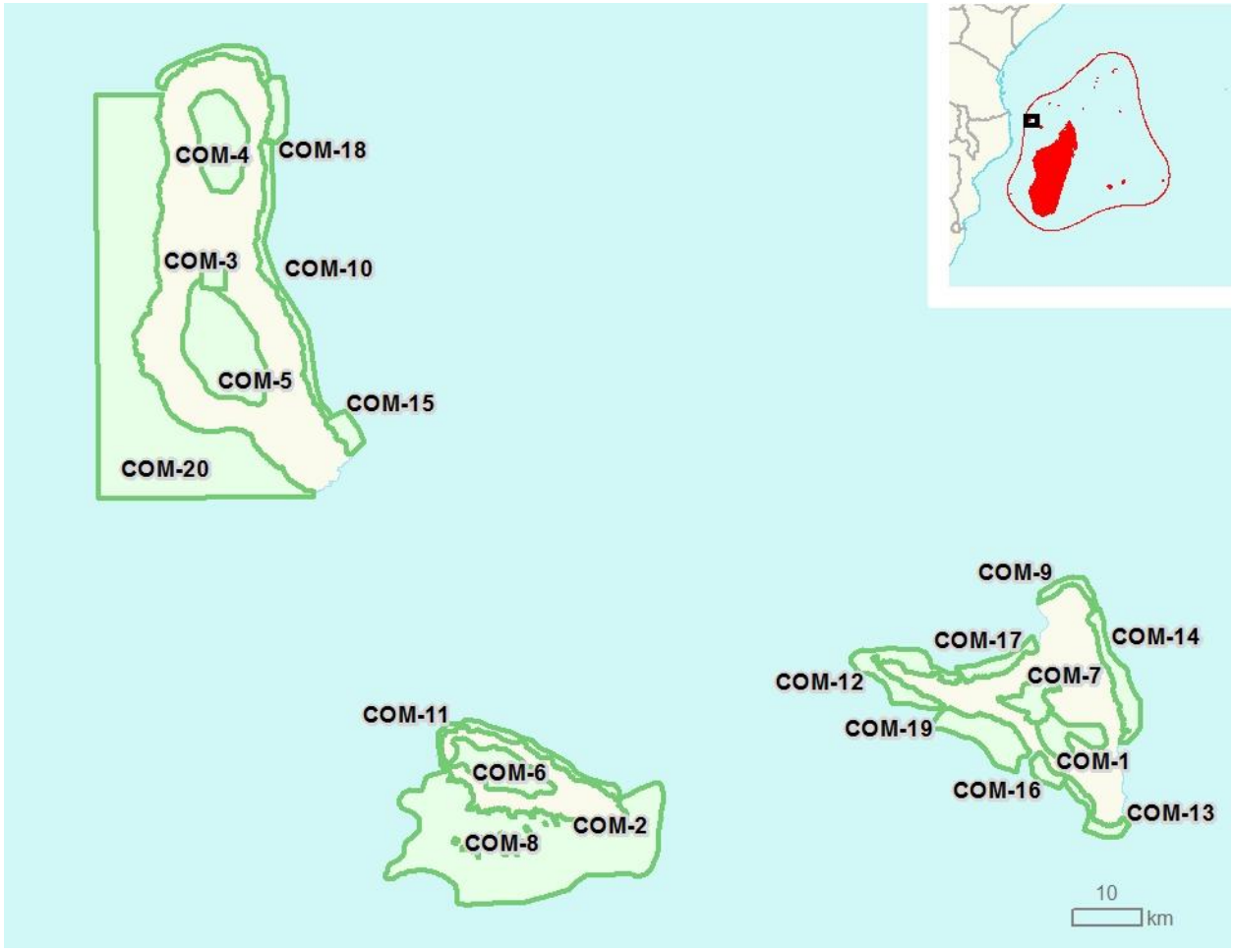


Table 4-11: List of Key Biodiversity Areas for the Comoros

KBA ID#	ZCB (nom Francais)	KBA (English name)	ILE ISLAND
COM-1	Forêt de Moya	Moya Forest	Anjouan
COM-2	Lac Dziani-Boudouni	Dziani-Boudouni Lake	Mohéli
COM-3	Lac Hantsongoma	Hantsongoma Lake	Mohéli
COM-4	Massif de la Grille	La Grille Mountains	Grande Comore
COM-5	Massif du Karthala	Karthala Mountains	Grande Comore
COM-6	Mont Mlédjélé (Hauts de Mwali)	Mont Mlédjélé (Mwali highlands)	Mohéli
COM-7	Mont Ntringui (Hauts de Ndzuani)	Mont Ntringui (Ndzuani highlands)	Anjouan
COM-8	Parc Marin de Mohéli	Mohéli Marine Park	Mohéli
COM-9	Récifs coralliens d'Anjouan	Anjouan coral reefs	Anjouan
COM-10	Récifs coralliens de Grande Comore	Grande Comore coral reefs	Grande Comore

COM-11	Récifs coralliens de Mohéli - hors Parc Marin	Mohéli coral reefs - outside of Marine Park	Mohéli
COM-12	Zone de Bimbini et Ilot de la Selle	Bimbini area and la Selle Islet	Anjouan
COM-13	Zone de Chiroroni	Chiroroni area	Anjouan
COM-14	Zone de Domoni	Domoni area	Anjouan
COM-15	Zone de Malé	Malé area	Anjouan
COM-16	Zone de Moya	Moya area	Anjouan
COM-17	Zone de Mutsamudu	Mutsamudu area	Anjouan
COM-18	Zone de Ndroudé et Ilot aux Tortues	Ndroudé area and Ilot aux Tortues	Grande Comore
COM-19	Zone de Pomoni	Pomoni area	Anjouan
COM-20	Zone du Coelacanthe	Coelacanthe area	Grande Comore

Seychelles

Gerlach (2008) produced a first inventory of KBAs for Seychelles and identified 48 sites of conservation importance, although the boundaries for some of them were not detailed, especially for the sites located in the outer islands. Within the project "*Mainstreaming Biodiversity Management into Production Sector Activities*" (supported by GEF-UNEP and the government of Seychelles), about 70 individual terrestrial Key Biodiversity Areas were identified in the inner Seychelles, and another 20 terrestrial sites in the outer islands. These were determined by compiling the results of recent biodiversity surveys in the main six granitic islands—Mahé, Praslin, Silhouette, La Digue, Curieuse, Félicité—plus results from previous biological surveys and national inventories, such as the inventory of Important Bird Areas (Rocamora and Skerrett, 2001), the NPTS Indian Ocean Biodiversity Assessment 2000-2005 (Gerlach 2008), and other past studies on plants, reptiles and invertebrates. Used as indicators were 776 species of special concern: 152 vascular plants, 14 amphibians, 21 birds, five freshwater fishes, two mammals, 19 reptiles, 563 terrestrial and freshwater invertebrates. A KBA database and an associated GIS application showing the distribution and abundance of these species were created (Senterre *et al.*, 2013).

In order to harmonize the results with other countries, the approach used for the Ecosystem Profile has been to merge into single, hence larger, KBA units all individual KBAs included in national parks (nine for Morne Seychellois, 11 for Silhouette, three for the proposed Montagne Planneau extension) and a few small islands and sites (four on Curieuse, three on Felicité, two neighboring sites on Praslin). In Mahé, about 10 sites of relatively limited interest identified by Carlström (1996), which had been affected by development or other forms of habitat degradations, and/or for which insufficient data was available, were left out. Only terrestrial sites with documented KBA criteria (presence of globally threatened species or sites verifying IBA criteria) were retained. Two small sites from Praslin with no globally threatened species but verifying other proposed international criteria as sites important for ecological processes (IFC, 2012) were provisionally left out until more information becomes available regarding how such criteria may be taken into account in the international KBA methodology currently under revision. Other sites, including protected areas of current limited biological interest (for example, five small unmanaged bird reserves and a small national park) were integrated into larger adjacent marine/coastal areas of high biodiversity value. These marine/coastal areas, almost

always bordering with terrestrial sites, are mainly composed of existing marine national parks of the granitic islands, plus areas of high biological interest identified as potential marine parks in the outer islands. The Port Launay coastal mangrove wetlands declared by Seychelles under the Ramsar convention were merged with the neighboring Port Launay Marine National Park. Existing Special Reserves and IBAs with both land and sea area were split into their terrestrial and marine parts for consistency and to simplify the comparative assessment of the conservation value, level of threats, etc. between all these sites, and to define priorities for action, which was done for terrestrial and marine sites separately.

As a result, a new total of 57 KBAs have been identified. For most marine sites, comprehensive inventories of threatened species have not yet been compiled. The terrestrial KBA sites of high biodiversity value cover 27,093.5 ha, which represents 59.5 percent of the total land area of Seychelles. This total is lower than the one given in the KBA inventory of Senterre *et al.* (2013), as some areas have been left out from the CEPF selection as explained above. The marine sites cover more than 124,000 ha (measurement for a few marine areas was unavailable). Additionnal information is available in a separate report (Rocamora, *in prep.*).

In terms of terrestrial biodiversity, the most important sites are found on the granitic islands (Mahé, Praslin and Silhouette), where the higher elevation has created favorable conditions for a diversity of habitats. The mountainous areas host a large diversity of plants, including a large number of endemics, and are of very high importance for water provision and erosion prevention.

The terrestrial biodiversity of other remote islands is generally lower, but some host unique, endemic species, with a *de facto* very restricted range, which qualifies them as KBAs. This is the case of Aldabra atoll, home to the iconic Aldadra giant tortoise, or of Denis Island, a coralline island that hosts the birds *Acrocephalus sechellensis* (VU), *Copsychus sechellarum* (EN) and *Terpsiphone corvine* (CR), introduced for conservation purpose. Several of these uninhabited atolls qualify as KBAs because they have been recognized as Important Bird Areas due to very large populations of seabirds. Cosmolédo atoll, for instance, is a nesting site of international importance for boobies of the Western Indian Ocean (20,000 to 25,000 couples of *Sula sula* and *S. dactylatra*) and hosts the largest colony of sooty terns (*Onychoprion fuscatus*) of the Seychelles (1.2 million pairs). Most of the coralline islands are also important nesting sites for sea turtles, and their marine area, while still largely unresearched, is home to the largest and best preserved coralian habitats of the Western Indian Ocean.

The map below presents the 57 KBAs identified for the Seychelles, and Table 4-12 provides the list of KBAs. Detailed maps a complete list of KBAs (including managers and number of threatened species) are presented in Appendixes 6 and 8.

Figure 4-7: Key Biodiversity Areas in the Seychelles

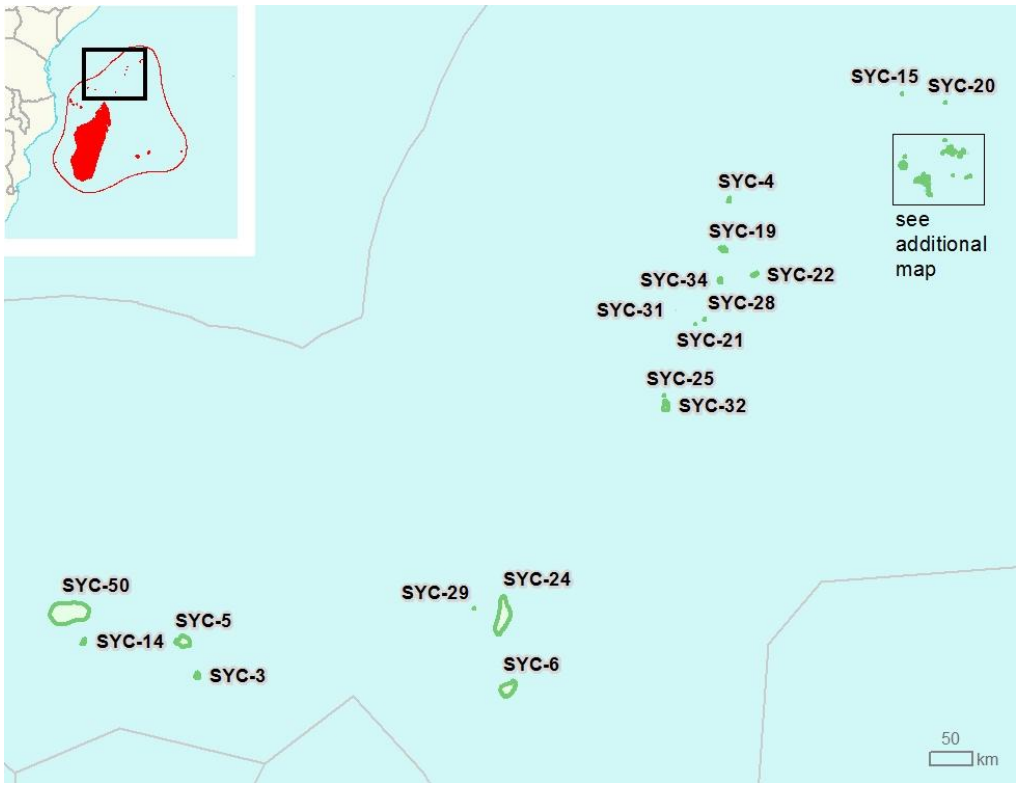


Figure 4-8: Key Biodiversity Areas in the Seychelles (details for Granitic Islands)

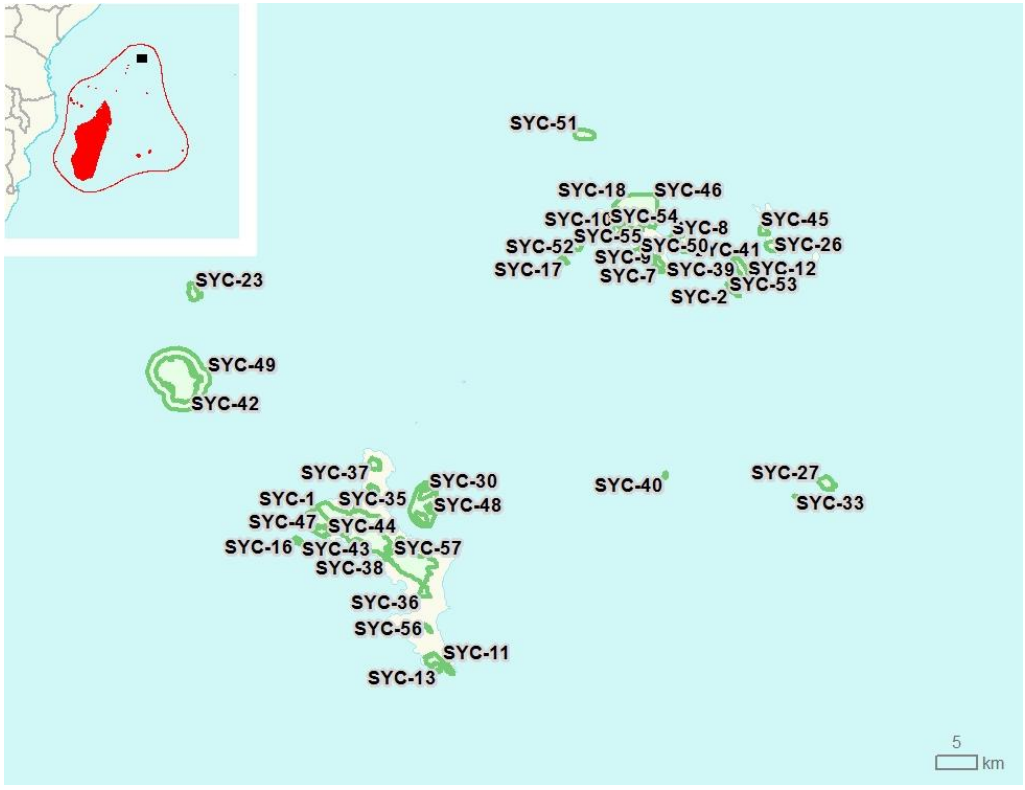


Table 4-12: List of Key Biodiversity Areas for the Seychelles

KBA ID#	ZCB (nom Francais)	KBA (English name)	ILE / ISLAND
SYC-1	Anse Major / Anse Jasmin (partie marine du MSNP)	Anse Major / Anse Jasmin (marine area of MSNP)	Mahé
SYC-2	Anse Source d'Argent-Anse Marron	Anse Source d'Argent-Anse Marron	La Digue
SYC-3	Astove	Astove	Astove
SYC-4	Bancs Africains	African Banks	Bancs Africains
SYC-5	Cosmolédo	Cosmoledo	Cosmoledo
SYC-6	Farquhar - Ile du sud et îlots	Farquhar - South Island and islets	Farquhar
SYC-7	Fond Azore (versants sud) à Anse Bois de Rose	Fond Azore southern slopes to Anse Bois de Rose	Praslin
SYC-8	Fond Diable et Pointe Joséphine	Fond Diable and Pointe Joséphine	Praslin
SYC-9	Fond Ferdinand	Fond Ferdinand	Praslin
SYC-10	Forêt de l'Amitié	L'Amitié Forest	Praslin
SYC-11	Forêts sèches de Montagne Corail-Collines du Sud	Montagne Corail-Collines du Sud dry forests	Mahé
SYC-12	Grand Anse-Petite Anse-Fond Piment	Grand Anse-Petite Anse-Fond Piment	La Digue
SYC-13	Grand Police (zones humides)	Grand Police wetlands	Mahé
SYC-14	Ile Assomption	Assomption Island	Assomption
SYC-15	Ile aux Vaches (Bird Island)	Bird Island (Ile aux Vaches)	Ile aux vaches
SYC-16	Ile Conception	Conception Island	Conception
SYC-17	Ile Cousine	Cousine Island	Cousine
SYC-18	Ile Curieuse	Curieuse Island	Curieuse
SYC-19	Ile D'Arros et Atoll Saint-Joseph	D'Arros Island and Saint Joseph Atoll	D'Arros/St Joseph
SYC-20	Ile Denis	Denis Island	Ile denis
SYC-21	Ile Desnoeufs	Desnoeufs Island	Desnoeufs
SYC-22	Ile Desroches - récifs environnants	Desroches Island - surrounding reefs	Desroches
SYC-23	Ile du Nord (North Island)	North Island (Ile du Nord)	Ile du Nord
SYC-24	Ile et Bancs de Providence	Providence Island and Bank	Providence
SYC-25	Ile et Lagon d'Alphonse	Alphonse Island and Lagoon	Alphonse
SYC-26	Ile Félicité	Félicité Island	Félicité
SYC-27	Ile Frégate	Frégate Island	Frégate
SYC-28	Ile Marie-Louise	Marie-Louise Island	Marie-Louise
SYC-29	Ile Sainte-Anne	Sainte-Anne Island	Sainte Anne
SYC-30	Ile Saint-Pierre	Saint-Pierre Island	Saint Pierre
SYC-31	Iles Etoile et Boudeuse	Etoile and Boudeuse Islands	Etoile & Boudeuse
SYC-32	Iles Saint-François et Bijoutier	Saint-François and Bijoutier Islands	Saint François & Bijoutier
SYC-33	Ilot Frégate	Ilot Frégate	Ilot Frégate

SYC-34	Lagon de Poivre et récifs environnants	Poivre Lagoon and surrounding reefs	Poivre
SYC-35	Mont Signal	Mont Signal	Mahé
SYC-36	Montagne Brûlée-Piton de l'Eboulis	Montagne Brûlée-Piton de l'Eboulis	Mahé
SYC-37	Montagne Glacis - When she comes	Montagne Glacis - When she comes	Mahé
SYC-38	Montagne Planneau (Grand Bois-Varigault-Cascade)	Montagne Planneau (Grand Bois-Varigault-Cascade)	Mahé
SYC-39	Nid d'Aigle (crêtes et versants Est)	Nid d'Aigle (ridge and eastern slopes)	La Digue
SYC-40	Parc National de l'Ile aux récifs	Recif Island National Park	Ile aux récifs
SYC-41	Parc National de Praslin	Praslin National Park	Praslin
SYC-42	Parc National de Silhouette	Silhouette National Park	Silhouette
SYC-43	Parc National du Morne Seychellois	Morne Seychellois National Park	Mahé
SYC-44	Parc National Marin de Cap Ternay / Baie Ternay	Cap Ternay / Baie Ternay Marine National Park	Mahé
SYC-45	Parc National Marin de l'Ile Cocos	Ile Cocos Marine National Park	Félicité
SYC-46	Parc National Marin de l'Ile Curieuse	Curieuse Island Marine National Park	Curieuse
SYC-47	Parc National Marin de Port Launay et zone humides côtières	Port Launay Marine National Park and coastal wetlands	Mahé
SYC-48	Parc National Marin de Sainte-Anne (PNMSA)	Sainte-Anne Marine National Park (SAMNP)	Sainte Anne
SYC-49	Parc National Marin de Silhouette	Silhouette Marine National Park	Silhouette
SYC-50	Réserve Spéciale d'Aldabra	Aldabra Special Reserve	Aldabra
SYC-51	Reserve Spéciale de l'Ile Aride	Aride Island Special Reserve	Aride
SYC-52	Réserve Spéciale de l'Ile Cousin	Cousin Island Special Reserve	Cousin
SYC-53	Réserve Spéciale de La Veuve	La Veuve Special Reserve	La Digue
SYC-54	Rivière Kerlan	Kerlan River	Praslin
SYC-55	Rochers d'Anse Petite Cour	Anse Petite Cour Boulders	Praslin
SYC-56	Val d'Endor	Val d'Endor	Mahé
SYC-57	Zone de La Misère-Dauban : La Misère	La Misère-Dauban area: La Misère	Mahé

Mauritius

For the Republic of Mauritius, KBAs were determined first on the basis of already identified IBAs (BirdLife, 2001) and by joining adjacent similar and complementary sites of highly threatened biodiversity instead of dividing into smaller biological areas. In many cases, Conservation Management Areas (CMAs) or other legally protected sites are usually better surveyed than adjacent areas, while species are often found in surrounding areas. For instance, important mountains endemic could be found in areas close to the Mount Cocotte area, outside of the Black River Gorges National Park. Therefore, KBAs were defined as including not only the site already under formal protection, but also the adjacent buffers deemed critical for the survival of species occurring in the area. This approach led to the identification of 17 KBAs: one in Saint Brandon, three in Rodrigues and thirteen in Mauritius. Due to the high level of endemism and the rarity of many species, it is certain that some other, smaller sites could have qualified as KBAs on the sole criteria of presence of endangered species. The study does not deny the importance of these sites, but the choice was made to consider a smaller set of larger areas, which host the largest part of the endangered Mauritian biodiversity.

The most important area on the Republic of Mauritius regarding marine diversity is the atoll of **St. Brandon**. It harbors the most pristine areas of coral reefs and the largest colonies of many sea bird species, hence its designation as an Important Bird Area. It has experienced relatively little human impact, although there is increased pressure for exploitation. This fragile ecosystem should be managed as one entity rather than a set of small islands, and was therefore identified as one KBA. Proper conservation actions, especially now, when development is being planned for this atoll, would ensure that the area will continue to be of high biological importance. Also, suitable long-term management would generate economic benefits for the fisheries.

The protected area network in **Rodrigues** covers less than 1 percent of its area. Due to its small size it would be difficult to reach the Aichi Target of 15 percent (at least on the terrestrial areas). After some decades of native forest restoration, the status of many endemic plants did not improve significantly when the ICUN categories are considered – even if the trends for many plants species have significantly improved in numerous cases (A. Waterstone and W. Strahm, *pers. com.*, V. Tatayah, *pers. com.*). Positive results were shown for birds (Steward 2013 in BirdLife 2013b), insects (Hugel 2012) and bats (V. Tatayah, *pers. com.*). It is clear that larger areas under protection and restoration of the native forest woudl be beneficial to maintain viable populations of the different species and ensure their resilience. The KBAs for Rodrigues were defined by extending the boundaries to areas adjacent to the already legally protected areas (Table 9). Apart from those areas, a few sites should be noted that hold important biodiversity, such as Mont Plaisir (which holds the only individual of the most famous Rodriguean plant *Ramosmania rodriguesii*), Mount Malartic, which is the only site of an endemic grass that is being currently described, Grande Montagne, Anse Quitor and some of the valleys (called ‘cascades’). In the same line, roosts of the Rodrigues fruit bats should be preserved. The Rodriguean fruit bat is one of the species under the 7 Wonders Campaign of the Alliance for Zero Extinction.

Table 4-13: Key Biodiversity Areas for the Island of Rodrigues

KBA #	Name	Sites	Importance
MUS-16	South Slopes of Grande Montagne	Grande Montagne Nature Reserve and Mourouk/Cascade Victoire	These sites contain the highest concentration of threatened species of native plants and animal (vertebrates and invertebrates) on Rodrigues. It represents the wetter vegetation of Rodrigues. The area of Mourouk is expected to obtain protected status through the creation of a botanical garden.
MUS-13	Plaine Corail	Anse Quittor Nature Reserve and Plaine Coral/Cascade St Louis	This area contains the best remnants of the dry forest of Rodrigues, and it includes most of the calcarenite caves. It holds the second highest concentration of threatened native species. It would include the Francois Leguat Reserve.
MUS-6	Rodrigues' Islets	South Islands Reserves (Gombrani Island/ Ile aux Crabes, etc.) Ile aux Cocos, Ile aux Sables Ile aux Fous (North of Rodrigues)	The only known natural population of *Sarcanthemum coronopus* is in Gombrani, which also harbors other threatened native plant species and is the islet with best-preserved and most diverse native vegetation. Ile aux Crabes, although highly modified, still holds a relatively large number of native species due to the different types of habitat resulting from its geology and altitude. Several islets are also IBa due to large colonies of seabirds.

For **Mauritius**, the identification of KBAs was based on the current protected areas and the IBAs identified by BirdLife International, complemented by a 2009 study on important areas to be added to the current protected areas network. This last study was implemented during the preparation of the UNDP/GEF project "*Expanding coverage and strengthening management effectiveness of the terrestrial protected area network on the island of Mauritius*" (Desmet, 2009). It was based on the forest quality from the plant surveys made by Page and D'Argent (1997), which also graded the native forest quality (Figure 4-5**Error! Reference source not found.**, A). This information was added to extended biodiversity data (mostly presence or absence of angiosperm native taxa) and to stakeholder knowledge of important biodiversity areas (among others) to create a final map of ranked important biodiversity (Figure 4-5, B) (Desmet, 2009).

Figure 4-9: A. Categorized Quality of Native Forest Remnants as per Page and D'Argent (1997). B. Ranked Biodiversity Priority Areas (from Desmet 2009).

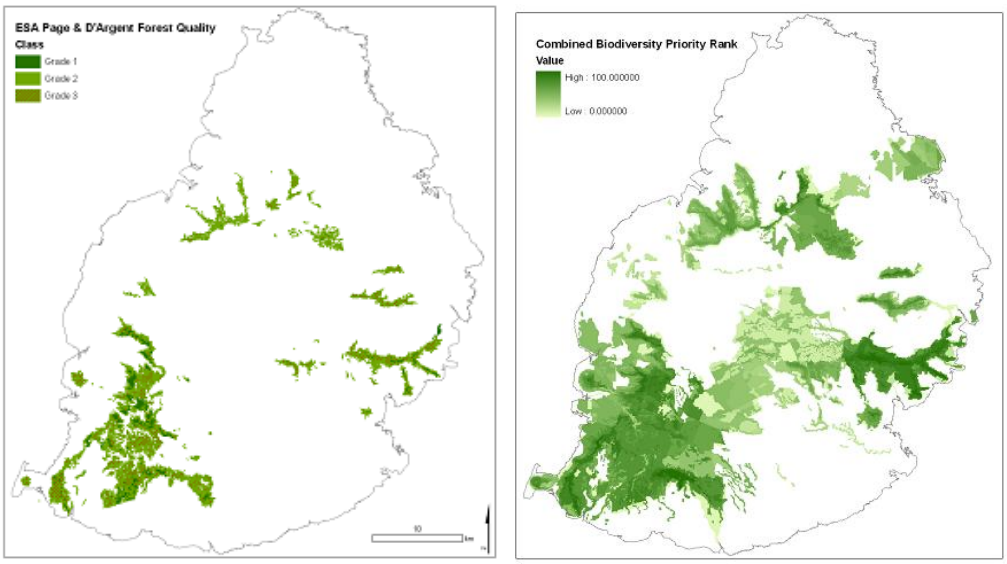


Table 4-14: Key Biodiversity Areas for the Island of Mauritius

KBA #	KBA Name	Importance
MUS-9	Le Pouce - Anse Courtois - Pieter Both – Longue Mountain	Highest diversity of plants and invertebrates on Mauritius, with many species endemic to site. Best population of many endemic species. Exceptional mollusc, Orthoptera and other insect communities. Numerous threatened species. Best population of many endemic species, many not present in large numbers, especially in and around the Le Pouce Nature Reserve
MUS-12	Black River Gorges National Park and surrounding areas	The Black River Gorge National Park is the largest protected areas of Maurotius and host a very biodiversity. Among the sites included in the NP: ***Bassin Blanc / Mount Cocotte:*** This area has been proposed as an addition to Black Gorges River National Park since 1990s. This area holds some passerines, molluscs and high diversity of plants. Many threatened plant species with good population sizes or endemic CR (site specific, like *Tambourissa* spp). Unique vegetation type (mossy forest of Mount Cocotte). Many threatened Orthoptera. The southern slopes of Mount Cocotte and Bassin Blanc are not included in the National Park. ***Plaine Champagne / Black River Peak:*** High plant diversity, large area that can sustain minimum viable populations, the last site existing for some plant species, rare species of endemic plants, good community of endemic molluscs.
MUS-11	Corps de Garde Mountain	High diversity of endemic plants and invertebrates, with some mountain endemic species of plants (*Pilea trilobala, Barleria observatrix*) or near site endemic (*Trochetia parviflora*), molluscs and Orthoptera. Best populations of many endemic species of these different groups.
MUS-17	Yemen-Tatamaka	Largest remnant of dry forest, many threatened species, largest population of some endemic species (*Aloe, Cyphostemma*, etc). Not legally protected and highly threatened.
MUS-2	Bambou Mountain Range	High plant diversity, many highly threatened species (*Pandanus* spp., *Eugenia bojeri, Turraea* new species; *Acantophoenix rubra*); some important endemic bird populations, one mountain endemic mollusc.
MUS-4	Tamarind Falls / Mount Simonet / Cabinet Nature Reserve	High diversity of plants. Some unique species (*Albizia vaughanii, Pilea articulata, Psiadia cataratae*). Largest population of some endemic plants. Some endemic birds, justifying the status of the Macchabée-Brise de Fer site as an IBA – with an important reintroduction programme of Pink Pigeon

		(*Columba mayeri, EN*). Large populations of bats and endemic reptiles.
MUS-3	Chamarel - Le Morne	Fair number of endemic plants. Patches with some good bird population, good transitional forest with some good population of threatened species. One mountain endemic plant species (the Mauritius national flower).
MUS-10	Mondrain - Magenta - Trois Mamelles - Mont du Rempart	Includes the best preserved semi-dry ridge forest (Mondrain, which is weeded). Dry forest, with unique species of plant (*Syzygium guehoi*). Relatively high diversity of native plants.
MUS-8	Mauritius South-Eastern Islets	This KBA includes Ile aux Aigrettes as well as other small islets and rocks of Bay de Grand Port. Ile aux Aigrettes is a Nature Reserve, hosting a unique dry evergreen forest assemblage. Ecological restoration plan is implemented by Mauritian Wildlife Foundation, including eradication of invasive mammals and reintroduction of native species.
MUS-7	Mauritius Northen Islets	This KBA includes Funner's Quoin, Flat and Gabriel Islands, Round Island and Serpent Island, all declared IBAs in particular for seabirds colonies. Also presence of endemic species of reptiles and plants – some endemic to the islets. Somel islets have seen successful invasive eradication campaigns and represent a high potential for translocation or reintroduction of Mauritian species.
MUS-14	Plaine des Roches – Bras d'Eau	The plain support mostly scrubby, exotic végétation. The IBA status due to large colonoies of Mascarene swiftlet (*Collocalia francica*, NT) and population of the Mauritian sub-species of *Terpsiphone bourbonnensis*. Bras d'Eau is the most recent national park of Mauritius.
MUS-5	Relict Forests of the Central Plateau	This area contains patches of relict forest – isolated peaks unsuitable for forestry or saved from clearance due to their botanical interest. It countains three small nature reserves (Les Mares, Gouly Pere and Bois Sec). Importance for some endmecic plants communities, extremely rare plants (such as *Tectiphiala ferox*, a monotypic palm genus) and presence of threatened birds.
MUS-15	Pont Bon Dieu	Small unprotected site with an underground complex of lava tudes and caves. IBA status due to the largest nesting colony of Mascarene swiftlet (*Collocalia francica*, NT). Large population of Natal Free-tailed Bat (*Mormopterus acetabulosus*, VU)

The maps below presents the 17 KBAs identified for the Republic of Mauritius (first map for Mauritius Island, second for Rodrigues), and Table 4-15 provides for the list of KBAs. Detailed maps and list of KBAs are presented in Appendixes 6 and 8.

Figure 4-10: Key Biodiversity Areas in Mauritius (Mauritius Island)

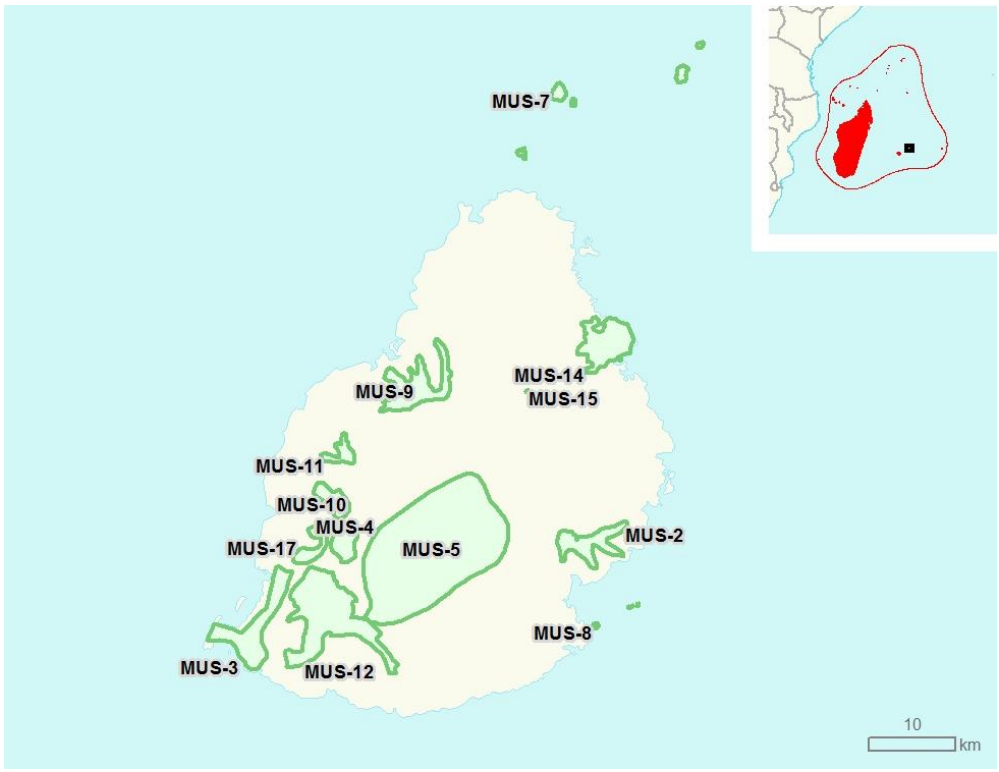


Figure 4-11: Key Biodiversity Areas in Mauritius (Rodrigues Island)

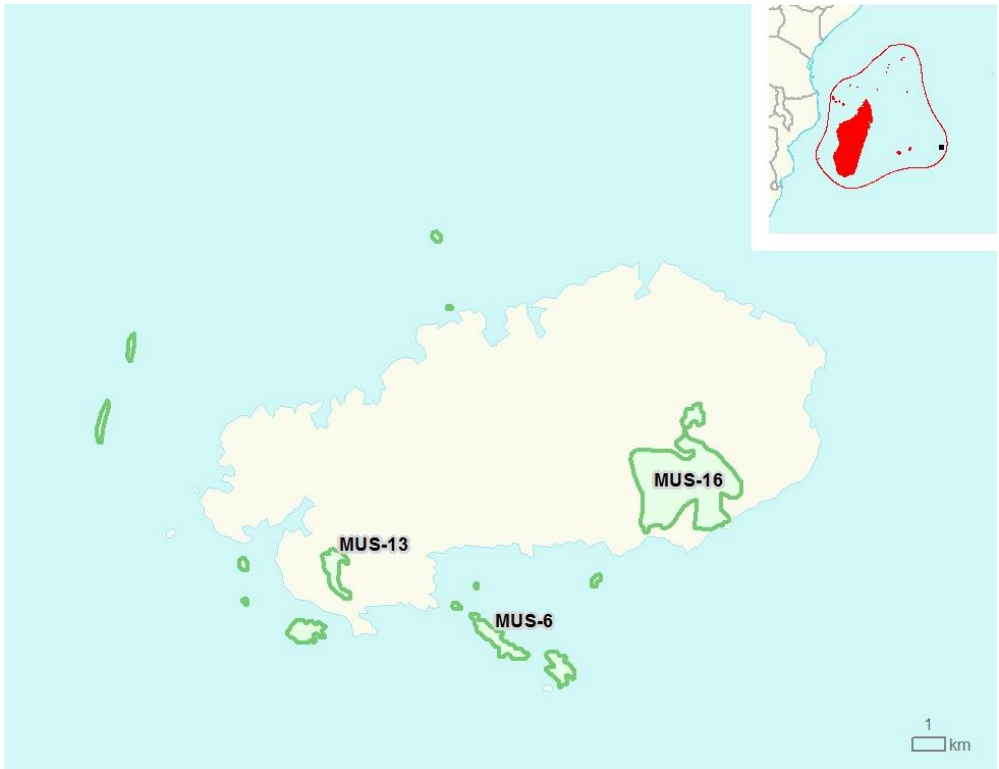


Table 4-15: List of Key Biodiversity Areas for Mauritius

KBA ID#	ZCB (nom Francais)	KBA (English name)	ILE / ISLAND
MUS-1	Bancs de Cargados Carajos	Cargados Carajos Shoals	Saint Brandon
MUS-2	Chaine des Monts Bambou	Bambou Mountain Range	Maurice
MUS-3	Chamarel - Le Morne	Chamarel - Le Morne	Maurice
MUS-4	Chutes Tamarin / Mont Simonet / Reserve Naturelle du Cabinet	Tamarind Falls / Mount Simonet / Cabinet Nature Reserve	Maurice
MUS-5	Forêts reliques du Plateau central	Relict Forests of the Central Plateau	Maurice
MUS-6	Ilots de Rodrigues	Rodrigues' Islets	Rodrigues
MUS-7	Illots du Nord de l'ile Maurice	Mauritius Northern Islets	Maurice
MUS-8	Ilots du Sud-Est de l'Ile Maurice	Mauritius South-Eastern Islets	Maurice
MUS-9	Le Pouce - Anse Courtois - Pieter Both - Montagne Longue	Le Pouce - Anse Courtois - Pieter Both - Longue Mountain	Maurice
MUS-10	Mondrain - Magenta - Trois Mamelles - Mont du Rempart	Mondrain - Magenta - Trois Mamelles - Mont du Rempart	Maurice
MUS-11	Montagne Corps de Garde	Corps de Garde Mountain	Maurice
MUS-12	Parc National des Gorges de la Riviere Noire et zones adjacentes	Black River Gorges National Park and surrounding areas	Maurice
MUS-13	Plaine Corail	Plaine Corail	Rodrigues
MUS-14	Plaine des Roches - Bras d'Eau	Plaine des Roches - Bras d'Eau	Maurice
MUS-15	Pont Bon Dieu	Pont Bon Dieu	Maurice
MUS-16	Versant Sud de Grande Montagne	South Slopes of Grande Montagne	Rodrigues
MUS-17	Yemen-Takamaka	Yemen-Takamaka	Maurice

Réunion, Mayotte and the *Iles Eparses*

The main difficulty that the team in charge of the profile faced in La Réunion, Mayotte and the Scattered Islands is the very large number of sites that could possibly qualify as KBAs. With the very high rate of endemism and threat, and varied ecosystems that depend on altitude and orientation, virtually all areas still covered by natural ecosystems—i.e. almost 40 percent of the Réunion Island surface area—are important sites for biodiversity. However, data have been provided by different actors in charge of protected areas operating under various statutes: National Park and its bordering areas, national nature reserves, sensitive natural areas (*Espaces Naturels Sensibles*, ENS), sites of the *Conservatoire du Littoral*, state-owned forests, plus natural areas of ecological, fauna and flora interest (ZNIEFF), most of which are unprotected. The complete list of such sites with their statutes and their managers—397 were initially identified—can be found in the detailed report for the French *Départements* and Territories (*in prep.*). Moreover, these sites under various statutes often overlap, and data on species are not always available or geo-referenced so as to relate them to the broader sites to check for of duplication. Another difficulty also lies in the gap between the global Red List of IUCN, the preferred tool in the context of the global methodology for identifying KBAs, and regional, and much more

complete, Red Lists, which include a large proportion of taxa that have not been validated at international level, including endemic species in the French islands.

The analysis has primarily focused on sites under national protection (national parks, nature reserves, marine nature parks). ZNIEFFs have not been retained, even when they are partially included in broader management entities. The smaller sites, many of them ENS, ZNIEFF and *Conservatoire du Littoral* sites, were retained where available data reported them as harboring species that are both threatened according to the global Red List and have limited distribution (endemic to sites or species restricted to particularly limited habitats such as low-altitudinal ecosystems), suggesting the crucial role of conservation sites at global level. Thus, threatened wide-range species have not been taken into account. The team in charge has also tried to avoid overlaps or inclusions—the rule being to consider the site encompassing the others.

Taking into account these limitations, 63 KBAs have been identified for the French islands: 38 for Réunion, 19 for Mayotte and six for the Scattered Islands. These sites are presented on Figures 4-12, 4-13 and 4-14**Error! Reference source not found.**. The detailed data are presented in the Appendix 6.

Further work remains to be done to include threatened endemic species (which should be conveyed to the international IUCN for inclusion in the global list) and to more accurately analyze data from smaller and non-protected sites, and to highlight those who play a key role in preserving globally endangered species, particularly through an extended consultation of stakeholders. This would have to be performed at a second stage of the prioritization of sites as part of the implementation program, as it is beyond the scope of the current study. The present analysis must be regarded as a preliminary work which can be refined through the BEST program, under the supervision of IUCN.

Figure 4-12: Key Biodiversity Area for the Iles Eparses

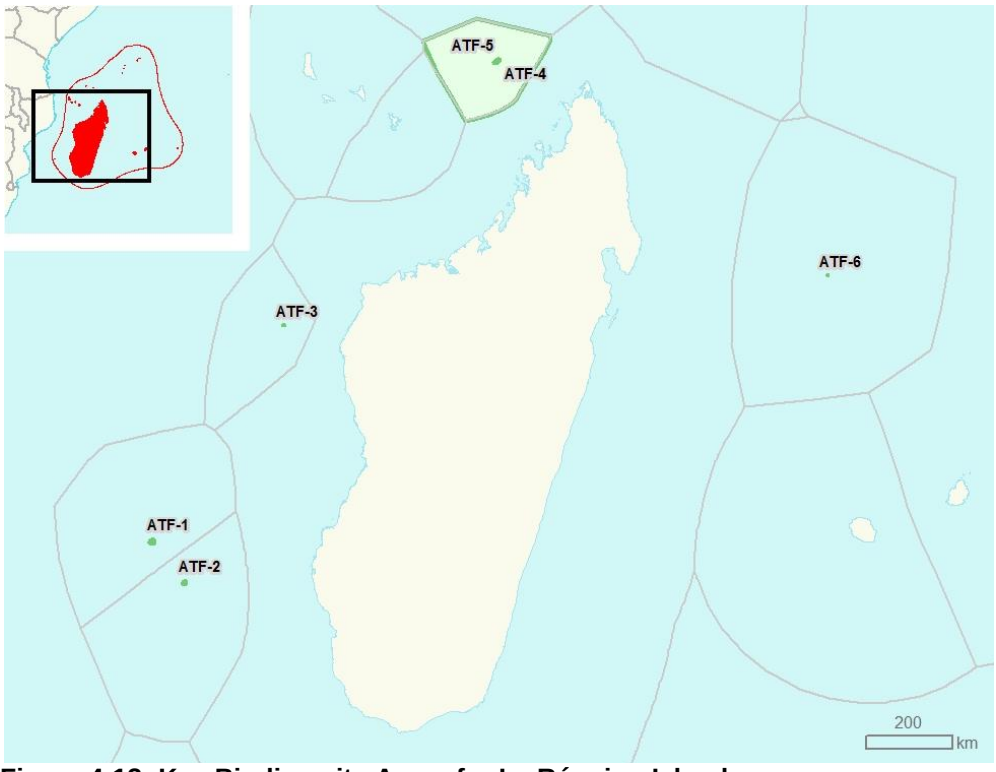


Figure 4-13: Key Biodiversity Areas for La Réunion Island

Figure 4-14: Key Biodiversity Area for Mayotte

Table 4-16: List of Key Biodiversity Areas for the Seychelles

KBA ID#	ZCB (nom Francais)	KBA (English name)	ILE / ISLAND
ATF-1	Bassas da India	Bassas da India	îles éparses
ATF-2	Europa	Europa	îles éparses
ATF-3	Juan de Nova	Juan de Nova	îles éparses
ATF-4	Les Glorieuses	Glorieuses Islands	îles éparses
ATF-5	Parc naturel marin des Glorieuses	Glorieuses Islands Marine Natural Park	îles éparses
ATF-6	Tromelin	Tromelin	îles éparses
MYT-1	Anse d'Hajangoua	Hajangoua Bay	Mayotte
MYT-2	Baie de Dzoumogné et de Longoni	Dzoumogné and Longoni Bay	Mayotte
MYT-3	Cratères de Petite Terre	Petite Terre Craters	Mayotte
MYT-4	Dziani Karihani	Dziani Karihani	Mayotte
MYT-5	Ilot Karoni	Karoni Islet	Mayotte
MYT-6	Ilots de Dembeni	Dembeni Islets	Mayotte
MYT-7	Ilots de la Passe	La Passe Islets	Mayotte
MYT-8	La lagune d'Ambato-Mtsangamouli	Ambato-Mtsangamouli Lagoon	Mayotte
MYT-9	Mangroves de la Baie de Bouéni	Bouéni Bay Mangroves	Mayotte
MYT-10	Parc naturel marin de Mayotte	Mayotte Marine Natural Park	Mayotte
MYT-11	Pointes et Plages de Saziley et Charifou	Beaches and Capes of Saziley and Charifou	Mayotte
MYT-12	Réserve forestière de Majimbini	Majimbini Forest Reserve	Mayotte
MYT-13	Réserve forestière de Songoro Mbili	Songoro Mbili Forest Reserve	Mayotte
MYT-14	Réserve forestière des crêtes du nord	Crêtes du Nord Forest Reserve	Mayotte
MYT-15	Réserve forestière des crêtes du Sud	Crêtes du Sud Forest Reserve	Mayotte
MYT-16	Réserve forestière du Mont Bénara	Mount Bénara Forest Reserve	Mayotte
MYT-17	Réserve Naturelle Nationale de l'îlot Bouzi	Bouzi Islet National Natural Reserve	Mayotte
MYT-18	Vasière des Badamiers	Badamiers mudflats	Mayotte
MYT-19	Zone de protection de N'Gouja	N'Gouja Protected Area	Mayotte
REU-1	ENS Archambeaud	ENS Archambeaud	Réunion
REU-2	ENS Bras des Calumets	ENS Bras des Calumets	Réunion
REU-3	ENS Grande Ravine des Lataniers	ENS Grande Ravine des Lataniers	Réunion
REU-4	ENS Le Tremblet	ENS Le Tremblet	Réunion
REU-5	ENS Les Orangers	ENS Les Orangers	Réunion
REU-6	ENS Piton de Montvert	ENS Piton de Montvert	Réunion
REU-7	ENS Plaine des Grègues	ENS Plaine des Grègues	Réunion
REU-8	ENS Plateau du Dimitile	ENS Plateau du Dimitile	Réunion
REU-9	ENS Ravine Renaud	ENS Ravine Renaud	Réunion
REU-10	Forêt départemento-domaniale de Basse-Vallée	Basse-Vallée Departemental-State Forest	Réunion
REU-11	Foret domaniale de Sainte-Rose	Sainte-Rose State Forest	Réunion
REU-12	Forêt domaniale du littoral de Saint-Philippe	Saint-Philippe Coast State Forest	Réunion
REU-13	Marine de Vincendo	Marine de Vincendo	Réunion
REU-14	Parc National de la Réunion	La Réunion National Park	Réunion
REU-15	Réserve Naturelle Marine de La Réunion	La Réunion Marine Natural Reserve	Réunion
REU-16	Réserve Naturelle Nationale de l'étang de Saint-Paul	Saint-Paul Wetlands National Natural Reserve	Réunion
REU-17	ZNIEFF Bras Leclerc	ZNIEFF Bras Leclerc	Réunion

REU-18	ZNIEFF Confluent de la Riv. des Pluies et la Ravine Montauban	ZNIEFF Confluent de la Riv. des Pluies et la Ravine Montauban	Réunion
REU-19	ZNIEFF Etang Saint-leu	ZNIEFF Etang Saint-leu	Réunion
REU-20	ZNIEFF Four à chaux	ZNIEFF Four à chaux	Réunion
REU-21	ZNIEFF Grande Ravine (Montagne)	ZNIEFF Grande Ravine (Montagne)	Réunion
REU-22	ZNIEFF La Butte - Terrain Couilloux (Montagne)	ZNIEFF La Butte - Terrain Couilloux (Montagne)	Réunion
REU-23	ZNIEFF Ligne d'Equerre	ZNIEFF Ligne d'Equerre	Réunion
REU-24	ZNIEFF Passerelle de la Mare d'Affouches (site géologique)	ZNIEFF Passerelle de la Mare d'Affouches (geological site)	Réunion
REU-25	ZNIEFF Petite Ravine des Lataniers	ZNIEFF Petite Ravine des Lataniers	Réunion
REU-26	ZNIEFF Pierrefonds	ZNIEFF Pierrefonds	Réunion
REU-27	ZNIEFF Piton Armand	ZNIEFF Piton Armand	Réunion
REU-28	ZNIEFF Piton Bernard (Matouta)	ZNIEFF Piton Bernard (Matouta)	Réunion
REU-30	ZNIEFF Ravine de la Chaloupe	ZNIEFF Ravine de la Chaloupe	Réunion
REU-29	ZNIEFF Ravine de l'Hermitage	ZNIEFF Ravine de l'Hermitage	Réunion
REU-31	ZNIEFF Ravine des Chênes	ZNIEFF Ravine des Chênes	Réunion
REU-32	ZNIEFF Ravine des Colimaçons	ZNIEFF Ravine des Colimaçons	Réunion
REU-33	ZNIEFF Ravine Divon	ZNIEFF Ravine Divon	Réunion
REU-34	ZNIEFF Ravine du Cap	ZNIEFF Ravine du Cap	Réunion
REU-35	ZNIEFF Ravine la Veuve	ZNIEFF Ravine la Veuve	Réunion
REU-36	ZNIEFF Ravine Petit Etang	ZNIEFF Ravine Petit Etang	Réunion
REU-37	ZNIEFF Ravine Précipice	ZNIEFF Ravine Précipice	Réunion
REU-38	ZNIEFF Ravine Trois Bassins	ZNIEFF Ravine Trois Bassins	Réunion

4.3 Conservation Corridors: Conservation Planning Units

CEPF considers conservation corridors as geographical units larger than KBAs through which investment in conservation is directed at the landscape level. These planning units incorporate groups of KBAs. If KBAs are meant to be protected or managed with biodiversity protection as a priority objective, isolated KBAs, even those that cover a large surface area, will remain threatened because of limits to ecological processes, or as a result of the pressure of environment changes such as those driven by climate change. A longer-term vision for conservation can be achieved through the management and protection of conservation corridors. Such corridors represent both a response to the causes behind loss of species, and loss and fragmentation of habitats, and a proactive response to a need to integrate the protection of biodiversity into the management of productive spaces, particularly farming. The corridor scale is also a good fit to accommodate ecosystem services.

In the smaller islands of the Indian Ocean, the concept of conservation corridor did not appear to be justified under the regional profile, mainly due to the size of the islands. However, the issue of ecological continuity remained at the heart of the profiling team's concerns, and groups of terrestrial sites have been identified for which a global approach would better achieve conservation outcomes. Thus, in Mauritius as in Seychelles, the terrestrial KBAs identified most often include several small protected areas, along with non-protected areas that surround them. The principle of biological continuity has been retained, even if the surface areas involved do not justify the creation of specific "corridors."

In Madagascar in 2001, the National Association for the Management of Protected Areas (ANGAP), since renamed Madagascar National Parks, developed the National System Management Plan (or GRAP under its French acronym). It is a fundamental tool for the future of the National Network of Protected Areas. The GRAP Plan draws upon the island's major ecoregions, seeking to ensure a good representation of different habitats within the network of protected areas. The plan also seeks to maintain, or sometimes restore, some connectivity between existing protected areas by establishing biological corridors through which operational projects can be implemented (Panegos, 2011). While the plan is currently being updated, the conservation corridors identified in the profile build on this previous work.

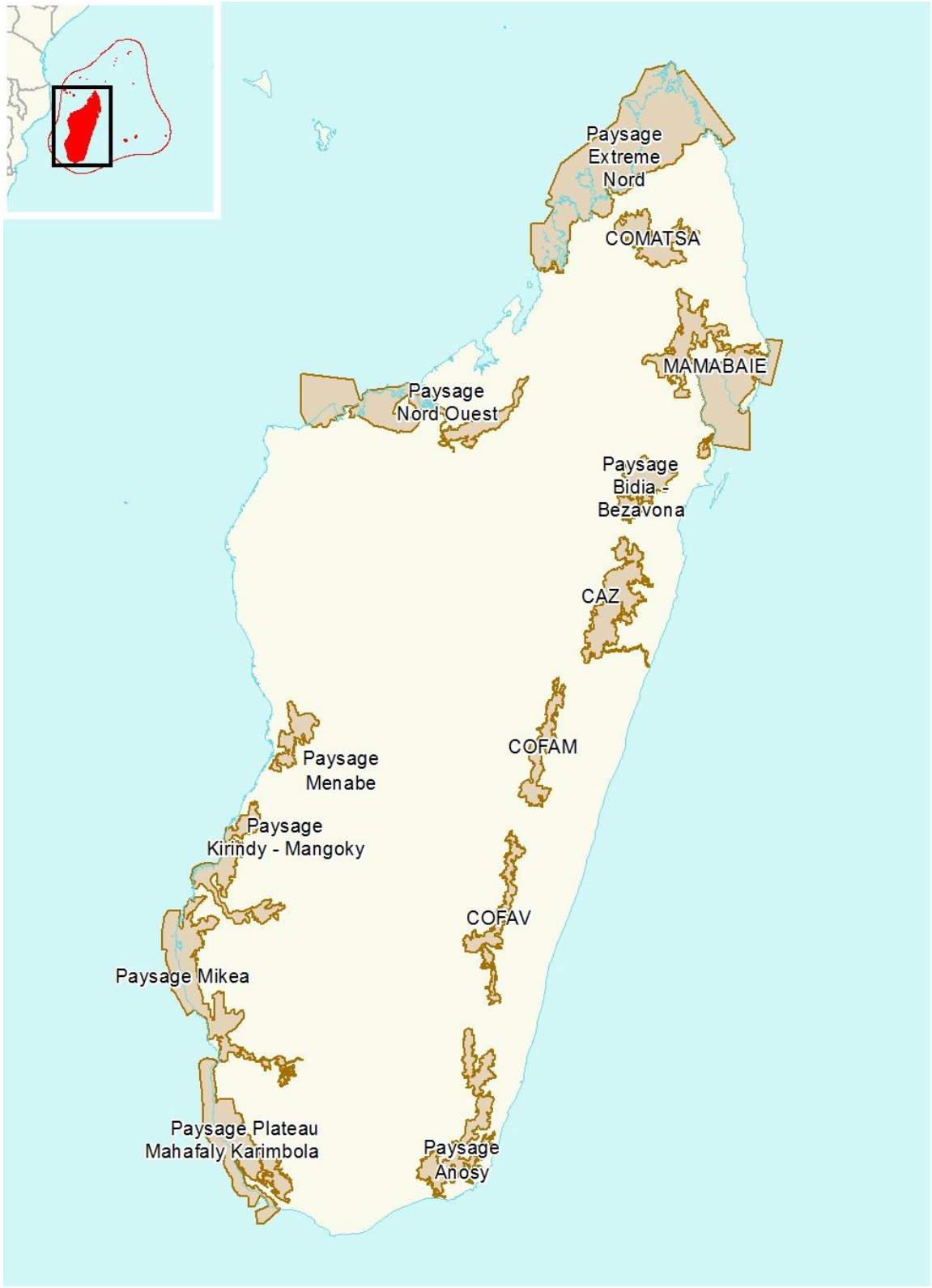
In the Eastern ecoregion, large forest blocks still exist, linking the protected areas along the eastern slopes of the Central Ridge. Seven important corridors have been identified that allow for ecological continuity. These corridors are of very high importance in terms of biodiversity, as they include most of the remaining humid forests of the country. They also play an important role in terms of ecosystem services—for carbon stock, of course, but also for provision of water.

In the other ecoregions, the natural ecosystems are a lot more fragmented, and ecological continuity would often be difficult, if not impossible, to restore. Nevertheless, some regions present a number of important sites, sometimes small, with very high biological value and sharing similar biological features and species. Even if natural ecosystems are not contiguous, genetic exchanges between the fragmented sites is possible for some species and could even be enhanced in the long term by human intervention. Conservation of biodiversity in these regions would therefore benefit from a broader vision, moving from a site-to-site approach. The river

systems in these regions also play an important role as natural connectors between sites, and require a coordinated management to preserve the quality of the water for freshwater species as well as species in the adjacent coastal and marine areas. This is particularly the case for the important river systems of Mahajanga River (Northwestern Landscape), Mangoky River (Kirindy-Mangoky Landscape) and Onilahy River (Mikea Landscape). For this part of the country, where sites are more fragmented, it was decided to use the term "Landscape," following a commonly used term within the Malagasy conservation community, to differentiate them from the contiguous forest blocks of the Eastern Ecoregion.

The Figure 4-15 next page **Error! Reference source not found.**presents the most important conservation corridors and landscapes identified, while the next section provides a brief description of the importance of these corridors.

Figure 4-15: Conservation Corridors in Madagascar



Corridor of the Extreme North Landscape

This landscape groups together about a dozen KBAs in the extreme north tip of Madagascar, in the Antsiranana Region. It contains marine and coastal areas as well as a mosaic of dry forests that are rich in fauna and flora, and is home to extremely rare endemic species. Most of the marine and coastal sites, as well as several terrestrial sites, are currently unprotected. The marine fauna is rich and varied, especially with the presence of important coral reefs. Ambodivahibe Bay is part of the important KBAs in terms of ecosystem services, supplying fish to the populations of the region.

Corridor of the Northwestern Landscape

This group of Madagascar's southwestern sites is composed of dry forests, xerophytic bush, wetlands, and marine and coastal areas, including mangrove forests. The central axis of this group of sites is the network of the Mahajamba River, which empties into the Bombetoka Bay or Mahajanga Bay, and its major sites of riparian forests and wetlands. Lake Tseny, although from another watershed, was associated with this group. It is an AZE site hosting many threatened fish species like the *Paretroplus*, whose only known population is *P. menarambo*, considered extinct in the wild before its rediscovery in 2008. The wetlands of Port-Bergé, outside of the landscape, without promoters but important for their environmental services, have also been retained. Also in the grouping is the Baie de Baly KBA, which includes the territory of the ploughshare tortoise *(Astrochelys yniphora)* and the Antrema biocultural reserve. The Mahavavy-Kinkony wetland complex are extremely rich in species, with 30 species of fish, five of which are endangered, and 133 species of birds, 10 of which are threatened. The grouping includes sites at different levels of protection, from MNP-managed sites, sites supported by national organizations (one site with an international organization supporting it) and orphan sites, including the Tseny Lake. The hydrographic network is one of the most important in the western part of the island for agricultural uses (and rice cultivation in particular), reinforcing the importance of the protection of the wetlands and the Bongolava Ankarafantsika-Ampijoroa forest corridors that also play an important role in flood prevention.

Corridor of the Menabe Landscape

The group includes the sites of the Menabe Central Corridor and Ambalibe Menabe, areas of high importance in terms of biodiversity, with an exceptional level of local wildlife endemism. These ecosystems of dry dense forests are highly threatened by land clearing, illegal logging and hunting.

Corridor of the Kirindy-Mangoky Landscape

This landscape consists of a set of sites particularly rich in wetlands, organized around the Mangoky River and its tributaries, and the Kirindy Mite National Park with its extensions. The dry forests of Kirindy Mite, managed by MNP, are particularly rich with endangered species, and provide important environmental services. Ecosystems linked to the Mangoky River are particularly important for local communities, and the delta area, with its mangroves, is a major fishing and rearing site of the western coast of the country.

Corridor of the Mikea Landscape

This group of sites in the southwestern part of Madagascar consists of dry forests, xerophitic bush, wetlands, and marine and coastal areas, including in particular important mangrove forests.

This diversity of habitats makes this a priority biodiversity landscape. The Mikea Forest, a protected area managed by MNP and an Alliance for Zero Extinction site, is home to 51 endangered species. With these diverse habitats, this landscape is home to remarkable bird populations, namely populations of Bernier's teal (*Anas bernieri*) and pairs of Madagascar's fish eagle (*Haliaeetus vociferoides*). But it is also of major importance for reptiles, with the presence of *Pyxis arachnoides* and *P. planicauda*, terrestrial tortoises in critical danger of extinction. Velondriaka and Salary Nord are marine protected areas being established, with the presence of sea turtles. In addition to its biological importance, this landscape was also chosen because of its importance in terms of ecosystem services: its mangroves, in a relatively densely populated area, provide many supplying and protection services against cyclones and are an unavoidable element for the resilience of local communities. The marine areas are among the most important in Madagascar in terms of fish and seafood production, while the carbon stored in the forest areas is relatively high (especially for the western part of Madagascar), with great potential in terms of avoided deforestation.

This landscape also includes a set of wetlands and forests associated with the downstream part of the Onilahy River, which flows into the St. Augustin Bay, not far from the town of Toliara. With the exception of the forest gallery of the Beza Mahafaly special reserve, managed by MNP, all sites have temporary or unprotected status. The WWF is the main promoter on this part of the landscape. This group is particularly important for environmental services, because forests and wetlands in the area play a role in regulating water supply for household and farm use in this densely populated region. The gallery forests and dry forests in the area also represent a habitat that is particularly subjected to population pressures.

COMATSA: Corridor Marojejy- Tsaratanana- Anjanaharibe-Sud

The COMATSA is composed of sites from the Northern Highlands, including the Anjanaharibe–Sud Strict Nature Reserve, the Tsaratanana Special Reserve and Marojejy National Park. Among the most threatened species specific to this area is the lemur *Propithecus candidus* (CR), the amphibians *Plethodontohyla guentherpeters* (EN), *Platypelis mavomavo* (EN), and *Platypelis tetra* (EN), the rodent *Brachytarsomys villosa* (EN) and the slender-billed flufftail, *Sarothrura watersi* (CR). Located in a densely populated area with much land under rice production, this corridor plays a very important role for water supply for domestic and agricultural use.

MAMABAIE Corridor

Located in the northeast, the complex of landscape and seascape called MaMaBaie includes Masoala National Park, Makira Natural Park and the marine ecosystem of Antongil Bay, with several marine reserves. It is one of the largest natural areas of Madagascar. With more than 1 million hectares of forest and marine habitats, the landscape of MaMaBaie contains about 10 percent of the remaining tropical rainforests of Madagascar, with a quarter of the highly threatened lowland forests, as well as coral reefs, mangroves and various wetlands. This diversity of habitats supports remarkable species diversity with many endemic species such as the red ruffed lemur (*Varecia rubra*, EN), the silky sifaka (*Propithecus candidus*, CR), and the cat-like carnivore fossa (*Cryptoprocta ferox*, VU). Antongil Bay is one of the most important breeding and nursery areas of the West Indian Ocean for humpback whales. Thirteen species of sharks, several species of marine turtles, dugongs and dolphins depend on these waters.

The natural landscape of MaMaBaie also provides essential ecological services to local communities, in addition to its economic importance for a population of nearly 230,000 inhabitants, including farmers and fishermen, whose main livelihood activities depend on natural resources. The salinity of estuaries, fed by several rivers and the area of upwelling to the southeast of the bay, makes this land and seascape a region of vital economic importance to agriculture, and the fish and shrimp industries (SIP-MamaBaie, 2013).

Corridor of the Bidia-Bezavona Landscape

This landscape, which integrates Classified Forest of Bidia - Bezavona and the Ambatovaky Special Reserve forms the western boundary of the eastern forests of Madagascar. Both sites are composed of a network and are part of the mountain plate Marovoalavo. The primary vegetation consists of dense forest, wet medium altitude, and home to several species of lemurs including *Indri Indri* (CR). The region lies at the head of catchment for many rivers; its wetlands network is particularly dense and houses endemic species such as *Pachypanchax sakaramyi* (CR).

CAZ: Ankeniheny-Zahamena Corridor

The Ankeniheny-Zahamena (CAZ) Corridor provides the connection between three existing protected areas managed by Madagascar National Parks: Zahamena National Park, Mantadia National Park and Mangerivola Special Reserve. This forest corridor ensures the protection of very important environmental services for the surrounding populations, and especially water that drains to the densely populated region of Antananarivo. CAZ is very rich in biodiversity. The only reserve, Mangerivola, includes 2,043 species of plants, of which 85 percent are endemic; 15 species of lemurs; 30 other species of mammals; 129 species of amphibians; and 89 species of birds. The relative inaccessibility of the sites, with very poor road infrastructure, has long limited threats to this forest corridor. It is, however, threatened by agricultural expansion. Conservation International is one of the main organizations working in this corridor.

COFAM: Forest Corridor Fandriana-Marolambo

The Fandriana Marolambo Corridor covers some 200,000 ha and consists of a mosaic of cultivated land, fallow land, grasslands, savannahs and forest plantations (pine and eucalyptus) in addition to remnants of degraded forests and other intact, primary forests forming an almost continuous forest block of more than 80,000 ha. This corridor is home to many animal and plant species, some rare and endangered. COFAM is a remarkable center of endemism, with nearly 95 percent of inventoried species endemic to the corridor. Shifting cultivation is the main cause of deforestation in the periphery of forest corridor. The forest is replaced by rice fields and sugarcane plantations (to produce a local rum, *toakagasy*), as well as sweet potato and corn. But the short fallow periods do not allow the soil to maintain its fertility and therefore its production capacity. Population pressure in the region—around 150,000 people live in the corridor—leads many farmers to clear new land. WWF is one of the major players in this region (WWF, 2013).

COFAV: Forest Corridor Ambositra-Vondrozo

COFAV is the last vestige of the low, medium and high altitude rainforests that once covered much of the southeast of Madagascar. It consists of a narrow strip (1-50 km wide) of forest that runs along Madagascar's eastern escarpment for approximately 300 km. It connects several formerly disconnected protected areas: Ranomafana and Andringitra national parks and Pic d'Ivohibe Special Reserve. This corridor is characterized by its rich biodiversity, which attracts

researchers and international (and more and more national) tourists. The forests are a refuge for 800 species of plants, 300 species of animals, including 17 species of lemurs (including *Hapalemur aureus*, *Prolemur simus*, *Eulemur cinereips*), 36 species of mammals, 110 species of amphibians including *Mantella bernardhi* (EN) and 94 species of birds. It provides important ecological functions, including water provision and carbon sequestration, and plays a major socioeconomic role for its local residents. Conservation International is one of the major players in the corridor, where it maintains a local team. The principle of co-management has been adopted for COFAV, meaning local communities play an important role, supported and strengthened by CI.

Corridor of the Anosy Landscape

The Anosy Landscape is composed of 20 protected areas and amazing sites rich in fauna and flora. It is composed of several types of vegetation as xerophytic thickets, dry dense forest, gallery forests of *Tamarindus* and rare formations of dry and humid mountain forests. It also includes the transition forest between the dry part and the wet part, at the site Ambatotsirongorongo. This area shows an extraordinary biological richness with sub-regional endemic and threatened plant species as *Allaudia ascendens*, *Adansonia za*, *Ravenea xerophila*, *Aloe helenii*, *Aloe suzanii*, but also reptiles with *Astrochlys radiata*, and lemurs with *Lemur catta* or *Propithecus verreauxi*. Ecosystems in the landscape provide important ecological functions such as stabilization of the rivers Mananara and Mandrare. Part of the forest between Midongy South and Andohahela deserves to be explored, as the information about it is still very patchy.

Corridor of the Mahafaly Plateau-Karimbola Landscape

This corridor includes the Tsimanampetsotsa Lake (Ramsar site), and the limestone plateaus of Mahafaly and Karimbola, characterized by their xerophytic bush. Two types of very characteristic vegetation are observed: lush coastal forest bordering the lake and, on the plateaus, a typical forest with *Aloe suzanna* and *Allaudia decipiens*. For wildlife, this area is rich in bird species, including an important population of flamingos, and is the only place where the blind fish (*Typhleotris madagascariensis*) is present. Lake Tsimanampetsotsa, salted and saturated with calcium sulphate, is the only remnant of a once larger network of coastal lakes in southwestern Madagascar. The area also includes karstic formations with spectacular caves, making it a recognized ecotourism destination.

5. KEY BIODIVERISTY AREAS AND ECOSYSTEM SERVICES (KBA+)

5.1 Importance of Ecosystem Services in Madagascar

Ecosystem services are the contributions of ecosystems to benefits used in economic and other human activity (European Environment Agency 2013). The Common International Classification of Ecosystem Services (CICES, EEA 2013) includes three categories of ecosystem services:

- *Provisioning services*, all nutritional, material and energetic outputs from living systems.
- *Regulating and maintenance*, the ways in which living organisms can mediate or moderate the ambient environment that affects human performance; and
- *Cultural services*, all the non-material, and normally non-consumptive, outputs of ecosystems that affect physical and mental states of people

The people of Madagascar, particularly its rural and poorer populations, are highly dependent on natural resources and have a strong relation to nature and environment (Kiefer *et al*. 2010). Natural ecosystems play a key role in food security, by providing wild sources of food (fisheries, e.g. Le Manach *et al*. 2012, and wildlife hunting, e.g. Brashares *et al*. 2011) as well as ecosystem services that support agriculture, such as freshwater for irrigation (e.g. Bakoariniaina *et al.*, 2006), soil quality, climate regulation, pest and pathogen control, and pollination (e.g. Bodin *et al.*, 2006).

Mangroves are particularly important for making fishing traps, canoes, processing prawn and fish catch, and for domestic use including fencing, housing, and fuel for cooking (Rasolofo 1997). They also provide nurseries and hatcheries for fish. There is mounting evidence that mangroves may provide protection from storm surges generated by cyclones (Jones 2013), the frequency and intensity of which are projected to increase in the future under climate change (IISD 2011, World Bank 2013). Coral reefs provide critical sources of food and income that can help coastal populations cope with climate impacts (Cinner *et al.*, 2009).

Madagascar's largest lake ecosystem, Lake Alaotra, supports the country's most fertile and productive rice fields (Bakoariniaina et al 2006). Natural ecosystems also provide energy: wood energy is used daily by more than 90 percent of the population and accounts for over 75% of primary energy consumption in the country (Ministry of Environment and Forestry, cited in Rabarison 2013).

Natural ecosystems also provide flows of freshwater for domestic use, irrigation, and energy. Many households in Madagascar, particularly the poorest households, are reliant on unimproved sources of freshwater (i.e. rivers, streams, ponds, and lakes; Razafindralambo *et al.*, 2004). Hydropower produces approximately 70 percent of the electricity in Madagascar.

Madagascar's remaining forests play a key role in carbon sequestration and storage, which are important for mitigating the impacts of climate change (Portela *et al*., 2012). Upland forests can reduce the impacts of small- and medium-sized floods (Kramer *et al.*, 1997).

Madagascar's biodiversity and natural beauty is its largest draw for tourists, providing aesthetic and recreational values for the tourists themselves as well as a large portion of the country's overall economic activity. Tourism accounts for 15 percent of Madagascar's GDP, and in 2011 it provided 31,207 jobs (Rabarison 2013). The cultural identity of certain ethnic groups is also tied

closely to their natural environment. For example, the Ankodida protected area in southeastern Madagascar includes a forest sacred to the Tandroy tribe (Gardner *et al.*, 2008).

Past studies have explored ecosystem service values at the national scale, with a specific focus on the links between ecosystem services and biodiversity priority areas. For example, there is an existing assessment of the relative priority of unprotected KBAs based on data on human related threats, ecosystem services, and biological values (Rogers *et al.*, 2010). The study focused on 70 KBAs that were unprotected at the time. The authors found that 16 key biodiversity sites emerged as particularly important for both biodiversity and ecosystem services (Figure 1). This assessment focused only on hydrological services (provision of drinking water to downstream populations and irrigation of rice paddies), thus our current KBA+ analysis substantially adds to this past work by including numerous additional ecosystem services.

5.2 Objectives, Methodology and Limitations

With the support of the Critical Ecosystem Partnership Fund (CEPF), Conservation International's (CI) Betty and Gordon Moore Center for Science and Oceans (MCSO) and CI-Madagascar collaborated to assess the value of KBAs and their surrounding areas for ecosystem services in Madagascar. The pilot analysis presented in this chapter used existing data on ecosystem services, covering provision of fresh water, disaster risk reduction / climate adaptation, climate mitigation, food provision, and cultural services. A more comprehensive report on the methodology and results is presented in the full report (Neugarten *et al.*, 2014), available on the CEPF website.

This KBA+ pilot analysis focuses on the island nation of Madagascar to develop a conceptual framework and guidance materials that can be applied throughout the Madagascar and Indian Ocean Islands (MIOI) hotspot and refined for future CEPF ecosystem profiles.

This pilot relied primarily on a literature review, limited desktop analyses using existing data and methodologies, and targeted engagement with key experts to gather relevant information and validate results. In total, 125 articles were reviewed, consisting primarily of scientific papers and some unpublished reports. Low availability of up-to-date data at the national scale required for the analysis was overcome by using available global data. Experts from CI-Madagascar and partner organizations were consulted throughout this process, including during workshops in Antananarivo. The literature review and expert engagement highlighted a set of "key" ecosystem services considered the most important in Madagascar (Table 5-1), which in turn informed the set of services to be included in the desktop analyses.

Table 5-1: Key Ecosystem Services in Madagascar, Organized Using the Common International Classification of Ecosystem Services (CICES) Framework

Section	Division	Ecosystem Service
Provisioning	Nutrition	*Food (fish; bushmeat; edible plants);* medicinal plants; *water flows for domestic use; water flows for irrigation*
	Materials	Construction materials (wood, thatch); materials for artisanal products (wood, sedges); water flows for mining
	Energy	Fuelwood; charcoal; *water flows for hydropower*
Regulation & Maintenance	Mediation of waste, toxics and other nuisances	Water quality for household use; water quality for irrigation; water quality for hydropower
	Mediation of flows	*Flood regulation;* drought regulation
	Maintenance of physical, chemical, biological conditions	*Carbon storage and sequestration; protection from cyclones;* genetic material
Cultural	Physical and intellectual interactions with ecosystems and land-/seascapes	*Ecotourism;* existence value (biodiversity)
	Spiritual, symbolic and other interactions with ecosystems and land-/seascapes	Cultural and spiritual identity

Notes: Services in italic are included in the analysis

It was not possible to complete analyses for every ecosystem service considered important in Madagascar due to either lack of data or complexity of the analysis; instead, a minimum of two key services in each category (provisioning, regulating, and cultural) were addressed. Geographic information systems (GIS) were used for all analyses.

For each ecosystem service, the following information was analyzed:

- Whether each KBA provided the service (yes, no, or data deficient); and
- The relative importance of each KBA for providing the service, when possible. The definition of "relative importance" varied depending on the service; e.g. more tons of forest biomass carbon stored, or a larger number of people potentially protected from cyclones. Each KBA was assigned ranks based on their relative importance.

A multi-criteria analysis to identify KBAs most important for providing multiple services was also conducted. Sufficient data was available to run a multi-criteria analysis for terrestrial and freshwater ecosystem services only.

The analyses included in this report were based on many assumptions about the benefits provided by natural ecosystems to people (such as protection from storms provided by mangroves). Simplistic mapping rules such as proximity of people to ecosystems were used. These analyses should be considered a first iteration, and would be strengthened by ground-based sampling to validate the assumptions and test our results. In particular, updated mapping of agricultural areas, better understanding of the links between natural ecosystems and food security, additional research on the benefits of ecosystems in terms of mitigating climate-related

events, and more complete inventories of cultural and spiritual values would all improve this analysis.

For more details on the literature review, data sources, methods, and detailed tabular results, see the full report (Neugarten *et al.*, 2014) on CEPF website.

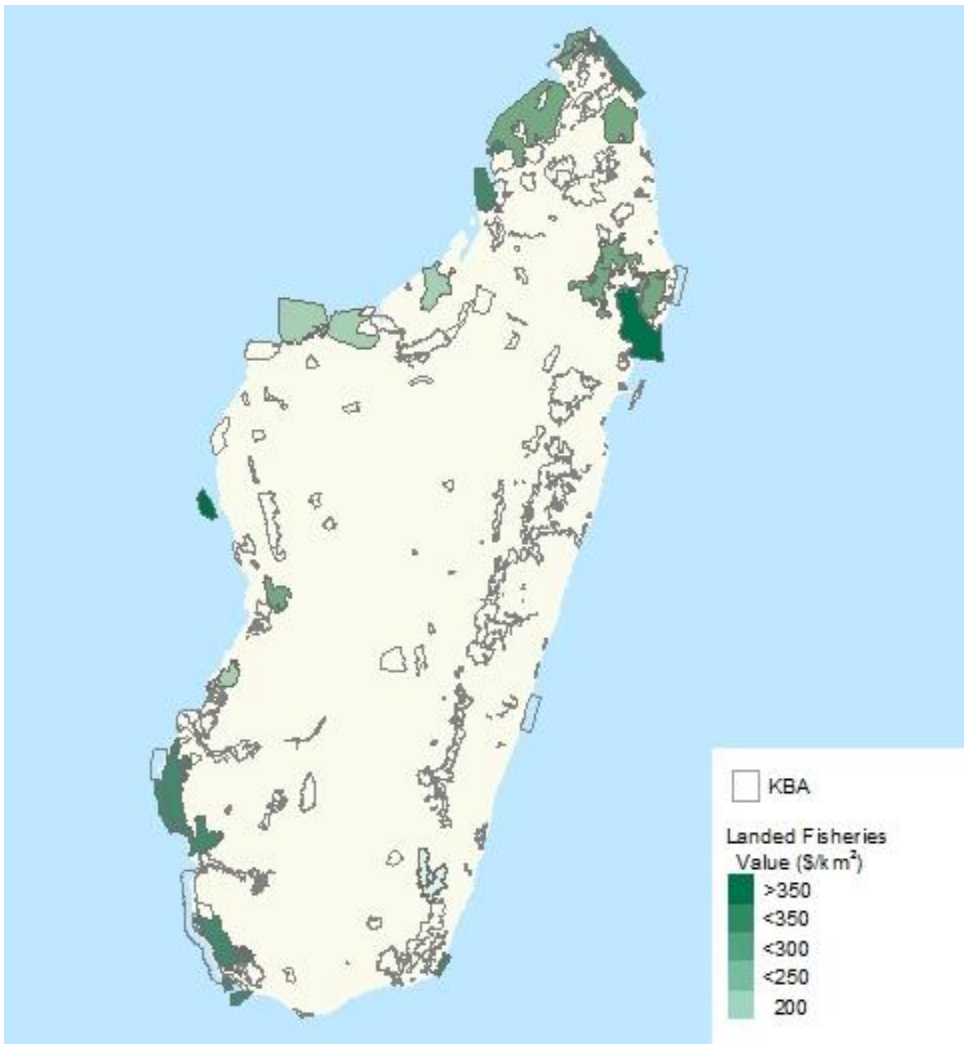
5.3 Results

Provisioning: Food

Commercial Fisheries: Average Landed Values of Fish Catch

Our analysis shows that 21 coastal/marine KBAs provide landed fish values (Figure 5-1). Certain KBAs in the northeast, northwest and west of Madagascar exhibited relatively higher values, including Antogil Bay, Barren Islands, Iranja-Ankazoberavina-Russes bays, Ambodivahibe Bay, and PK32-Ranobe. These sites could be prioritized and carefully managed to avoid overharvest.

Figure 5-1: Landed Value of Fish in KBAs, Expressed as USD/km^2

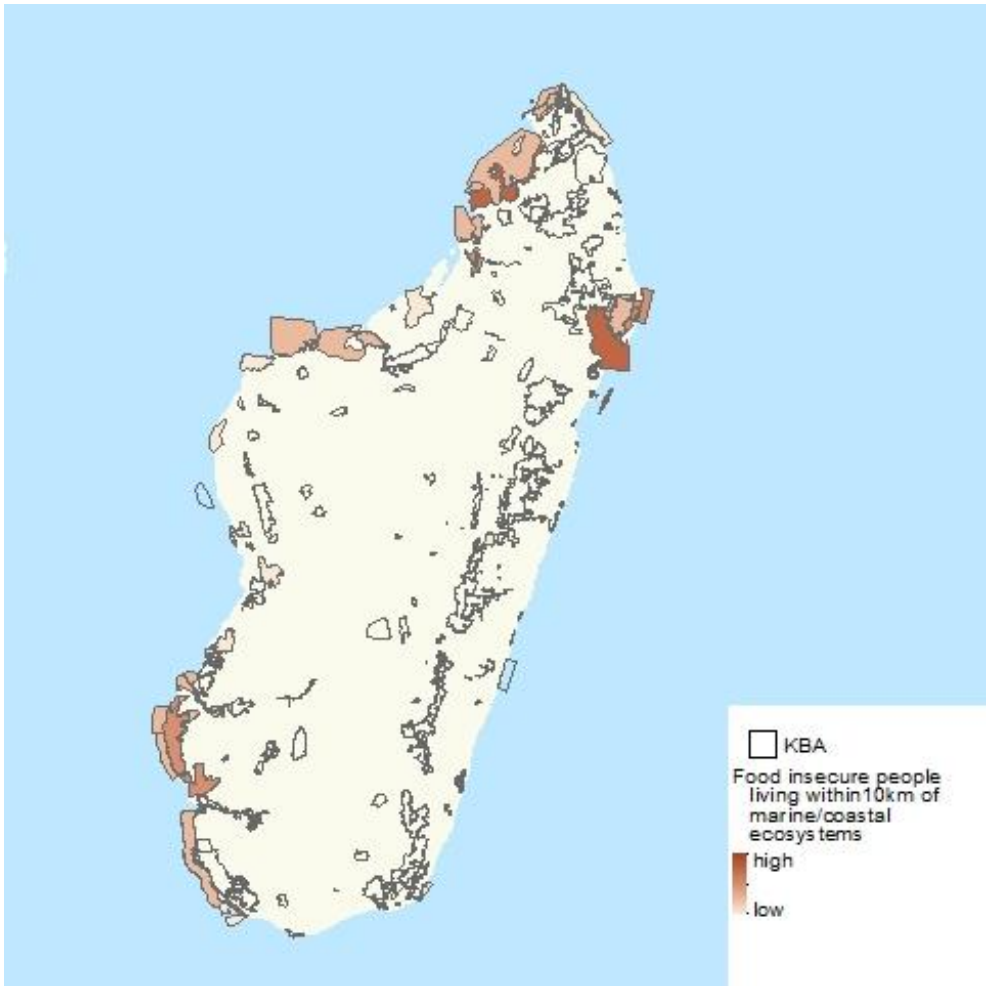


Data: Swartz et al. 2012

Small-Scale Fisheries: Number of Food-Insecure People with Access to Coastal/Marine Ecosystems

Many coastal/marine KBAs contain ecosystems (coral reefs and mangroves) that may serve as important sources of food to food-insecure populations (Figure 5-2). A subset of those KBAs contain ecosystems that are accessible (within 10km) of relatively large numbers of food-insecure people. Examples include Sainte Marie Island (Ambohidena), Three Bays complex, Antogil Bay, Southwestern Coastal Wetlands and Nosy Manitse Future SAPM Marine, and Ampasindava/Rigny Bay (Est). These sites could be prioritized and carefully managed to avoid overharvest.

Figure 5-2: Number of Food Insecure People Living within 10km of Mangroves and Coral Reefs

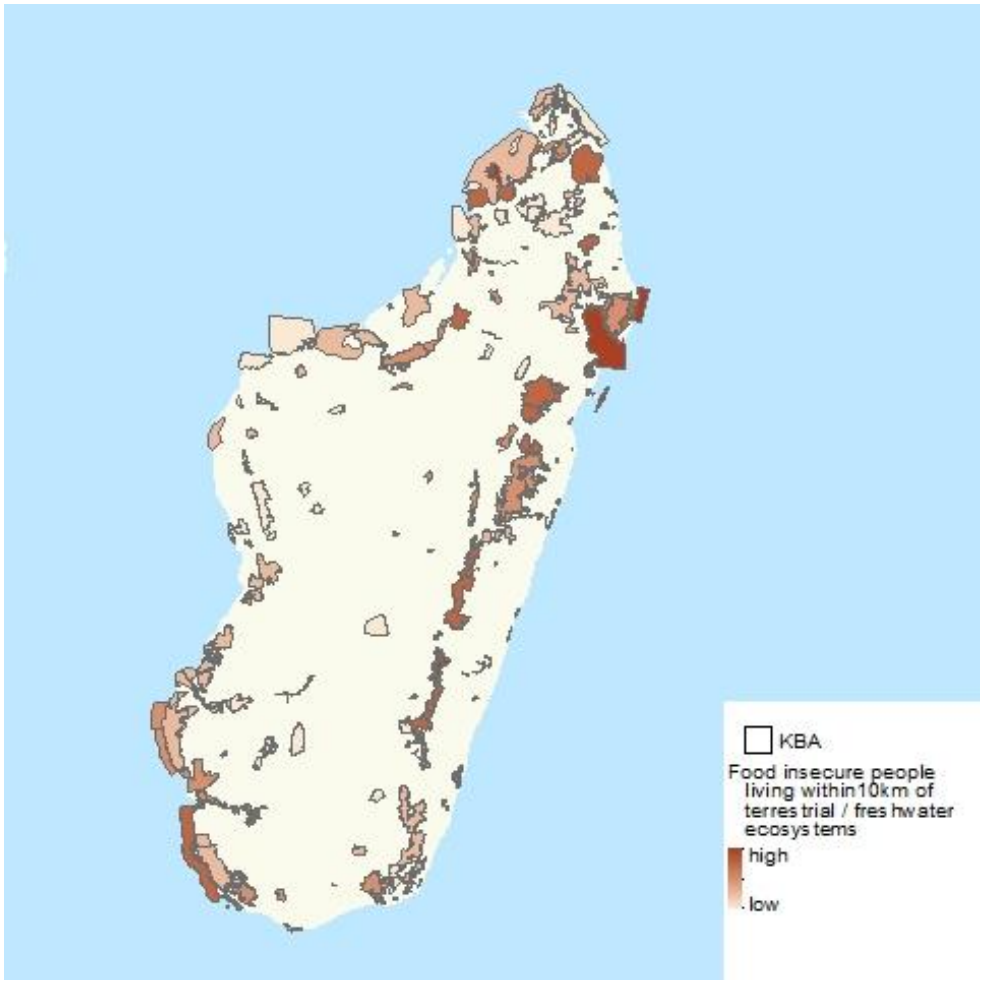


Data: mangrove data from Giri et al. 2011, coral reef data from WRI Reefs at Risk Revisited (Burke et al. 2011); population data from Landscan; food insecurity data from Moser et al. 2008)

Wildlife Hunting and Non-timber Forest Products (NTFPs): Number of Food-Insecure People with Access to Terrestrial and Freshwater E

All terrestrial KBAs contain ecosystems (forests, mangroves, wetlands, and water bodies) that may serve as sources of food or non-timber forest products (NTFPs) to food-insecure populations (Figure 5-3). A subset (77 out of 212) contain ecosystems that are accessible (within 10km) of large numbers of food-insecure people. Examples include: Nankinana (Ambodibonara-Masomeloka), Manjakatompo-Ankaratra Massif, Namorona-Faraony River, Anja community Reserve, and Ankavia-Ankavana River (Antalaha). These sites might be prioritized if there is an interest in investing in sites that are potentially providing food and NTFPs to local communities. Such sites should be carefully managed to avoid overharvest. Mangroves were included in this analysis as well as the analysis above, as they cross the terrestrial/marine boundary.

Figure 5-3: Number of Food Insecure People Living within 10km Terrestrial and Freshwater Ecosystems



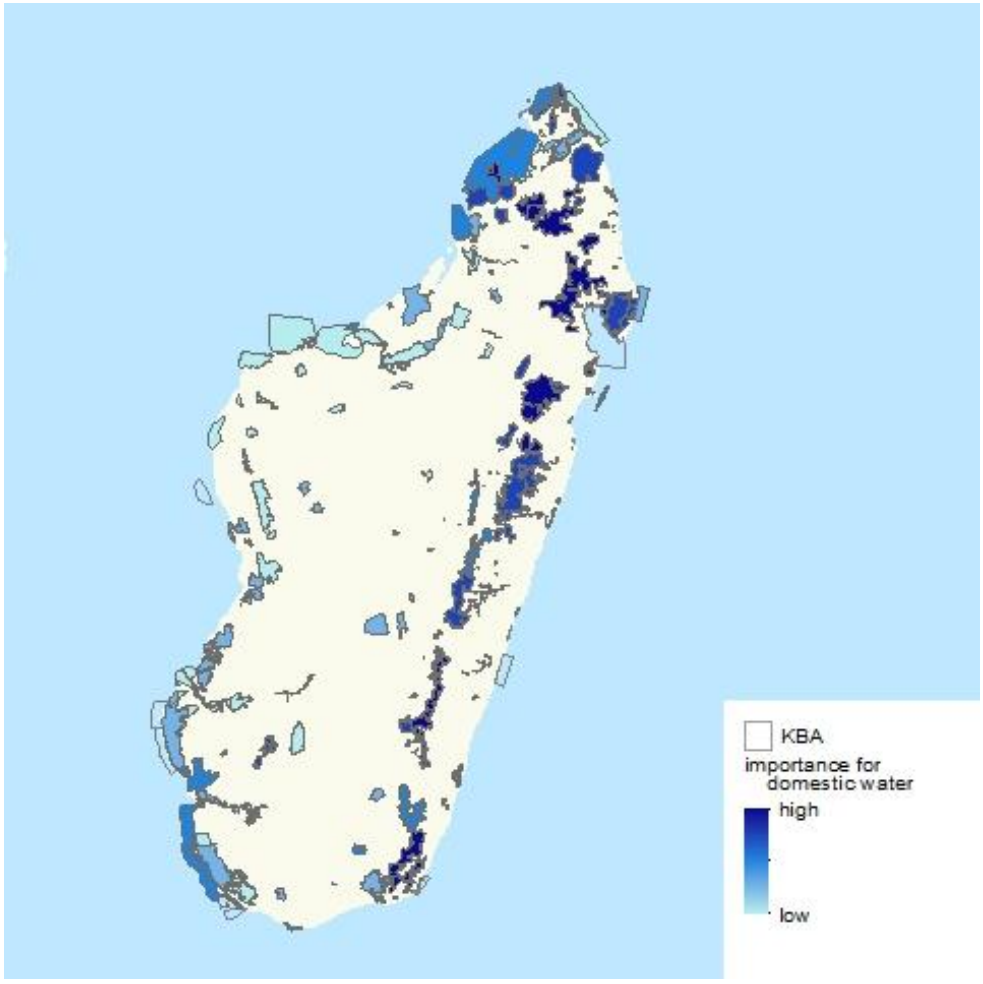
Data: ecosystems data from Kew Royal Botanic Gardens 2007; protected area data from CI; population data from Landscan; food insecurity data from Moser et al. 2008

Provisioning: Fresh Water

Relative Importance for Providing Fresh Water for Domestic Use

Most KBAs (203 of 212) are upstream of people and are likely to provide freshwater for drinking and other domestic uses (Figure 5-4). "Relative importance" for domestic freshwater was estimated using the average annual water availability in a KBA as a proportion of the overall water availability of a watershed, weighted by estimated water demand downstream. The demand was calculated from number of people living downstream and average estimated water use per person (42.3 L/day, or 15.2 m^3/y) (Razafindralambo *et al.*, 2004). KBAs in the highlands, upstream of the largest numbers of people, and KBAs in the arid northeast and southwest, where water is most scarce, appear to be relatively more important. Throughout the rest of the country, the importance of KBAs for providing water is variable.

Figure 5-4: Relative Importance of KBAs for Fresh Water for Domestic Use

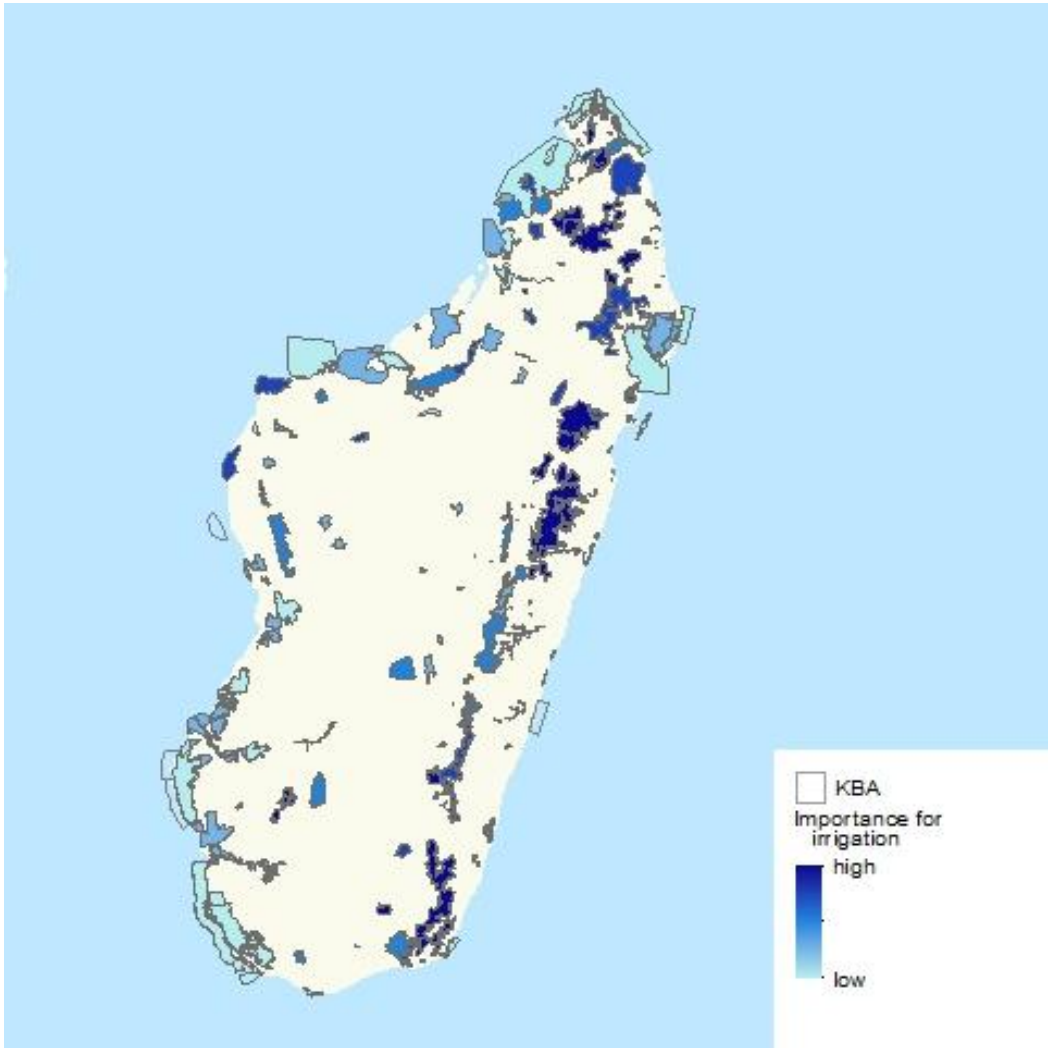


Data: WaterWorld (Mulligan 2013), Landscan

Relative Importance for Providing Fresh Water for Irrigation

Similarly, "relative importance" of a KBA for water for irrigation was estimated using the average annual water availability in a KBA as a proportion of the overall water availability of a watershed, weighted by estimated irrigation demand. The demand was estimated based on area of irrigable agriculture downstream and estimated water demand per hectare per year, adjusted for annual rainfall. Most KBAs (184 of 212 total) provide fresh water for irrigation (Figure 5-5). Those with the highest relative importance were again located in the eastern highlands, where the largest number of people and highest concentration of irrigated rice agriculture occurs. But there are also relatively important areas in the eastern, northern, and western areas of Madagascar, regions characterized by larger areas of irrigated rice, as well as areas of higher aridity and lack of rain.

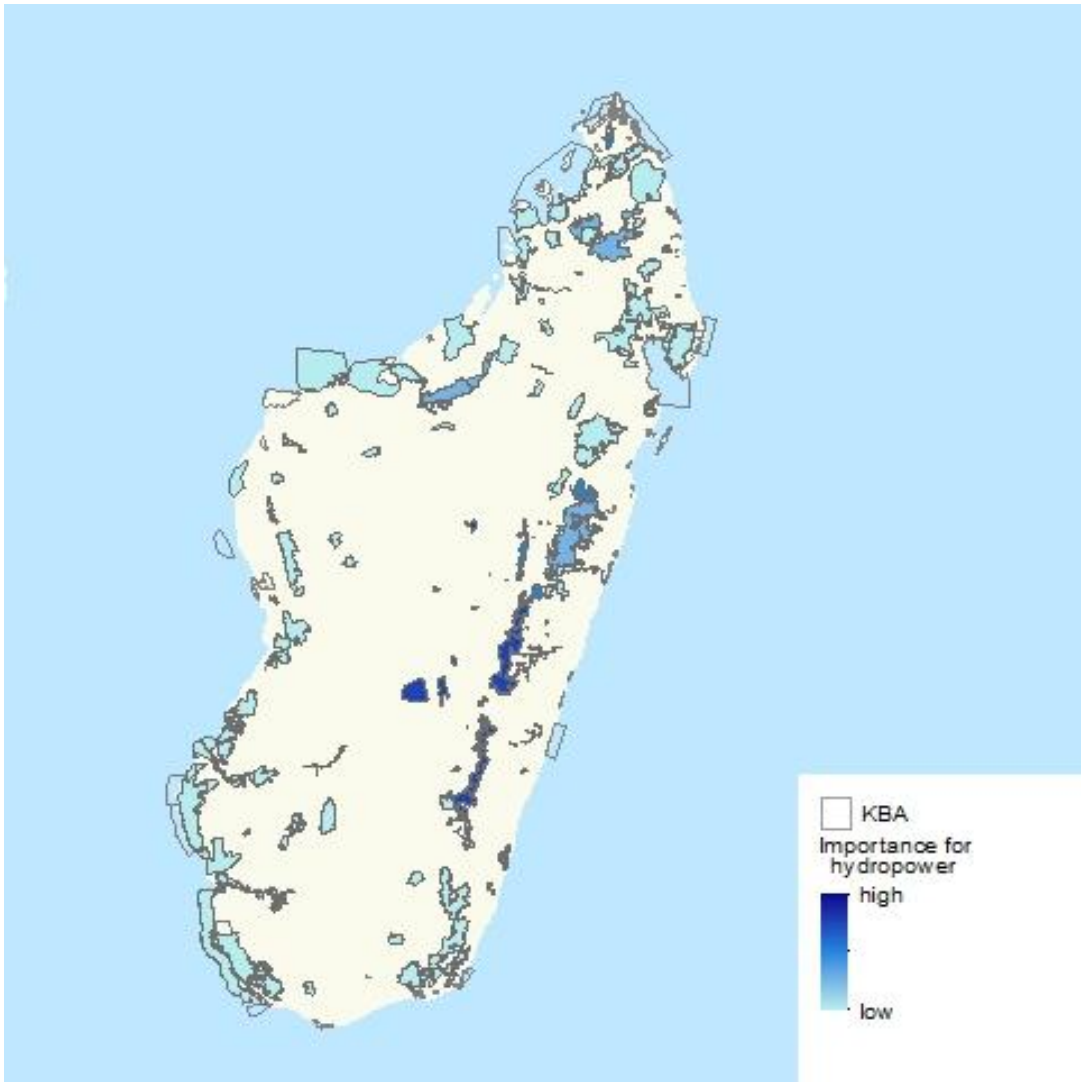
Figure 5-5: Relative Importance of KBAs for Fresh Water for Irrigation



Relative Importance for Providing Fresh Water for Hydropower Dams

Relative importance of KBAs in terms of providing freshwater for hydropower was estimated using the KBA's contribution to the overall water balance in each watershed, weighted by demand for hydropower downstream (Figure 5-6). Cumulative power generated by hydropower plants (MHW) was used as a proxy for water demand (data supplied by JIRAMA). Several KBAs in the east, north, and northwest were relatively important for freshwater for hydropower. These included: Angavokely Forestry Station, Tsarasaotra Lake, Ankafobe, Manjakatompo-Ankaratra Massif, and Efatsy (Farafangana).

Figure 5-6: Relative Importance of KBAs for Fresh Water for Hydropower Dams

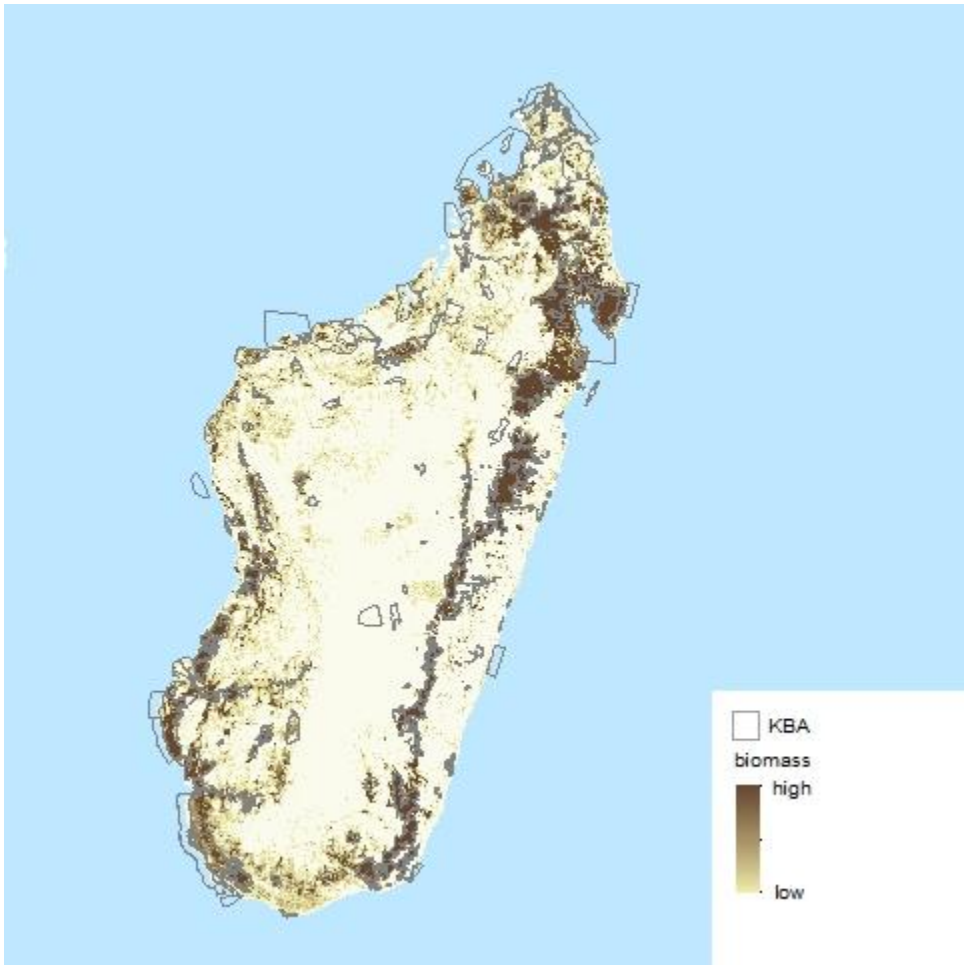


Regulating: Climate Mitigation

Long-Term Carbon Storage: Average Biomass Carbon Stock per Hectare

Virtually all of Madagascar's remaining forest is contained within KBAs; thus these areas in relative terms contain significant value in terms of forest biomass carbon stock compared to the rest of the land (Figure 5-7). All terrestrial forested KBAs (180 out of 212 total KBAs) contain varying amounts of biomass carbon stock.

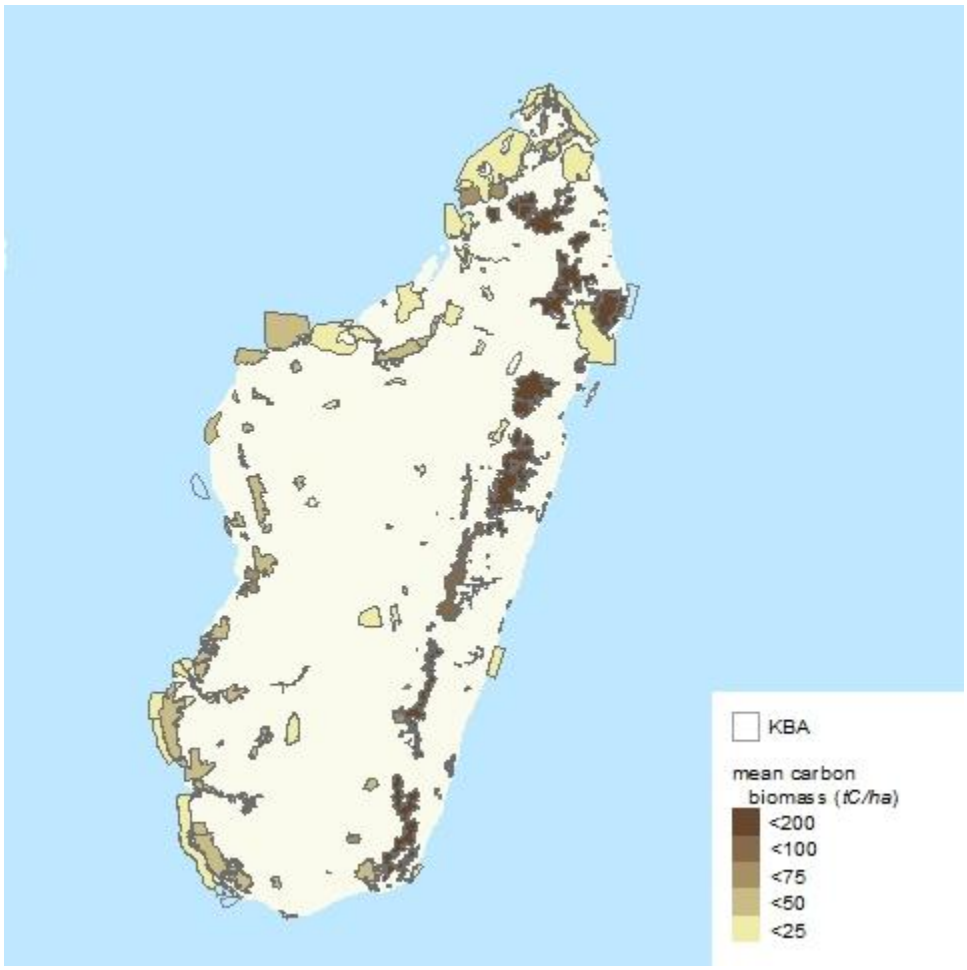
Figure 5-7: Total Biomass Carbon in Madagascar, Overlaid with Key Biodiversity Areas (KBAs)



Note: Most of the remaining forest is contained within a KBA, and therefore most of the remaining biomass carbon stock exists within KBAs. (Data source: Saatchi et al.)

Some KBAs contain forest with comparatively high biomass carbon density as measured in tC/ha. The highest values are found in KBAs containing humid forest, particularly in the eastern highlands (Figure 5-8). Examples include Mananara-North National Park, Vohibe Ambalabe (Vatomandry), Ambatovaky Special Reserve, Analamay-Mantadia Corridor, and Masoala National Park.

Figure 5-8: Average Biomass Carbon per Hectare within KBAs (tC/ha)

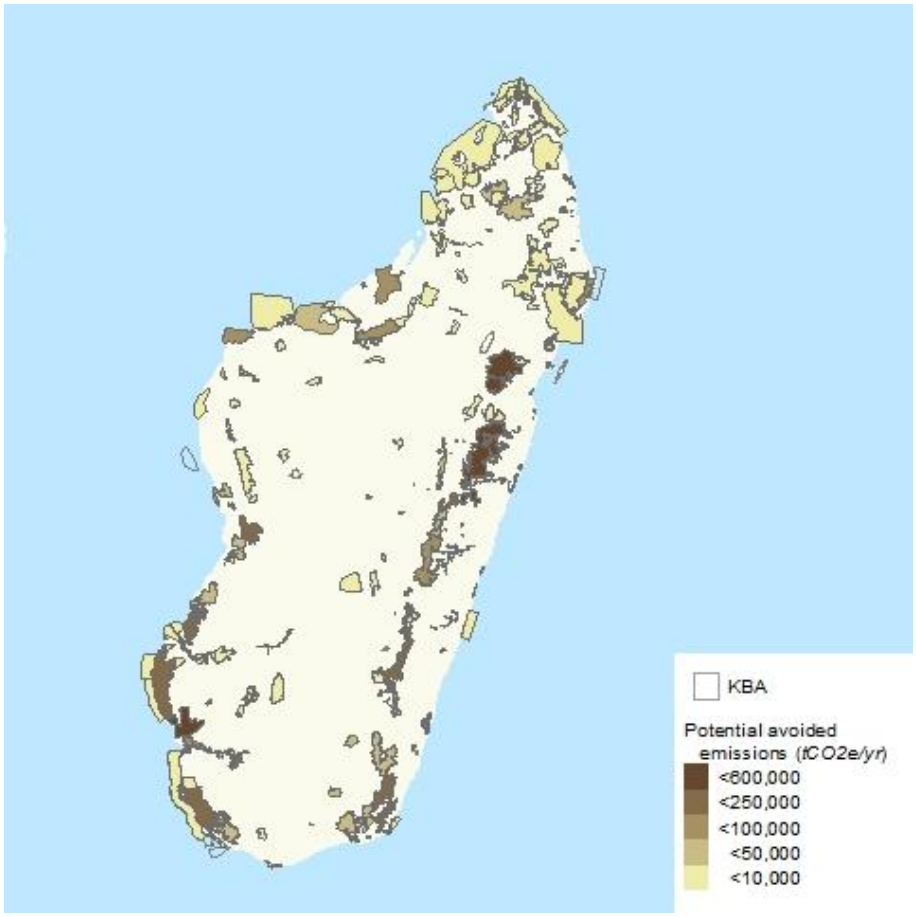


Data source: Saatchi et al.

Potential Avoided Carbon Emissions from Deforestation

Many KBAs (92 of 212 total) contain forest and have experienced historic deforestation. If conserved, these sites may have the highest estimated maximum potential for avoiding future carbon emissions from deforestation (Figure 5-9). This "estimated maximum potential" is based on the assumption that deforestation is completely stopped. Feasibility studies must be conducted if there is an interest in estimating the *actual potential* of sites for Reduced Emissions from Deforestation and Degradation (REDD+). Examples of KBAs with relatively higher estimated levels of potential avoided emissions are: PK32-Ranobe, Bidia-Bezavona Classified Forest, Ankeniheny-Lakato Future SAPM, Zahamena-Ankeniheny SAPM, and Mahafaly Plateau North Future SAPM.

Figure 5-9: Potential Avoided Emissions within KBAs, Estimated Based on Historic Deforestation Rates within KBAs



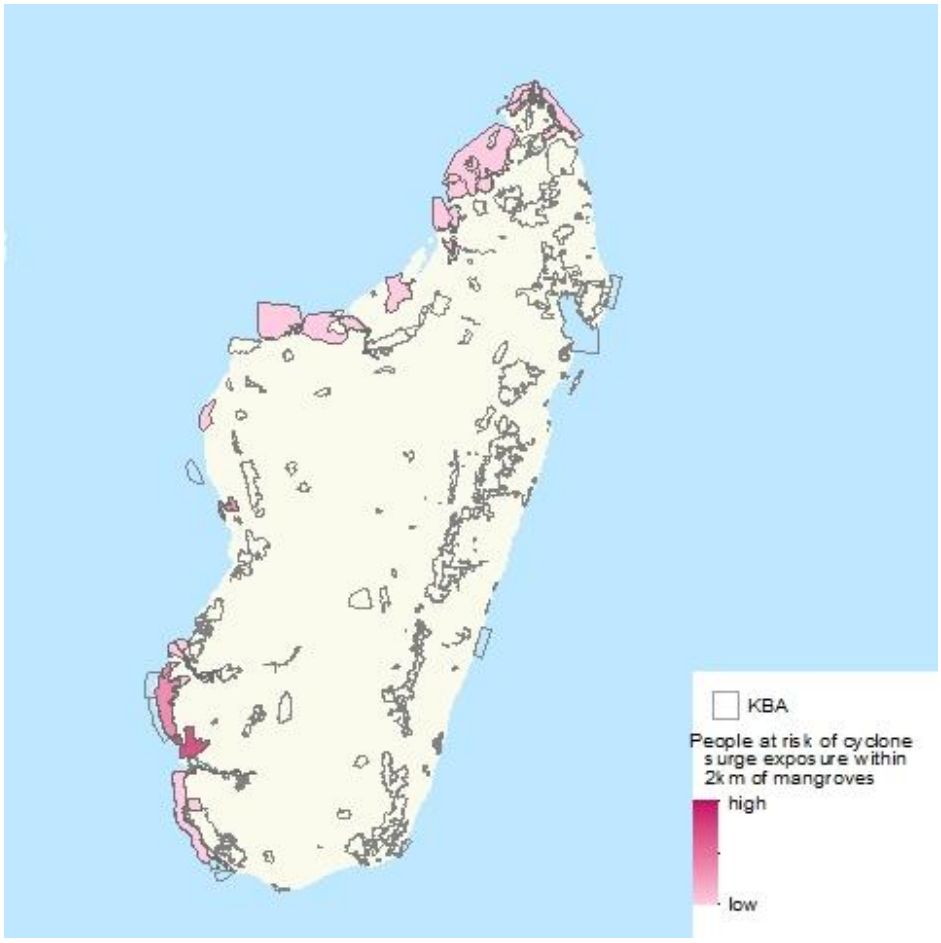
Data: Historic deforestation from Conservation International and biomass data from Saatchi et al.)

Regulating: Disaster Risk Reduction and Climate Adaptation

Number of People Vulnerable to Climate Change-Driven Increases in Storm Surges that are Potentially Protected by Mangroves

Sixty-three KBAs contain mangroves that are within 2 km of people that are considered vulnerable to storm surges, based on historical cyclone events (Figure 5-10). This analysis uses historical occurrence of cyclones as a proxy for future risk, and assumes that proximity to mangroves provides some protection. Examples of KBAs that contain mangroves within 2km of people who are vulnerable to cyclone surge include Amoron'i Onilahy et Onilahy River, Three Bays complex, PK32-Ranobe, Mikea Forest, and Diégo Bay. In Madagascar, cyclones primarily hit from the east and north; however remaining mangrove habitat exists primarily in the west. More research is required to understand the actual protection provided by mangroves, and the potential for mangrove restoration in the eastern part of the country.

Figure 5-10: Number of People Vulnerable to Climate-Change Driven Increases in Storm Surge, within 2km of Mangroves

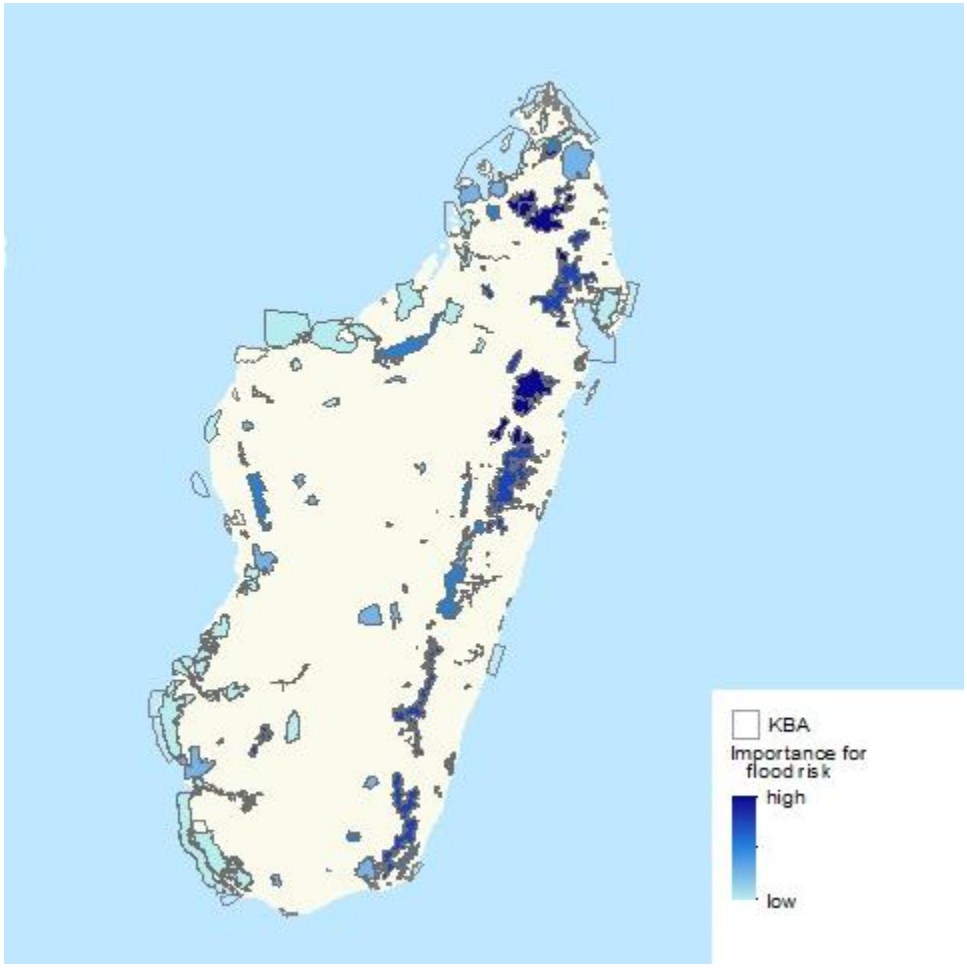


Data: Human exposure to cyclone surge data from UNEP GRID, data on mangroves from Giri et al. 2011).

Flood Risk Reduction

Relative importance of KBAs for flood risk reduction was estimated using each KBA's contribution to the overall water balance in each watershed, weighted by the number of people vulnerable to flooding downstream (Figure 5-11). KBAs in the eastern and northeastern highlands showed up as relatively more important in terms of flood risk. These include: Anjanaharibe Sud Special Reserve, Analalava-Analabe-Betanantanana (Ambatosoratra), Ambohipiraka, Angavokely Forestry Station, and Lake Alaotra. This analysis assumes that forest ecosystems provide some protection from flooding; however, more research is required to better understand the role of ecosystems in reducing floods in Madagascar.

Figure 5-11: Relative Importance of KBAs in Terms of Flood Risk Protection



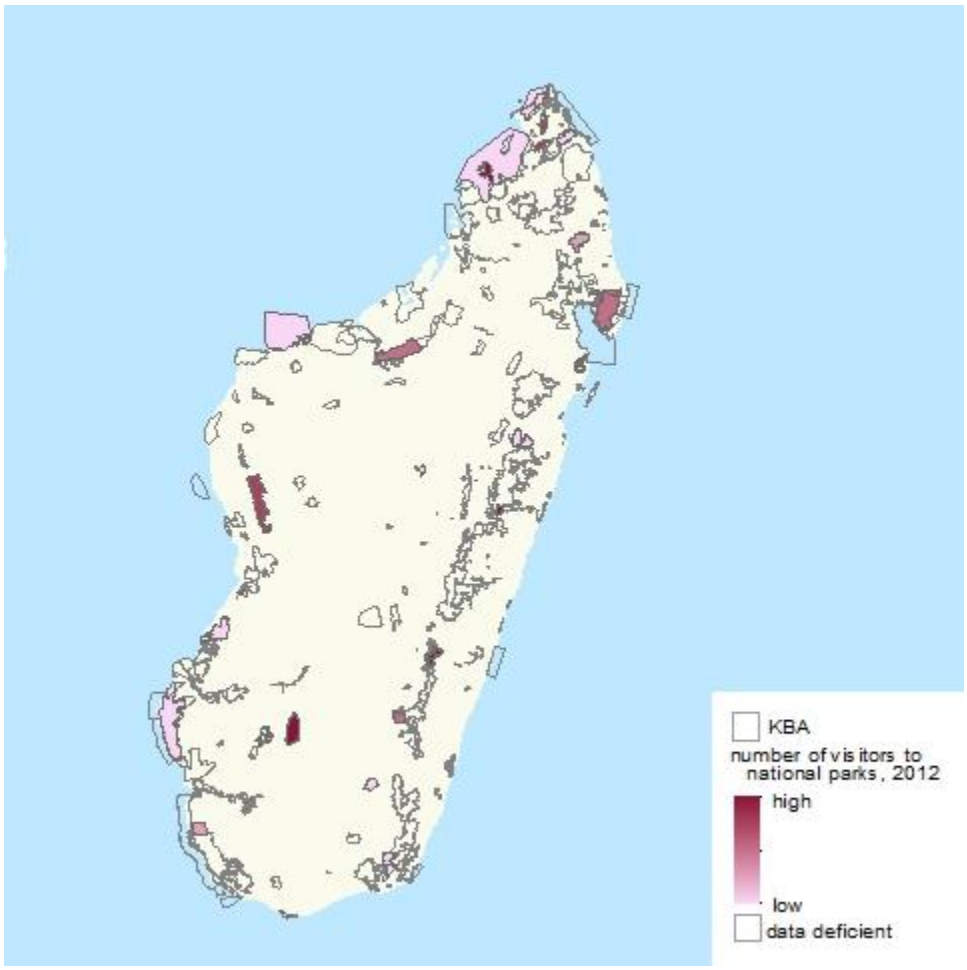
Data sources: human exposure to flooding data from UNEP GRID, water balance data from WaterWorld
Note: based on relative importance of an area to regulate water weighted by number of people vulnerable to flooding downstream

Cultural Values and Ecotourism

Ecotourism: Number of Visitors to National Parks in 2012 (data limited)

Data on ecotourism was only available for 32 protected KBAs managed by Madagascar National Parks. KBAs that had the largest number of visitors in 2012 include Isalo National Park, Mantadia National Park and Analamazaotra Special Reserve, Ranomafana National Park, Nosy Be and Satellites Islands (Nosy Tanihely), and Ankarana Special Reserve (Figure 5-12). Note that this data is limited to only certain sites and is for only a single year. However, most ecotourism in Madagascar is centered on the national park system, thus while this dataset is incomplete, national parks do have relatively high values for ecotourism.

Figure 5-12: Number of Visitors to Protected KBAs Managed by Madagascar National Parks in 2012



Data: Madagascar National Parks
Note: just because a site is data deficient does not mean that there were no visitors in 2012.

Cultural/Spiritual Values (data limited)

For this ecosystem service, data was only available for 14 out of 212 KBAs. These 14 sites were included in an inventory of community heritage areas of Madagascar (Conservation International 2011). The sites included: Ambodivahibe Bay, Andrafiamena, Bongolava Classified Forest (Marosely), Fandriana Marolambo Corridor, Ibity Future SAPM, Itremo Vakinakaratra Future SAPM, Manjakatompo-Ankaratra Massif, Montagne des Francais, Nosivolo Wetland, Vondrozo Classified Forest and surrounding areas, Zahamena National Park and Strict Reserve, and Zahamena-Ankeniheny SAPM. However; many sites throughout Madagascar have important cultural values, but were not included in this inventory. Thus a map of sites of known cultural/spiritual importance was not included because any such map would be incomplete. Additional investments in research are required to better understand the value of KBAs for providing cultural and spiritual services.

Multiple Terrestrial/Freshwater Ecosystem Services

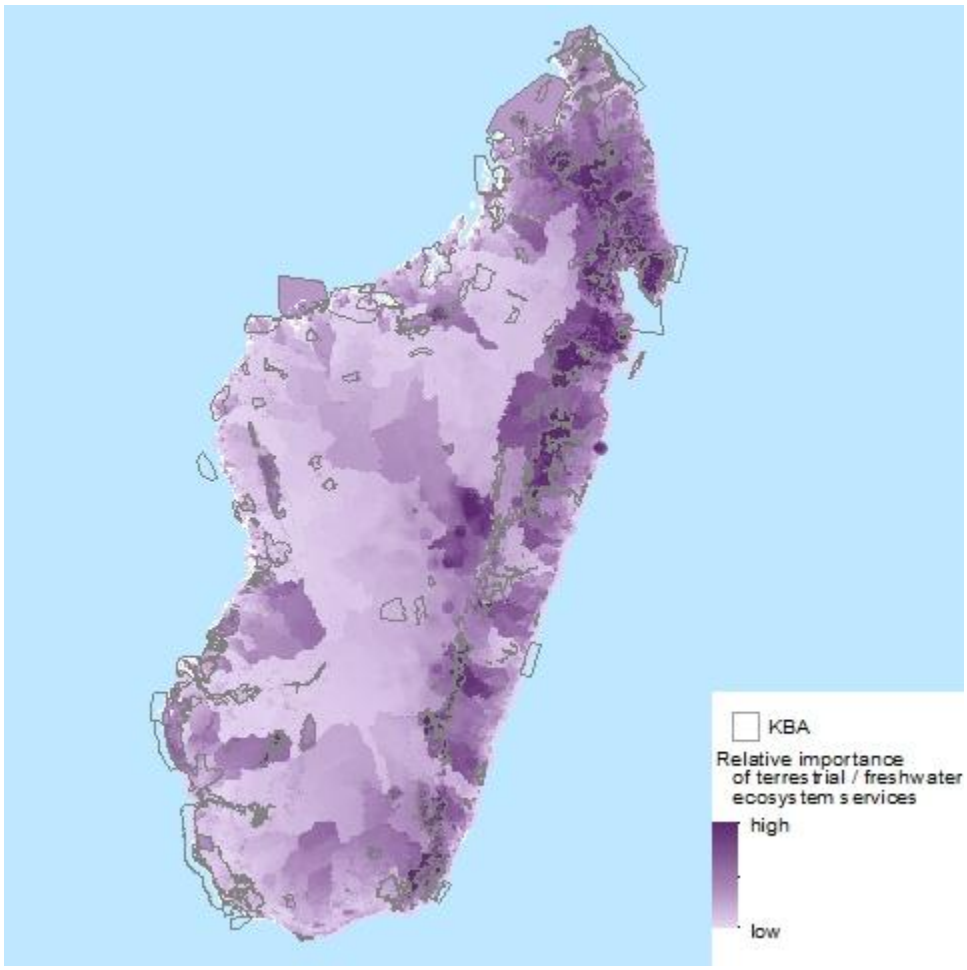
Multiple ecosystem services from terrestrial/freshwater ecosystems were combined in a multicriteria analysis based on several of the above results: 1) biomass carbon stock, 2) number of food-insecure people with access to terrestrial/freshwater ecosystems, 3) relative importance for providing freshwater for i) domestic use, ii) irrigation, iii) hydropower, 4) flood risk reduction, and 5) ecotourism (Figure 5-13). The weights assigned to each of the values in the multi-criteria analysis were established with expert input; the weights are shown in Table 5-2.

Table 5-2. Weights Given to Each of the Terrestrial and Freshwater Ecosystem Services Included in the Multi-Criteria Analysis

Variable	Weight (out of 100)
Total biomass carbon stock (tC)	30
Food provision (# of food insecure people within 10km of unprotected terrestrial & freshwater ecosystems)	30
Ecotourism (# of visitors to Madagascar National Parks in 2012)	10
Relative importance for fresh water (FW) (total):	30:
Relative importance of FW for domestic use	7.5
Relative importance of FW for irrigation	7.5
Relative importance of FW for hydropower	7.5
Relative importance of FW for flood protection	7.5
TOTAL	**100**

The highest value areas were found in the northeast and eastern highlands, with additional high-value areas on the southeastern side of the island. Examples include: Zahamena National Park and Strict Reserve, Mananara-North National Park, Andohahela National Park - Parcel I, Mantadia National Park and Analamazaotra Special Reserve, and Marojejy National Park. Note that this analysis includes only terrestrial and freshwater services, it does not include coastal protection, commercial fisheries, or small-scale fisheries. This map should be presented in combination with the above maps of coastal/marine services for a more complete picture. Note that areas important for providing multiple services are not necessarily "more important" than areas that are important for a single service. Thus this analysis may help to combine the above analyses, but it should not be presented in isolation.

Figure 5-13: Results of a Multi-criteria Analysis of Terrestrial and Freshwater Ecosystem Services



The same analysis was repeated for the above services, but carbon was excluded, in order to focus on places important for "local" terrestrial and freshwater ecosystem services (food provision, ecotourism, and freshwater). Weights assigned to each service are shown in table 5-3.

Table 5-3. Weights Given to Each of the "Local" Terrestrial and Freshwater Ecosystem Services Included in the Second Multi-criteria Analysis

Variable	Weight (out of 100)
Total biomass carbon stock (tC)	0
Food provision (# of food insecure people within 10km of unprotected terrestrial & freshwater ecosystems)	30
Ecotourism (# of visitors to Madagascar National Parks in 2012)	10
Relative importance for fresh water (FW) (total):	60
Relative importance of FW for domestic use	15
Relative importance of FW for irrigation	15
Relative importance of FW for hydropower	15
Relative importance of FW for flood protection	15
TOTAL	**100**

This analysis indicates that again, areas in the eastern and northeastern Madagascar are important for multiple terrestrial and freshwater services, but also highlights some regions in the northwest and southwest (Figure 5-14). Values were then averaged for each KBA (Figure 5-15). Examples of sites that are important for multiple "local" terrestrial and freshwater ecosystem services include: Zahamena National Park and Strict Reserve, Tsarasaotra Lake, Marojejy National Park, Angavokely Forestry Station, and Ankavia-Ankavana River (Antalaha). Again, note that this analysis doesn't include coastal/marine ecosystem services, and that areas important for multiple services are not necessarily "more important" than areas that are important for a single service. Thus this map should be presented in combination with the above maps for a more complete picture.

Figure 5-14: Multi-criteria Analysis of Fresh Water, Food Provision, and Ecotourism Ecosystem Services

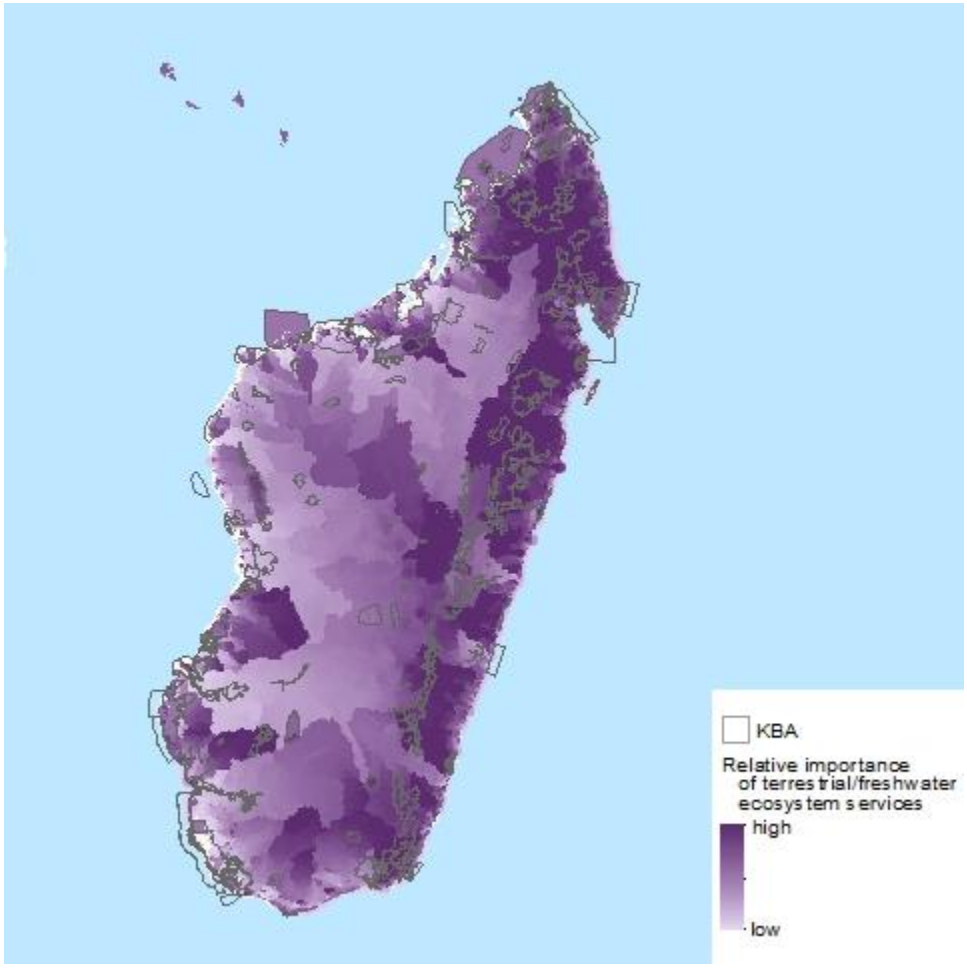
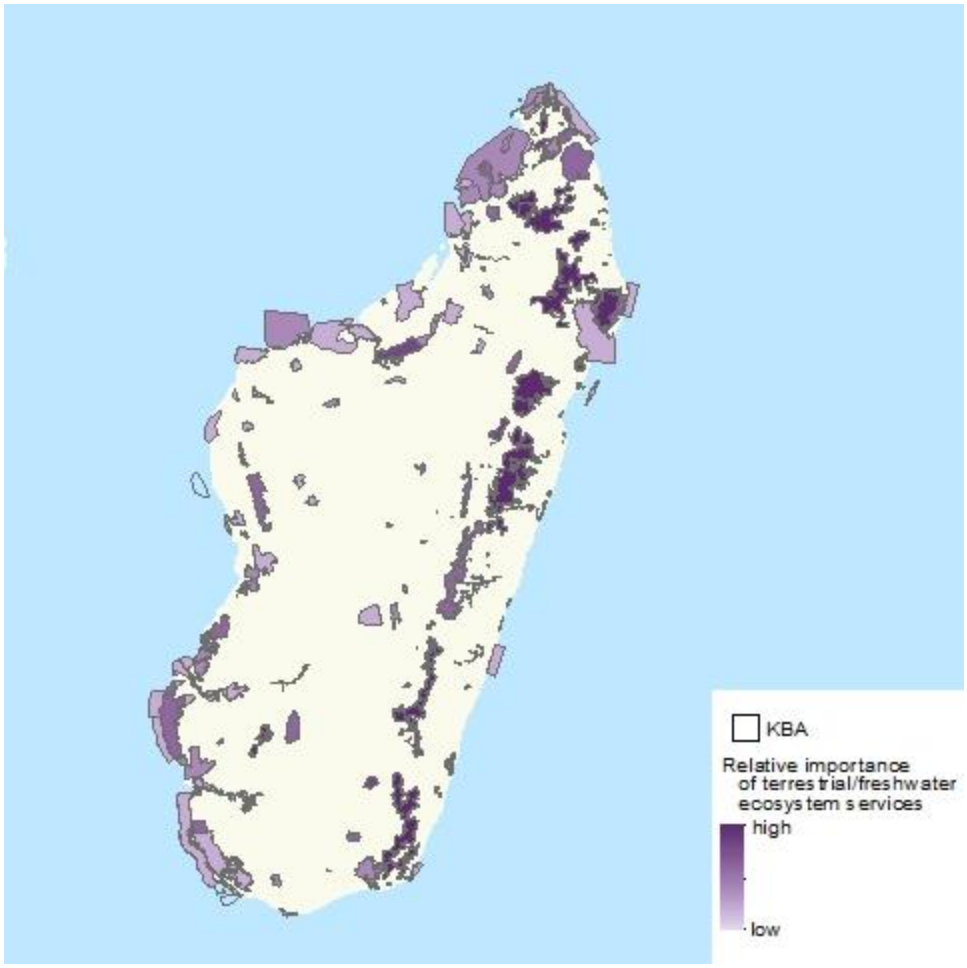


Figure 5-14: Multi-criteria Analysis of Freshwater, Food Provision, and Ecotourism Ecosystem Services, Averaged for Each KBA



5.4 Conclusions

Different KBAs are important for providing different ecosystem services. Coastal and marine KBAs provide commercial fisheries, as well as mangrove and coral reef ecosystems that protect coastal areas from storms and support small-scale fisheries. The humid, dense forests of the eastern highlands are important for both climate mitigation and freshwater for domestic use, irrigation, and hydropower. However, KBAs in the more arid north and southwest of the country are also important for freshwater for domestic use and irrigation in these water-scarce regions. Dry and spiny forest ecosystems are extremely threatened in Madagascar, and have been under-represented in past conservation investments. Thus while they may not appear at the top of the list in terms of the provision of services, these ecosystems are critical for biodiversity conservation. Additionally, the coastal areas of the east are extremely important because of the amount of services they could provide in terms of resilience to climate-related events. Ecosystems that are currently unprotected are likely providing important services to people who are food-insecure, such as hunting, fishing, and fuelwood collection. KBAs in Madagascar's national park system provide important ecotourism values, supporting local livelihoods and the country's economy.

6. SOCIOECONOMIC PROFILE

The hotspot countries constitute a heterogeneous whole in terms of geography, demography, and socioeconomics. At one end of the spectrum, Madagascar covers 592,040 km² and has a population of over 20 million inhabitants (87 percent of the hotspot population), with a high rate of poverty. At the other end, the land mass of Seychelles, which has only 88,000 inhabitants, covers less than 500 km^2 (taking into account the uninhabited islets) and has a gross domestic product per capita equivalent to that of the OECD countries. This chapter summarizes the demographic and economic situation in the hotspot, and the importance of the key economic sectors, focusing on those that impact biodiversity.

6.1 Demography and Population

The hotspot is home to about 23 million people, with very high population densities on the islands outside of Madagascar. However, population densities presented in Table 6-1 hide significant variations at the local level. On the volcanic islands, the landscape leads people to gather on the coastal areas, and in Seychelles, almost all of the population live on the three main islands. In Madagascar, the overall population density is 35 inhabitants per km^2, but they are unevenly distributed across the territory: the southwest and middle-est are under-populated areas, while the central and eastern coasts are home to more than half of the Malagasy population on approximately 30 percent of the total island area.

Table 6-1: Population and Density in the Hotspot Countries and Territories

	Population	% of Hotspot population	Area (km^2)	Density (inhab/km^2)
Seychelles	88,400	**0.4%**	455	186
Comoros	691,350	**3.0%**	2,170	319
Republic of Mauritius	1,295,500	**5.6%**	1,974	656
Mauritius	1,257,121	**5.4%**	1,865	674
Rodriguez	38,379	**0.2%**	109	352
French Departments in the Indian Ocean	1,05, 645	**4.5%**	2,880	365
Réunion	839,000	**3.6%**	2,504	335
Mayotte[(1)]	212,645	**0.9%**	376	566
Madagascar	20,146,440	**86.6%**	587,041	34
Total	23,269,535		598,919	

Sources: INSEE 2012, IEDOM 2013b (French Departments); COI, 2013

Notes: (1) the figure gives the official population of Mayotte, which also has a large number of illegal migrants from other of the Comoros islands.

The main indexes related to the population show a gap between Madagascar and Comoros on the one hand, and Seychelles, Mauritius and the French departments of the other end, as shown in Table 6-2. Madagascar's population growth is particularly high: almost 2 million in 1900, the population reached 5 million in 1958, 10 million in 1985, and 20.7 million in 2010. With an annual growth of 2.65 percent, it is estimated that the population of Madagascar will be approximately 23.7 and 35.3 million respectively in 2015 and 2030. This growth rate is relatively

higher than that of other sub-Saharan countries (2.4 percent on average) and of the Indian Ocean islands (except –the Republic of Comoros at 1.97 percent and Mayotte at 2.7 percent), and in the current context, it leads to increased pressure on natural resources and biodiversity.

Table 6-2: Key Population Indexes in the Hotspot Territories

	Rate of Population Growth (%)	Life Expectancy (years)	Less than 15 yrs old (%)	Over 65 yrs old (%)	Fertility Index	Urban Population (%)	Literacy (%)	Internet Users (%)	Human Development Index	GDP per capita 2013 (US$)
Seychelles	0.9	74	21.9	7.2	1.9	55	91.8	35.55	52	13,683
Republic of Mauritius	0.68	75	21.8	7.5	1.78	42	84.4	22.08	77	9,135
Réunion	1.3	78	25.2	8.8	2.48	76	88.9	-	14	21,024
Mayotte	*2,7*									
Comoros	1.97	60	41.6	3.1	4.09	28	56.5	3.29	163	928
Madagascar	2.65	64	43.1	3	4.96	30	68.9	1.41	151	458

Sources: COI, Annual Report 2012 except GDP per Capita Growth Rate of the Population
Per capita GDP: IMF, Data 2013 except GDP Réunion (2010);
Growth Rate of the Population: CIA World Factbook, 2013 (est.) except for Réunion and Mayotte (INSEE, 2012)

Ethnicity, Languages, and Religion

The questions of when the first settlers from Asia and the Pacific arrived in Madagascar, or when the East African Bantus arrived in the Comoros Islands before spreading on the coast of Madagascar, is still debated among the scientific community. Some archeological evidence suggests that Austronesian communities settled in Madagascar as early as 2,000 B.C., while other communities (Bantus, Persians of Shiraz, Arabs) arrived on the island from the middle of the first millennium.

The cultural richness of the Indian Ocean countries comes from the mixing of populations. Being a link between the islands, the Indian Ocean is an ancient maritime contact zone—a rich cultural venue for meetings and exchanges between European, African, Arab and Asian civilizations. From the 18th century on, slavery and slave trade shaped the islands' populations. Europeans had forced Africans and Malagasy people to develop the land. After the abolition of slavery by England and then by France, thousands of workers were recruited on the Indian coasts in the mid-19th century to work in the sugarcane plantations. Most of them have stayed. Then Muslim traders from Gujarat, Chinese from Canton, and others came. These successive waves of immigrants often led to a mixing of languages and produced a multiculturalism and multilingualism that are common in the region (taken from COI, 2012).

Linguistically, the former colonial languages (French and English) remain the official languages in all hotspot countries, but the recognition of the local languages and Creole increases (see

Table 6-3). In addition to the specific dialect of each ethnic group, Madagascar has its unique language, Malagasy, spoken and taught throughout the island; Malagasy was recognized as an official language in the 2010 Constitution.

Table 6-3: Diversity of Languages Spoken in the Hotspot

	Official Languages	Other Languages Used
Seychelles	English, French, Seychelles' Creole	
Republic of Mauritius	English	French, Mauritian Creole
Réunion	French	Réunionese Creole
Mayotte	French	Shimaore, Malagasy Dialects
Comoros	French, Arabic	Shikomor, Malagasy, Kiswahili, English
Madagascar	Malagasy, French	Malagasy Dialects

The various waves of settlement in the hotspot also left their religious mark. Christianity, coming from European colonization and migration, dominates Seychelles and Réunion, and is practiced by about half of Madagascar's population. Hinduism prevails in Mauritius (49 percent of the population) and is present in Réunion. Islam is the state religion of the Islamic Republic of Comoros, where 97 percent of the population practices Sunni Islam, also represented in Mayotte, in Madagascar (8 percent), and in Mauritius (17 percent). In Madagascar, the common cultural heritage, based particularly on respect for ancestors, is also ubiquitous without excluding the monotheistic religions (COI, 2012).

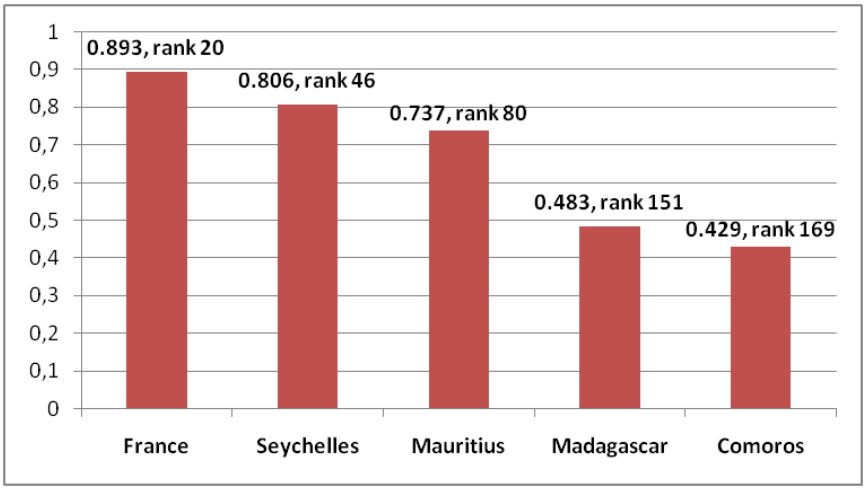
The Malagasy population counts 18 ethnic groups distributed throughout the country. However, the concept of indigenous people, in the sense of a minority population having different cultural, economic and social characteristics that differ from those of the dominant society, does not apply in this country. The preamble to the 2010 Malagasy Constitution further affirms the equality of citizens *regardless of region, origin, or ethnicity*.

6.2 Human Development

Human Development Index and Poverty

The human development index calculated by UNDP (see Figure 6.1 for 2012 data) shows a significant dichotomy between Madagascar and Comoros, the "least developed countries (LDCs)," Mauritius and Seychelles (countries of middle economics), and finally the French departments (even if the data shown concern the whole country and not only those departments).

Figure 6-1: Human Development Index 2012 and World Ranking for the Hotspot Countries



Source: UNDP, 2013. Note: 186 countries were classified by the UNDP for this year.

According to UNDP global reports, **Madagascar** had gained six positions in the world rankings between 2001 and 2005: its HDI rose from 149th to 143th (out of 177 countries at the time), and at that pointMadagascar was ranked among the countries with medium human development. It has fallen in the ranking since then, however, reaching the rank of 151st in 2011 (0.480 of HDI) and 169th in 2012 (0.482 of HDI). The HDI level is not uniform throughout the country. The poorest regions are Androy (0.393), Vatovavy Fitovinany (0.405), and Atsimo Atsinanana (0.406). At the national level, more than three out of four people (76.5 percent) lived below the poverty line in 2010, and more than one of two people (56.5 percent of the population or 11 million people) lived below the extreme poverty line (INSTAT, 2011). The rural area (62.1 percent of the population) is more affected by extreme poverty than the urban area (34.6 percent).

In **Comoros,** nearly 45 percent of the population lives below the poverty line, but the incidence of poverty varies considerably from one island to another. It is generally higher in rural areas and Anjouan.

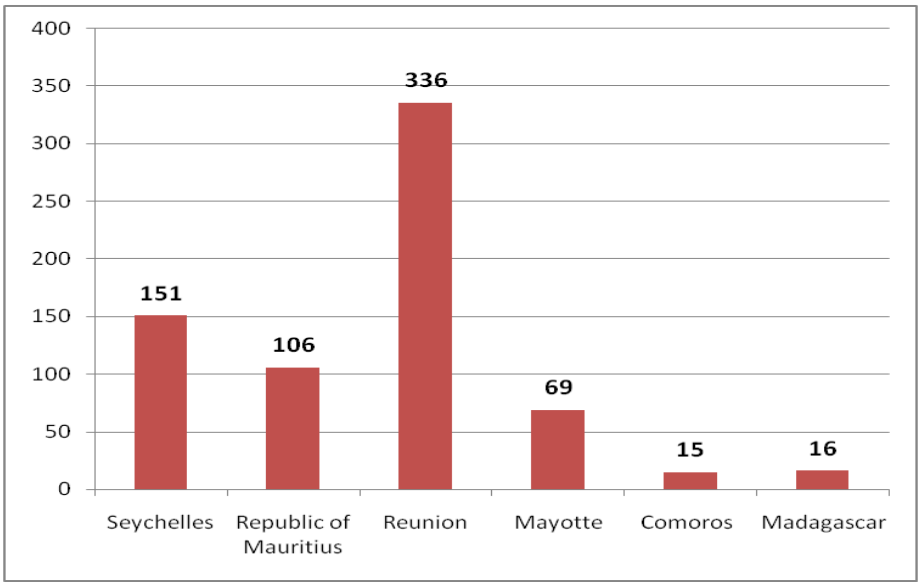
In other jurisdictions, the level of extreme poverty is low, and in no way comparable to the levels in Comoros and Madagascar. However, some segments of the population may be in precarious situations. The Mauritius traditional fishing communities, for example, face financial difficulties to access education, and their chances of entering the labor market in other sectors are thus limited; population growth leads to an increase of the fishermen's number, putting more pressure on coastal fish stocks (Sobhee, 2004).

The social security systems limit the level of absolute poverty in the French departments; and the standard of living in Mayotte has increased significantly (+ 87 percent between 1995 and 2005, INSEE 2010) while remaining significantly higher than the proportions of the other Overseas *Départements* or continental France (INSEE 2012; IEDOM 2013a). Half of the Réunionese lived in a household reporting an income of €10,140 during 2009. This median income keeps increasing but remains lower by almost half of that of metropolitan France (€18,355).

Health and Vulnerability to Pandemics

Access to health services is generally satisfactory in the Mascarene and Seychelles, while Comoros and Madagascar are among the least developed in terms of medical coverage (See Figure 6-2). Health expenditures did not exceed $19 per capita in Madagascar, compared with $510 in Mauritius, or $4,952 in the whole France (WHO, 2012).

Figure 6-2: Number of Physicians per 100,000 Inhabitants



Sources: WHO, 2012; ARSOI, 2012 for the French Departments (general figures + specialists)

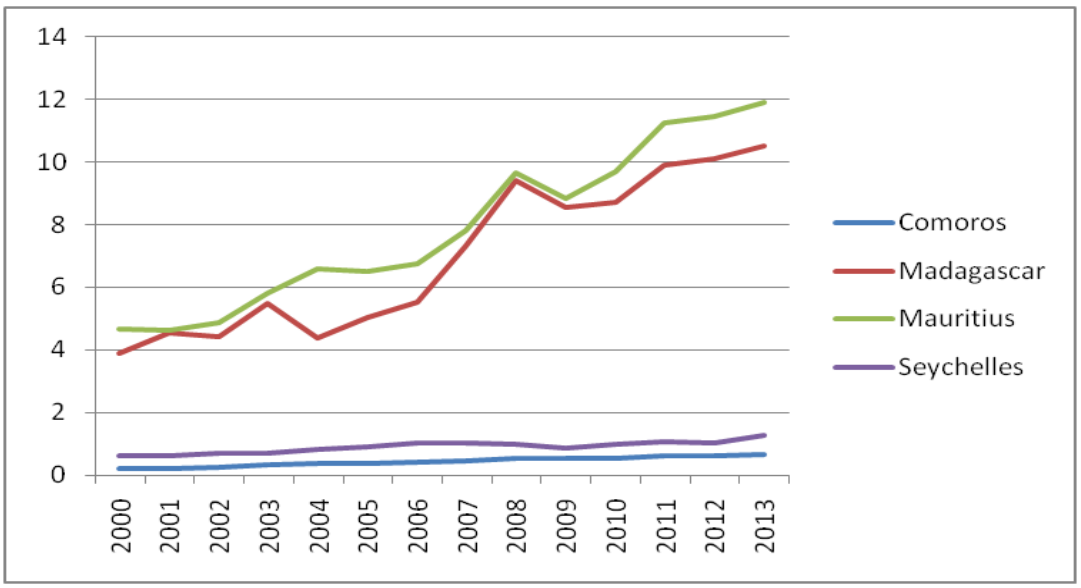
In this context, traditional medicine is an important element in Madagascar, with significant use of medicinal plants. This ecosystem service provided by plant biodiversity, though little studied today, is undoubtedly of great importance for people's well-being, especially in rural areas.

The western region of the Indian Ocean, at the crossroads of human and animal routes linking three continents (Africa, Europe, and Asia), is also an emerging area of pathogenic elements both for human populations as well as domestic animals or wild animals, affecting animal health and the economy, and generating conservation and biodiversity maintenance problems (Bastien, 2012). The hotspot region has recently experienced several pandemies (dengue, chikungunya, Rift Valley fevers, and West Nile virus). Factors facilitating the emergence of infectious diseases in this region include the proximity to territories where infectious agents are common—such as the East African countries for chikungunya *(Diallo et al.*, 1999) or Rift Valley fever (Bird *et al.*, 2007)—the frequent exchanges with three different continents, the presence of a diversified wildlife with a high rate of endemism as in Réunion (Kon-Sun-Tack, 2006), or ecological disturbances (Altizer *et al.*, 2011).

6.3 Economic Trends

Countries in the region have been hit by the financial and economic crisis since 2008, marked by a general slowdown in the economy. The decline in global activity has resulted in a tourism slowdown and a decrease in raw materials demand that have affected the economies of the region, including Mauritius. In Madagascar, these effects are combined with political instability.

Figure 6-3: Evolution of Gross Domestic Product, 2000-2013 (billion $)



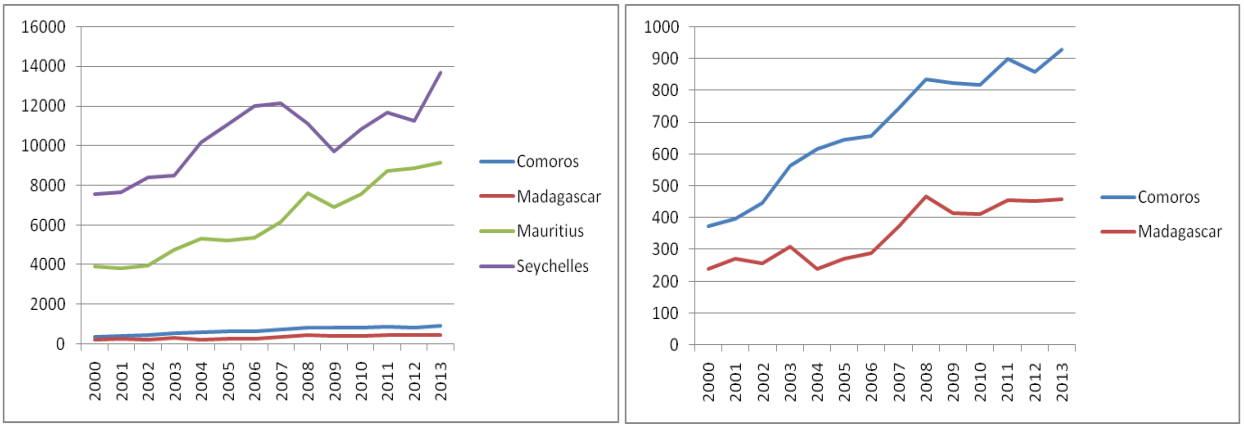
Source: IMF, 2013

Mauritius and Madagascar have experienced the highest growth rates over the last decade. The growth strategy of middle-income countries (Mauritius and Seychelles) is based on the development of foreign direct investment (FDI). The economic growth of these countries derives mainly from the service sector, namely tourism, information technology, communication, and other offshore services, or fisheries for Seychelles. The situation of La Réunion is characterized by low production activities oriented towards external markets. In addition, the small size of the local market and its permeability brings the local production into competition with imported products (Reunionese companies generally meet only half of the local needs). All productive activities provide only a quarter of the jobs on the island, where employment is dominated by public services, trade and construction.

Regarding the low-income countries (Madagascar and Comoros), the development strategy has long been dominated by the agricultural sector. The low added value of the agricultural sector explains the investment weakness in these countries as well as the low share of income distributed to its inhabitants. Recently, Madagascar has seen an increase in FDI development, especially in Export Processing Zones, which explains the relatively high growth during the last decade (5 percent per year). However, this growth remains fragile and dependent on political and economic crises. After an average growth rate of 6 percent between 2001 and 2008, the 2009 crisis has reduced the economic growth rate respectively to -3.3 percent. Even if growth resumed in 2011 (1.6 percent), it remains low compared to the average growth in Sub-Saharan Africa,

estimated at 5.3 percent by the International Monetary Fund (ILO *et al*, 2011). This increase is mainly due to FDI (mining industries, EPZ exports) and tourism resumption. As far as Comoros is concerned, the industrial sector is almost nonexistent and the economy is still dominated by the primary sector. Growth is consistent, but the GDP per capita remains very low.

Figure 6-4 Gross Domestic Product per Capita (in $) in the Hotspot Countries (all countries, zoom on the Least Developed Countries), 2000-2013



Source: IMF, 2013

6.4 Main Economic Sectors

Table 6-4: Main Economic Sectors of the Hotspot Countries and Territories

Seychelles	Mauritius	Réunion	Comoros	Madagascar
Tourism, Fishing	Sugarcane industry (sugar, rum), textiles, tourism, financial services	Construction and public works, trade, sugar, tourism, renewable energy, communications technology	Vanilla, cloves, ylang-ylang, peaches, subsistence agriculture	Textiles and clothing, tourism, seafood (shrimp), minerals, subsistence agriculture

Sources: inspired from IOC, 2013

Agriculture

Agriculture is the pillar of **Madagascar**'s economy: it employs 80 percent of Malagasy households, distributed over 2.5 million acres of farms, and accounts for 27 percent of the GDP and 47 percent of the primary GDP (MAEP, 2007; INSTAT, 2007). Although the farm area is small in size of agricultural land (on average 0.87 ha), the potential areas for crops, grazing and ranching are estimated at more than 35 million hectares. Despite its great potential, the poor performance of the sector is a major cause of rural poverty. This performance is attributable, among other things, to structural weaknesses, environmental degradation, use of traditional and low-intensity technologies, low use of agricultural inputs, low level of equipment, difficult access to land, exposure to natural disasters, and locust invasions.

Production of rice, the staple food, accounts for 70 percent of the total agricultural production. The country imports 5 percent to 10 percent of the national consumption. The System of Rice

Intensification (SRI) and the Improved Rice Cultivation System (SRA), advocated to significantly increase the production and the productivity, take only 0.34 percent of the area. Irrigated agriculture represents 70 percent of agricultural production and 88 percent of rice production (APRM, 2010), resulting in a strong dependence of the sector on water resources. In addition to subsistence farming are the export sectors (litchi, vanilla, cocoa) that inflow major currencies on a case-by-case basis, but very localized. Madagascar remains below its potential for various sectors (especially for essential oils, spices, fruits, and vegetables).

The expansion of the traditional slash and burn agriculture, called "Tavy", is a major cause of deforestation and biodiversity loss. Due to population pressure, lack of access to land, and land degradation in areas currently being exploited, the agricultural frontier continues to grow at the expense of primary forests, also in remote areas, in the high-altitude lands, and on hitherto spared steep slopes. This situation is particularly acute in the regions of Vatovavy Fitovinany and Atsinanana (MAEP, 2007). Land conversion for farming is also a major cause of natural habitat loss, especially in dry forest ecosystems and the xerotic scrubland of southern Madagascar.

Comoros' agricultural situation is similar to that of Madagascar in many ways: in the main economic sector, it contributes about 40 percent of the GDP and income comes essentially from exports. Agriculture employs 70 to 80 percent of the country's workforce. Ranching, the traditional and complementary activity to agriculture, is well developed, with ruminants and domestic poultry. A total of 234,000 head of livestock were recorded in 1996, of which three-quarters were sheep. An activity long considered as local level/subsistence, agriculture is in a transitional phase due to international support for various projects and programs. Producers have been encouraged to organize themselves into groups, and a National Union of Comoran Farmers (SNAC) has been formed to defend the producers' interests. Even so, progress remains slow and insufficient to generate adequate income for the growing rural population. Unsustainable practices and the expansion of agriculture and ranchingat the expense of the natural areas make this sector a major driver of biodiversity loss on the island.

In **Mayotte,** in the Comoros archipelago, agriculture is mainly a means of food self-sufficiency, for some basic commodities or additional income. Agricultural production is limited due to the small size of farming fields, a lack of training of most farmers, and the lack of efficient farming techniques and irrigation. Mahorais farmers are poorly mechanized, use little agricultural inputs, and are generally subject to land insecurity. A census conducted by the Food, Agriculture and Forestry Section (DAAF) in 2010 reported 28,578 people engaged in agriculture (only 2,500 primarily) on 15,700 farms, mainly for food crops and market gardening (IEDOM, 2013a), on a total of 7,092 ha. Plantations of some export crops (ylang-ylang, vanilla) were established during the colonial era. Some of these still exist on smallholder farms, and are now being worked by individual farmers, although these areas are in decline and the crops rarely exported (CCI Mayotte, *comm. pers.*, 2013). The agricultural area in **La Réunion** totals 45,152 ha. It is limited by the rugged terrain of the island. In 2010, 10,700 people were engaged in permanent agricultural labor, declining sharply over the last decade (-16 percent of permanent employees). Growing sugar cane is the mainstay of agriculture in Réunion (23,400 ha or more than half of the agricultural area), although family farming continues widely and other crops adapted to various altitudes of the island are diversified (vegetable crops, litchi, mango and fodder crops). Geranium and vanilla (140 producers on 187 ha), as well as sugar, are the main products for export.

Dominated by sugar cane farming for a long time, this industry in **Mauritius** is in decline, especially after the reforms of preferential trade agreements with the European Union. Once completed, it is expected that the sugar sector reform would have led to a decrease in workers involved in operations and field work by 7,200 people. In **Seychelles,** agriculture is economically marginal—it represents only 3 percent of the GDP of Seychelles (NSB, 2006). Production of copra oil from coconut used to be the only cash crop of economic importance, and now it is largely non-existent. Subsistence farming (vegetables and fruits), in some cases associated with poultry and some cattle, is still well represented. Cash crops (bananas, papayas, pineapples, vegetables and flowers) have continued to decline although contributing to the hotels' supply of fresh products.

Forestry

Forestry remains an important economic sector only in Madagascar, and to some extent in Comoros in the informal sector. In the Mascarene as in Seychelles, people marginally use non-timber forest products, but logging operations do not generate income, neither from timber nor from fuelwood (see section on energy). The business of timber production concerns but 3,000 ha of forest in Réunion, and 1,785 ha of this is of *Cryptomeria* (primarily under the management of the National Forest Office) and is generally in deficit. Mauritius' and Seychelles' forests are natural forests (dominated by exotic species but very important for water resources and biodiversity conservation) most often protected, located on the mountains, and are not used for production.

In Madagascar, on the contrary and despite rapid deforestation, 12 percent of the national territory, or 9 million hectares, is estimated to be covered by a range of forest ecosystems (e.g. dry forests, rain forests and azonal forests). Timber and non-timber products meet the daily needs of the growing population, and contribute to the livelihoods of 80 percent of the population. A 2001 study estimated the contribution of the forestry sector to the GDP at 20.5 percent, comprised of timber (9.9 percent), fuelwood (9.3 percent), CITES and Non-CITES plants and animal species (1.2 percent), and ecotourism (0.08 percent) (Ramamonjisoa, 2001).

Malagasy people have used medicinal plants since the very birth of the Malagasy society and each region has its own pharmacopoeia. In a country lacking modern medical services, herbs prescribed by traditional healers are used daily by people, especially in rural areas. This overwhelmingly informal sector remains little studied and its economic contribution at the national level has not been evaluated. The commercial exploitation of medicinal plants appeared later, with the arrival in Madagascar of the Colonial State.

For wood products, Madagascar's annual consumption was estimated in 2006 at 21 million m^3, 80 percent of which are for wood energy (JariAla *et al.,* 2006). In the mid-2000s, the government set an objective of reforesting 25,000ha/year, which was reached for the period from 2006 to 2008, but then dropped to 12,671 ha in 2009 (MEF, 2012). The forestry sector, despite efforts made for over several decades, is still dominated by informal operations, often illegal. Thus, many civil society actors have noted since 2009 the increase in illegal logging for precious woods, in particular rosewood *(Dalbergia spp.).* The promotion of the Forest Stewardship Council (FSC) system has been initiated by Initiative for Certifying Forest in Madagascar

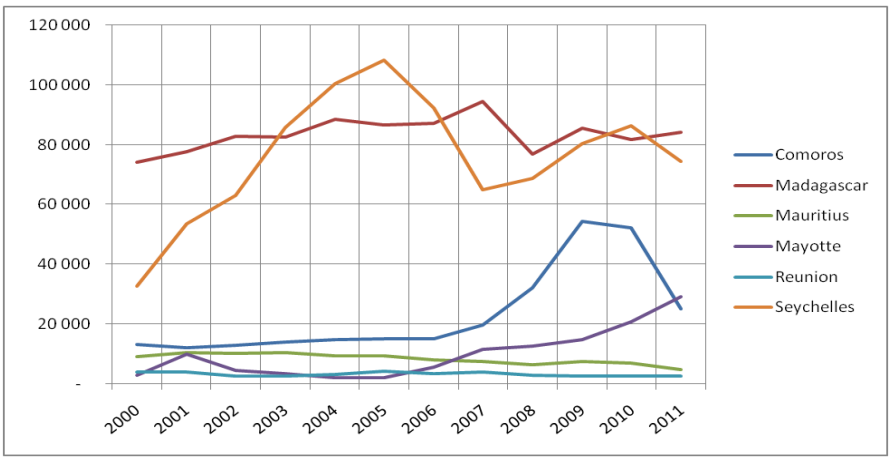
(ICFM), but this initiative is still in its infancy. The sustainable management of forest resources still remains one of the country's top priorities; according to a review initiated in 2010, forest governance remains significantly lower than the international standards (AVG, 2010).

In Comoros, industrial logging came to an end in 1987 after a century of operations. However, logging continues in the informal sector along the peripheral villages in forest areas. Some forests have been emptied of their valuable timber. It is difficult to estimate the importance of this operation due to its informal nature, but field observations verify that it is having a serious and permanent impact. Some endemic tree species have become rare or even unseen in some forests. For example, the forest in Grille (Grande Comore) was stripped of its mahogany *(Khaya comorensis).* Deforestation is largely due to the expansion of agriculture and the use of wood for energy.

Fisheries and Aquaculture

The fisheries sector is one of the economic pillars of the hotspot, especially in the region's islands. The traditional fishing activity provides a significant proportion of proteins to the populations, living obviously on small islands, but also in Madagascar where about 34 percent of the population lives within 100 km of the coast (REEM, 2012). Marine catches are between 200,000 and 250,000 tons of fish throughout the hotspot (see Figure 6-5).

Figure 6-5: Evolution of Fish Catches at Sea (T/year), 2000-2011



Source: FAO, 2013

In **Madagascar** alone, approximately 256,000 people work in the sector, 62,000 of which are direct jobs (including people seasonally engaged in fishing and aquaculture) (Andrianaivojaona, 2010). The situation is similar in **Comoros,** where fishing is a key economic sector and essential to food security in the coastal areas. However, unsustainable fishing methods are practiced by the traditional fishermen, such as dynamite fishing or use of poison like *Tephrosia candida*, in spite of the existing regulation (UNEP, 2008). These practices put at risk the sustainability of the local fisheries resources and are damaging to marine ecosystems, particularly coral reefs.

The fishery sector in **Mayotte** is dominated by a coastal fleet that is largely unmotorized and very informal (300 boats). Very few boats are equipped to go to the open sea and to preserve the

fish that they catch (IEDOM, 2013, Muller, 2013). The fishing fleet in Réunion is much more developed. Boats used for coastal fishing decrease in number in Réunion, while the number of those equipped for offshore and deep-sea fishing is twofold that of 2000—they mainly fish on territorial sub-Antarctic waters, outside of the territory covered by the hotspot.

In **Seychelles**, more than 15 percent of the total formal employment sector is based on the fishing industry, and the sector contributes from 10 to 30 percent of the GDP per year. Tuna fishing is the main fishing activity and Victoria Harbor is the largest port for landing tuna in the Indian Ocean (26 percent of the tuna catches in the Indian Ocean). Tuna fisheries alone account for the majority of the country's exports. A significant decline in tuna landings occurred after 2008 because of Somali piracy. International and local efforts to fight against piracy and systematic protection of vessels by guards or soldiers on board, however, helped to address this situation. In some years, fishing exceeds tourism in terms of annual revenues in foreign currencies (42 percent in 2010).

Fishing production in **Mauritius** is declining after reaching the peak in the mid-1990s. The government has actively promoted the seafood sector and offered a series of incentives to work on the vast exclusive economic zone of 1.9 million km^2, which is potentially rich both in terms of stock and commercial species diversity.

Aquaculture in freshwater and in brackish and marine waters has boomed in Madagascar since the 1990s. The shrimp industry (fishing and aquaculture) has been a promising sector and source of currencies (USD $106, 70, and 60 million respectively for 2007, 2009, and 2012, contributing to 9.24 percent, 7.15 percent, and 4.81 percent of the total exports in those years) (INSTAT, 2013). This operation represents an important source of local jobs and income for local people, but not without causing environmental problems, including clearing of mangroves to install the farms (ANGAP, 2007). The sector is currently going through a crisis because of the decrease in activity due to the appearance of white spot virus, and is struggling to remain competitive while oil prices increase. Shrimp production has decreased from 8,652 t in 2002 to 3,143 t in 2010.

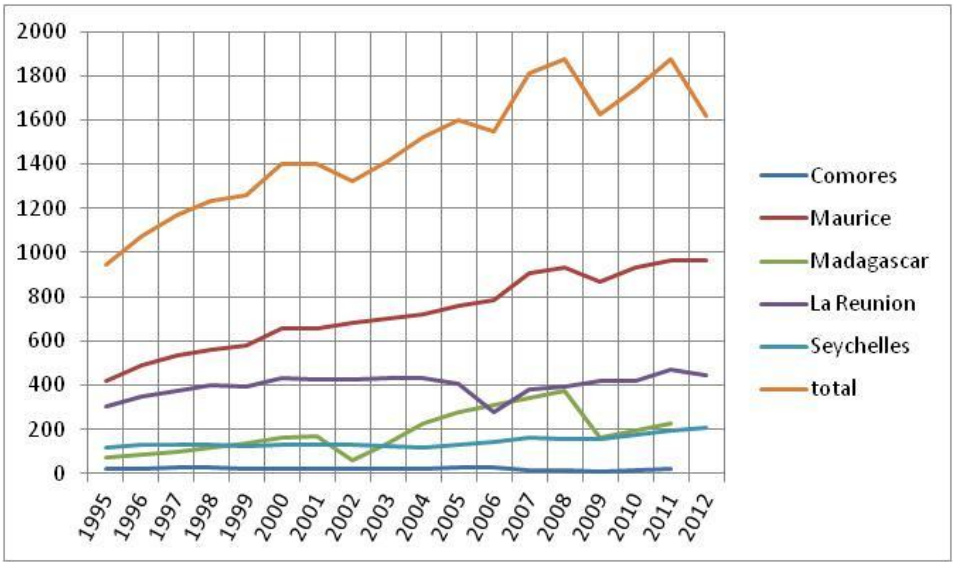
Tourism

Because of its climate and the natural beauty of the countries that compose it, plus its hotel infrastructure and hosting structures, the hotspot is a very popular tourist destination. More than 1.5 million tourists visited the hotspot annually over the past decade, reaching 1.62 million visitors in 2012 (see figures by country in Figure 6-6). The major tourist orientations differ among countries and territories: mass beach tourism in Mauritius; smaller scale and higher end tourism in Seychelles; sport, nature and family tourism in Réunion and Mayotte; and discovery and nature tourism in Madagascar. Natural heritage and biodiversity are major assets for seaside and nature tourism in the hotspot.

Mauritius, Réunion, Seychelles, Madagascar, Comoros and Mayotte Islands launched in 2010 the Vanilla Islands concept, with the objective of increasing tourism exchange between the islands, establishing a common marketing strategy based on the uniqueness of the Indian Ocean destination, and developing a tourist market benefitting from the variation and complementarity of the different experiences the region has to offer. In September 2013 the Maldives joined this

regional initiative, thereby increasing the potential to attract tourists to this part of the Indian Ocean islands.

Figure 6-6: Evolution of the Number of Tourists, 1995-2012 (in Thousands of Arrivals)

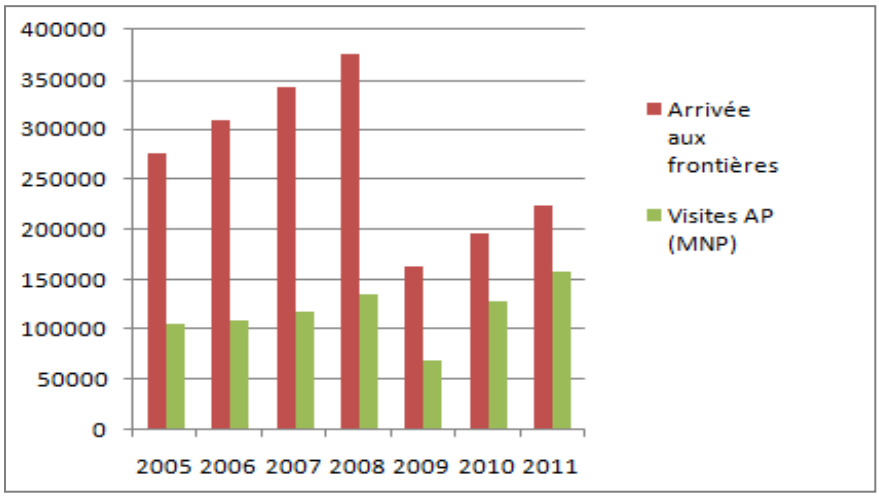


Sources: World Tourism Organization, Accessed on UN Data

Madagascar's tourism sector has experienced strong growth since the early 2000s, and in 2008 the tourism industry was the second largest source of foreign currency, after the shrimp industry, with USD $78 million (Ministry of Tourism, 2013). The socio-political crisis since 2009 and the rise of insecurity (MEF, 2012) have reduced by half the arrivals on the island. However, the sector still contributed 8 percent of the GDP (2012) and had the potential to create significant employment. In 2011, as the sector isslowly recovered, tourism alone generated 31,207 jobs (Ministry of Tourism, 2013).

Tourism is a very important source of income for protected areas and the riparian communities: in the context of the Rio Convention implementation, Madagascar has established a system managed by Madagascar National Parks that allocates 50 percent of the entry fees to finance development activities for the benefit of local populations. Tourism in protected areas is one of the country's strengths and it has held up relatively well during the recent political crisis, although the number of arrivals declined in 2011 to its 2008 level (see Figure 6-7). However, the nature tourism sector grew at a rate of 10 percent per year before the crisis, and employed 10 percent of the workforce, particularly benefiting women in rural areas (World Bank, 2011). But the potential for development has been severely affected by the crisis. Given its natural assets, namely the presence of an exceptional fauna and flora with a wide variety of landscapes and cultural wealth, the sector's performance is quite mitigated: Mauritius receives about five times the number of tourists of Madagascar. Among the factors limiting tourism in the hotspot are the distance from Europe, the USA, and Asia, which results in high transportation costs. In Madagascar and Comoros in particular, the lack of transport, communications, and hospitality infrastructure, as well as insecurity and political instability also hinder the development of tourism, harming the image of the islands on the international scene (MEF, 2012).

Figure 6-7: Number of Tourists and Entries in the National Parks in Madagascar (2005-2011)



Source: Ministry of Tourism, 2013 and REEM, 2012
Note: Red: Arrivals at the border; Green: Visits to Protected Areas managed by MNP

Tourism is one of the major economic sectors of **Mauritius**, contributing at 8.2 percent to the GDP, generating 35,000 direct jobs and 15,000 indirect jobs. The market is dominated by seaside tourism by European visitors (75 percent, mostly French), and from South Africa (13 percent) (Lallchand, 2013). Tourism has been important for more than 15 years and increased from about 420,000 visitors in 1995 to a little less than the expected 1 million in 2013 (Mauritius Statistics, 2013). The slowdown of regular visitors is offset by the emergence of Indian, Chinese and Russian markets in particular. The government has stated its commitment to attract 2 million tourists by 2015, investing therefore in new infrastructure, namely airports. The challenge of the island lies in preserving the environmental quality and the integrity of natural habitats for the sake of tourism industry development. **Rodrigues** aims to broaden the basis of its tourism projects and create more jobs in this sector. However, a study of the tourism development plan capacity (2002) concluded that the island's natural and physical resources are barely sufficient to support the resident population, suggesting the need for developing a niche.

Tourism is the main economic sector of **Seychelles**, representing 15 percent of direct jobs (40 percent including indirect jobs), contributing to 20-25 percent of the GDP and over 50 percent of foreign exchange inflows. Visitors reached 208,000 in 2012, an increase of 48 percent in seven years. The main markets are France, the United Kingdom, Germany, and Italy, representing 60 percent of total visitors to the country. The "Seychelles Strategy 2017" national policy recognizes tourism as one of the major engines of growth for economic development. The tourism operators may play a direct role in biodiversity conservation actions—especially on the privately managed islands—for example by funding programs eradicating invasive species and restoring habitats (Rocamora, *comm. pers.*, 2013).

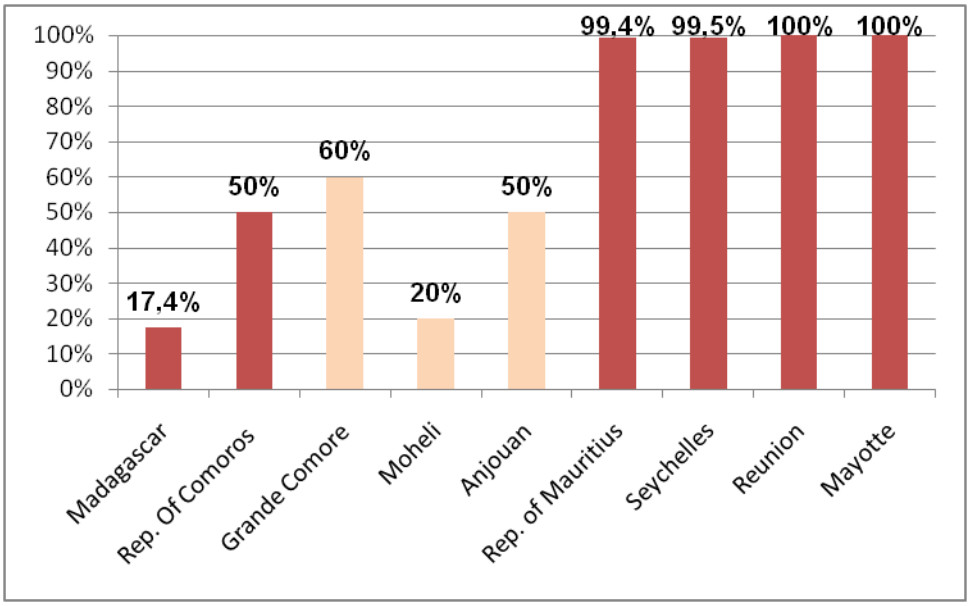
In 2012, Réunion received 446,500 visitors and Mayotte received 45,800, mostly from metropolitan France, and half of those visitors came for affinity reasons (visiting family or friends). In 2011, the sector represented 3.2 percent of Réunion's total employment, 7 percent of the assets, and 2 percent of the Mayotte salaried workforce (IEDOM 2013a; CCI Mayotte,

comm. Pers. 2013). Outdoor sports activities (hiking, surfing, diving) are an important part of tourism and are therefore directly related to natural environmental quality. Only in Mayotte have hiking trails (146 km) and thematic paths (24 km) been identified (Muller 2013). Mayotte is currently the most touristic island of Comoros, while tourism remains very low in the Comoros Republic islands.

Energy

On energy issues, the hotspot countries are clearly divided into two groups. The first, composed of Mauritius, Seychelles, Mayotte and Réunion, has relatively high levels of per capita energy consumption, excellent access to electricity by the population and a heavy dependence on imported fossil fuels. The policies of these countries/territories are aimed at developing renewable energies. In the second group, composed of Comoros and Madagascar, energy consumption is lower, access to electricity is lower, especially in rural areas, and their people depend heavily on fuelwood and charcoal to meet their energy needs (see Figure 6-8).

Figure 6-8: Electrification Rate (% of households)



Sources: International Energy Agency, 2013 (Madagascar, Mauritius), World Bank, 2013b (Comoros), ESMAP, 2013 (Seychelles).

Table 6-5: Fuelwood and Charcoal Production in the Hotspot, by Country

Charcoal Production (tons, FAO Estimates)						
	2007	2008	2009	2010	2011	2012
Madagascar	989,100	1,028,500	1,067,880	1 194 970	1,194,970	1,186,806
Comoros	36,400	37,500	38,572	39,710	40,804	41,928
Réunion	14,654	14,682	14,709	14,709	14,731	14,725
Mauritius	300	300	50	50	50	50
Seychelles	0	0	0	0	0	0
Fuelwood Production (m^3, FAO Estimates)						
Madagascar	13,100,000	13,100,000	13,100,000	13,100,000	13,100,000	13,044,951
Comoros	245,026	251,789	258,750	265,913	272,740	279,754
Réunion	31,000	31,000	31,000	31,000	31,000	31,000
Mauritius	3,000	3,000	1,700	4,000	2,200	2,000
Seychelles	3,160	3,160	3,160	3,160	3,160	3,160

Sources: FAO Statistics Division, 2013.

In Madagascar, the wood (and charcoal) energy sector represented 92.64 percent of the energy sources used by the Malagasy population in 2011, against 7.36 percent for imported oil products. Renewable energies made up only a very small portion of the country's energy sources (WWF *al*., 2012). Charcoal production places significant pressure on forest resources, owing to increasing energy needs arising from population growth and persistence of non-efficient practices. Even in urban areas, charcoal is used by 17.1 percent of households. Production is carried out by thousands of coal producers scattered across the island (INSTAT, 2011; Montagne *et al.*, 2010). Data on fuelwood consumption are less available for Comoros, but the situation seems comparable. Wood energy comes from pruning fruit trees, secondary formations (coppice type of guava, invasive species) in peri-urban areas, but also in natural forests. Charcoal production, once produced only from coconuts, tends to spread to other species. Since 2000, an FAO report highlighted the unsustainable use of wood products and the need to develop and disseminate improved stoves and alternative energy (Abdourahaman, 2000).

Madagascar has significant potential to produce solar and wind energy, as well as bioenergy. Currently however, alternative energy production is very low. Various pilot projects and initiatives are being carried out, but scaling up is quite difficult (GT-CC, 2011; WWF *et al*., 2012).

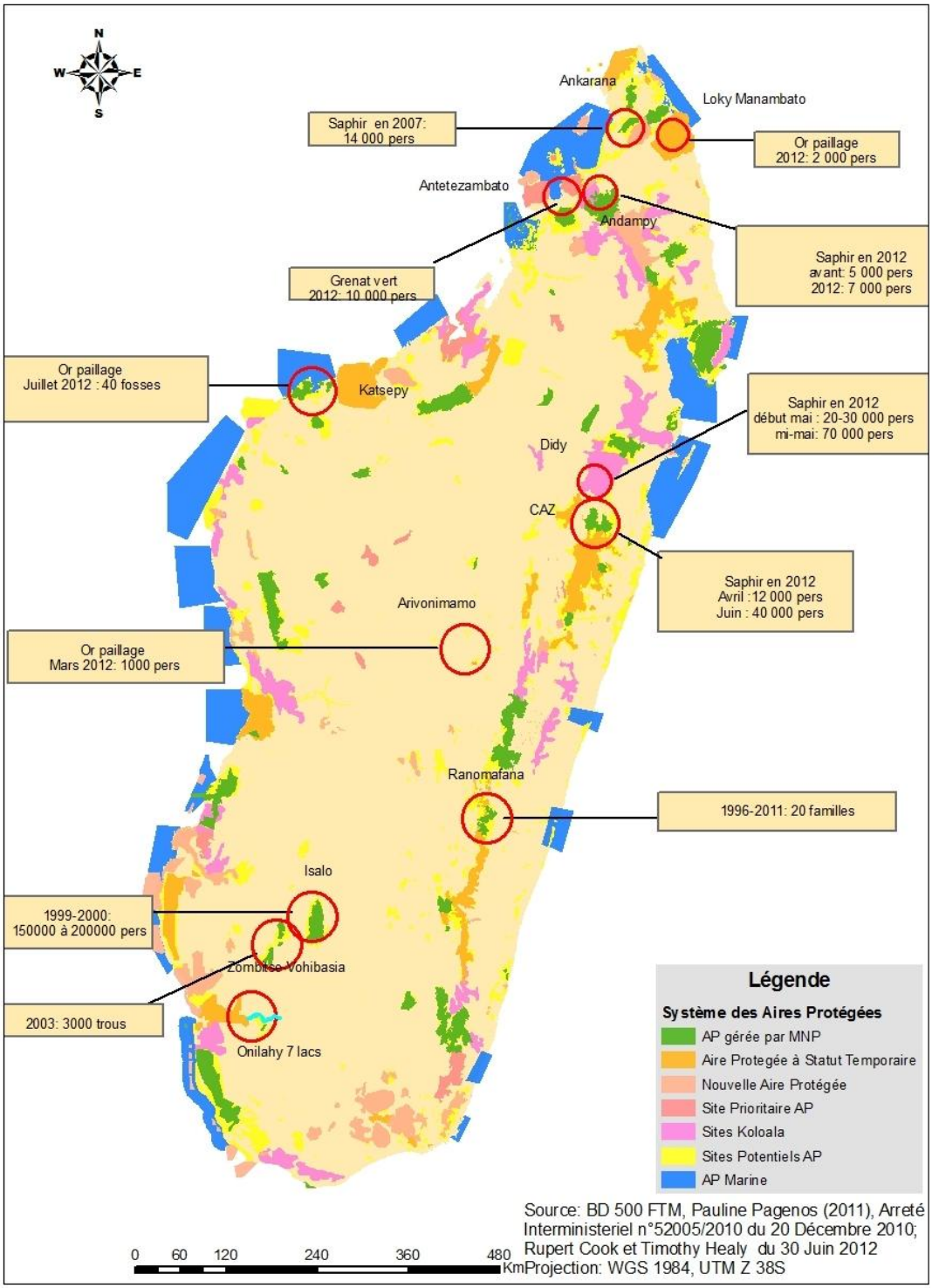
On the other Indian Ocean islands, the dependence on fossil fuels remains high: the energy share of fossil fuels for electricity production is at 98 percent in Mayotte, 74 percent in La Réunion, 79 percent in Mauritius, and over 90 percent in the Seychelles (CEMER, 2013 ESMAP, 2013). However, in a context of rising oil prices, each of these countries tends to develop policies aimed at greater energy independence, focusing on biomass, hydro, solar, wind, or even geothermal or tidal sources. The implementation of these infrastructures for energy production requires great vigilance to ensure that they do not jeopardize the survival of certain species.

Extractive Industries

Madagascar is rich in mineral deposits (e.g. bauxite, iron, limonite, precious stones). However, the sector's contribution to the GDP is presently less than 1 percent (REEM, 2012). In the past, mining was mainly focused on small-scale operations (gold, semi-precious, and precious stones) but the country is going through a transitional period, with the development of industrial production, illustrated by several big projects: ilmenite mining by QMM in the Anosy Region (southeast), the nickel-cobalt mining by Ambatovy, where production began in 2012, or the production of chromium by Kraoma. With these big investments, the sector's contribution could increase the GDP by 15 percent in the coming years (World Bank, 2013). For many years, the sector has been the country's main source of foreign currency (through industrial operations). About 500,000 people work in this sector, and these are for the most part artisanal miners or employed to wash gold (World Bank, 2010).

Mining activities can be classified in three categories: large-scale mining as mentioned earlier, artisanal small-scale mining with little or no mechanical equipment, and finally mining that responds to a "mining rush" in which individuals or small groups of miners take advantage of a mining opportunity. Activities carried out with extreme rapidity following the discovery of minerals are informal and often illegal, resulting in social, economic and environmental disasters. These include, for example, deforestation, water pollution, conversion of ricefields, spontaneous creation of villages, school drop-off of children, and sexual exploitation. Figure 6-1 below presents some of the most important gold and precious stones rushes affecting protected areas since the mid-90s (most recent data 2012). The western part of the country has experienced the most impact from this phenomenon.

Figure 6-1: Most Important Gold and Precious Stone Rushes in Madagascar Having Impacted Protected Areas (1995-2012)

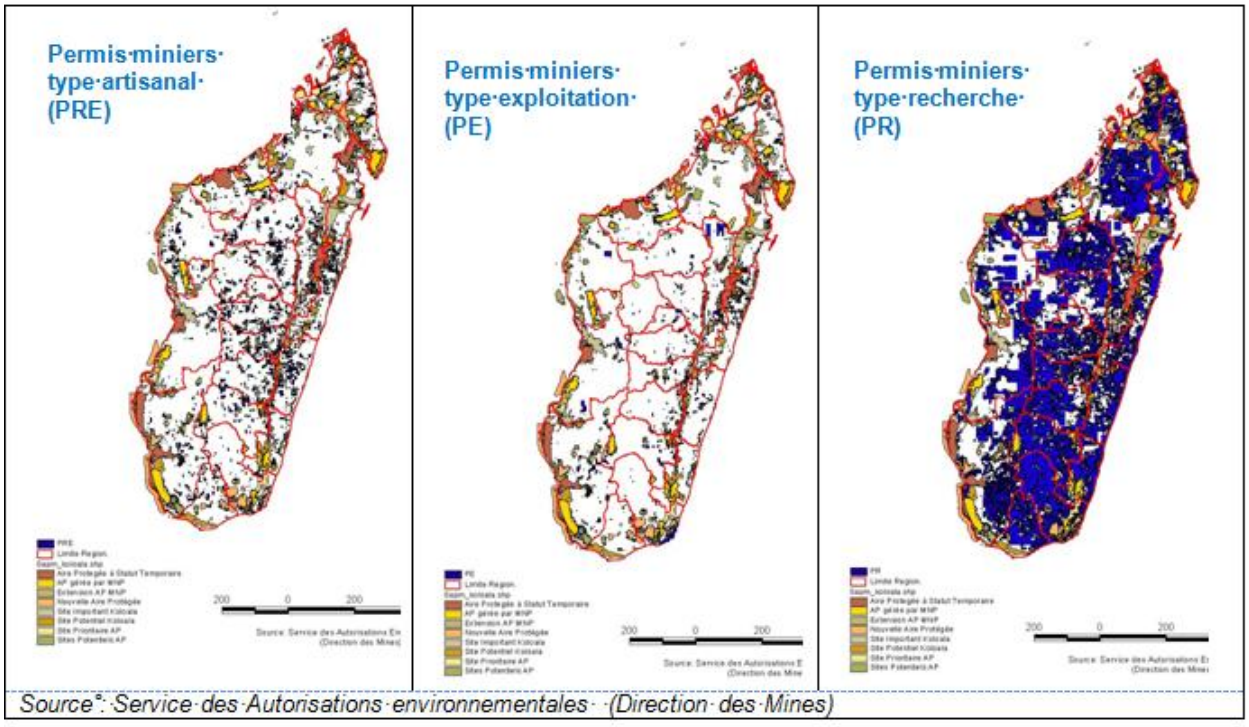


Mining obviously poses risks to natural resources and biodiversity. Individual and small-scale mining activities, often in the informal sector, are difficult to control and their direct and indirect impacts on the environment can be significant. Industrial mining is better controlled, but its size

also entails major risks for the regions. The mining sector is the first sector in which each step (research and exploitation) is subject to a study of environmental impacts—for both artisanal and industrial operations. However, the means available to the structures and the authorities in charge of monitoring and control are limited.

A current issue of importance lies in the overlap of some legal mining permits within the protected areas. Fifteen sites are concerned. An Interministerial Committee was set up to redefine the protected areas and the mining permits. Some overlaps also exist between mining permits and the protected areas under temporary status.

Figure 6-2: Legal Mining Permits and Protected Areas in Madagascar



There is no oilfield in the hotspot yet, but exploration licenses have been issued by some countries (Madagascar, France and Seychelles). As in mining, overlap problems between potential oil blocks and terrestrial and marine protected areas exist in Madagascar and may arise (mainly offshore) in other countries.

7. POLITICAL CONTEXT

This chapter provides an overview of the political situation in the hotspot. It presents an analysis of national policies and legislation, the strategies pertaining to key development sectors as they relate to biodiversity conservation, and of international and regional conventions related to poverty, natural resource management, and biodiversity conservation.

7.1 Historical Context

The political power in Madagascar was traditionally organized around many small kingdoms. Having dominated the neighboring kingdoms by the end of the 18th century, King Andrianampoinimerina strengthened the Imerina kingdom whose capital was the current Antananarivo. His son Radama I took over and extended the domination of the Imerina Kingdom to almost the whole island, creating the de facto first Malagasy State. He and his descendants would be recognized by the European powers as the rulers of Madagascar. In 1896, France colonized Madagascar which became independent in 1960.

In the Comoros, initially inhabited by Bantu from the coast of the African mainland, the first sultanates were established by Arab-Persian Chirazians around the 15th century, when the fleet of Mohammed bin Haissa arrived. The political power was then divided into many small sultanates, constantly evolving due to alliances, wars, and marriages. In the 16th century, the Malagasy raids were frequent, mainly to take back slaves for trade, Comoros was then an important hub for Arabs and Europeans traffickers. A Malagasy Sultanate settled in 1830 in Moheli and Mayotte. Some sultans sought protection from the French King Louis XIII. Mayotte became a French protectorate in 1841 and Anjouan in 1866. Grande Comore, unified by a sultan with French support, became a protectorate in 1886, foreshadowing the creation of the French colony "Mayotte and dependencies" in 1892. In 1973, a self-determination referendum was held, during which the Comoros was in favor of independence with the exception of Mayotte. The Comoros Republic has been unilaterally declared in 1975. Mayotte remains *de facto* a French overseas territory, , a situation that has not been recognized by the Comorian state.

The other Indian Ocean islands were not inhabited (or not permanently) before the arrival of European sailors (Portuguese, Dutch, British and French) in the 16th century. Mauritius, Réunion, and Seychelles, due to wars and agreements, were either under the British crown or French domination. Mauritius and Seychelles became independent from the United Kingdom in 1968 and 1976, while Réunion became fully a French department; this island is part of the European space as an outermost region of the European Union. Scattered islands, uninhabited, were once related to the French colony of Madagascar and are now overseas French territories administered by French Southern and Antarctic Lands (TAAF). This situation is disputed by some States in the region.

Table 7-1: Key Events and Milestones in the Political History of the Indian Ocean Islands

Country	Main Historical Events and Milestones
Mauritius	1598 - 1710: Dutch Occupation 1715-1810: French Colony 1810-1968: British Colony 1968: Independence
Comoros	1866: The Sultan of Anjouan asked for French protectorate 1912 - 1946: French colony and attached to Madagascar 1947: Administrative autonomy vis-à-vis Madagascar 1958 - 1975: Overseas French Territory 1975: Independence (except Mayotte)
Mayotte	1832: Conquest by Madagascar's Sultan Andriantsoly 1841: French protectorate after the sale to France 1946: French Overseas Territory 2011: French Department Overseas
Seychelles	1756: Taken by France 1770: First French settlements 1814: France ceded Seychelles to Great Britain 1903: British Colonial 1976: Independence
Réunion	1642: Taken by France under the name of Bourbon Island 1810-1814: British Occupation 1946: French Overseas Department
Scattered Islands	From the 15th century: progressive discoveries of the islands and description by European navigators Early 20th century: Gradual integration in the French colonial empire 1960: Placed under the authority of the Réunion Prefect 2005: Placed under the authority of the French Southern and Antarctic Lands (5th District)

7.2 Political Status and Territorial Organization Principles

Madagascar is a semi-presidential Republic with a bicameral legislature system composed of a National Assembly of 160 representatives elected by direct suffrage and of 90 senators elected by local legislators in the context of a multiparty system. The country is organized into 6 provinces, 22 regions, 118 districts, 1,549 communes, and 17,433 Fokontany. The regions and municipalities enjoy a certain form of autonomy due to a decentralization policy. The Fokontany or Fokonolona represents the village community. The regime was led during the 2009-2013 period ("transition period") by Andry Rajoelina after a declaration by the High Transitional Authority Supreme Court President in March 2009. The recent period (2009-2013) has been marked by the non-recognition by a part of the international community of the transitional government, a concomitant reduction in international aid, and a slowdown in many activities of the economic sectors (in addition to the global financial crisis consequences). Presidential elections, to be followed by parliamentary elections have been held in 2013, leading to the election of Hery Rajaonarimampianina, proclaimed by the special electoral court on the 17th of January, 2014.

Comoros is a Federal Muslim Republic whose President is both the president and head of the government. The legal system is based on Muslim law, inspired by the French code and traditional customs (*mila na ntsi*). Each of the islands has a large autonomy within the federation, and has its President and its parliament. The Constitution provides that a representative of each

of the islands takes the office of the Federation Presidency in turn every four years; the current President being Ikililou Dhoinine.

Seychelles is a Republic whose president, elected by universal suffrage for 5 years, is both president and head of the government. The current President, James Michel, was reelected for a second term in 2011. The Parliament consists of 34 deputies. The multiparty system was reinstated in 1991. The inner islands, the most densely populated, are divided into 25 districts (including 22 in Mahé, the capital island), while the outer islands are not part of any district.

The Mauritius Republic is based on a democratic parliamentary system, in which the President and Vice-President are elected by the National Assembly. The Prime Minister is the head of the government. The legal system is based on the British system while conserving some influences from the French codes. Following the adoption of an autonomous status in 2002, Rodrigues has a Regional Assembly of 18 members, who appoints a Chief Commissioner acting as head of the local government. The outlying islands of Mauritius (including Agalega and St. Brandon) are under the responsibility of the Ministry of the Local Governments and the Outer Islands.

Réunion and Mayotte are French Overseas Departments; Mayotte acceded to this status in 2011 after a local referendum. These islands are part of the French territory and subject to the national legislation. Réunion is both a Region and a Department, and is composed of 24 municipalities; some intermunicipalities also exist with five communities of agglomeration. These different administrative levels play a role in the territorial planning and manage some natural areas. Mayotte, composed of 17 municipalities, is both a Region and a Department, a single assembly competent for both levels of government. Réunion and Mayotte are also European Outermost Regions (ORs) and are therefore part of the European Union (Mayotte has acquired that status on 1st January 2014).

The *Iles Eparses* (or Scattered Islands), which are not permanently inhabited (only scientists and military staff are based there), were attached in 2005 to the authority of the French Southern and Antarctic Lands. These islands, overseas territories, are not part of the European Union. These territories are the subject of territorial disputes whether with Madagascar (Mozambique Channel Islands), or with Comoros (Glorious), or with Mauritius (Tromelin).

7.3 Policies, Strategies, and Environmental Legislation in Madagascar

Administrative Framework for the Environment

- The Ministry of Environment and Forests (MEF) defines the national environmental policy, ensures its implementation and integration in the country's economic development. The Ministry supervises administratively and technically some bodies, including:
    - *Madagascar National Parks* (MNP), an associative structure that manages a network of 52 protected areas of categories I, II and IV;

- the Office of the National Environment (ONE),a Public Industrial and Commercial Institution (EPIC) ensuring the role of a unique interlocutor for guidance and approval of environmental impact assessments;
- the National Association of Environmental Actions (ANAE) and the Supporting Service for the Management of the Environment (SAGE), associative structures involved in the fields of the environment, the development, and community capacity building.

An environmental unit is placed within each Ministry to ensure environment consideration in policies, programs, and projects of the concerned sector. The effectiveness of these units varies according to the Ministries.

Pursuant to the decentralization and deconcentration (PN2D) national policy established in 2006, the MEF established 22 Regional Directions of Environment and Forests (DREF) to ensure that forest and environmental policy is implemented at the regional level, in collaboration with the decentralized Regional and Local Authorities, the private sector, civil society, the communities, and the technical services of the central government.

The decentralization of the natural and forest resources management is one of the major reforms initiated in the sector. One of the successes is the application of the natural resources management transfer that allows the legal management transfer empowering local grassroots communities who have voluntarily requested it. This decentralization has also led to a better participation of the municipalities in environmental management. However, a major challenge to make decentralization effective is the capacity and resources of the various regional actors.

In implementing the country's environmental policy, several spaces for discussion, exchange and cooperation have been established at different levels (national, regional, and local). Civil society organizations (NGOs, associations, grassroots communities) have been invited to participate. Civil society is active in 12 of the 15 identified structures. Civil society organizations, as protected areas "promoters", are expected to play a role as manager/ co-manager in some protected areas that are not part of the MNP network (see below).

Statement on the National Environmental Policy - NEP (2010)

The Environmental Charter (Act no. 90-033 of 21 December 1990, amended by Acts no. 97-012 of 6 June 1997 and no. 2004-015 of 19 August 2004) is the legal basis of the Plan for National Environmental Action, PNAE. This plan is divided into three environmental programs: PE1 (1990 to 1995/96), PE2 (1996/97 to 2004) and PE3 (2004 to 2009/10), the latter is extended to the current transition. PE3 has resulted in a Statement on the National Environmental Policy, drafted by the Ministry of Environment and Forests. This statement defines that the PNE aims at improving the livelihoods of the population in urban and rural areas and should lead to the adoption of a Malagasy Environment Charter (under development), and programs of action.

National Strategy for Biological Diversity

In implementing the Convention on Biological Diversity, Madagascar adopted its national biodiversity management strategy and action plans (2002-2012). Madagascar is currently

preparing its 5th Communication and updating the biodiversity management strategy and action plan (SNPAB).

Madagascar also has specific strategies and plans for conservation of some species such as for amphibians (the amphibian conservation program in 2008, the strategy and plans for the conservation of *Mantella aurantiaca* species in 2008-2015), or for primates (lemur conservation strategy for the period of 2013-2016).

Local Communities Involvement in Sustainable Use of Natural Resources, Management Transfers

Public participation in environmental management is stipulated in the Malagasy Constitution. The Environmental Charter adopted in 1990, specifies the forms of public involvement in environmental management. It consists of two components: (i) the transfer of competencies such as the transfer of natural resource management, the protected areas management, and (ii) the contribution to decision-making through environmental management instruments such as the environmental impact study.

The first legal instrument establishing the local management of renewable resources is the 1996 law called GELOSE (Gestion Locale Sécurisée or the Secure Local Management) concerning forest, fisheries, land, and sea resources (Bertrand *et al.*, 2009). This law establishes the principle of Natural Resources Management Transfer (TGRN). The law was enforced from 2001, when the decree on Contractualized Forest Management (CFM) was published. In addition, the national strategy for reforestation (MEF, 2004) provides for the involvement of actors other than the State in its implementation. Reforestation can be initiated by grassroots communities, farmers' association, families/ individuals, local associations, and NGOs, as well as the municipalities in view of increasing the forest cover, as well as watershed protection related to agricultural areas, or for energy needs.

For marine resources, only pelagic fish, octopus, and crabs are transferable resources, but shrimps and lobsters are excluded as these are considered to be as strategic resources. Local communities, the private sector and NGOs are more generally involved in the establishment and management of marine resources through the Locally Managed Marine Protected Areas (Le Manach *et al.,* 2013). The management transfer of pastoral resources is governed by Decree 2005-001, while discussions are underway for the management transfer of beaches and coral reefs (GTZ, 2008). The sustainable development Policy on coastal and marine areas (Decree 2010/137) promotes the sustainable development of coastal and marine areas by implementing integrated management. It involves a participatory planning process where plans and drawings must indicate the boundaries of the coastal zone values and conditions for allocating and using concerned land and marine areas. The local communities are also involved in planning, as well as in the implementation and monitoring.

Policies and Legislation on Protected Areas

In 2003 Madagascar had 46 protected areas covering an area of 1.6 million hectares. The management of all the sites was entrusted in 1991 to the National Association for the Management of Protected Areas called Association Nationale pour la Gestion des Aires Protégées (ANGAP), which later became the ***Madagascar National Parks***. The State has

transferred its protected areas management prerogative to a private law association (Decree 92-591). The Board of Directors consists of nine members and is chaired by the Minister of Environment or his representative. Six board members are recruited according to their specialties and two are elected by the General Assembly. Through its members, the Association is thus dedicated to the protection of ecosystems in protected areas, scientific research, environmental education, and to generating income for protected areas through ecotourism. The association also promotes equitable benefit sharing to assist with in the development of regions and villages surrounding the protected areas.

Further, Madagascar has a Management Code for Protected Areas (COAP). This law establishes three categories of protected areas: the Integral Natural Reserve (INR), the National Park (NP), and the Special Reserve (SR). In accordance with the Environmental Charter, these three categories form the Terrestrial, Marine, Coastal, and Aquatic Protected Areas Network. Its management is entrusted to *Madagascar National Parks* (Decree 98-164 in application of the Charter Environment).

During the Parks World Congress in Durban in September 2003, the Malagasy Government had pledged to triple the size of Madagascar's protected areas, bringing this area from 1.7 million hectares in 2003 to 6 million hectares in 2012, raising the coverage to at least 10 percent of the national territory. As part of the implementation of the Durban Declaration and the Madagascar Naturally Vision, a *System of Protected Areas of Madagascar* (SAPM) was put in place (Act 2008/028 pending enactment). To implement this goal, new categories of protected areas have been created: the Natural Park, the Natural Monument, the Harmonious Protected Landscape, and the Natural Resources Reserve (Decree 2005-848). The objectives of these New Protected Areas (NPA – or NAP under their French acronym) are to complete the representativeness of the national protected areas network managed by MNP, to protect species that are currently outside of this national network, to preserve viable populations of key species, to contribute to ecological corridors maintenance, to preserve important ecosystems and habitats, and to support the sustainable valorization/ management of natural ecosystems. This legal framework provides an opportunity for participation by actors other than the state and MNP in managing and governing the protected areas (local communities, associations and NGOs, private sector, and local authorities). The SAPM includes the National Protected Areas Network and the NPA managed by MNP. However, its implementation has fallen during the 2009 political crisis and some provisions are still not implemented. The vast majority of NPA is currently under temporary protection status.

The present situation in terms of the status and extent of protected areas in Madagascar is presented in the Table 7-2.

Table 7-2: Status of Protected Areas in Madagascar

	Surface (ha)	Number
Protected Areas Within Madagascar National Parks network	2,823,999	52
New Protected Area Having received official gazettement	371,217	1
New Protected Areas Under temporary protection status	2,005,768	26
New Protected Area under creation included in Arrêté interministériel Nº 9874 from 6 of May, 2013 issuing a global temporary protection status for sites within the Madagascar Protected Area System	898,380	34
Other Protected Areas included in Arrêté interministériel Nº 9874 From 6 of May, 2013 issuing a global temporary protection status for sites within the Madagascar Protected Area System	642,764	31
TOTAL	**6,742,128**	**144**

Policies and Legislation on Environmental Impact Assessments

Article 10 of Madagascar's Environmental Charter, adopted in 1990, calls for the establishment of a legal framework for environmental impact studies. It is implemented by Decree 99-954, amended by Decree 2004-167 on rendering investment compatible with the environment, known as the MECIE Act. The MECIE process considers the participation of various actors in environmental management decision-making. The process includes a step for evaluation of the EIA by the public, thereby allowing for participation by civil society.

Policy on Research and Integration of Science in Decision-Making

Since 2013, Madagascar has a National Scientific Research Strategy, which was developed to meet the new needs of sustainable development, in which the fight against poverty plays a major role. Given the strengths and natural potential of Madagascar and its location in terms of development, the strategy emphasizes the valorization of natural resources based on green technology and clean energy, and on management methods appropriate for the population (MESupRes, 2013).

7.4 Presentation of the Political and Legal Environment Framework in Other Countries and Territories

For these countries, additional information on political and legal environment is provided in the country summaries, available on www.cepf.net.

Mauritius

The Ministry of Environment and National Development Unit is the main ministry for territory planning and environment at large. It is directly involved in environmental protection by identifying environmentally sensitive areas, and administering environmental impact assessments (EIAs) and activities to reduce pollution. It assumes the role of national focal point for the Convention on Biological Biodiversity.

The Ministry of Agro-Industry and Food Security is also extremely important in the management of natural resources, as this ministry supervises:

- the Forestry Unit, responsible for the management of state forest lands, whether planted or natural forest, this unit principally manages the natural reserves;
- the National Park and Conservation Unit, established in 1994, is responsible for terrestrial biodiversity protection and preservation, and management of national parks.

A National Commission on the Environment, chaired by the prime minister, manages the work of the Ministry of Environment and the National Development Unit by setting national goals for environmental protection. However, this inter-ministerial body is not currently very active. The advisory board of national parks and wildlife and the council for the natural reserves are consultative structures, bringing together actors beyond administrative services, advising the Ministry of Agro-Industry on issues related to fauna, national parks or reserves. Other informal advisory committees exist, such as the committee on invasive alien species and the committee for threatened endemic plants.

In Rodrigues, organizations involved in biodiversity conservation are under the supervision of the chief commissioner's office (Environment Unit, Division of Forestry and Marine Parks) or the office of deputy chief commissioner (Unit for Water Resources, Agriculture, and Food Production and Quarantine Services). In addition to the environmental impact assessment studies (EIA), all decisions pertaining to environmental issues can be made independent of the central government of Mauritius.

Some nature reserves, such as the islands called Ile aux Aigrettes or Ile Ronde in Mauritius, are co-managed with NGOs such as the Mauritian WildLife Foundation, or with companies with a mix of public and private investors, like Discovery Rodrigues on Coco Island. Some private entities also play a very positive role in nature conservation by establishing private reserves and engaging in active policies of habitat restoration and endangered species conservation (e.g. Vallée de Ferney and Vanille Reserve in Mauritius, François Leguat Reserve in Rodrigues) in collaboration with the Mauritian WildLife Foundation, the University of Mauritius, and the international scientific community.

Some of the PA types that exist in Mauritius such as Pas Géométriques, Mountain Reserves or River Reserves have loose protection that did and do not stop natural habitat transformation. These therefore include non-native and much degraded habitats. For example, the *Pas Géometriques* is narrow coastal belt of state-owned land around the island, theoretically 250 French feet (81.21 m) in width, but in reality narrower or non-existent. The conservation value of undeveloped land within the *Pas Géometriques* areas is limited. Such is the case for some of the declared river reserves or mountain reserves. However, there are still large areas with remaining good quality native vegetation on Mauritius that are without protection or are on areas with weak protection (e.g. mountain reserves).

A tentative classification of current PA of the Republic of Mauritius using the IUCN categories of the different terrestrial PA of Mauritius and Rodrigues was done recently (Baret *et al*. 2013), and revealed that the total PA in Mauritius is 87.9 km^2 or 4.7 percent of the land area, and it is only 0.7 km^2 or 0.6 percent of its land mass for Rodrigues.

Table 7-3: Protected Areas (in km^2) and Percent of Land Area per the Six IUCN Categories

IUCN category	Ia		II		III		IV		RAMSAR		UNESCO/BIO	
	km^2	%	km^2	%	km^2	%	km^2	%	km^2	%	km^2	%
Mauritius	0.8	0.04	74.5	4.0	5.0	0.3	7.6	0.4	0.5	0.03	35.9	1.9
Rodrigues			0.1	0.1	0.2	0.2	0.4	0.3				

Source: Baret et al.,2013

In Mauritius, some landowners are weeding out alien plants from their areas in order to conservation the native forest. Some of these private reserves were set more than 30 years, as is the case of Mondrian, which was created for conserving a endemic hibiscus (*Hibiscus genevii*) that previously was thought to be extinct. Currently, these private reserves are not considered legally protected areas. An overview of the protected areas network, not considering the private reserves managed by small landowners, is provided in Table 7-4 below.

Table 7-4: Existing Protected Areas in the Republic of Mauritius

Name	Type	Manager	Area (ha)
Black River Gorges	National Park	NPCS	6,574.00
Bras d'Eau		NPCS	497.00
Perrier	Nature Reserve	Forestry Service	1.44
Les Mares		Forestry Service	5.10
Gouly Pere		Forestry Service	10.95
Cabinet		Forestry Service	17.73
Bois Sec		Forestry Service	5.91
Pouce		Forestry Service	68.80
Corps de Garde		Forestry Service	90.33
Vallee d'Osterlog	Endemic Garden	Vallee d'Osterlog Endemic Garden Foundation	275.00
Rivulet Terre Rouge Bird Sanctuary	Ramsar Site	NPCS	26.00
Pointe d'Esny Wetland		Forestry Services	22.00
TOTAL – MAURITUS MAINLAND			**7,594.00**
Pigeon Rock	National Park	NPCS	0.63
Ile d'Ambre		Forestry Service	128.00
Rocher des Oiseaux		NPCS	0.10
Ile aux Fous		NPCS	0.30
Ile aux Vacoas		NPCS	1.36
Ile aux Fouquets		NPCS	2.49
Ilot Flamants		NPCS	0.80
Ile aux Oiseaux		NPCS	0.70
Round Island	Nature Reserve	Forestry Service/NPCS/ MWF	168.84
Ile aux Serpents		NPCS	31.66
Flat Island		Partially leased (disputed in court)	253.00
Gabriel Island		Partially leased	42.20
Gunner's Quoin		NPCS	75.98
Ilot Mariannes		NPCS	1.98
Ile aux Aigrettes		MWF	24.96
Ile de la Passe	Ancient Monument	National Heritage Foundation	2.19
TOTAL – MAURITIUS ISLETS			**735.19**
Plantations – varied	*Pas Géométriques*	Forestry Service	226.00
Leased for grazing and tree planting		Forestry Service/Private sector	230.00
Unplanted, protective or to be planted		Forestry Service/Private sector	179.00
Varied	Mountain Reserve	Forestry Service/Private sector	3,800.00
Varied	River Reserve	Forestry Service/Private sector	2,740.00
Mondrain	Private Reserve	Medine SE/MWF	5.00

Emile Series	*(no legal status)*	Medine SE/Royal Society of Arts and Science of Mauritius	8.00
Ebony Forest (Chamarel)		BCM Ltd Mauritius	39.00
TOTAL – MAURITIUS MISCELLANEOUS PROTECTED AREAS			**6,592.00**
Blue Bay Marine Park	MPA/Ramsar site	Ministry of Fisheries	353.00
Balaclava	MPA	Ministry of Fisheries	485.00
Port Louis	Fishing Reserve	Ministry of Fisheries	330.00
Black River		Ministry of Fisheries	780.00
Grand Port-Mahebourg		Ministry of Fisheries	18300.00
Flacq-Poste Lafayette		Ministry of Fisheries	600.00
Trou d'Eau Douce		Ministry of Fisheries	570.00
Riviere du Rempart- Poudre d'Or		Ministry of Fisheries	25400.00
TOTAL – MAURITIUS MARINE			**46,818.00**
Grande Montagne	Nature Reserve	Forestry Service/MFW	13.76
Anse Quitor		Forestry Service/MFW	10.34
Francois Leguat Giant Tortoise and Cave Reserve	Private Reserve	BCM Ltd Mauritius with support of MFW	20.00
TOTAL – RODRIGUES MAINLAND			**44.10**
Ile aux Cocos		Forestry Service/MWF	15.00
Ile aux Sables		Forestry Service/MFW	8.00
TOTAL – RODRIGUES ISLETS			**23.00**
South East Marine Protected Area (SEMPA)	MPA	Ministry of Fisheries	4300.00
Rivière Banane	Marine reserve	Ministry of Fisheries	150.00
Anse aux Anglais		Ministry of Fisheries	150.00
Grand Basin		Ministry of Fisheries	1410.00
Passé Demi		Ministry of Fisheries	720.00
TOTAL - RODRIGUES MARINE			**6730.00**

Seychelles

The Ministry of Environment and Energy plays an important role in environmental protection and planning for sustainable development. Through various mechanisms and tools, it regulates and controls the pollution and the negative impact of human activities. Additionally, it encourages the population to adopt positive behavior toward the environment. The MEE is also responsible for implementing the country's commitments to the Convention on Biological Diversity.

Many parastatal organizations play important roles in nature protection issues:

- *The Seychelles National Parks Authority (SNPA):* the national parks authority, which manages the protected land and marine areas (national parks and equivalent), with the exception of the reserves and special reserves (among which Aldabra, Aride and Cousin Islands special reserves)

- *The Seychelles Fishing Authority (SFA):* the authority in Seychelles for fisheries: management of fisheries and fisheries reserves.

- *The Seychelles Islands Foundation (SIF):* Association managing two reserves declared as UNESCO World Heritage: Aldabra (more than 30 percent of Seychelles areas), and the Vallée de Mai. The members of the Board of Directors are composed of scientists and local and foreign dignitaries, and are appointed by the president of the republic.

- *The Islands Development Company (IDC):* The company oversees management and development of the outer governmental islands (except Aldabra and D'Arros-St. Joseph) and the Silhouette Island.

The Society for Island Development (IDC) and the Ministry of Environment and Energy has a memorandum of understanding with the Foundation for the Islands Conservation *(Island Conservation Society),* a nongovernmental organization that serves as environmental advisor with SDC and acts as protected areas co-manager or manager under the authority of foundations grouping together the ICS, IDC, MEE, SNPA, and economic partners operating on these islands (hotel managers, villa owners, local population, national heritage). The foundation approves the management plans and related budgets, with funds coming mainly from the economic partners, the IDC, local and international donors.

ICS and Nature Seychelles (a local NGO partner of BirdLife) manage the special reserves of Arid Island and Cousin Island (which respectively belong to ICS UK and BirdLife). The private islands often host high-end tourist establishments and play an important role in biodiversity conservation in the Seychelles. In collaboration with the NGOs and the MEE, they conduct ecosystem restoration programs (eradication of introduced invasive species such as rats and cats, replanting native trees), and reintroduction of endangered species.

Réunion and Mayotte

Environmental governance is exercised in both French departments by institutions depending on the central, regional, departmental and communal levels; but each has special powers. Management of national parks and reserves is the responsibility of the central administration (Ministry of Environment), represented on each island by the Directions of the Environment, Land and Housing (DEAL). The departmental level (General Council) is responsible for the policy of Sensitive Natural Areas, funded by building permit taxes. The municipalities play an important role in territory planning by preparing local urbanization plans, which can have significant impact on the protection of the areas.

The public forest areas are managed by the Office of the National Forestry (ONF), a public institution with industrial and commercial characteristics under the responsibility of the Agriculture Ministry. The Conservatoire du Littoral, a public administrative institution, is in charge of the protection and land management of coastal spaces entrusted to it or assigned by public or private owners.

NGO involvement in nature conservation has developed significantly over the last 20 years in Réunion, and recently in Mayotte. Some NGOs are (or have been) associated with the management of protected sites, such as the Naturalists of Mayotte, the Société d'Etudes Ornithologiques de la Réunion (SEOR) and the SREPEN in la Roche Ecrite, or the National Botanical Conservatory of Mascarin on some lands belonging to the Conservatoire du Littoral in Réunion and in Mayotte. The *Iles Eparses*, or Scattered Islands, are under the jurisdiction of the Prefect for the French Southern and Antarctic Lands (TAAF), whose headquarters are located in St. Pierre of Réunion. Some research and nature conservation programs are developed in collaboration with the University of Réunion and various scientific bodies (CNRS, IFREMER, IRD) as well as with NGOs (ARVAM, Kelonia).

The creation of the Réunion National Park in 2007 (covering 40 percent of the island) marked an important step, reinforced by the recent nomination of the '*Pitons, Cirques et Remparts de la Réunion*' to the UNESCO World Heritage List. In Mayotte, the gazettement of the Nature Reserve of Mbouzi Island in 2007 (managed by the Naturalists NGO of Mayotte) and of the

Marine Park in Mayotte created in 2010 are positive developments, as is the creation of the ornithological association GEPOMAY (Group for Birds Study and Protection in Mayotte). Many village associations in Mayotte, grouped in the Mahoran Federation of Environmental Associations, and naturalists clubs in most colleges, work on environmental protection.

More details on environmental governance are given in the country summary profile (in prep.).

7.5 International Conventions and Regional Agreements

International and Regional Conventions on Environment in Force in the Hotspot

Error! Reference source not found. summarizes the main international and regional environmental conventions in which hotspot countries participate. The rate of international conventions ratification is particularly high. However, active participation is sometimes limited by the human resources allocated by governments, especially for small island states. Effective implementation may also be limited by financial resources available to governments, particularly for Madagascar and Comoros.

Table 7-5: Participation of the Hotspot Countries in the Main International and Regional Biodiversity-Related Conventions

	Madagascar	France	Mauritius	Seychelles	Comoros
Conventions, international agreements and initiatives					
Convention on Biological Diversity (CBD)	X	X	X	X	X
Convention on International Trade of Endangered Species (CITES)	X	X	X	X	X
United Nations Framework Convention on Climate Change (UNFCCC)	X	X	X	X	X
United Nations Convention on the Fight against Desertification	X	X	X	X	X
Convention on Migratory Species Conservation	X	X	X	X	
Convention on Wetlands of International Importance, RAMSAR	X	X	X	X	X
UNESCO Convention concerning the Protection of World Cultural and Natural Heritage	X	X	X	X	X
Cartagena Protocol on Biosafety	X		X	X	X
International Treaty on Phylogenetic Resources for Food and Agriculture	X	X	X	X	
International Whaling Commission		X			
United Nations Convention on the Law of the Sea (UNCLOS)	X	X	X	X	X
United Nations Forum on Forests (active members)	X	X			X
United Nations Action Program on Sustainable Development of Developing Small Islands (Barbados Action Program)			X	X	X
International Coral Reef Initiative	X	X		X	
Conventions, Agreements, and Regional Initiatives					
Convention for the Protection, Management, and Development of the Marine and Coastal Environment of the Western Indian Ocean Region (Nairobi Convention)	X	X	X	X	X
International Convention on the Conservation of European Wildlife and Natural Habitats		X			
African Convention on Nature and Natural Resources Conservation, called Alger's Convention	X		X		
African Conference of Ministers of the Environment	X		X	X	X
Libreville Statement on Health and Environment	X				
Memorandum of Understanding on the Conservation and Management of Marine Turtles and their Habitats in the Indian Ocean and in the South East Asia Area	X	X	X	X	X

Sources: Websites of Conventions and NBSAP of countries, compilation CEPF.

Regional Cooperation Organizations

As a result of colonial history, the waves of settlements and recent political history, the different hotspot states are members of various regional and international cooperation organizations. Their involvement on these different mechanisms affects their economic and environmental choices.

Table 7-6: Regional/International Cooperation Organizations and Affiliation of Hotspot Countries

	Seychelles	Mauritius	France	Comoros	Madagascar
Indian Ocean Rim Association	2011	1995	(1)	2012	1996
Common Market for Eastern and Southern Africa (COMESA)	2001	1981		1981	1981
Southern African Development Community (SADC)	1997	1995			2005(2)
Commission of the Indian Ocean	1984	1984	1986	1986	1984
Commonwealth of Nations	1976	1968			
International Organization of the Francophone Countries	1976	1970	1970	1977	1970(2)
European Union			1951		

Sources: Organizations' Websites, accessed in 2013. Compilation CEPF.
Notes: (1) Observer State (2) Madagascar is suspended from these organizations during the current transition period

The Indian Ocean Rim Association brings together states bordering the Indian Ocean from Australia, Indonesia, or India to the African coastal states. Its focal areas are organized around six major themes: maritime safety, fisheries management, trade and investment, tourism, scientific cooperation, and disaster management.

The Common Market for Eastern and Southern Africa, known by its English acronym COMESA *(Common Market for Eastern and Southern Africa),* is an international organization with a regional focus in East Africa which aims at creating a custom union of the twenty member countries. The Southern African Development Community, known by its English acronym SADC *(Southern African Development Community),* has a program on natural resources management, focusing in particular on fisheries, forestry, wildlife management, and trans-boundary protected areas.

The Indian Ocean Commission (COI), an intergovernmental organization created in 1982, brings together all hotspot states. Its principal mission is to strengthen the friendship and solidarity ties between the peoples of countries in the Indian Ocean area and to build regional sustainable development projects, to protect, improve livelihoods, and preserve natural resources on which they strongly depend (COI, 2013). One of these five strategic axes is environment and climate change, including a regional program on biodiversity (see **Error! Reference source not found.**), with a budget of € 15 million allocated for 2013-2017, part of which is accessible to the civil

society (see also Chapter (see also chapter 7 section 5) The COI also conducts activities on tourism industry, renewable energy, or fisheries (SmartFish program).

Table 7-7: The COI Biodiversity Program

Main Objective	It contributes to regional integration by managing a more effective, coherent, coordinated, and adaptive use of biodiversity, in accordance with the priorities and with the international and regional agreements for sustainable development and promotes sustainable livelihoods.
Specific Objective	It develops and strengthens national and regional capacities to manage the direct and indirect use of coastal, marine, land that are specific to each island for sustainable biodiversity conservation sake.
Fields of Intervention	
1	The policies, the legal and institutional frameworks on biodiversity use are strengthened, harmonized, and established across regions.
2	Educational, awareness, communication, and information tools on biodiversity use management are developed, improved, and used by decision-makers at regional, national, and community levels.
3	Improved systems for networking and data exchange, statistics and information relating to biodiversity are established.
4	Topical centers on biodiversity are created (or strengthened) to serve as platforms for information and best practices exchange on sustainable use of biodiversity.
5	The biodiversity contribution to sustainable economic development and sustainable livelihoods is sustained or enhanced through the calls for proposals mechanism and a special grant program.

The International Organization of Francophone Countries, grouping together 77 countries around the world, hosts the Institute of Francophone Countries for Sustainable Development, which seeks to strengthen the capacity and professional skills, and to disseminate quality information in French on environmental issues. Although the Commonwealth organization, which brings together 53 countries which used to be part of the British Empire, has no specific environmental program, its charter includes environmental issues and sustainable development. Technical collaborations between members, expert forums are regularly held to support the small island states in some international negotiations.

8. CIVIL SOCIETY OVERVIEW

This chapter aims to give a general picture of the civil society situation and its capacity for the entire hotspot. The focus is on the associative structures, but information is also provided on the research organizations and the private sector, which are considered by CEPF as part of the civil society. Owing to the difference in size and information between Madagascar and other countries and territories, the first section focuses specifically on this country. The situation on the other islands of the hotspot is presented in the second part - which deals very briefly with the French departments where CEPF has no authority to intervene in terms of funding. A third section considers regional collaboration within the hotspot. The final section provides a summary and the regional findings.

8.1 Civil Society and Conservation in Madagascar

Overview of Civil Society in Madagascar

In 2013, according to current statistics, 680 NGOs and associations are registered with the Ministry of Population, 30 percent of which are partially or fully involved in the field of environment. More than half (54.85 percent) are based in the capital (Ministry of Population, 2013).

According to the audit initiated in 2011 by CIVICUS, the main weaknesses of the legal framework are obsolete and inadequate laws governing civil society. The audit also found lack of knowledge or even ignorance, on the part of CSOs themselves, of civil society regulations and fundamental values. Consequently, (i) breach of apolitical feature from the associations, (ii) non-compliance with legal forms is frequently observed - for example, some associations operate like cooperatives or economic interest groups (CIVICUS *et al.*, 2011b).

According to surveys conducted in 2011, it appears that civil society has a good reputation in Madagascar: 84.4 percent of the population trusts them. In terms of self-assessment of their impact, only 28.7 percent of CSOs said that civil society in general has had a tangible impact on local / national policies in the country, while 39.7 percent of CSOs advocated for the adoption of a policy (CIVICUS *et al.*, 2011c).

Despite the population's trust, nearly half of the CSOs find that the social impact of CSOs' interventions in general has not turned out as well as they might have (53.8 percent). Areas where these impacts are noticeable are social development, education, and health. The audit also highlighted the weakness of cooperation between the government, CSOs, and other stakeholders, as well as low citizen's mobilization and low civic engagement across the country (CIVICUS *et al.*, 2011c).

The majority of national civil society organizations (associations and NGOs at all levels - local regional, and national) is facing a funding problem. To carry out their mission, CSOs depend largely on international financial partners to carry out their operations (CIVICUS *et al.*, 2011d). The financial situation of many organizations has worsened because of the political situation between 2009 and 2013, and the suspension of several cooperation programs.

International NGOs Working on Biodiversity Protection

International NGOs in Madagascar work at different scales by the presence of antennas at national, regional, and local levels and the development of partnerships with national civil society organizations and other small NGOs / international associations.

Table 8-1: Major International Organizations Active in Conservation in Madagascar

Conservation International	CI	Collection and analysis of data on biodiversity and environmental services. Support to the creation and management of Protected Areas. Training experts in conservation. Capacity building of partner organizations (from associations and local communities to national and international organizations). Support for the definition and implementation of environmental policy in the country
Blue Ventures	BV	Focus on marine biodiversity. Scientific expeditions and monitoring with support from international volunteers. Support for local projects of fishery resources management, of locally managed marine protected areas.
BirdLife International	BL	No presence in the country, but support for its national partner organization - Asity. Identification of Important Areas for Birds Conservation (ZICO)
Durrell Wildlife Conservation Trust	Durrell	Support for community-based sites management, strengthening local organizations. Focus on critically endangered species (birds, turtles)
Union International pour la Conservation de la Nature	UICN	No presence in the country (regional office in Nairobi). Support for the definition of prioritization tools (Red Lists, KBA). Participation in and information on regional issues (invasive species, payment for environmental services)
Missouri Botanical Garden	MBG	Focus on plant conservation. Identification of Important Areas for Plant Conservation. Collection, analysis, and dissemination of botanical data. Support for site management and capacity building.
Muséum National d'Histoire Naturelle	MNHN	Scientific expeditions (Atimo Vatae, 2010, treetop raft, 2001), biodiversity data collection and analysis (flora and fauna, marine areas). Training in partnership with the Universities of Antananarivo, Toliara, and Mahajanga. Site management: bio-cultural pilot project in Antrema.
The Peregrin Fund	TPF	Focus on raptors. Support for community conservation programs, for backup programs of species safeguarding. Training and research.
Royal Botanical Gardens, Kew	RBG	Support for the implementation of the Durban Vision and the Global Strategy for Plant Conservation. The work covers: taxonomic and systematic research in botany, species and habitats conservation with a focus on plant species.
Wildlife Conservation Society	WCS	Support for the conservation of Madagascar's unique flora and fauna. Training for protected areas managers, educating local community on forests and marine ecosystems protection.
World Wide Fund for Nature	WWF	Biodiversity preservation on priority land and marine landscapes with support for the system of Madagascar's protected areas and sustainable management of natural resources.

These organizations are also involved in building the capacities of individuals and national organizations, with various training and capacity building initiatives (e.g. WIO-COMPAS supported by WCS and WWF, and the Program of Network Educators and Professionals of Conservation (REPC), supported by *the American Museum of Natural History*, Durrell, CI, and WCS).

In general, the main international NGOs work in collaboration with national and local organizations, and communities. These organizations manage and are associated with programs and projects related to conservation or sustainable management of natural resources, including projects related to protected areas.

NGOs and National Associations

NGOs and national associations perform critical functions in the sector. They work in the creation and management of protected areas, inventories, ecological monitoring and evaluations, research, alternatives activities to deforestation, awareness campaign and training, natural resources development, capacity building, natural resource management transfer, as well as mobilization and social structuring. These national organizations most often intervene as implementing agencies for various projects of technical and financial partners (government, international NGOs, bilateral and multilateral donors or foundations). The proximity of national NGOs with the local population has woven links between these two actors and fostered a better understanding of environmental and social problems leading to innovative approaches or projects.

Table 8-2: Main National NGOs and Associations in the field of Environment in Madagascar

Acronym	Name of the organization	Main activities
ACCE	Arongampanihy Communication Culture Environnement	Conservation of fruit-eating bats of Madagascar and other endemic species, through research, education and communication
AED Action	Association des Etudiants en Didactique en Action	Multidisciplinary organization with a focus on environment and sustainable development through research, sensitization and communication
AIFM	Association des Ingénieurs Forestiers de Madagascar	Professional association of Forestry Engineers, working on protection and sustainable use of forests
AIM	Association Intercoopération de Madagascar	Development organization supporting rural communities in their social and economical development, and strengthening their role as active stakeholders for the development of the country
AJE	Association des Journalistes Environnementaux	Professional association of journalists in the field of environment, working on advocacy and sensitization of the Malagasy population
ANAE	Association Nationale Pour l'Action Environnementale	Promotion of community driven natural resources management, with focus on territorial planning
Ankoay		Improvement of the livelihood of the members, contribution to rural development and protection of the environment
APMM	Association des Populations de Montagne du Monde ou Tambohitravo Malagasy	Improvement of the livelihood of the communities of the mountainous areas, through improvement of their rights on land and land management
APPA	Association des Pêcheurs et Producteurs d'Alevins d'Andapa	Protection of the environment, in particular in mainland freshwater, and protection of endemic fish
ARSIE	Association Réseau du Système d'Information Environnemetale	Network for the production of environmental metadata, introduction of information sharing policies and practices, and capacity building on database management
ASITY	ASITY	Preservation and valorization of biodiversity, for Man and Nature to live in harmony
AVG	Association Voahary Gasy	Network (plateforme) for advocacy, information sharing, capacity building and social innovations
BCM	Biodiversity Conservation Madagascar	Conservation of biodiversity in some specific sites in Madagascar
CEL	Centre Ecologique Libanona	Training center on environment and biodiversity conservation

CETAMADA	Idem	Protection of the Indian Ocean marine mammals and promotion of related ecotourism
DELC	Development and Environmental Law Center ou Mizana Maitso	Creation of a legal framework for a balance between natural resources conservation and economic development
Fanamby	Fanamby	Biodiversity conservation and sustainable human development based on a regional approach of environmental problems in priority areas
FAPBM	Fondation pour les Aires Protégées et la Biodiversité de Madagascar	Foundation for the sustainable funding of conservation activities in Madagascar
Fondation Tany Meva	Fondation Tany Meva	Mobilization of financial resources to promote sustainable management of the environment and to contribute to the global challenges, though the engagement with local communities
Foniala	Foniala	Protection of the Environment and improved natural resources management for a sustainable development
GERP	Groupe d'Etude et de Recherche sur les Primates de Madagascar	Research on lemurs and their habitats and advocacy for recognition of their importance in the economic development strategy of the country
GSPM	Groupement des Spécialistes de Plantes de Madagascar	Representing the IUCN Plan Specialist Group in Madagascar, to revise the conservation status of plants and promote their protection
Koloharena	Koloarena	Network of Farmers' Association promoting sustainable and improved agriculture for the benefit of the environment
LRA	Laboratoire de Recherches Appliquées	Multidisciplinary organization with a focus on environment, forestry and development
MATE	L'Homme et l'Environnement	Sustainable development and biodiversity conservation through the engagement of local communities in poverty
Ma-Voa	Madagasikara Voakajy	Provide support for the conservation of endemic mammals in line with the national environmental policy
MBP	Madagascar Biodiversity Partnership	Protection of forest where lemurs are present, while improving the livelihood of the population dependent on natural resources
MICET	Madagascar Institut pour la Conservation des Ecosystèmes Tropicaux	Participation to the environmental program Ranomafana and conservation actions in other sites in the areas of Vatovay Fitovinany, Haute Matsiatra, Amoron'i Mania and Atsimo Antsinanana
Mitsinjo		Improvement of the livelihood of the population through the sustainable development of local communities and sound management of natural resources
Otitsara	Orimbaton'ny Tontolo Iainana TSARArindra	Management of the National Parks of Madagascar
PENSER		Protection of the environment and sustainable development through improved education, in particular for women
Reniala		Strengthening the public health system at community level, including through the protection of the environment
SAF FJKM	Sampan'Asa momban'ny Fampandrosoana FJKM	Association of botanists for the protection of the environment, and more specifically of the plants
SAGE	Service d'Appui à la Gestion de l'Environnement ou Fampandrosoana Maharitra	Association affiliated to the church, working in social and economic development in all the country, including environment protection activities

Tandavanala		Promotion of sustainable development through better governance and improved management of natural resources
Vahatra		Promotion of sustainable development and management of forest ecosystems in Madagascar, with a focus on the COFAV corridor
Velondriake		Association for the development of research on biodiversity and ecosystems, and for scientific training in Madagascar
VIF	Vondrona Ivon'ny Fampandrosoana	Network for the sustainable use of natural resources through education and awareness raising of communities on marine ecosystems and promotion of livelihood activities alternative to fishing
Voahary Salama	Voahary Salama	Protection of the environment and community development through local management and capacity building
Voarisoa	Voarisoa	Network working on integrating Health, Population and Environment
C3 Madagascar	Community Centred Conservation Madagascar	Awareness raising to mitigate the risks of chemicals use on the environment

Madagascar National Park (MNP) and the Service d'Appui à la Gestion de l'Environnement (SAGE) and the Association Nationale des Actions Environnementales (ANAE) represent associations of a particular type as they remain under the tutelage of the Ministry of Environment and Forestry.

Active Fora and Networks on Environment

In 2013, a total of 17 active platforms and networks have been identified. These can be placed in three categories:

- *Thematic Networks:* some networks exist in the fields of knowledge management, research and capacity building. Following the implementation of the Durban Vision, community organizations Federations and Confederations have been created to monitor the governance and management of protected areas.
- *Geographic Networks:* the networks' objectives are to share information and collaborate at the district level, such as PLACAZ (Platform for Corridor of Ankeniheny Zahamena) or the Multi-Local Planning Committee CMP Tandavanala (working in the Corridor Fandriana Vondrozo) or the Platform for Conservation to Develop the Bay of Antongil (PCDBA) for fisheries and integrated coastal zone management.
- *Advocacy Networks to face emerging threat:* Alliance Voahary Gasy (AVG) was created as a result of the 2009 political crisis to address increased illegal logging of some natural resources. Subsequently, other networks of civil society, working in several regions of Madagascar have also emerged such as FAMARI (Toliara), Komanga (Mahajanga), or OCSE Diana (Antsiranana).

The list of existing networks and platforms in Madagascar is shown in Appendix 4.

Community-Based Organizations

Since 1996, local communities are involved in natural resources management in the context of the policy of Natural Resource Management Transfer (TRGN). Approximately 750 management transfer contracts (all resources) were signed, covering an area of more than 1 million ha (Elison, 2011). To benefit from a TRGN, local communities are required to be declared as a legal organization, under the status of "Communauté de Base" (Grassroots Communities) known under their acronym of COBA. The TRGN enhanced participation of local communities in protected areas' and their buffer zones' management. The phenomenon is amplified with the New Protected Areas. The COBA's involvement was through governmental projects (PNAE) and especially the international and national NGOs initiatives for mobilization, social structure, and accompanying the implementation.

The effectiveness of these community-based management initiatives is hampered by lack of skills, means, and resources at governmental level (for evaluation, monitoring, and supervision), and at the municipal level for conflict resolution. Further, there is a lack of support organizations, which presents a challenge because continuous support for these grassroots communities for at least the first three years before contract renewal, is optimal. Support is also needed for COBA for implementation of the simplified management plan.

In the case of marine and fishery resources, locally-managed marine protected areas are run by community-based associations. Specifically in the case of the Antongil Bay, owing to the support of the PCDBA platform, an agreement on the fishing areas and the schedule between artisanal and industrial fishermen has been passed (Le Manach *et al.*, 2013).

Women's Organizations

In general, the national policies, strategies and programs for development and for sustainable management of natural resources (forests, water catchment and irrigation, preparation of the REDD strategy, climate change, land use, food security, risk and disaster management...) take into account the gender dimension. In spite of difficulties, women are taking an increasing leadership in the environment sector. The Table below presents some of the important milestones of the last 15 years in terms of women engagement in the environment sector.

Table 8-3: Milestones in Women's Organizations Involvement on Environment in Madagascar

1990s	Emergence of women's organizations ; creation of the network of women organizations (DRV - Dinika sy ho Rindra an'ny Vehivavy)
2000	The Ministry of the Environment develop a Policy for the Promotion of Women
2000	FAO programme provides training in Socio-economic and Gender Analysis (SEAGA) to five Ministries (including Environment and Agricultire) and NGOs
2003	Japanese Government supports the Gender components of the PEIII (3rd National Environment Plan)
2003	National Action Plan for Gender and Development
2004	Framework Document on Gender and Environment; the implementation is interrupted after a few years due to political situation.
2007	The Madagascar Action Plan includes specific objectives and activities on Gender

Source: Rapport final du processus de préparation de la participation de Madagascar à Rio+20 soutenu par le PNUD, 2012

Following the national policies and commitment, gender approach has been widely mainstreamed in the field of environment. During the implementation of the Third Environmental Programme (PEIII) UNDP/GEF funded activities in protected areas included support to women's groups and women in local communities "*for the establishment of income generating activities (IGAs) such as embroidery, sewing, basket or fruit processing*" (Baastel, 2012). Similarly, national or international NGOs involved in the conservation of biodiversity, are now largely promoting initiatives to involve women in the implementation of reforestation activities, promotion of improved stoves, community tourism or improved agricultural practices. Mining companies (QMM and Ambatovy) also support women's organizations or vulnerable households as part of income generating activities respecting the environment (sustainable management of lianas as mahampy, embroidery and sewing, beekeeping…) Among the interesting intiatives, Blue Ventures has adopted an "Integrated Population-Health-Environment (PHE) Approach", recognizing the links between health, gender inequality, unmet family planning needs, and environmental degradation; the organization has set up familial planning centers and implements awareness raising activities on reproductive health with women at the community level (Blue Ventures, 2014).

A few civil society organizations focusing on gender are also involved in the promotion of biodiversity conservation and sustainable management of natural resources, such as the Réseau Genre et Développement de Madagascar (Awareness raising on climate change, sustainable agriculture) or the Plateforme Nationale Femme Développement Durable et sécurité alimentaire (FDDSA), which supports women entrepreneurs in the field of agro-ecology and sustainable agriculture in Madagascar and the Comoros (with support from the IOC).

Summary of the Activities of Groups of Associations Working in the Field of Biodiversity

Civil society organizations working partially or fully on environmental issues have increased during the implementation of the three PNAE environmental programs (1991-2010). According to 2013 information and data provided by the Ministry of Population, 219 NGOs and associations work partially or fully in the field of the environment. However, the geographical distribution of these structures is uneven: while many environmental CSOs are present in Analamanga and Vakinankaratra regions, they are almost absent in the regions such as Atsimo Atsinanana, Sofia, or Androy.

During the PNAE, the national structures (associations, national NGOs, and CBOs) intervened as secondary partners while international NGOs were structures mandated by international financial partners. A summary of the civil society intervention areas, depending on the level of intervention, is shown below.

Table 8-4: Main Areas of CSOs Organizations Expertise According to Their Level of Intervention (Madagascar)

Local Interventions	Regional Interventions	National Interventions
Typology		
• Community- organization (via management transfer or community-based management of natural resources) • Cooperatives arising from income-generating activities	• NGOs and national associations • Antenna of international or national NGOs • International NGOs • Research Institutions / Universities	• Associations / National NGOs • International NGOs • Foundations • Research Institutions / Universities
Main Areas of Intervention		
• Delegating the management of natural resources in an area (implementing management tools such as the development plan) • Biodiversity and cultural heritage conservation • Participatory ecological monitoring • Participatory environmental and social monitoring (EIE framework) • Monitoring (natural resources, threats, and pressures) • Valorization of natural resources • Climate Change (reforestation, ecological restoration, …) • Development of an area (establishment / maintenance of infrastructure) • Communication • Administrative and financial management of the Association • Partnership Development • Questioning (with respect to violations or at the levels of TGRN or AP)	• Protected Areas Manager (Development and implementation of management tools such as the various development plan, strategies, conservation plan, …) • Implementation, support, capacity building of the committees / CBOs • Participation in committees / commissions related to tools for orientation or regional environmental management (strategy, action plan, policy) • Communication and Awareness • Environmental education • Environmental Impact Study • Follow-up and environmental monitoring • Research • Partnership Development	• Participation in various dialog structures for the development and implementation of national orientation tools (strategies, policy, legislation, action plan, and development of tools,…) • Capacity building, education, training • Promoting new tools (PES, REDD…) • Force of advocacy, questioning or proposal • Knowledge management • Participation/Monitoring, environmental impact study • Follow-up and biodiversity/ environmental monitoring • Technical and financial partners • Environmental Justice

Research Institutions and Universities

Madagascar has various institutions that are partially or fully involved in training and research activities related to biodiversity conservation. Among them are the Faculty of Science with its Departments of Animal Biology, Plant Biology and Ecology (at three Universities: Antananarivo, Mahajanga, and Toliara), the l'Institut Halieutique des Sciences Marines, which trains and conducts research in fisheries, aquaculture, and marine and coastal environment, and the Department of Water and Forestry of the l'Ecole Supérieures des Sciences Agronomiques (ESSA - Forestry), which operates in the fields of forest and water resources, especially in forestry and development, ecology, biodiversity, water and soil management, economics and natural resources management policy. The mission of the Centre National de Recherche pour l'Environnement (CNRE) is to conduct research on biodiversity and its preservation, and on improving the livelihoods of rural and urban communities. Many NGOs and national and international associations conduct research on both sites and species.

International institutions are also involved in research. The Institute for Research and Development (IRD) conducts research on climate change, biodiversity and soil functioning in agro-systems and population. The NGO GRET (Groupe de Recherches et d'Echanges Technologiques) works in sustainable management, local land governance, and watershed protection. The Centre de Coopération Internationale pour la Recherche Agronomique pour le Dévelop-pement (CIRAD) focuses on forests and biodiversity areas, and cultivation and sustainable rice growing systems such as the direct-seeding on plant cover or agroecology.

Foundations

There are two national foundations working specifically on biodiversity conservation in Madagascar.

The Tany Meva foundation, created in 1996, working for the community, is involved in the sustainable management of natural resources, mitigation and adaptation to climate change, fight against desertification, and the environmental awareness.

The objective of the Fondation pour les Aires Protégées de Madagascar (FAPBM), created in 2005, is to sustain funding for protected areas management. It is also involved in activities or projects related to protected areas, species conservation, and ecological habitats.

Private sector

In recent years, private sector organizations have begun to engage in environmental issues in Madagascar. The mining sector is the pioneer, through large mining firms of the moment, such as the nickel-cobalt extractive program in the East-central part of the country (Ambatovy program), as well as the limonite extractive program in the south-east (QMM). Companies investing in these programs orient their environmental activities towards collaboration with local communities and through environmental education activities, reforestation, and land restoration activities. Moreover, the funding approved by Air France for a vast project of forest conservation is worth mentioning: during the first phase (2009-2012), this airline company granted EUR 5 million for the project, executed by GoodPlanet/ Etcetera and WWF. The TELMA Foundation, a charity organization of the Malagasy telecommunications sector, has sponsored some small initiatives, generally focused on renewable energy and environmental awareness.

Civil Society and Protected Areas Management

One of Madagascar's peculiarities is that the management of almost all protected areas is (or will be) ensured by the civil society. MNP or Madagascar National Parks manages a network of 51 sites of IUCN Classes I, II and IV. Other national and international OCSs are involved as promoters or managers of New Protected Areas (NPA), the status of which are still temporary for all but one site (Makira forest, first to be gazetted in 2012). For NPAs, international organizations are as twice as much represented as protected areas managers than their national counterparts (Figure 8-1).

Among the most important promoters are Conservation International (12 KBA covering 715,000 ha), WWF (12 KBA for 767,000 ha), MBG (10 KBA, but smaller, covering 40,000 ha) and WCS (6 KBA, but for 1,023,000 ha). Among the national promoters FANAMBY (6 KBA for 532,000 ha) and Asity (5 KBA for 467,000 ha) are well ahead of other organizations, which manage

usually one or two sites. Table 8-5 presents an analysis of the promoters. The figures refer to the number of KBA, which are sometimes several in a single protected area or corridor

The majority of these national and international structures work also in the areas of awareness, local development by promoting practical alternatives to deforestation, establishment of income-generating activities, and the promotion of sustainable fishing techniques.

Figure 8-1: Distribution of Types of Protected Areas Promoters in Madagascar (final and temporary status)

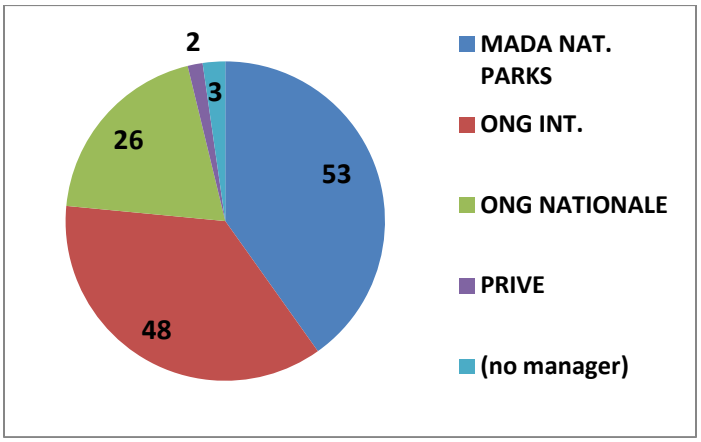


Table 8-5: Promoters on Madagascar's KBA (Protected and Unprotected Areas) in 2013, by Category

INTERNATIONAL ORGANIZATIONS	**53**
BCM	*2*
Blue Ventures	*2*
CI	*12*
DURRELL	*4*
Kew	*1*
MBG	*10*
MNHN	*1*
Nature Evolution	*1*
TPF	*3*
WCS	*6*
WWF	*11*
MADA NAT. PARKS	**53**
PRIVATE	**4**
Ambatovy	*1*
QMM	*2*
RANARIVELO	*1*

NATIONAL ORGANIZATIONS	**33**
ACCE	*2*
ASE/TAMIA	*1*
ASITY	*5*
ESSA-Forestry	*2*
FANAMBY	*7*
MATE	*3*
MAVOA	*5*
MBP	*2*
Mitsinjo	*1*
SADABE	*1*
SAGE	*2*
VIF	*1*
VOI	*1*
NO PROMOTER	**69**
GRAND TOTAL	**212**

The table of key biodiversity areas, shown in appendix 6 identifies the "promoting" organization for each protected area.

8.2 Civil Society and Conservation in the Other Indian Ocean Islands

Seychelles

The role of civil society role has increased considerably in Seychelles over the past 15 years. The number of organizations was estimated in 2012 to be about 85 across all areas (Government of Seychelles, 2012). This is a ratio of about one organization per one thousand inhabitants. Most of organizations are registered with the *Liaison Unit for Non-Governmental Organizations* (LUNGOS), a national platform representing civil society.

The main civil society organizations involved in environmental issues and biodiversity conservation are listed below.

Table 8-6: Major Civil Society Organizations Involved in Biodiversity Conservation in Seychelles

Associations, Foundations, and ONGs	**Community-Based Organizations**
Green Island Foundation (GIF)	Roche caiman district group
Island Conservation Society / Fondation pour la Conservation des Iles (ICS)	Port Glaud Environment Club
Marine Conservation Society of Seychelles (MCCS)	Bel Ombre Action Team
Nature Protection Trust of Seychelles (NPTS)	**Private Sector Organizations**
Nature Seychelles (NS)	North Island,
Plant Conservation Action group (PCA)	Cousine Island,
Sustainability for Seychelles (S4S)	Ephelia Resort,
Seychelles Farmers Association (SFA)	Denis Island,
The Ecotourism Society of Seychelles (TESS)	Bird Island,
Terrestrial Restoration Action Society of Seychelles (TRASS)	Aride Island,
TAGGS (Association gathering all public, private and NGO partners involved with marine turtle monitoring)	Fregate Island,
Wildlife Club of Seychelles (WCS)	Banyan Tree Resort Seychelles,
Public Foundations and Trust Funds	Lemuria Resort,
Seychelles Islands Foundation (SIF)	Chalets Anse Forbans.
Environment Trust Fund (Government)	
Seychelles Botanical Gardens Foundation	

These various actors play complementary roles in nature protection. Many foundations and associations play the role of a financial mechanism able to channel funds from various sources to carry out conservation actions on some islands (Silhouette, Alphonse, and Desroches). The *Seychelles Islands Foundation*, whose members are appointed by the President of the Republic, is somehow parastatal in its operations, it works in the same way in Aldabra and the Vallee de Mai - same thing on the *Seychelles Botanical Gardens Foundation* for botanical gardens. Many NGOs conduct ecosystem restoration activities on islands that belong to them (Cousin, Aride) or work on private islands with their owners (14 of 20 Seychelles' granitic islands are private - hence the important role of the conservation sector).

The University of Seychelles, although only recently established, intends to develop curricula in the fields of conservation and to conduct research programs. It could be called upon to play an important role at the national and regional levels to build capacity and to mobilize expertise.

Community-based organizations, which would educate and mobilize citizens around activities in favor of biodiversity, are still poorly represented, and are present only on a few islands. Collaboration between different NGOs, knowledge exchange, and knowledge sharing are still relatively undeveloped.

Comoros

Civil society organizations working on environmental conservation and protection are represented by village or neighborhood associations, NGOs, and professional networks.

Village or Neighborhood Development Associations

Associations exist in each Comoros village. In the 1960s, sociocultural associations appeared and participated in social and community events. In 1990 and 1991, associations for environmental protection were created respectively in most villages of Anjouan and Grande Comore. Everywhere, reforestation and cleaning and awareness actions were undertaken in the communities. Very often, these associations are spontaneously created within the communities, as an initiative of the youth who want to take care of their natural resources and their environment, especially in cases where the authorities do not provide consistent and sustainable measures for environmental protection. However, despite their enthusiasm, these local organizations have limited capacity and are not always stable in the long term as they are often dependent on individual commitments. The Project of Support Fund for Community Development funded by the World Bank helped to institute "steering committees" and to strengthen some of these legally-constituted village associations.

Some of these organizations have developed some specific biodiversity-oriented activities. These include the Ndudju Association in the Chindini Village, affiliated with the Megaptera Indian Ocean NGO, which educates fishermen and organizes whale watching for tourists, and the Association for Social Development in Itsamia Mwali, whose logo is the Green Turtle. This organization educates the population on the importance of endangered or endemic species, and works to protect the bird colonies of Rocher Mchako, the Lake Boundouni slopes, and sea turtles.

Non-Governmental Organizations and Professional Networks

The Association for the Preservation of Gombesa (APG) or Gombesa NGO is grouping together a dozen villages in the south-western coast of Grande Comore and wishes to contribute to sustainable development by protecting the Coelacanth, *Latimeria chalumnae*, its marine environment and the nearby coasts where the species lives. The NGO works to raise awareness in communities and encourage sustainable fishing.

The Association of Intervention for Development and Environment (AIDE), created in 1997, is supported by the Environmental National Section through the IOC Environmental Regional Program funded by the European Union. AIDE's mission is to contribute to sustainable development of Comoros through research activities and environmental protection. The objectives of AIDES are to monitor the natural environments, to build environmental capacity, to conduct awareness campaigns and environmental education, and to develop socioeconomic alternative activities.

The Anjouan HTC NGO, created in 2003 by young professionals involved in sustainable development, works in marine resources management and protection, tourism promotion, and agricultural resources management and protection.

The Anjouan Action Comores NGO aims to contribute to the Livingstone dogfish and the Anjouan forest conservation. It regularly conducts general biodiversity inventories and awareness campaigns for Comoros' sustainable environmental management. Among other activities are the fight against upstream soil erosion and the promotion of the island's ecotourism.

The Dahari NGO, sponsored by the European Union and the French Embassy (€ 260,000), develops work programs in the south of Anjouan on Moya forest management, its biodiversity, and the ecosystem services it provides.

The Federation of Comoran Consumers (FCC) fights for consumers' protection and for the citizens so that they benefit from the technical, economic, and social progress of the community. The FCC works through training, information, awareness actions, lobbying, campaigns, and when necessary through legal public events. It participates in national debates on issues related to Comoros' environment, organizes hiking for the public to show the biodiversity and landscape richness of the archipelago, and encourages the public to work for its conservation and valorization.

The National Federation of Comoran Farmers and Women Farmers work to develop the agriculture and livestock sectors by promoting its activities and protecting its interests. It wants to be a unifying movement aiming to reorganize the "union and professional body" of agricultural operators through associations, groups, unions, or any other natural or legal entity.

Research institutions

The National Research Institute for Agriculture, Fisheries and Environment (INRAPE) is tasked, among other things to design and conduct programs and research, to conduct agricultural, fishery, and environmental studies, to maintain relationships with research organizations in the field of agriculture, fisheries, and environment, and to promote techniques and methods that would increase the productivity of agriculture, fisheries, and environment preservation. It also works to participate in the evaluation of the technical implementation of agricultural projects, fisheries, and environment. INRAPE has an unreliable and insufficient budget as well as staffing problems, and faces serious difficulties in fulfilling its objectives.

The National Center for Documentation and Scientific Research (CNDRS), a Comoran public institution, conducts wide range of activities, such as museology, documentation, and information dissemination to the public and specialists, the National Archive, scientific research, geological and spatial mapping, observation of the Karthala, cultural promotion, dissemination and popularization of scientific information, organization of seminars, production of documents with academic connotation, for both researchers and the public. It is a reference point for all those interested in history, geography, geology, literature, tradition, wildlife, flora, religion of Comoros, and the environment of the archipelago, in and around the Indian Ocean, without omitting aspects of Bantu civilization. Today, empowered with administrative, financial, and

management autonomy, CNDRS is soon going to adopt rules of procedure and establish a high-level Scientific Council. It intends to further consider the need for organic or functional integration of various existing training and research institutions so that it can fulfill its mission.

Commitment of the International Civil Society

Few international organizations have worked in biodiversity conservation in Comoros. Some organizations include Comoros in the mandate of their regional offices, such as WCS, WWF (based in Madagascar) or the Africa office of BirdLife (based in Nairobi, Kenya) but the actions of these organizations in the country have remained extremely limited.

The main project implemented by international organizations is the Community Engagement for Sustainable Development Project (ECDD), whose aim is to develop in Comoros a management model of the Community territory that includes improved livelihoods and sustainable management of natural resources; namely soil, water, forests, and biodiversity. The project is a partnership between Bristol Conservation and Science Foundation, Durrell Wildlife Conservation Trust, Agronomes et Vétérinaires Sans Frontières, the Government of the Union of Comoros, and other local partners. It is mainly funded by the French Development Agency (€ 750,000), the Darwin Initiative of the British Government (about € 300,000), and the Global Environment Facility (€ 30,000).

Mauritius

Although nearly 6,000 organizations are registered in Mauritius, it is estimated that about 300 NGOs are actually active, but very few are interested in conservation.

The *Mauritian Wildlife Foundation* is practically the only NGO working on terrestrial environment issues in Mauritius and Rodrigues. Established in 1984 with support from the *Durrell Wildlife Conservation Trust*, MFW is particularly interested in the protection of endangered animal species (birds, reptiles, mammals) and plants. MWF works closely with the Mauritian authorities especially in bird conservation programs on the islands (such as Round Island). The Foundation also became responsible for managing the private reserve of Mondrain in August 2013, although its involvement spans 30 years. MWF is the only organization to intervene in terrestrial ecosystems in Rodrigues, where it has been active since 1985. It co-manages the sites of Grande Montagne, Anse Quitor, Ile aux Cocos and Ile aux Sables.

Many environmental NGOs have worked in marine environments and have been active since the 1970s. The most important one is the *Mauritius Marine Conservation Society* (MMCS), which is involved in advocacy and awareness, it is involved in scientific programs of monitoring dolphins, whales, and sea turtles, and is conducting marine conservation activities (e.g. creation of artificial reefs). Reef Conservation Mauritius, newer and smaller, conducts similar activities. Others include Forever Blue and Lagon Bleu in Mauritius or Shoals of Rodrigues, and Rodrigues Underwater Group in Rodrigues, they are involved in awareness outreach to residents and tourists, and provide scientific oversight and conduct protection activities on a few sites.

8.3 Skills and Needs of Civil Society Organizations

Due to the differences between the countries in the hotspot, this section is presented by country. The information presented was gathered primarily during the stakeholder consultation meetings held during the ecosystem profiling process.

Madagascar

Civil society in the field of conservation in Madagascar is relatively powerful and has the capacity to intervene effectively in many areas. It exists in the country in a variety of structures involved in multiple levels in the areas of natural resource sustainable management: biodiversity conservation, sustainable development of resources, ecosystem services, research, education, advocacy and questionings. Training programs, implemented by international organizations, then gradually by national organizations such as Vahatra, have allowed the emergence of a generation of dynamic and trained conservation professionals - even if they are still insufficient to meet the needs of today's conservation challenges.

The conservation community in Madagascar is organized around the major international organizations. Having easier access to international funding, supported by their respective headquarters, mobilizing (more and more) national and international expertise, these organizations play an important and effective role not only in the implementation of field activities, but also in relations with the authorities or the private sector.

The national and local NGOs have lower capacities to conduct fundraising activities and have difficulties in accessing available funding which is needed to carry out their field activities in the long term.

Seychelles

Civil society in Seychelles benefits generally from high capacity, particularly in terms of scientific and technical expertise. There are a number of sizeable organizations fulfilling specific functions and covering the major areas of conservation intervention. The private sector involvement and the existence of funding related to the tourism industry enable civil society to implement ecosystems conservation and restoration programs. However, sustaining the actions may be jeopardized by the defection of a single donor or by long periods between projects. The low number of possible "windows" for conservation is thus the Achilles heel of conservation in the archipelago. The actions are also limited by the workload and logistical costs in this vast archipelago. One of the main areas where civil society in Seychelles appears weaker than its neighbors is in involving people at the local level, in establishing local organizations that can play a major role in the long-term management, and in environmental monitoring which is still very limited in the archipelago.

Comoros

Comoros is the hotspot country where the need for civil society capacity building is the most acute. Despite the existence of a vibrant local community life for decades, and the almost autonomous implementation of many local initiatives related to environment and livelihoods, civil society involvement in biodiversity conservation is still very low - and should be added to this the weakness and lack of means available to public institutions in this field. Needs for

capacity building are particularly high in the science and knowledge fields, research, environmental education, natural resources management and use, improved agricultural practices, fight against invasive species, and the promotion of alternative economic activities. In particular, it is necessary to strengthen – as was done for the past fifteen years in Madagascar - the training of the next generation of conservation professionals.

Mauritius

Despite the increase in recent years of the number of NGOs and community-based organizations, few are active in the field of environment, and globally civil society capacity is still insufficient to allow for sharing responsibility in managing the environment. New initiatives are generally focused on the marine environment, while the involvement in protection of terrestrial ecosystems relies almost entirely on Mauritian Wildlife Foundation. The collaboration between civil society and the public sector in program planning and implementation could prove mutually beneficial. Overall, NGO institutional capacity is low – with the exception of the Mauritian Wildlife Foundation and a few other organizations focusing on marine ecosystems; this is particularly the case for community-based organizations that are rarely involved in biodiversity issues.

Shared Needs in the Hotspot

The grassroots communities' organizations case is particularly striking. Their direct access to national or even international funding is currently almost impossible due to their low capacity. The governance within these organizations is still fragile and hampers local and sustainable management of natural resources. Joint-management of protected areas by the communities requires strengthened capacities, and possibly new structures supporting these approaches, for longer periods than those of the usual projects – often limited to two or three years. Given the importance of COBA involvement in biodiversity conservation, it is important to sustain these structures. Various areas for capacity improvements were identified, they include: association management, social mobilization, leadership, and participatory ecological monitoring.

Even if the different actors (government, private sector, technical and financial partners) consider the civil society and the OCSs as a full actor or partner, the involvement of these structures in the governmental decision-making process to defend biodiversity conservation is not fully achieved. This is due to the ability of these structures and also the Government willingness to implement a participatory approach.

The consultations have also highlighted various topics where civil society organizations' involvement needs improvement, such as integrated water resources management (IWRM), the rational management of useful species (medicinal and artisanal plants), the promotion and dissemination of conservation agriculture, the OSC participation in environmental impact assessment processes (in all phases of the process), or the awareness and support of citizen initiatives.

Despite the existence of civil society in different sectors of development, the cooperation between development and conservation actors is limited. This is partly due to poor coordination between sectoral programs and projects. Some donors (AFD, EU, World Bank) are now

supporting more projects that will lead to better cooperation. However, despite these efforts, development organizations are still relatively inactive in the conservation sector.

Finally, it is important to emphasize the complementary of expertise developed by conservation communities in the region. Each country has its strengths: management transfers and communities involvement in Madagascar, invasive species or species conservation in the Mascarene and Seychelles, and mobilization of people in Comoros. These differences open the possibility to promote exchanges and partnerships, be they "South-South" or "North-South" by integrating the French departments in the Indian Ocean.

9. THREATS TO BIODIVERSITY

Human arrival has deeply disturbed ecosystems and biodiversity across the hotspot for centuries. In Madagascar, some species were exterminated before the arrival of Europeans, such as the *Aepyornis* giant birds or giant lemurs like *Palaeopropithecus.* These extinctions probably happened between the 14th and 16th century, and are most likely attributed to anthropogenic pressure (Godfrey, 2003). The hotspot was also home to the famous dodo, eradicated only a few years after the first settlers arrived in Mauritius, and became the symbol of species extinction. Some islands, in particular those where the topography allowed for an easy agricultural conversion, were already largely deforested at the end of the 19th century, such as in Mauritius (see Figure 9-1). Threats to biodiversity are therefore not new. But today, enhanced anthropogenic pressures due to population growth and exacerbated by climate change, seriously threaten the already degraded and often fragmented ecosystems.

Figure 9-1: Evolution of the natural vegetation cover (in black) since the 18th century in Mauritius

Sources: adapted from Vaughan and Wiehe (1937) and Page and d'Argent (1997)

This chapter provides an overview of the main threats to biodiversity and natural habitats in the hotspot and is closely linked to Chapter 5 (Socioeconomics). The chapter has been prepared on the basis of information collected from literature, interviews with experts, and assessments during national consultations. The threats are classified according to the IUCN standardized categories of threats. Salafsky *et al.,* (IUCN 2011) presents an evaluation of the major threats.

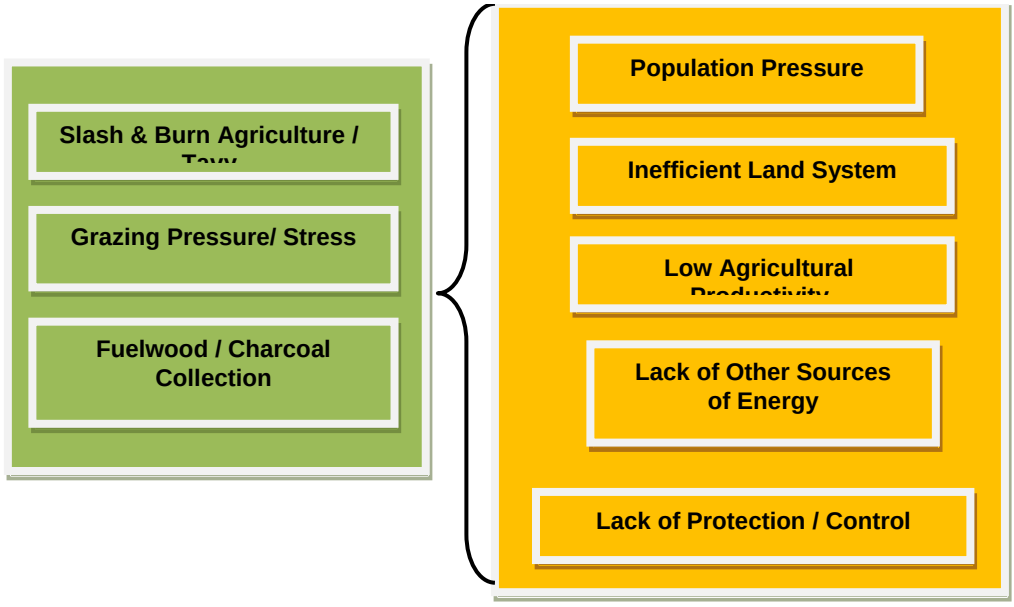
Table 9-1: Evaluation of the Main Threats to Biodiversity in the Hotspot, according to the IUCN Classification (3: major threat, 2 important threat, 1; minor threat)

	MADAGASCAR					COMOROS	MAURITIUS	SEYCHELLES	REUNION	MAYOTTE	ILES EPARSES
	West	East	South	Wetlands	Coastal Marine						
1 Urbanization	1	1	1	2	2	2	3	2	3	3	
2 Agriculture & aquaculture											
2.1 Agriculture	2	3	3	3	1	3	2	1	1	3	
2.3 Breeding	3	2	3	1		1	2	1	1	2	
2.4 Aquaculture				2	3	1	1	1	1		
3 Extractive Industries and Energy	2	3	2	1	2	1	1	1	1	1	1
4Transport Infrastructures	1	1	1	1	1	1	1	1	2	1	
5 Biological resources exploitation											
5.1 Hunting	2	2	2			1	1	2	2	1	
5.2 Plants gathering	1	1	1			1	1	1	1	1	
5.3 Forestry and wood gathering	3	3	3	1	2	3	1	1	1	2	
5.4 Fishing				3	3	3	2	2	2	2	1
6 Human disturbance	1	1	1	1	2	1	2	1	1	1	2
7 Perturbation of natural systems											
7.1 Fires	3	1	2			2	2	1	2	1	
7.2 Dams and water management	1	1	1	2		1	2	2	2	2	
8 Invasive Species	1	1	1	3	2	2	3	3	3	3	3
9 Pollution	1	1	1	3	1	1	2	2	2	2	
10 geological Events			1		1	2					
11 Climatic Events (including CC)	2	2	2	3	2	2	2	2	2	2	2

Sources: Classification: Salafski et al.*, IUCN, 2011; Assessments: Consultations within the Profile Framework.*

9.1 Deforestation, Forest Degradation, and Fragmentation

Figure 9-2 : Direct and Indirect Deforestation Causes



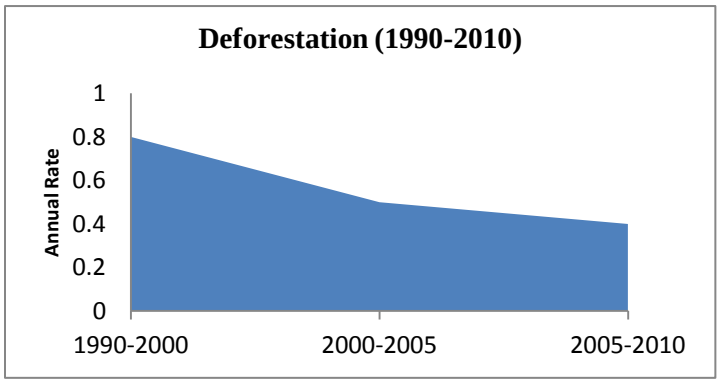
Deforestation and forest degradation are among the most significant threats to terrestrial ecosystems in Madagascar. Due to a strong awareness campaign and the Malagasy civil society involvement in biodiversity conservation, essentially after the National Environmental Action Program (NEAP) has been implemented, the deforestation rate has reduced by half from 1990 to 2010. It went from 0.83 percent annually over the period of 1990-2000 to 0.4 percent between 2005 and 2010 (see Table 9-2 and Figure 9-3). This level is alarming in a country where natural forests cover has already been reduced to about 12 percent of the surface. The situation is even more critical for some western dry forests, where the deforestation rate reached 0.9 percent and 0.8 percent per year (over 2005-2010) respectively in the Boeny and Atsimo Andrefana regions. The lowland forests (less than 400 m in altitude) are more affected by deforestation than forests in high altitude, with a rate of loss of 0.5 percent per year. Spiny forests and dry forests are more threatened compared to rainforests.

Table 9-2: Evolution of the Forest Cover by Climate Biome in Madagascar, 2005-2010

Climate Biomes	Natural Forests Cover (in hectares)		Annual Deforestation Rate
	2005	2010	2005-2010
Eastern Biome (rainforests)	4 702 020	4 658 155	0.2%
Western Biome (dry forest)	2 628 029	2 554 746	0.6%
Southern Biomes (spiny forests)	2 070 632	2 009 792	0.6%

Source: ONE et al., 2013

Figure 9-3: Evolution of the Deforestation Rate between 1990 and 2010 in Madagascar



Source: ONE, 2013

Deforestation leads to habitat fragmentation, which is a major threat to species, both in terms of fauna and flora. Indeed, because of the high biodiversity and micro-endemism phenomena, the loss of even a small forest area can lead to extinctions. Currently small-sized and isolated sites still host a wide variety of species and an incredible endemicity; most AZEs sites are isolated sites, such as Bemanevika, Ankaratra, or Ambohidray.

Fragmentation of forest blocks accentuates the risks to biodiversity. If thirty hectares are enough to keep viable populations of some amphibians like Microhylidae (Lehtinen *et al.*, 2003), hundreds or even thousands of acres of habitat are often necessary for other species. Themaintenance of biodiversity cannot be ensured in a forest fragment when it is located more than 1.7 km from a large forest block (Conservation International, 2011). The rainforests in eastern Madagascar were once connected from the extreme north of the island to the southern

tip, and are currently fragmented into several large blocks. The situation is even more critical for the western deciduous dry forests and the coastal forests on the east coast (Conservation International, 2011).

The primary cause of deforestation is the traditional agricultural technique or tavy (UNIDO, 2009). According to this traditional practice, the fields are prepared by slash and burn, are used to grow crops, and are then fallowed for ten years. When the long cycles are respected, this practice can be efficient and productive for subsistence agriculture. However, population pressure has led farmers to shorten the cycles and use *tavy* on steep slopes, in higher altitudes - with low yields and severe soil degradation and erosion (Jolly, 1989), leaving room for vast abandoned areas that are quickly colonized by weeds and secondary pioneer or invasive species.

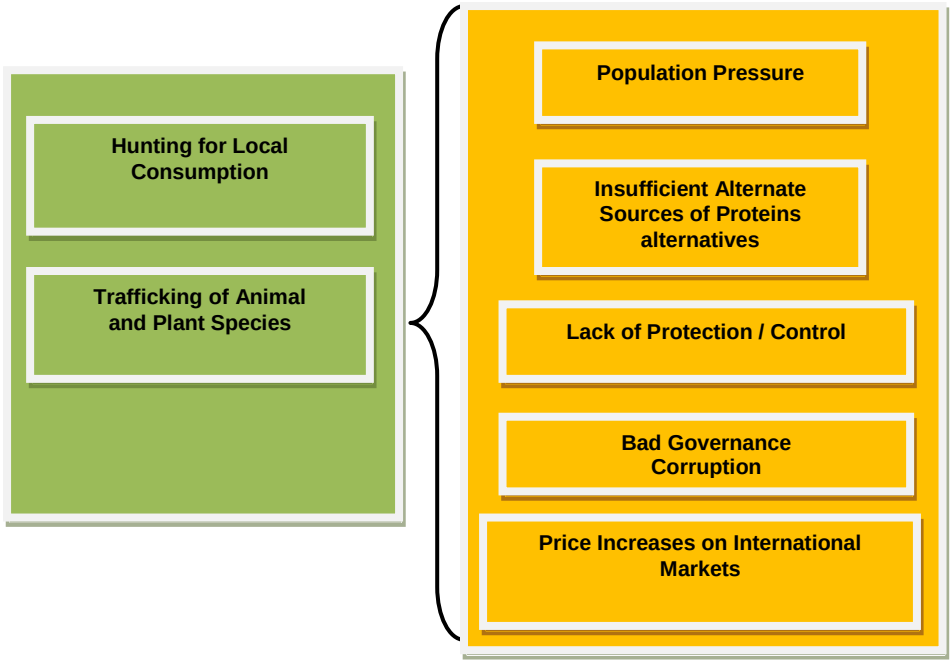
Grazing pressure is also an important driver of deforestation and forest degradation, particularly in the western and southern regions of Madagascar. Grasslands extend at the expense of natural habitats as a result of population growth but also of economic and cultural principles favoring increasing of herds. In addition, burning grasslands before the rainy season to promote re-growth is often the cause of out-of-control fires that destroy forests and natural habitats. This situation is also found in Mauritius with habitat modification resulting from deer farming. Renewing and cleaning pastures by fire could have eliminated some indigenous biodiversity (Florens, 2013 *pers com.).*

Finally, as mentioned in section 6.4 on energy, the pressure for fuelwood is an important factor in the degradation of forest ecosystems. This threat was seen as important for both Madagascar and Comoros during the ecosystem profile consultations. Noting that fuelwood represents 92 percent of the energy sources used by the Malagasy population, this threat is not so important in Réunion, Mauritius, and Seychelles, where energy consumption is based on imported fossil fuels, and increasingly on renewable energy.

In 1990, Madagascar had 11 million hectares of forest area for a population of 11 million. Currently, the population has nearly doubled to around 20 million, for an area of 9.22 million hectares (Freudenberger, 2010; ONE, 2013). While the inhabitants of the island remain extremely dependent on forest resources, stimulating a change in the rate of forest loss compared to the use of its resources is an unquestionable priority.

9.2 Overexploitation of Wild Species

Figure 9-4: Direct and Indirect Causes of Wild Species Overexploitation



The illegal and unsustainable exploitation of natural resources is a primary in Madagascar. In this country, the unregulated and illicit exploitation of wildlife, forestry and natural resources, including the protected areas, has increased since the 2009 political problems and constitutes a serious threat to biodiversity conservation. One of the major threats comes from the collection of species for international trade. While all countries have ratified the CITES Convention (see 7.5), the enforcement is often ineffective, for a range of reasons. Even for species that can be legally traded, quotas are not always respected.

The example of the Madagascar's precious wood is also cause for concern. In 2009, it was estimated that 52,000 tons were extracted from 100,000 rosewood *(Dalbergia* spp.) and ebony *(Diospyros* spp.) trees, an increase of at least 25 percent compared to the previous year. More than 60,000 trees were located in protected areas, which represent a degradation of at least 4,000 ha of parks and 10,000 hectares of intact unclassified forest (Randriamalala and Zhou, 2010). Profits primarily benefit intermediaries and traffickers, as local employees receive an estimated wage of less than $1 per day despite the immense value of the wood (Black, 2010). Species trafficking also poses a significant risk to reptiles (terrestrial tortoises, chameleons), and orchids and succulents plants, among others. Madagascar's radiated tortoise *(Astrochelys radiata)* sold as a pet could disappear within two decades in the absence of protection (Platt, 2010). The big-headed tortoise *(Erymnochelys madagascariensis),* the only freshwater turtle endemic to the island is illicitly exported to Asian markets as traditional medicine.

Hunting and consumption of bushmeat pose a threat to small mammals (tenrecs), the megachiropterans, turtles, amphibians *(Mantidactylus grandidieri, M. guttulatus, Boophis*

goudoti), waterfowl (ducks), and primates. Although the data are incomplete, it appears that bushmeat consumption has increased in riparian forests to meet protein needs but also for local trade. The big lemur, *Propithecus tattersalli,* could disappear because of this threat, according to R. Mittermeier *(in* Barret and Ratsimbazafy, 2009). Loss of this species and others would directly (and negatively) impact tourism.

9.3 Forest Fires and Wildfires

Fire origins can be natural or anthropogenic, accidental or intentional. Fires meant for *tavy* or pasture sometimes spread to nearby forests. In some cases, it seems that the fires are lighted to express public discontent vis-à-vis the authorities, as in the case of Manjakatompo in 2009 when fires destroyed almost entirely some recently reforested areas. In Madagascar, the Eastern Biome and the different Highlands plant formations such as Tapia or the Itremo rupicol formation are particularly threatened by the fires (Rafalimanana, 2007).

Even small fires can have serious consequences on small-sized populations living in limited spaces. Fires are considered to be an important threat for small islands such as Rodrigues. Réunion National Park experienced a major fire in 2011 which affected 26 rare native/endemic species, 16 of which are considered to be endangered (Réunion National Park, 2011). In addition to direct damages, fires often open the door to invasion by exotic species.

9.4 Alien Invasive Species

Like most island ecosystems in the world, biodiversity in the h small islands is particularly threatened by invasive species, this threat being characterized as very important in the Seychelles, Mauritius, and Réunion, and important for Comoros and the Malagasy wetlands.

The introduction of rats and carnivores such as cats and mongooses has historically been an important extinction factor on small islands. In Mauritius, where the only native mammals were the bats, there are now 13 species of exotic mammals that have, or are strongly suspected to have, an impact on the native fauna. Endemic birds like pink pigeons are constantly at risk due to predation by feral cats (Jones, 2008), while rats destroy many of the seeds of some native trees. The situation is similar in Seychelles, where several endemic and threatened birds, reptiles, and invertebrates are confined to islands without the introduced rats, cats, or tenrecs (Rocamora and Henriette in press) In Madagascar, the rapid proliferation of exotic rats constitutes a major threat to the survival of small forest mammals, especially endemic rodents (Goodman and Soarimalala, 1996). The Common Myhah (*Acridotheres tristis),* imported into the region from Asia, is today colonizing many areas of Mauritius, Réunion, Seychelles, Comoros, and Madagascar (and many other countries and islands in the world), where it is a threat to native forest birds (Goodman and Hawkins, 2008).

Invasive plant species also pose a very significant threat to ecosystems. In Mauritius alone, 731 angiosperms are naturalized (Jones 2008) and at least 21 species are now considered serious threats to Mauritius' biodiversity, from coastal habitats to the highest mountains (Strahm 1993, Kueffer and Mauremootoo, 2004). The problem arises with the same acuity in Réunion or Seychelles, where thirty species are considered invasive (Rocamora and Henriette, in press). For Comoros, an FAO study conducted in 2004 reported 16 invasive woody species, stressing that *in the Comoros archipelago, reliable information is limited(...) With the exception of Mayotte, the*

awareness of potential danger for biodiversity and crops represented by plant invasion remains low (Vos, 2004). In Madagascar, some invasion cases have also been reported, particularly in the dry forest ecosystems (R. Edmond, *com. pers.*).

Wetlands are particularly affected by invasive alien species, whether plant invasions such as the water hyacinth *(Eichhornia crassipes)* seen in most part of the hotspot, or *Pistia stratiotes*, the invasive water lettuce, which covers much of the Seychelles wetlands, with cascading consequences for the fauna and flora. The introduction of exotic fish *(*namely *Tilapia spp. Heterotis niloticus* and *Channa maculata*) has resulted in the reduction of Madagascar's endemic fish distribution and diversity (Benstead *et al.,* 2003), either by habitat transformation, by direct predation, or by competition with native species. The proliferation of invasive crayfish of the genus *Procambarus* which reproduce rapidly in a parthenogenetic way affects significantly Madagascar's freshwater ecosystems, and is a serious threat to the endemic crayfish such as *Astacoides* (Ramilijaona *et al.,* 2007).

It should be noted that the *Batrachochytridium dendrobatidis,* an amphibian's invasive parasite fungus that threatens many species over much of the globe, is not yet reported in the hotspot. A monitoring unit against the arrival of this chytrid was set up in Madagascar with continuous monitoring in eight sites since 2010 (Rabibisoa *et al.*, 2011).

Eradications of cats and rats have been conducted in Seychelles or the Scattered Islands, often with success (Soubeyran, 2008). Actions were also taken against plant invasions – in view of limiting the proliferation rather than ensuring its eradication. In any case, to avoid or at least to reduce the risk of return and/ or arrival of invasive species, some bio-security protocols must be put in place and monitored regularly, which is more difficult in countries with low resources and lower levels of governance. Among the initiatives in place include the Réunion Invasive Species Working Group (GEIR), bringing together institutions, associations, professionals and resource persons that promote the coordination of local actors, undertake planning, and conduct outreach and environmental monitoring.

9.5 Mining and Oil Exploitations

Extractive industries do not currently represent a real threat to the biodiversity in Madagascar, although quarrying or beach sand mining can cause localized problems on some other hotspot islands.

The environmental impact of future mining could be important. For example, the Ambatovy mine (nickel-cobalt), embedded in quasi-primary forests should clear 600 ha of forest and move around 360 million m^3 of land during the 29 years of operations, while requiring 23 million m^3 of water per year from the production phase of ore slurry (CAC, 2012).

A current issue of importance lies in the overlap of some lawful mining permits in protected areas. Fifteen sites are concerned. An Inter-Ministerial Committee was established to redefine the limits of protected areas and the mining permits. Other overlaps also exist between mining licenses and protected areas under temporary status. Three quarters of Madagascar are covered by mining banks/ pit heads, except parts of the west coast; most of the new protected areas under

development could be at risk vis-à-vis mining (see also Figures 6-1 and 6-2 in the Socio-Economic Chapter).

There is not yet an oilfield in the hotspot, but exploration permits have been issued by several countries (Madagascar, France, and Seychelles). Even during this exploration phase, some impacts are evident. A group of independent experts, mandated by the International Whaling Commission, has attributed the death of 75 Electra dolphins in Madagascar in 2008 to the use of high-frequency sonar (Southall *et al.,* 2013). Like in mining activities, overlap problems between potential oil blocks and the protected areas (terrestrial and marine) exist in Madagascar.

9.6 Climate Change

Note: This section comes largely from the book entitled Changement climatique et biodiversité dans l'outre-mer européen (title translated in English by Climate Change and Biodiversity in the European overseas), Petit, J. and Prudent, G. (eds), UICN 2010.

Climate Projections in the Indian Ocean

According to the Intergovernmental Panel on Climate Change (IPCC), the average annual temperatures in the Indian Ocean could increase by 2.1°C by 2100 (see Table 9-1). Observations in Seychelles already show a significant temperature increase between 1961 and 1990 (Easterling 2003). El Niño fluctuations directly affect the Indian Ocean water surface temperatures. In 1998, during a major El Niño phenomenon, the surface water temperatures stayed above 30°C for several weeks throughout the Indian Ocean. The impact of climate change due to El Niño occurrence is uncertain to date, but it can significantly increase its scale and its impacts in the coming years.

In terms of precipitation, the confidence level of IPCC projections is not as satisfactory as for temperatures, and the projections are not uniform according to sub-regions and seasons. However, the IPCC predicts stronger annual rainfall in the North Indian Ocean, including an increase in Seychelles in summer (December, January, February), at the Chagos Archipelago in winter (June, July August), and a decrease in rainfall in Réunion and Mauritius during winter. Extreme rainfalls have already increased significantly in Seychelles from 1961 to 1990 (Easterling, 2003). For the entire Indian Ocean, the IPCC projects an increase in annual average rainfall by 3 to 5 percent by the end of the century.

There are no specific data showing the impact of climate change on the incidence of cyclones in the Indian Ocean. However, the projections show that tropical cyclones will become more violent bringing stronger winds and more intense rainfall for the entire globe. This trend will have a direct impact on the Western Indian Ocean, which is already one of the world's most affected by this phenomenon.

Finally, the IPCC predicts a global sea level rise of 0.35 meters on average, and a similar average rise in the Indian Ocean (Church, 2006). It should be noted that, on the one hand, the different models used show big differences, which makes uncertain estimates, and on the other hand, the sea level rise is not uniform between sub-regions. From 1993 to 2001, a significant sea level

rise was observed at the Chagos Archipelago, while a significant decrease was measured in the island of Réunion (Church, 2006).

Table 9-1: Climate Change by the End of the Century (IPCC, 2007), Average for 21 Global Simulation Models (Scenario A1B)

Climate Component	Variation from 1980-1999 to 2080-2099
Air temperature	Increase by 2.1°C [+1.9 to +2.4]
Rainfall	Annual increase by 4 percent [+ 3 to + 5]
Extreme events	Intensification of cyclones bringing maximum stronger winds and heavier rainfall
Sea level	Average elevation by 0.35 meters [0.21 to 0.48]

Source: GIEC, 2007
Note: Probable uncertainty range between brackets (quartiles 25/75%)

Impact of Climate Change on Biodiversity

The strongest impact of climate change in the region is undoubtedly coral bleaching. In 1998, the particularly strong heat wave striking the Indian Ocean caused extremely strong coral bleaching in the Indian Ocean. More than 95 percent of corals bleached in some areas (Sheppard, 2003). The resulting average mortality is estimated at about 30 percent of corals for the entire region (Obura, 2005) and could reach 90 percent locally (Rocamora, *pers. comm..)* Bleaching events are likely to increase with sustained temperatures increase. Some studies inform that Indian Ocean corals may completely disappear within 20 to 50 years following increasingly frequent bleaching events (Sheppard, 2003). Through coral degradation, it is the whole marine ecosystem that is affected. A study conducted in the Chagos, which can be extrapolated to the hotspot islands, shows that reef fish diversity and abundance have largely declined after the 1998 bleaching.

Rising sea levels and increasing extreme weather events could erode beaches and coastal ecosystems of the Indian Ocean islands. The islands that are predominantly coral, such as the Scattered Islands and much of Seychelles, are particularly threatened; their very low altitude and soils are vulnerable to the power of the waves. This situation could become even more critical with degradation - or in some cases lead to the disappearance of the reef barrier due to temperature rise and ocean acidification.

Beach degradation will widely affect populations of sea turtles that inhabit these islands. These populations are also threatened by rising temperature: the gender of the turtle is determined by the egg's incubation temperature during the days following the spawning. There is therefore a "pivot" temperature around which the male:female ratio evolves in one direction or the other. A rise in temperature at spawning /nesting beaches increases the birth of female turtles; a decrease instead favors the male gender. Climate change can induce an imbalance of male/female ratio of sea turtle populations, with serious consequences for the reproductive and survival capacity of these species. Relatively limited temperature increase could have a direct impact on their survival (Griessinger). Furthermore, populations of migratory marine mammals in the Indian Ocean are likely to be affected by climate change during their feeding period in the Polar Regions.

On land, the climate change impacts on ecosystems are more difficult to measure. There are no observational data of such impacts for the region, but consulted experts have mentioned some projections. In the high volcanic islands, such as Réunion and the Comoros archipelago islands, rising temperatures will likely make some species move in altitude and the ridge forests and mountain forests disappear. This habitat structure breakdown will happen at the expense of native species and will likely accelerate the spread of invasive species that already put a strong pressure on native habitats of these islands. In Seychelles, the many endemic and threatened species that took refuge in the highest parts of Mahe and Silhouette may thus lose much of their habitat while some may disappear.

Social and Economic Consequences

Unfortunately, there is insufficient data on the observed and potential socioeconomic implications of climate change on communities in the region. Only a few assumptions have been proposed. As noted previously, the hotspot countries have very high population densities in coastal low areas. The combination of rising sea level, degradation of the natural protection provided by coral reefs, and an increase in the number and intensity of cyclones could have dramatic consequences on the security and lifestyles of many people living in the coastal areas of the region. The displacement of coastal populations to the interior would further increase land pressure, bringing many social problems and jeopardizing the last uninhabited natural areas.

In Réunion, as in Mauritius, large urbanized coastal spaces, particularly those exposed to the west, would be threatened by swells should the reef barrier disappear. Beaches and coral degradation may hinder tourism development. Reef deterioration could lead to the decline of many commercial fish species and decrease the fishing communities' income. Economic loss caused by the 1998 bleaching on the tourism and fisheries sectors was estimated between USD 0.7 and 8.2 billion for the entire Indian Ocean (Wilkinson *et al.*, 1999). Finally, water temperature rise and coral reef degradation in the region creates the ideal conditions for the development of some microalgae, highly toxic for marine fauna and human beings.

9.7 Focus on Threats to Marine and Coastal Environments

Overexploitation of Marine and Coastal Resources

Several species are experiencing overfishing in marine and coastal areas of Madagascar and other islands in the region. In most cases, this overfishing follows a windfall with strong demand in national and international markets, as in the case of octopus in the southwest, sea cucumbers in the northwest, and shark fins (in almost all fishing areas).

On the other hand, unsustainable fishing practices are increasing among fishing communities, including in Madagascar, and include the use of unsuitable materials such as mosquito nets, dynamite, and chemicals (including natural poisons from plants). Combined with the increase in the number of fishermen, these practices can be devastating to coastal ecosystems.

On the social level, the deterioration of livelihoods, particularly those linked to agriculture, have led to a migration to coastal areas. Migrants often settle near mangroves (e.g. Morombe), which provide essential materials (houses construction, firewood) and livelihoods.

Insufficient Monitoring, Maritime Protection, and Coastal Areas

The exclusive economic zone areas are immense in the hotspot. Those of Seychelles spread over 1.4 million km^2, and those of Madagascar extend 1.14 million km ². To be fully effective, monitoring of such areas requires significant resources. Seychelles, where the tuna industry is a key economic sector, is facing this problem in addition to maritime safety – due to the presence of Somali pirates since 2008 between the Gulf of Aden and the Mozambique Channel.

Unsustainable Economic Development

In Madagascar, the coastal areas generally lack an appropriate development plan. Construction is for the most part unregulated. This is the case of almost all the fishing and seaside villages (e.g. Andranomavo and Ampasindava in the northwest, Andimakabo and Dzamandar in Nosy Be, Anakao and Andavadoaka in the southwest). Urbanization and tourism development on the coast remain unplanned, giving free way to informal and sometimes illegal practices.

Sedimentation, Siltation

This natural phenomenon is currently exacerbated by the effects of deforestation of upstream watersheds, mainly in Madagascar and the Comoros Islands (including Mayotte) - but also in some areas of Réunion and Mauritius. This causes mudding of marine and coastal ecosystems. To this end, the soil inputs alter the profile of coastal and marine areas and littorals. The coral reef areas, estuaries and bays are the most affected. Consequently, sedimentation degrades fringing reefs by smothering corals. It increases turbidity, and decreases the necessary light for coral life (Maina, 2009*;* IHSM, 2009).

Climate Change

Climate change has an impact on marine and coastal ecosystems, mainly on coral reefs and mangroves. Coral reefs are sensitive to rising sea levels, temperature increase, and to related water acidity. In the Southwest and Northwest of Madagascar, the risk of coral bleaching is particularly high (Maina and Obura, 2008, Mc Clanahan *et al.*, 2009).

Table 9-2: Assessment of Threats to Marine and Coastal Habitats of Madagascar

	Overexploitation of resources	Sedimentation, Siltation, Mudding	Ecosystem Conversion into Croplands and/or Aquaculture sites	Pollutions	Migratory flows towards Coastal Areas	Lack of protection and Control on Coastal Areas	Lack of Marine Monitoring	Unsustainable Economic Development	Climate Change	Total
Estuaries and Bays	3	3	NA	3	2	3	3	3	1	**21**
Low-Altitude Coastal Forests	2	NA	NA	NA	1	3	3	3	1	**13**
Coastal Forests	3	1	1	1	2	3	3	2	1	**17**
Seagrass Beds	1	2	NA	2	NA	NA	2	1	2	**10**
Islands and Small Islands	3	1	1	1	3	3	3	3	2	**20**

Lagoons and Coastal Lakes	3	2	1	1	2	NA	NA	1	1	**11**
Mangroves	3	2	2	1	2	2	2	3	1	**18**
Beaches and Dunes	2	1	NA	1	1	2	2	2	2	**13**
Reefs	3	3	NA	2	2	2	2	2	1	**17**
Total	**23**	**15**	**5**	**12**	**15**	**18**	**20**	**20**	**12**	

Source: National Consultations within the Framework of Ecosystem Profile

9.8 Other Threats to Biodiversity

Urbanization and Artificialization of the Environment, Transport Infrastructures

This threat is particularly important in small island states where the population density is high, with a particular emphasis on coastal areas. This is the case of Mauritius with the development of hotel infrastructure, and of Réunion with the development and renewal of transport infrastructure, programs for building housing, offices, Economic Activity Zones (AEZ), and Commercial Activity Zones (CAZ).

Light pollution, a side effect of urbanization, could represent a major threat for some species. In Reunion Island several endangered Shearwaters and Petrels run to or from their breeding site at night. The most violent sources of artificial lights (such as stadiums and industrial infrastructure) disorient birds, which eventually fail exhausted. They are unable to take off again without human intervention. Each year, approximately 2,000 individuals are recovered by the rescue network of SEOR, a local NGO (SEOR, *com.. pers.*). While other cases are not documented for the Indian Ocean Islands, adverse effects of artificial light is highly probable for other species of birds, moths and other nocturnal insects.

Disruption of Ecosystem Functioning

These threats are well documented in small islands, particularly in Mauritius, where the rate of native biodiversity extinction was one of the highest in the world. The species extinction that plays a crucial role at a time in the life cycle of other species may lead to the depletion of these species or in turn their extinction. One of the classic examples is due to problems of seed dispersal by the extinct animal species (Hansen, 2010). Heavy "ecological engineering" activities are then often required to save the species from extinction, which may include the introduction of related species considered as environmentally "similar" for conservation purposes. This was done with the Aldabra Giant Tortoise *Aldabrachelys gigantea* in some islands or some sites of Seychelles, Mauritius, and Rodrigues, following the islands endemic tortoises' species extinction, which occurred several centuries ago (Hansen, 2010, Gerlach *et al.*, 2013).

Pollution and Siltation

The excessive intake of nutrients from fertilizers, or degradation consequences of substances used in veterinary or phyto-sanitary products, or biocides pollute the freshwater and marine ecosystems. Other sources of pollution are waste from cities, industries, and mines. Their impact is especially significant in the hotspot, in wetlands near the urban centers.

Many wetlands are subjected to accelerated mudding, especially in Madagascar. This phenomenon stems from a combination of upstream anthropogenic activities, deforestation, and bush fires, aggravated by climate change phenomena. During low level periods, Lake

Alaotra's depth is today reduced to 60 cm. For the same period, almost all the rivers of the western slopes are dry - posing a risk to the survival of aquatic species, and causing catastrophic consequences for local populations.

More and more non-biodegradable floating waste made of plastics and other polystyrene materials (e.g. synthetic fishing lines and nets, plastic bags, shoes, buoys, beacons) wash up on the beaches throughout the hotspot where they are a source of pollution. This is particularly the case in Seychelles where some hundreds of kilos of waste are collected every month on some islands. At sea, these wastes can be accumulated by the currents and represent a serious hazard to wildlife; birds and turtles ingest them and often die. In particular this waste can cause serious injuries to turtles and cetaceans.

Natural Hazards

In the context of high micro-endemicity and with species whose populations are sometimes relict, natural disasters can have significant consequences for some species. Thus, volcanic activity in 1985 and subsequent years has reduced the habitat of the Mount Karthala White-eye (*Zosterops mouroniensis*, VU), endemic to this mountain peaks (Marsh, *in* IUCN, 2013). Cyclones, more frequent since 1985 (UNFCCC Madagascar, 2005) may also have an impact on the populations already weakened by other stressors.

9.9 Root Causes and Barriers

A number of indirect causes or "roots causes", can be identified as the source of most of the above-mentioned threats. Table 9-3 below provides a non-exhaustive list, based primarily on information collected during the stakeholder consultations.

Table 9-3: Main Indirect Causes of Threats to Biodiversity in the Hotspot

Rapid Population Growth	As indicated in Chapter 6, the rate of population growth is very high in Madagascar and throughout the Comoros archipelago (Mayotte included). Continued population growth "absorbs" the potential productivity gains and development efforts (even if educational or medical services increase in absolute numbers, their relative numbers stagnates or falls...). Population growth increases the pressure on ecosystems that are already under severe constraints.
High Population Densities	The high population density on small islands and the population concentration in coastal areas lead to a very strong pressure on natural areas. Low altitude lowland areas of volcanic islands, with high agricultural potential, have thus been almost entirely devoted to agriculture (especially Mauritius). With very high land prices, sites conservation then becomes very difficult.
Price Increase of Raw Materials and Other Natural Resources	The price of mineral commodities, highly increasing over the last ten years, leads to increased mining and oil exploration in the region. In parallel, the Asian and especially Chinese economic growth has led to increased demand for certain plant and animal products (precious wood, sea cucumber, shark fins, animal parts used in traditional medicines), which makes this trafficking more lucrative and difficult to combat.
Poverty of Populations (mainly in rural areas)	In Madagascar and Comoros, rural poverty is the main indirect cause of threats to biodiversity: 80 percent of the Malagasy population lives in rural areas, and over 60 percent of the population lives below the poverty line (see Section 6.2). This explains the rustic farming modes and the profusion of survival activities. Coupled with limited education and training, it limits the possibilities of developing alternative activities or reducing harmful activities in the long term, even in cases where people realize their non-sustainability. Poverty is also the cause of population movements in Madagascar - including mining rushes – that negatively affects the environment.
Natural Hazards and Cyclones	Natural disasters reinforce the situations of population deprivation and can also zeroing some conservation efforts. The increase in cyclones due to climate change is already strengthening the indirect cause.
Insecurity	Insecurity due to Somali pirates in the northern part of the hotspot has limited some conservation actions (especially in the outer islands of Seychelles). Increased insecurity in some parts of Madagascar has also been cited as a potential problem for conservation stakeholders - while impacting on ecotourism traffic.
Poor Environmental Governance	It is obviously observed in some countries by a lack of control, and deficient of law enforcement. This surely concerns key issues like species trafficking, but more broadly environmental governance operations: respect of the protected areas boundaries, fisheries control, and buildings or pollution controls. Ministries in charge of the environment are often weakened compared to those in charge of economic sectors; and the choices in terms of development strategy often reflect a low consideration for environmental and biodiversity issues.
Political Instability	While Comoros is stabilized, and that other hotspot countries are considered as advanced democracies, political instability in Madagascar after the 2009 events - and the transition period that followed—has led to a freeze of most environmental policies and a withdrawal of most international donors—with strong impacts on the implementation and the environmental protection.
Economic Incentives Against Biodiversity	Coupled with the previous cause, the economic and political choices can go against long-term preservation of natural resources. In Madagascar, since there are no tax incentives for investments in planted forests, carbon taxes make unaffordable the alternative to use wood fuel by most households.

These root causes are still exacerbated by a series of barriers limiting the impact of actions conducted to preserve nature. Table 9-4 lists the main barriers identified during the consultations.

Table 9-4: Main Barriers Limiting the Success of Conservation Actions in the Hotspot

Inexistent or Inadequate Land System	This is especially the case in Madagascar, in rural areas. It is embryonic in the rural areas. Clearing forests is the only way to grab land, whose ownership right is recognized and transmitted from generation to generation. Paradoxically, this ownership right does not become land tenure, and the formed land capital is not valorized, nor for the capitalization of the countryside, nor for economic structuring**.**
Traditional Beliefs and Force of Habits	Mentioned several times, the force of tradition that can be an advantage in some situations is often a barrier to the adoption of more sustainable practices, while traditional methods become inadequate in the new context. Among the cited examples are the changes in agricultural practices and introduction of alternative energy sources such as solar cooking
Lack of Legal Protection	This is especially true for Comoros, and to a lesser extent for Madagascar. Some sites with very high ecological value are not protected, or still under temporary status in Madagascar. Without reaching the same level, gaps in legal protection also persist in the other islands, especially for habitats. These deficiencies are also felt in the monitoring and the enforcement of law and regulations (human, material and financial resources)
Deficit of Information on Biodiversity (Sites, Species…)	Although the hotspot has been well studied in comparison with others at the world level, the basic data are still incomplete. New species are still discovered - including primates – some sites are not yet explored, and marine ecosystems are still largely unknown. For some species, information are lacking on biology, behaviors, and interactions with other species that allow implementing safeguarding plans.
Difficulty to Access Information	When scientific information is available, it is often scattered and difficult to access. Numbers of scientific publications «remain" in the countries of origin of foreign researchers; and they do not benefit much to the country. Scientific publications are not often translated into local languages. Dissemination of information in simple form for policymakers and citizens is rarely performed. For example, there is no accessible database on sites and species, and no platform for sharing best practices at the regional level…
Lack of Awareness Campaign on Environmental Issues	The vast majority of citizens and (political and economic) decision-makers in the region remain hardly sensitive to biodiversity issues and to biodiversity importance for human well-being and to sustainable economic development.
Lack of Skills	Particularly in Madagascar and Comoros, skills at the level of the government, but also the civil society and surely at the level of the grassroots communities are a barrier to implementing effective and long term programs.
Insufficient Resources for Conservation	If every country and territory have deplored the lack of resources, the differences between Madagascar, Comoros and other hotspot islands are important. The situation is particularly difficult for Madagascar, where even the needs to ensure regulatory functions would be immense—and certainly impossible to meet for the government even in a normal political context (World Bank, 2011).

10. CURRENT INVESTMENTS

The objective of this chapter is to present a synthesis of biodiversity conservation investments across the hotspot to guide the definition of the CEPF investment niche. We have chosen not to include as part of the profile the investment in the French overseas departments, on the one hand, because these departments are not eligible for CEPF funding; and on the other hand, due to very different funding mechanisms from those of other countries. Their funding mainly comes from Europe, the Government, and the concerned local authorities. However, Mayotte being until 2010 an oversea territory eligible for official development assistance, the data concerning this island was included when available.

Funding modalities vary strongly from one country to another, and information is generally spread across different sources, available in a wide variety of formats, and open to interpretation in terms of what constitutes an investment in biodiversity. Therefore this chapter should not be considered as an exhaustive review of the investments in biodiversity, but instead a synthesis of the information the profiling team was able to collect during the time allocated. This chapter is organized according to the major categories of investors in order to allow temporal analyses, by countries and by donors. The chapter also provides details on some of the most important programs pertaining to environmental matters.

10.1 Bilateral Cooperation and the European Union

The most comprehensive information source on bilateral cooperation is that of the Organization for Economic Cooperation and Development (OECD). The member states officially declare their development assistance annually to the OECD. Institutional donors are required to use a marker system to identify assistance to implement the Rio conventions. This system provides a picture of the investment in biodiversity from bilateral donors (and European institutions), even if interpretations may vary from country to country. The analyses shown below concern only grants (not loans) and the figures are those of annual commitments (rather than actual disbursements).

Figure 10-1: Distribution of Bilateral Contributions Affecting Biodiversity (left, all projects, right, projects with biodiversity as key objective) - 2005-2011 (OECD, 2013)

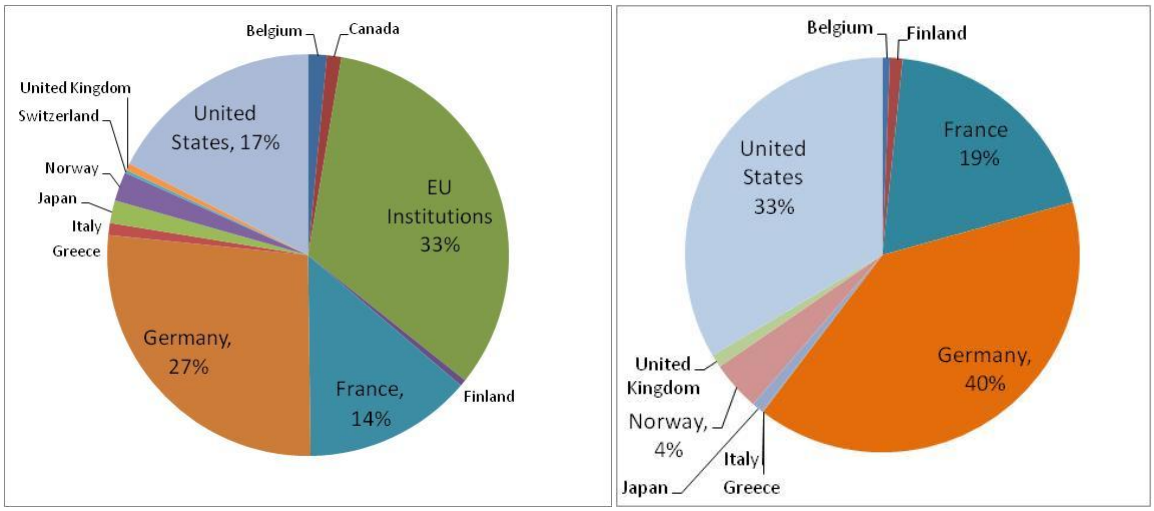


Table 10-1: Summary of Bilateral Cooperation Investment (Grants) in the Hotspot

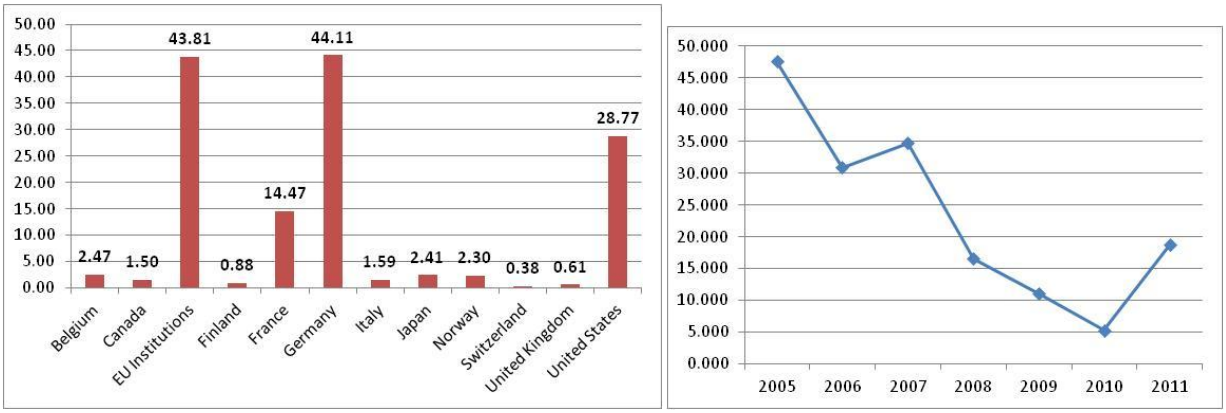
Grants for Projects with Significant Impact on Biodiversity, 2005-2011 (M USD)						
	Comoros	**Mauritius**	**Mayotte**	**Seychelles**	**Madagascar**	**Grand Total**
Belgium					2.47	**2.47**
Canada	0.41				1.50	**1.92**
European Institutions	0.29	8.46		1.86	43.81	**54.43**
Finland					0.88	**0.88**
France	0.99		4.92	1.94	14.47	**22.32**
Germany					44.11	**44.11**
Greece		0.02				**0.02**
Italy					1.59	**1.59**
Japan	0.04	0.52		0.06	2.41	**3.02**
Norway		1.55			2.30	**3.85**
Switzerland					0.38	**0.38**
United Kingdom	0.23	0.08		0.00	0.61	**0.92**
United States					28.77	**28.77**
Grand Total	**1.97**	**10.63**	**4.92**	**3.86**	**143.30**	**164.69**
Grants for Projects Whose Principal Objective is Biodiversity Protection, 2005-2011 (M$US)						
	Comoros	**Mauritius**	**Mayotte**	**Seychelles**	**Madagascar**	**Grand Total**
Belgium					0.53	**0.53**
Finland					0.88	**0.88**
France	0.99		4.79	0.97	9.61	**16.37**
Germany					34.07	**34.07**
Greece		0.02				**0.02**
Italy					0.03	**0.03**
Japan					0.82	**0.82**
Norway		1.55			1.94	**3.49**
United Kingdom	0.23	0.08		0.00	0.61	**0.92**
United States					28.77	**28.77**
Grand Total	**1.23**	**1.65**	**4.79**	**0.97**	**77.27**	**85.91**

Sources: OECD, 2013

The principal bilateral donors for biodiversity in the region are the European institutions (mainly through the European Development Fund (EDF)), Germany, the United States and France. All contributions of the European Union member states contribute more than 75 percent of bilateral funds for biodiversity. European projects more generally include biodiversity within broader programs (agriculture, fisheries) rather than funding strict conservation programs. The European Cooperation is also one of the major IOC donors (with France), and thus supports many environmental programs of this organization in the region (see below). Bilateral funding of public aid to development in the region is largely attributed to governments.

Madagascar is the largest recipient of bilateral aid in the region, with the highest number of present donors and 87 percent of the aid (see Figure 10-2)). However, bilateral development assistance dropped due to the 2009 political events, compounding the fact that biodiversity assistance had already suffered a sharp drop. The recovery in 2011 was mainly linked to the unique commitment of more than US$11 million from Germany. The United States, traditionally an important donor for conservation in Madagascar with US$6 million to $9 million per year over 2005-2009, ceased their cooperation in this field in 2010.

Figure 10-2: Bilateral and EU Grants in Madagascar (All Projects on Biodiversity, 2005-2011, in M USD) and Trends over the Period.



United Kingdom

Data reported by this country to the OECD appears to be unsystematic in reporting projects funded by the *Department for Environment, Food, and Rural Affairs* (DEFRA), within the Darwin Initiative framework. It was found that 13 projects amounting to 1.69 million pounds sterling (approximately US$3 million) were approved since 2007. These *Darwin Initiative* projects are listed in Appendix 5. More than 80 percent of these funds benefited Madagascar; these were primarily research projects involving British universities and research centers. The support for Mauritian initiatives has considerably dropped since 2007, while Comoros has benefited from a single project only.

Japan

The Japanese cooperation has few activities focusing directly on biodiversity, but supports large projects of integrated rural development, with components on soil conservation and reduction of erosion, which offers cobenefits in terms of biodiversity conservation. This is for instance the case of the on-going 5 MUSD, JICA-supported *Project of Integrated Approach Development in order to Promote Environment Restoration and Rural Development in Morarano Chrome*, which de facto helps preserving the ecosystem of Lake Alaotra, a KBA and AZE site.

France

AFD and FFEM have significant involvement in Madagascar in the field of environment, for natural resources management, biodiversity protection, and rural development, particularly for conservation agriculture. Ecosystems and natural resources management for local development are an important focus and experience axis for AFD.

AFD and FFEM were the first donors to contribute financially in 2005 to the Madagascar Biodiversity Fund (FAPBM) endowment for protected areas. France, through AFD contributions (EUR 2 M), FFEM (EUR 1 M), and C2D resources (EUR 13.5 M), is the main contributor/ investor in the Madagascar Biodiversity Fund (45 percent of the endowment fund amount).

Regarding agro-ecology, AFD has extensive experience, particularly in Madagascar, where it has researched the direct sowing techniques under plant cover (SCV) with support from CIRAD. "Watersheds – irrigated perimeter" type projects allowed for testing and large-scale dissemination of sustainable systems of agricultural production, most often related to reforestation actions on steep slopes.

In addition to its support to Madagascar, France has contributed funds in Seychelles for ecosystem rehabilitation, and to the Mauritian government for implementing the Mauritius Island sustainability strategy (also supported by the European Union). In Comoros, AFD has supported the Bristol Zoo to manage the forest in Moya in Anjouan (EUR 750,000), and will be one of the major co-funders sponsoring the protected areas system (see Table 10-9). France is also a CEPF donor partner since 2007.

Table 10-2: Major Projects Related to Biodiversity Funded by France in the Hotspot

Madagascar			
2006-2012	FAPBM	Assistance to the Fondation pour les Aires Protégées et la Biodiversité de Madagascar (FAPBM) (*assistance to protected areas managed by MNP*)	AFD € 2 M FFEM € 1 M C2D € 13,3 M
2009-2012	CIRAD, WWF, L'Homme et l'Environnement	COGESFOR: Sustainable management of natural resources project for conservation in three biodiversity «Hotspots» regions (COGESFOR) (Alaotra-Mangoro: Vohimana and Didy, Atsimo-Andrefana: Plateau Mahafaly)	AFD € 2 M
2013-2016	*WWF, Etc Terra (tbc)*	Holistic forests conservation project (HCPF) in Madagascar - Phase II (*Corridor Marojejy, Anjanaharibe Sud, Tsaratanana - Comatsa, in the Northeast, and Beampingaratsy, in the Southeast*)	AFD € 2 M
2011-2015	GoodPlanet et Agrisud International	Mahavotra – Agroecology and forestry in Itasy, project pilot to evaluate the impact of change in agricultural practice on greenhouse gas emissions	AFD € 1 M
2006-2013	Ministry of Agriculture – consulting office - BRL – in-site NGO	Watersheds and irrigated areas project in the Southeast and the Highlands (BVPI SEHP)	AFD € 15 M
2008-2013	Ministry of Agriculture – FAUR -- CIRAD –in site NGO	Project for the development and protection of Lake Alaotra watersheds and to support the national agroecology device (BV LAC 2)	AFD € 10,765 M FFEM € 2 M
2005-2010	Identi Terre	Bio-cultural pilot project in Antrema	FFEM € 320,000
2006-2008	CETAMADA	Development of sustainable whaling ecotourism in Madagascar and contribution to the scientific repository of Indian Ocean humpback whales	FFEM-PPI € 45,000
2011-2013	FAMA	Forest restoration and new operating techniques of the slopes to contribute to the Ankenihany-Zahamena Corridor conservation	FFEM-PPI € 11,000

2011-2013	Missouri Botanical Garden (MBG)	Promoting a sustainable community-based natural resources management of Pointe Larree	FFEM-PPI € 35 000
2011-2013	Azafady	Reintroducing *Dyspsis* sainte lucie in the littoral forest of Manafiafy	FFEM-PPI € 23,700
Seychelles			
2005-2011	ICS, North island, DoE, IDC	Rehabilitation of islands ecosystems	FFEM € 460,000
Comoros			
2005-2011	Bristol Zoological Society	Forests sustainable management in Moya in Anjouan	AFD € 750,000

French Decentralized Cooperation

The term decentralized cooperation covers all international solidarity activities implemented by "independent" local authorities—municipalities, departments, regions—from the central government. Although this is a modest financial amount compared to amounts incurred by the government and the French Development Agency, this multifaceted cooperation has its own advantages and can have a very strong impact locally for beneficiaries. Linking the territories, it is also a catalyst for other solidarity mechanisms—such as those engaging the civil society or the private sector. In addition, it has sometimes a pioneering role in the implementation of programs eventually funded by bilateral or multilateral donors (Briand and Carret, 2012).

In Madagascar, 13 French territorial communities conduct assistance programs in the fields of environment, ecotourism and conservation. Examples include the important assistance by the Auvergne Region to the ecotourism sector in the Vakinankaratra Region (more than US$1.65 million over 2007-2012, with additional co-financing from the French Cooperation), the Finistère Department's assistance of about US$250,000 to ecotourism and plant biodiversity protection in the Diana Region, interventions on the Tampolo site with the support of the Nord-Pas-de-Calais Regions and Bretagne, as well as the Finistère and Ille-et-Vilaine Departments. A non-exhaustive summary of investments from the decentralized cooperation actors in relation to biodiversity conservation is shown in Appendix 5.

Several French local governments have agreements and cooperation with Mauritius – and the Regional Council of La Réunion has some activities in Rodrigues. Nevertheless, no specific activity on biodiversiry conservation has been found on the decentralized cooperation portal. In the Comoros, the decentralized cooperation activities focus on health, education and support to local governements capacities; no specific activities on environment have been identified (CNCD, 2014).

European Union

The principal recent interventions of European cooperation in conservation over the past five years occurred mainly in Madagascar, and predominantly in parallel with or integrated into rural development programs. The Commission has therefore supported civil society in the form of international and national organizations, in the field of development on the outskirts of many protected areas. The Commission has also developed a wide agroforestry program around the capital, with components on biodiversity preservation. These investments are important due to the fact that environment does not represent a focus for the Commission in that country.

On the other hand, the Commission has also developed an assistance program to non-governmental actors, which could benefit stakeholders in the environment sector.

Table 10-3: Major investment by the European Commission in Favor of Biodiversity in Madagascar Since 2007

2012-2014	CARE	Improving populations livelihoods and resilience in the Northeastern area	$390,000
2012-2014	GRET	Improving populations livelihoods and resilience around the National Park of Mananara Nord	$430,000
2012-2014	*AIM*	Improving populations livelihoods and resilience around the Mananara National Park	$430,000
2012-2014	AVSF	Improving populations livelihoods and resilience in the vicinity of the national parks and reserves of Ambatovaky and Zahamena (CAZ)	$430,000
2009-2013	MNP	Contributing to poverty reduction, biodiversity conservation, and fight against climate change by managing jointly the primary forests of Marolambo	$4,000,000
2011-2013	Radio France International	Mobilizing the radios for environment preservation	$357,000
2014- ?	Tbd	Agroforestry assistance program around Antananarivo	$ 20,000,000

Source: Representation of the European Commission in Madagascar, com. pers., DEVCO C6, com. pers.
Note: Amounts are given indicatively and use a conversion rate of €-$ @ 1.359

In Comoros, the European Commission intervenes mainly in infrastructure, but there are other interventions. For example, a program dedicated to strengthening resilience to climate change will begin in the near future with EUR 3 million in funding. Environmental assistance in Mauritius and Seychelles is indirect and generally related to agricultural programs and solid wastewater treatment; no direct investment in conservation or ecosystems management was noted in recent years.

Being itself a regional organization, the European Commission is an important donor to African regional organizations. It supports several regional initiatives in the field of environment. In the hotspot, these interventions are most often implemented by or through the Indian Ocean Commission (see section 7.5). The European Commission had also since 2012 become one of the CEPF partners.

For the record, the Commission is also an important donor in the field of biodiversity in the French territories and departments—Mayotte and Réunion being part of the European Space. Many funding lines have been mobilized, managed by the general management for the EU's Development and Cooperation (for the Scattered Islands, and Mayotte until 2013), Regional Policy, and Environment agencies.

10.2 Other Multilateral Donors

World Bank

The World Bank has been and remains one of the principal partners of Madagascar for biodiversity conservation. The main program the World Bank has supported since 1990, with other donors including France and Germany, is the National Environmental Action Plan (PNAE). This Plan was implemented in three phases of environmental programs: PE-1 (1990-1997), PE-2

(1998-2003) and PE-3 (2004-2011). In 2009, despite the political crisis and in light of the importance of maintaining assistance to protected areas, the World Bank agreed to extend the PE3 until 2011, with a budget of US$12 million. It is through this continuous support, jointly with other donors, that the Madagascar network of protected areas, currently managed by MNP, then by the Système des Aires Protégées de Madagascar (SAPM), and the FAPBM as a sustainable funding mechanism, could be put in place.

In 2011, the World Bank approved additional assistance funding to the PE-3, with a budget of USD IDA 42 M (loan) plus a US$10 million donation through the FEM, as specific support to the Foundation for Protected Areas and Biodiversity in Madagascar (see Table below) The main components of this program are listed below in Table 10-4. It is worth noting that the World Bank and the FEM assistance under this program were restricted to 30 protected areas managed by Madagascar National Parks, in addition to the corridors of: Mamabaie (Masoala, Makira and Bay of Antongil), Corridor Ankeniheny-Zahamena (CAZ) and Anjanaharibe, whose proponents are, respectively, WCS, CI and WWF.

Table 10-4: Components and Budget of the World Bank and the FEM Support Program to the PE-3 (Madagascar)

	World Bank (IDA)	*(total*)*	**FEM**
Component 1: Protected areas and landscape management	**16**	*23.2*	
Monitoring the protected areas (30 AP managed by MNP and three corridors)	11.7	*17.5*	
Infrastructure for protected areas ((idem)	1.9	*2.1*	
Equipment for the protected areas (30 AP MNP), including vehicles	1.1	*1.1*	
Pilot project of landscape management (MAMABAIE) with support to civil society pilot	0.5	*0.5*	
MNP institutional reform	0.8	*2.1*	
Component 2: Support to local communities and development	**14**	*14*	
Implementation of backup policies and projects of compensation for the Ankeniheny-Zahamena Corridor and Makira projects	6	*6*	
Support and/or creation of local monitoring committees and local authorities to support the parks (including 175 groups of community-based forest management) to 30 MNP areas and three corridors	8	*8*	
Component 3: Mechanisms of sustainable funding of protected areas and landscapes	**8.9**	*8.9*	**10**
Capitalization of the trust fund of the Foundation for Protected Areas and Biodiversity in Madagascar			10
Technical support for the trust fund	0.7	*0.7*	
Support for ecotourism development (infrastructure, interpretive centers) in 18 AP, public-private partnerships in eight AP, 15 community ecotourism projects	5.4	*5.4*	
Definition of the database and evaluation of the legal and institutional framework in preparation of carbon financing, and other technical studies activities	2.8	*2.8*	
Component 4: Project management, monitoring and evaluation	**3**	*3*	
TOTAL	**41.9**		**10**

*Source: World Bank, 2011 Note: * total includes national counterparts*

The World Bank also sponsors many rural development programs in Madagascar, some with strong environmental components, such as a project dedicated to farming organic cotton in Mikea (US$1.875 million) implemented by WCS. The World Bank also provided US$1.5 million for the WAVES (Wealth Accounting and Valuation of Ecosystem Services) program, which focuses on the economic assessment of ecosystem services.

In Seychelles, the World Bank has long been an important partner on biodiversity and environmental issues. For example, US$810,000 was allocated to support protected areas management by NGOs and the private sector in 2004, and $1 million was provided in 2000 to support marine ecosystems management. In the Seychelles, US$1 million was allocated in 1998 for bird conservation). Since 2004, although the budgets allocated by the Bank have increased (US$7 million in 2013), they focus on administrative and fiscal reform and on competitiveness, according to budget support rules. Since 2004, no specific support has been allocated for environmental projects or programs.

Concerning Mauritius, the World Bank saw the amounts of its loans to the government falling from annual envelopes of about US$120 million in 2009 and 2010 to US$35 million in 2012 and 2013, an evolution in parallel with the country's better access to financial markets. Loans came as budgetary support to the general development policy, and the implementation of fiscal and administrative reforms in particular. The last biodiversity conservation project (a GEF-World Bank project) happened from 1995 to 2001 (US$1.2 million).

The World Bank commitment in Comoros is limited to an annual envelope ranging from US$5 million to US$9 million from 2010-2013. The projects support the development policy in general, infrastructure programs or, more recently, the electricity sector reform, which could have a positive effect on firewood consumption. The main recent initiative in the environmental sector is a project on coastal resources co-management in the amount of US$2.73 million over the period 2011-2017.

Global Environment Facility

The Global Environment Facility commitments for biodiversity in the region can be estimated at nearly US$32 million for the period 2000-2013. Table 10-5 summarizes the amounts committed over the period, excluding regional programs and small grants (whose data are shown in Table 10-6). The complete list of projects with their status is shown in Appendix 5.

Table 10-5: GEF Commitments on Biodiversity Projects in the Hotspot Countries, 2000-2013 (USD)

	Closed	In process	Validation	Total
Comoros		274,000	4,246,000	4,520,000
Madagascar	14,666,000		16,000,000	30,666,000
Mauritius	2,155,800	4,220,000		6,375,800
Seychelles	1,561,000	3,900,000	4,100,000	9,561,000
Total	18,382,800	8,394,000	24,346,000	51,122,800

Sources: GEF, online database accessed in January 2014, et com. pers. FEM Secretary Office

Like the World Bank, GEF's partial investments (except for small grants) in Madagascar have been blocked since 2009 due to the ongoing political crisis. This is why the approved US$16 million were not in the implementation phase in this country in 2013. This situation is changing following the recent stabilization of the political contexte, and two large projects have recently been approved in early 2014. The first one, *Conservation of Key Threatened, Endemic and Economically Valuable Species in Madagascar*, will benefit from a 14 MUSD grant from the GEF, intends to engage local communities in sustainable management of important Malagasy trigger species ; the implementation will rely extensively on international as well as national NGOs. The second one, *A Landscape Approach to conserving and managing threatened Biodiversity in Madagascar with a focus on the Atsimo-Andrefana Spiny and Dry Forest Landscape*, focuses on landscape management for the protection of the dry forests of the South-West of the country, and includes provision for community-based conservation and sustainable use of natural resources. This project will benefit from a 26 MUSD grant from the GEF; the implementation will involve governmental authorities and agencies as well as Tany Meva Foundation and SAGE.

In Mauritius, GEF is the major international funder of a big program to improve the protected areas management system—US$15.7 million (US$4 million from GEF and co-sponsored by the Mauritius government, Wildlife Fund, and the private sector). A similar program is in preparation in Comoros, with funding in the amount of US$4.246 million from GEF and many other donors including the AFD (see Table 10-9).

GEF has also funded many regional and global programs directly related to the Indian Ocean. For example there is a program targeting dugongs and seagrass conservation (*The Dugong and Seagrass Conservation Project*) implemented by UNEP in the Pacific and the Indian Ocean in the amount of more than US$23 million, of which US$5 million is a GEF grant.

GEF works with civil society mainly through the Small Grants Program. During the fifth operational phase, an amount totaling nearly US$4.68 million was allocated to 85 projects in four eligible countries of the hotspot.

For all countries in the region, the GEF is the lead donor to support establishment of institutional structures for biodiversity protection (namely the systems of protected areas and the national action plans on biodiversity), technical support for drafting reports to the Convention on Biological Diversity, and meeting commitments on Biosafety in the Cartagena Protocol context. The program's implementation is mainly entrusted to UNDP and the World Bank, in close collaboration with national administrations.

Table 10-6: GEF Small Grants Programs in the Hotspot, Given for Biodiversity Projects, 5th Operational Phase (2011-2014)

	Comoros	Seychelles	Mauritius	Madagascar	Total Hotspot
Number of Grants	13	11	16	45	**85**
Average	*29,037*	*33,333*	*63,727*	*22,600*	***32,944***
Budget	**612,237**	**640,920**	**1,609,708**	**1,817,007**	**4,679,872**

Source: UNDP-SGP Database

African Development Bank

The African Development Bank does not sponsor specific projects on biodiversity, but has intervened on a few environmental issues—principally on energy. In Madagascar, the Bank supported a renewable energy program including the promotion of public-private partnerships for wind, solar, and hydropower in Nosy Be (US$99,000), as well as a program to mitigate CO^2 emissions under the clean development mechanism, with Hydelec (US$8.1 million). They also supported the implementation of a climate change adaptation program sponsored by EDF in the sector of agriculture in the Southwest for US$8.4 million. In Comoros, the interventions are in the energy restructuring sector with a component on renewable energies.

10.3 Other International Funding

International Foundations

International foundations sponsoring biodiversity conservation programs are especially active in Madagascar. Unlike the institutional actors working mainly with governmental institutions, their main channel of intervention is that of NGOs, with international NGOs benefiting primarily from their support (see Figure 10-3Figure 10-3: Main Recipients from the MacArthur, Prince Albert II of Monaco and Helmsley). Detailed information is not always easily accessible, and the format is variable. Hence, it is not possible to present comprehensive figures on commitments. Using available data, it is estimated that the contribution of big international foundations contribution to the conservation sector is approximately US$12 million over the last six years. Table 10-7 presents the major programs mentioned during consultations and specific interviews with some of these foundations.

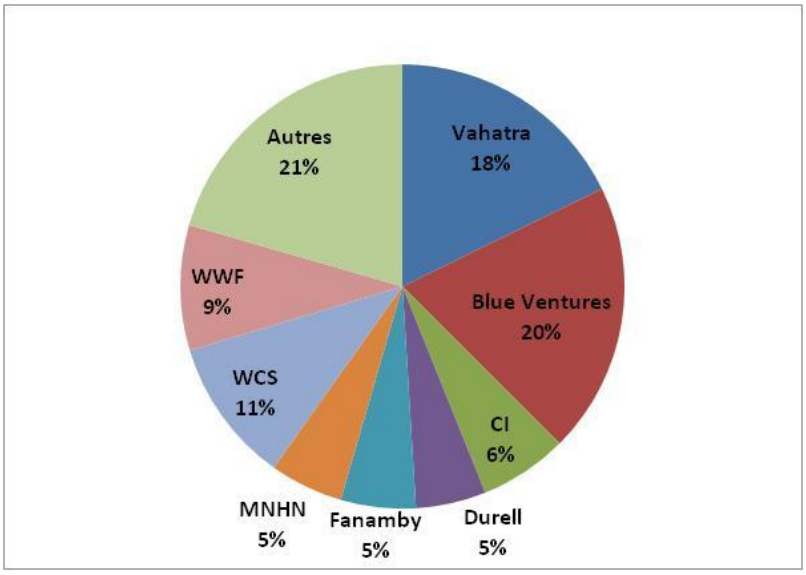
Table 10-7: Major Projects Funded by International Foundations in the Hotspot

	Recipients	Projects Description	Budget
MacArthur Foundation			**$4,300,000**
2008-2013 Madagascar	Blue Ventures	Carbon program on mangroves, environment-population health integrated program, education of young girls near marine areas, program to set the foundations of a network of locally managed marine protected areas	$1,590,000
	Asity	Conservation and climate change on Mangoky-Ihotry Wetlands	$ 250,000
	Fanamby	Local communities' participation in protected areas management (Loky-Manambato)	$ 200,000
	Durell	Community-based management of natural resources in and around protected areas	$ 240,000
	The Peregrine Fund	Creation of community-managed protected areas (forest and wetland)	$ 160,000
	WWF	Adaptation to climate change and mangroves role on the West Coast	$ 210,000
	WCS	Climate change impact on the West Coast	$ 400,000
	CI	Adaptation to climate change and conservation	$ 650,000
	Field Museum	Climate change impact on biodiversity	$ 400,000

		DELC	Capacity-building in environmental law	$ 200,000
Helmsley Charitable Trust				**$ 4,015,468**
2012 (2018) Madagascar		WCS	(Marine and terrestrial) Natural resources management MaMaBaie	$ 400,000
		Durell	Wetlands	$ 275,950
		Blue Ventures	Sustainable funding mechanism/ fisheries management / coral reefs in the Southwest	$ 399,240
		Fanamby	Habitats and biodiversity conservation, Sokafana / Anjozorobe Agavo	$ 350,000
		MBG	Plant conservation	$ 224,998
		FAPBM	Establishment of new protected areas (Antrema, Ambohidray, Itremo, and Montagne des Français)	$ 350,000
		The Peregrine Fund	Conservation of the bald eagle (Pygargue) and other important species	$ 225,280
		Vahatra	Research: capacity building for young scientists	$ 1,790,000
Albert II de Monaco Foundation				**$ 1,770,000**
Madagascar	2007-2009	MNHN	Research on biodiversity (Atimo Vatae expedition - marine and coastal area of the South)	$ 540,000
	2007-2010	WWF	Conservation of the Toliara reef complex	$ 350,000
	2013-2016	Energies pour le Monde Foundation	Boreal (sustainable, solar and wind energy)	$ 260,000
	2007-2010	WWF	Support to civil society (Club Vintsy)	$ 360,000
	2013-2016	WCS	Reducing the vulnerability of coastal communities in the Northwest of Madagascar by creating marine protected areas	$ 260,000
Liz Claiborne Art Ortenberg Foundation (LCAOF)				**$ 187,228**
Madagascar		Tany Meva, MBG, Durrell, WCS	Ecological research (species protection), forests, protected area	$ 187,228
Mohammed Bin Zayed Foundation				**$ 817,468**
Since 2009, Entire Hotspot		Numerous NGOs	Actions in Madagascar, 53 projects	$ 536,240
			Actions in Comores, 4 projects	$ 48,000
			Actions in Réunion, 2 projects	$ 20,000
			Actions in Seychelles, 2 projects	$ 24,000
			Actions in Mauritius, 1 project	$ 2,000

Sources: Consultations, Websites of Foundations, Personal Communications. Compilation CEPF

Figure 10-3: Main Recipients from the MacArthur, Prince Albert II of Monaco and Helmsley Foundations



The current trend in terms of funding seems to have been relatively stable, if not increasing, over the past years, according to interviewees. Foundations were not particularly affected in terms of investment by the political crisis in Madagascar. They were able to continue activities with the main organizations in the country. The Helmsley Trust has developed a strategy for 2012-2018, and expects to fund about US$2 million annually (pers. com). The MacArthur Foundation plans to evaluate its interventions in the country before any potential reinvestment in the coming years. The other foundations' interventions are determined on the basis of global programs, and it is difficult to forecast the funding levels that the hotspot would receive.

International NGOs

The principal international organizations present in the hotspot contribute also to the financial effort for conservation by making available their own resources, funds from their own direct donors, or funds from their head offices. Such funding, co-funding or in-kind contributions could not be assessed for the profile, but should not be overlooked.

Private investors

In recent years, private sector organizations have begun to engage in environmental issues in Madagascar. The mining sector is the pioneer, through large mining firms, such as those engaged in the nickel-cobalt extractive program in the east-central part of the country (Ambatovy program), as well as the limonite extractive program in the south-east (QMM). Companies investing in these programs orient their environmental activities towards collaboration with local communities and through environmental education activities, reforestation, and land restoration activities. Moreover, the funding approved by Air France for a vast project of forest conservation is worth mentioning: during the first phase (2009-2012), this airline company granted EUR 5 million for the project, executed by GoodPlanet/ Etcetera and WWF. The TELMA Foundation, a charity organization of the Malagasy telecommunications sector, has sponsored some small initiatives, generally focused on renewable energy and environmental awareness.

	Principal Activities	Implementing Partners	Budget
Ambatovy Program	Forests (sites around d 'Ambatovy), community development	CI, ANAE, Federation of Local Grassroots Communities, MAVOA, Association MITSINJO, GERP, ASITY	Annual provisional Budget US$1 million
QMM	New protected areas (creation process), community development, *Crocodiles niloticus* management	QMM, WCS, ASITY, LANGAHA, MBG	Non specified
Air France	Forest-carbon market – management transfer (Phase 1)	GoodPlanet/ Etcetera, WWF	€ 5 millions

Seychelles is certainly the hotspot country where conservation funding by the private sector is the most advanced. Nature reserves (Aldabra, Cousin, Aride) sometimes benefit from corporate financing in the form of equipment or donations. In Aride, construction of the conservation center was funded by the Seychelles breweries in 2005. Since 2003, the *Miguel Torres* wine company has donated 10 percent of its annual profits to Island Conservation Society, totaling EUR 57,000 over 10 years. Since 2013, the government has ordered businesses whose annual profits exceed 1 million of Seychelles' rupees to pay a tax of social and environmental responsibility (CSR) of 0.5 percent, half of which can be given directly to the authorized nonprofit charity organizations. It is still too early to assess the total annual amount of funds raised for nature conservation through the RSE.

The contributions of the tourism sector such as private islands and hotels or private owners, are not negligible, and are often accompanied by in-kind contributions (such as equipment, transportation, and lodging) without which nature protection agencies could not intervene. These investments can be estimated at approximately US$1 million annually (Rocamora, *pers. comm.*). Funds have finally been made available via contributions for protected areas management (Vallée de Mai/Aldabra: SIF, Barren: ICS, Cousin: NS, marine parks: SNPA) collected from ecotourism promoters, for an annual total of approximately US$400,000.

Critical Ecosystem Partnership Fund (CEPF)

CEPF first invested in the hotspot from 2001 to 2006, with a focus on Madagascar only. During this period, 40 grants were given to 18 civil society organizations, for a total of US$4.25 million. CEPF funds served to sponsor a multitude of projects, large and small, both local and national. Although confined to the parameters set out by the CEPF strategic directions, the projects explored many intervention areas, including the methods to ensure biodiversity conservation in the corridors, conservation planning initiatives, and activities determining the priorities and integrating local population's concerns.

In the context of the Durban declaration to increase the area of protected land, CEPF has provided direct support to promoters in preparing the zone classification of the Adriana, Loky-Manambato, Makira, and Zahamena. The 2006 assessment also highlighted the CEPF contributions to the training of conservation professionals and strengthening national NGOs. Finally, CEPF helped conduct the pilot experiment of *Nodes*, small local management units, supervised by a conservation organization and providing support, particularly by small and micro grants to community-based organizations. This approach linking conservation and development, closer to communities, produced important results locally.

A consolidation phase, for a total of US$1.4 million, was scheduled to start in 2009 but its implementation was delayed due to the political crisis. Five grants were finally granted and implemented over 2011-2013. The program was dominated by the consolidation of the *Nodes* program, implemented by Conservation International and local partners (approximately 50 percent of the funding).

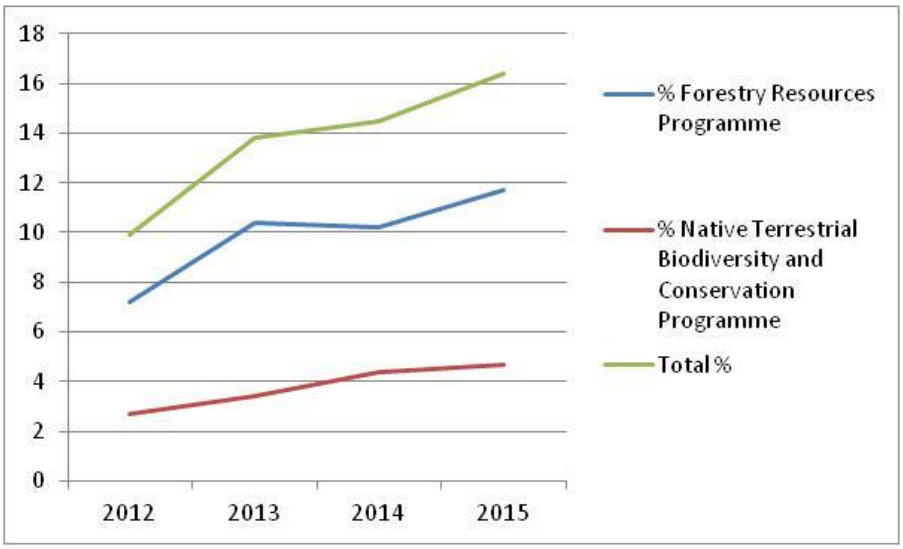
10.4 National Resources

Government Budgets

In Madagascar, the annual budget of the Ministry of Environment and Forestry for the past six years (2008-2013) is around MGA 30 to 40 billion, the equivalent of US$13.5 million to $18 million, representing less than 1 percent of the national annual budget. This budget is expected to cover both the operations and the investments linked with the Ministry's mission, which is to ensure sustainable development through the preservation and economic development of Malagasy environmental wealth. It is worth noting that the socio-political and institutional change that occurred since the beginning of 2009 has had no significant impact on the budget figures.

In Mauritius, the national budget resources devoted to terrestrial biodiversity conservation and forest management was estimated in 2007 at RM 200 million annually, or US$6.5 million (*Ministry of Environment and National Development Unit*, 2007). Over the period of 2012-2015, despite a general budget cut of the Ministry of Agro-Industry and Food Security (in charge of forests and protected areas), budgets allocated to biodiversity are preserved—and have even slightly increased.

Figure 10-4: Evolution of the Budget Share of the Ministry of Agro-Industry and Food Security Allocated to Biodiversity in Mauritius (2012-2015)



Sources: Government of Mauritius. 2012-2013: planned budget. 2014-2015: projections

National Foundations

Madagascar Biodiversity Foundation (Fondation pour la Biodiversité et les Aires Protégées de Madagascar, FAPBM)

Promoted initially by the Malagasy Government, Conservation International and the WWF, the Madagascar Biodiversity Fund is a private Malagasy foundation created in 2005 and declared of public utility. The Foundation strives for the financial sustainability of Madagascar's protected areas and biodiversity. It carries out numerous actions that relate to the funding of the recurrent managerial costs of the protected areas and of project that aim at reducing the pressures put on them, while addressing the needs of the populations. The capital of this Conservation Trust Fund amounts to close to US$45 millions, provided by bilateral and multilateral donor agencies (see below).

Donor	Amount (US$ million)
France	**20.8**
Debt Cancellation Contract	*16.9*
AFD	*2.6*
FFEM	*1.3*
Global Environment Facility	**10**
World Bank	**7.5**
Germany (KfW)	**5.85**
Total	**44.15**

Note: exchange rate used for calculation: 1EUR=1.3USD; Source: FAPBM, 2014

From 2010, the FAPBM has begun to generate interest income on the basis of its primary endowment. In 2011, the funding granted by the Foundation for Protected Areas and Biodiversity of Madagascar amounted to US$850,000. They covered a total area of 1.5 million ha of protected areas across 11 sites, including six national parks and five new protected areas. In 2012, the Foundation awarded more than US$1 million for 15 protected areas, representing a total area of approximately 1.7 million hectares. For 2013, the funds allocated by FAPBM are shown in the table below.

Table 10-8: FAPBM Funds Allocation, 2013

Number of Protected Areas	Funding Source	Amount (USD)	TOTAL (USD)
12	Interests generated by Capital	731,491	1,379,422
05	Sinking Fund (Fw)	519,572	
04	Different donors	128,358	

Tany Meva Foundation

Created in 1996, Tany Meva Foundation’s mission is to mobilize and manage financial resources to promote sustainable environmental management through local communities’ involvement. Its focus areas are sustainable management of natural resources and biodiversity protection, mitigation and adaptation to climate change, fighting against desertification, and environmental awareness.

The Foundation has received several grants from international donors (including Switzerland) and also plays the role of implementation agency for some donors, allocating sub-grants to field

actors. In 2011, Tany Meva gave more than US$780,000 in grants to 229 projects (including 199 small environmental education projects). From its creation until 2011, the Foundation supported 291 projects amounting to US$3.554 million. Details of sponsored activities in 2011 are provided as an example in Appendix 4.

Seychelles Islands Foundation (SIF)

The mission of this foundation, created in 1979 at the initiative of the Seychelles government, is to protect and manage the Aldabra and Vallée de Mai sites. Most of its budget is provided by entry fees paid by tourists and scientific expeditions.

10.5 Regional Cooperation Programs

Except for projects funded by GEF and previously mentioned, the largest part of regional conservation programs—and more widely of environment programs—is implemented within the framework of the Indian Ocean Commission. The principal donors on these issues are the European Union (mainly via the EDF regional lines) and France (via AFD or FFEM). The main initiative is the IOC Regional Biodiversity Program (see **Error! Reference source not found.**), a US$15 million program for 2013-2017. The IOC is also the prime contractor for several regional programs on fisheries (including tuna fishing), the SMARTFISH program with FAO under EU funding, or the renewable energies program funded by the EU in the amount of EUR 15 million over five years. Most of these projects are implemented with or by the IOC member states.

The IOC is also implementing, with IUCN, the program developing an integrated model for the management and dispersal of invasive alien species (IAS) in island ecosystems—with a budget of EUR 15 million to start in 2014.

10.6 Conclusions on Investments

Madagascar

The recognition of this island's exceptional biodiversity by the international community and the Malagasy authorities, and the long-time mobilization of international organizations working on nature conservation, have actually led to a significant investment in conservation in Madagascar.

A very large portion of national and international funding for conservation is devoted to protected areas management. In this respect, the mobilization of some US$50 million, constituting the current capital of FAPBM, represents a considerable effort to establish a sustainable system of conservation funding. However, the funding needs for protected areas management are still far from being met; they are estimated to be between US$17 million and $20 million per year, at US$3 per hectare on average. On the other hand, most of the funding is concentrated on protected areas systems managed by Madagascar National Parks, and to a lesser extent on a subset of large "new" protected areas. This leaves a substantial number of protected areas still on temporary status without any real funding opportunities, some even without any active promoter. Moreover, biodiversity protection outside of protected areas is currently extremely limited and thus some habitats are under-represented in the network of protected areas.

Geographically, it is clear that the southern and southwestern regions, the Eastern Coast (including the Southeast), as well as the far northern regions, are favored by donors, while the West receives much less investment. Attention devoted to the marine and coastal ecosystem has come slowly, and wetlands, which are so important for water resources, are not yet benefitting to any major extent despite their value.

On the conditions for investment, donors are presently investing mainly through the national Foundation (FAPBM), or by sponsoring directly Madagascar National Parks. A second major investment channel is that of international NGOs in Madagascar (CI, WWF, WCS, Durrell, TPF, BCM, MBP, MBG, Blue Ventures) as direct implementers of projects and programs, while national and local NGOs often act as subcontractors. Without opposing international NGOs, whose staff are now largely nationals and represent a real strength of national civil society, it is important to emphasize the difficulty that national NGOs have in accessing international funding, whether from official development assistance or private foundations. This factor is critical in developing a network of national and local organizations that could strengthen the advocacy capacity and civil society capacities to monitor the environment. This situation also contributes to the concentration of funding and projects on a set of large sites dominated by international NGOs—sites that are very important for conservation—to the detriment of actions on a set of smaller sites whose protection is essential for the conservation of Malagasy biological wealth.

The link between conservation and development is now understood by the vast majority of donors and conservation actors, and some donors (AFD, EU, World Bank) sponsor integrated projects. However, research turned up few examples of development projects in the strict sense of the term where conservation issues have been fully integrated. The conservation sector currently seems to be putting more effort into this type of integration. This also contributes limits conservation efforts in protected areas and their direct vicinity.

The involvement of the private sector still appears to be a new frontier for the conservation sector. Encouraging signs are emerging, especially in the mining sector (which also contributes parallel substantial threats in certain habitats). The engagement of the ecotourism and tourism sector not widespread and remains unstructured; as such, Seychelles' and Mauritius' successful experiences represent a great opportunity to share lessons learned. More broadly, the implementation of payments for environmental services is still at the pilot stage.

Mauritius and Seychelles

Without denying the differences between the two countries, Seychelles and Mauritius have similar characteristics in matters of conservation funding.

The first is the relatively important effort made by governmental authorities to provide substantial operating and investment budgets in the protected areas and for biodiversity management—fairly typical for countries that are becoming middle-income countries. Even though some shortcomings are deplorable, and despite some contradictory sectoral policies, the two countries' financial investment in conservation is presently better than those found in Madagascar and Comoros.

The second characteristic these two countries share is the stronger involvement of the private sector. Seychelles represents in that respect a model for the region (see Chapter 8, section 2), and interesting examples also are recorded in Mauritius. This is related to the importance of the tourism sector as well as government willingness, with the implementation of social and environmental responsibility in Seychelles and recently in Mauritius, as well as the establishment of foundations responsible for managing natural sites, receiving income from ecotourism. In both countries, owners of private natural spaces also contribute, sometimes significantly, to biodiversity conservation.

Finally, these two countries have lesser involvement of international conservation donors. With the notable exception of the GEF, which is undoubtedly the primary funder of the sector on these islands, international organizations have drastically reduced their contributions in the field—particularly in the past five to 10 years—following the evolution of the development level of these countries. This situation leaves few funding opportunities for their civil society organizations. Beyond the question of funding, this situation could limit potential for innovation among civil society organizations, and their ability to assume advocacy roles vis-à-vis governmental institutions. Another problem highlighted during the consultations is "inter-projects" management: the limited number of windows, dominated by large-scale projects sometimes hardly flexible, sometimes leads to funding gaps that are harmful to current conservation activities.

Comoros

Comoros presents a third scenario within the hotspot, with an almost total absence of biodiversity funding. The extreme poverty of the country, coupled with the constraints of its international creditors, does not allow the Comoran government to generate resources for its natural environment protection. The weak private sector turns toward the internal market and, facing no environmental pressure, is not involved in the field. Finally, international donors, the only players likely to mobilize funding in this context, have very little invested in biodiversity conservation issues so far—a situation inherently linked to the slight involvement of international nature conservation actors in the archipelago.

The only major player in the past had been the GEF, through establishment of the Biodiversity Project in the late 1990s, leading to the creation of the first protected area in the country, the Moheli National Marine Park, as well as through its Small Grants Program. To a lesser extent, Comoros has benefitted from many regional environmental projects under the responsibility of the IOC.

However, the situation will evolve in the coming years with the implementation of a major project to establish a network of protected areas. This project, to be implemented by the UNDP, is principally funded by GEF, AFD and the EC (see Table 10-9 below). The project should allow the creation of a network of seven protected areas, strengthening the capacity of the administration in charge of monitoring and managing them, and establishing sustainable financing mechanisms. The importance of funding conservation needs in Comoros—and particularly enabling civil society to take responsibility in matters of awareness and management with the village communities—will only partly be addressed by such support.

Table 10-9: Components and Funding Plan for the Multi-Donor Program to Strengthen the Protected Area Systems in Comoros (2014-2018)

Components	Funding	
1. Strengthening the protected areas system	Government of Comoros	5,800,000
1.1 Implementing the legal framework	AFD	3,600,000
1.2 Strengthening the capacities of AFD Agency	AFD (Djando project)	6,960,000
1.3 Expanding the protected areas network:	Bristol/Durrell/AFD	1,000,000
Karthala	Indian Ocean Commission /CE	1,500,000
Mohéli Rainforests	University of Turin/CE	625,000
Anjouan Mountains/ Mont Ntringui	UNDP	500,000
Community Forests in Moya	GEF	4,246,000
Community Reserve in Ilôt de Ndroudé	**Total**	**24,231,000**
The Coelacanth zone / Baie des Dauphins		
Bimbindi Peninsula / Ilôt de la Selle		
1.4 Establishing a funding mechanism		
2. Making management operational at the site level		
2.1 Strengthening sites management		
2.2 Governance on access to resources		
2.3 Tourism		
2.4 Income-generating activities		

Regional Cooperation

Funding for regional actions is almost exclusively conducted under the aegis of the Commission of the Indian Ocean. Significant results have been achieved, particularly in legislative convergence, protection of fisheries resources, climate change or natural disaster preparedness (see section 10.5).

However, stakeholders involved in the consultations have emphasized the importance of further enhancing these regional actions. In most cases, they stress the need for better cooperation at government level, and in some cases, it is also noted that the autonomy of national offices of regional programs is a barrier to these programs reaching their full potential in terms of experience exchange and technical cooperation, particularly in areas where the civil society expertise and strengths are complementary among the hotspot countries.

11. NICHE FOR THE CEPF INVESTMENT

During the past several decades, the Madagascar and Indian Ocean Islands Hotspot has received much attention from the international community for biodiversity conservation. However, the level of attention varies significantly from country to country, and also considerably among regions within countries (all regions of Madagascar, for example, have not received comparable assistance). There are also variations in the levels of support for different activities. Meanwhile, indicators and trends show that while progress has emerged, threats remain significant and ecosystem degradation continues at a steady pace, endangering the long-term conservation of hundreds of species and the well-being of a growing population that is dependent on the health of the ecosystems they live in.

The level of CEPF financial commitment over the next seven years will be small in comparison to global interventions, as well as to the needs for biodiversity conservation across the hotspot. It is therefore necessary to define an investment niche in order to guide future CEPF investments on themes and towards geographical areas to maximize the program's impact in terms of biodiversity conservation and sustainable development. Defining such a niche should also reduce the risk of duplication with existing initiatives funded by other stakeholders, and avoid investments that would have only a marginal impact. The CEPF niche must also meet the CEPF main objective, which is to support the establishment of conservation communities in the hotspots in which civil society effectively assumes its role in leading species and landscape conservation at the local, national and regional levels, in conjunction with other stakeholders.

The definition of the CEPF investment niche is the result of a highly participatory process culminating with the strategic regional workshop held in Antananarivo on 15 November 2013. Based on the threats identified and prioritized during the previous workshops and bilateral consultations, participants were asked to identify, organize and prioritize the potential topics of CEPF intervention. These recommendations led to the definition of this niche and the development of the intervention strategy presented in the following chapter.

One of the main recommendations resulting from the consultations was the need to focus greater attention on the role of local communities in conservation programs. The conclusion that local communities need to be involved in protecting the environment is certainly not new, and Madagascar in particular is one country in the world where community-based approaches have been tested by international NGOs, and then widely promoted by national legislation. While Madagascar has experience that other countries in the hotspot could learn from, these approaches have not always produced the expected results. A recurring problem seems to be the lack of prior consultation with the residents, especially at the time of project identification, which leads to misunderstanding and sometimes an end to implementation before the project is completed.– This is a common finding of many conservation interventions in Africa, as indicated in the African Protected Areas Roadmap (IUCN and WCPA, 2012). On the other hand, with regard to the many interventions at the community level, some result in community-based organizations being able to work independently, although most have great difficulty continuing beyond funding periods that are often limited to one or two years. These organizations remain very dependent on national and international organizations.

CEPF has the ability to provide variable levels of funding, in particular with its small grants mechanism. In this context, CEPF could play an important role in the emergence and strengthening of local organizations that could work toward the implementation of site-based conservation actions, maximizing the chances of local inhabitants' ownership. It is at present unrealistic to think CEPF can identify local actors and award grants; capacities are simply too low. However, it would be feasible to establish a sequenced approach on a pilot basis and when appropriate award:

(i) a small grant to an organization for participatory preparation of a project,
(ii) a large grant to this organization for the implementation and monitoring /follow-up, with sub-grants or small grants in parallel to grassroots organizations, to strengthen their capacities,
(iii) small grants to pursue field activities and the grassroots organizations' objectives, with monitoring from a larger organization if necessary, and regular capacity-building actions.

It is worth noting that large grant awards (option ii) could be funded partially or entirely by donors other than CEPF or with CEPF as cofunding. This option might be appealing to donors whose operational procedures may limit the possibility, or the efficiency, of supporting a preparation phase. The role of the CEPF's regional implementation team would be essential to ensure a permanent dialogue with the donors present in the hotspots in order to catalyze their actions towards these potential projects and opportunities.

Implementation of a program that includes pilot phases may necessitate more than five years, therefore it is proposed that CEPF's new investment in this hotspot be implemented over a five-year period, noting that even with seven years, it is likely that grassroots organizations may not become fully capacitated over this period of time, and that an additional investment period will be necessary to achieve transformative results. However, seven years will allow CEPF to set the foundation for the strengthening of local organizations and the emergence of a regional conservation community.

The consultations have also shown conservation stakeholders' willingness to work together more closely. Complementarities exist in terms of experience and expertise between the various countries in the hotspot that are presently little exploited. CEPF is the first initiative specifically dedicated to supporting civil society to play a key role in biodiversity conservation within a regional strategic program, and is therefore ideally placed to support the birth of a regional conservation community. This initiative will allow partners to maximize mutual experiences, and to speak with a stronger voice in regional and international forums. This regional dimension will be integrated into the strategic directions and will be the subject of specific activities.

12. CEPF INVESTMENT STRATEGY AND PROGRAM FOCUS

12.1 Geographic Priorities

CEPF's geographic priorities were determined using a multi-criteria analysis, by initially gathering as much information for each of the KBAs as possible. Such analysis has some limitations, given the variability of existing data about each site, and because of the challenge of weighing each criterion objectively. While all KBAs are important to maintain the level of biodiversity in the hotspot, we have used a set of criteria as decision tools to select sites for which CEPF investment is most important, and for which sites present the best opportunities for CEPF interventions. (European overseas islands were not included in the prioritization process as they are not eligible to receive CEPF funds).

The following criteria were taken into account in the analysis:

- Biological irreplaceability, considering the presence of species classified as Endangered on the IUCN Red list.
- Status of site protection, considering the existing protected areas, those under temporary protection status, and finally those so-called "orphan" sites receiving no protection. The presence or absence of "implementers" on these sites also gives an indication of the level activity. In Madagascar, specific attention was given to the sites under "temporary protection status," as many need additional support in the coming years to ensure a full protection.
- Ecosystem services. These criteria could only be analyzed for Madagascar, through the work of the Moore Center for Science and Oceans. They provide guidance as to the sites' importance for local populations and beyond.
- Representativeness of the ecosystems within the protected areas systems.
- Level of pressure and threats, considering the most important factors (from scientific literature and consultations), analyzed at a higher geographic level (rather than on site-by-site basis) based on cartographic analyses of the pressures from population and use of natural resources, and on the risks associated with mining operations.

The ecosystem profile has highlighted that some natural landscapes and ecosystems are currently under-invested, both in terms of available international funding and the level of protection provided by the respective governments.

The **terrestrial wetlands** are under-represented in the protected areas system of Madagascar, and a similar situation exists in many Indian Ocean islands. Being biologically rich and diverse, the wetlands are under considerable pressure from urbanization (especially in Mauritius, Rodrigues and Seychelles) and the conversion to agricultural land (especially rice cultivation). Pollution and sedimentation compound these threats. However, these landscapes play a key role in supplying fresh water for domestic and agricultural use and in preventing drought and flooding. These are vital ecosystem services both on Madagascar and on the smaller islands, where issues of water availability become crucial in a context of population pressure and climate change. Streams and riparian-associated forest, in addition to environmental services related to supply and control of flows and the quality of water resources, play the role of an essential ecological corridor for the long-term survival of terrestrial KBAs.

Dry forests have also been identified as areas in which CEPF interventions can have a very significant impact in terms of conservation. These habitats have high ecological interdependence with marine and coastal systems, constituting (in non-degraded settings) a continuum from dry forests to wooded/grassy savannah to mangrove to beach vegetation to marine vegetation to coral reefs. Often degraded and existing as relics in fragmented areas, dry forests have not received the same attention as the rainforests. Iconic animal species are less frequent, the potential of these forests as carbon stock is lower, and their small size is less amenable to large-scale projects. Despite the fact that they have been less studied, they are recognized for hosting an extremely high wealth of species, particularly plants. Dry forests are subject to major threats such as deforestation for agriculture and livestock, bushfires, invasive species, and urbanization on some islands.

If **coastal areas** have received more attention, the ecosystem profile showed significant gaps in terms of investment. Many initiatives are being developed at the Indian Ocean high sea and western region level, but integration of local communities into coastal fisheries management and the establishment of locally managed marine areas are still highly inadequate. At the same time, the threats to these ecosystems are extremely worrying. Artisanal fisheries, a food source the hotspot's inhabitants could not survive without, are threatened in the short or medium terms. Integration of activities at the Land-Sea Interface is also largely insufficient. In places where actions are implemented on the marine-coastal landscapes, the associated terrestrial ecosystems (mangroves, coastal forests, estuaries and dunes) are often neglected, *ultimately* threatening the integrity and functions of the ecosystems.

The profile's prioritization process resulted in the selection of 78 priority KBAs for CEPF investment (cf. Table 12-1), out of the 369 KBAs identified in the hotspot. Given the available resources, CEPF will not necessarily be able to intervene at all these sites, but considers this subgroup as a guide for investment.

Table 12-1: Number of Priority KBAs for CEPF Investment by Country

Corridors or Clusters	Number of Priority KBAs	Surface in ha, terrestrial	Surface in ha, marine
Madagascar	**38**	**1,516,665**	**983,053**
Corridor of Kirindy-Mangoky Landscape	4		
Corridor of Mikea Landscape	6		
Corridor of Menabe Landscape	2		
Corridor of Extreme-North Landscape	6		
Corridor of North-West Landscape	10		
Cluster of the Coastal Forests and Wetlands of the East	3		
Cluster of the Central Highlands	4		
Other Sites	3		
Comoros	**19**	**36,538**	**105,672**
Mauritius	**9**	**14,894**	**43,702**
Saint Brandon	1		
Mauritius Island	5		
Rodrigues Island	3		
Seychelles	**12**	**8,492**	**18,217**
Cluster of Mahé Mountains	4		
Praslin	2		
Other Sites	6		
Total	**78**	**1,576,589**	**1,150,644**

Geographic Priorities for Madagascar

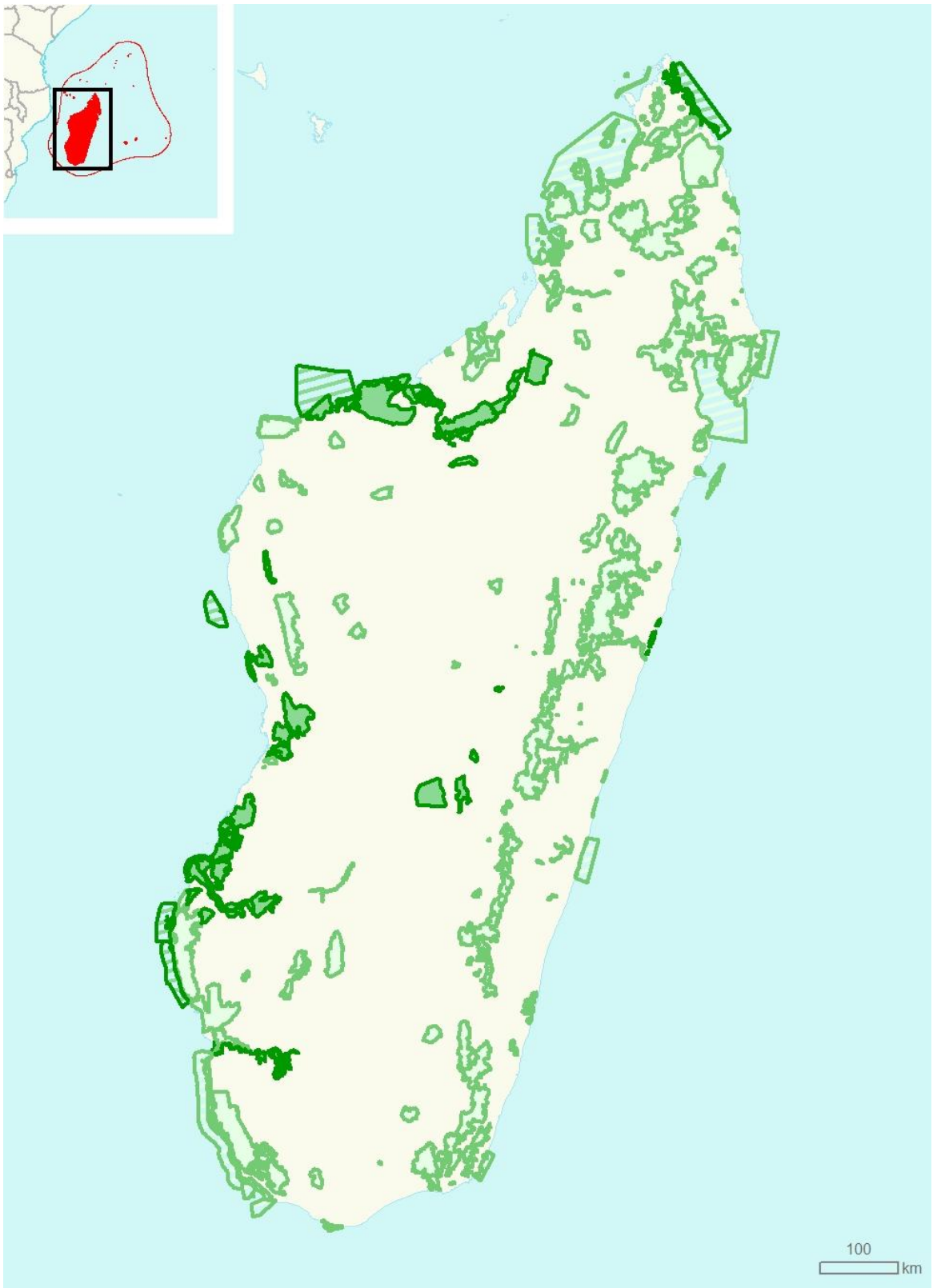
The prioritization process identified 38 among the 212 KBAs occurring in Madagascar as priorities. These 38 sites cover about 2,5 million hectares: 983,000 ha of marine areas and 1,517,000 ha of land areas. The sites were primarily chosen within five priority corridors where similar ecological characteristics and threats could be found, to allow the emergence of synergies between actors within small regions, to facilitate the exchange of experiences in case of success or failure, and to allow for approaches at a larger scale that would enhance connectivity and reinforce the long-term conservation of species and sites.

Following on the findings of the profile, CEPF geographic priorities are mainly focused in the western part of the country (from the extreme north to the Toliara Region). The selection of these corridors is the results of the difficult choice to not invest in the eastern rainforests. Despite the fact that these rainforests are still in need of attention, the findings of the profile (and in particular the results of the consultations) made it clear that these sites have received greater attention over the past 20 years. Civil society is relatively more developed, and funding, while still insufficient, is nevertheless more prevalent for the rainforests. Conservation of Malagasy biodiversity requires a focus on wetland ecosystems, shorelines and coastal areas, as well as on dry forests and the other xerophitic ecosystems of the west. Although these areas are less rich in species, they are unique and host numerous endemic species. With regard to environmental services, conservation of fish stocks through sustainable management of coastal ecosystems appears crucial for the West Coast populations, which are heavily dependent on protein from the sea. On the other hand, even if water flows are smaller in absolute value than in the more humid eastern region, the natural areas in the west and central watersheds are crucial for their ability to mitigate the water stress often experienced in these areas. The most important zones for ecosystem services within these ecosystems are therefore put forward as priorities.

In addition to the 28 KBAs that are part of the five priority corridors, 10 other KBAs have been prioritized for CEPF investment. These sites emerged during the prioritization process because of their outstanding biological value, importance in terms of ecosystem services and need for additional funding. Seven of these KBAs have been grouped in two "clusters": these sites belong to the same administrative region, share a number of biological similarities, and therefore synergies and collaborations could be sought. These sites, however, are too disconnected to be considered a management unit and did not qualify as corridors. The first of these clusters is composed of four sites characteristic of the remnant forests of the Central Highlands—including the Tapia formation—and the second is composed of three small sites that are remnants of the humid ecosystems of the lowland of the East Coast.

Figure 12-1 below presents the general map of CEPF priority KBAs for Madagascar. Additionnal maps, detailing sites for each sub-region, are presented in Appendix.

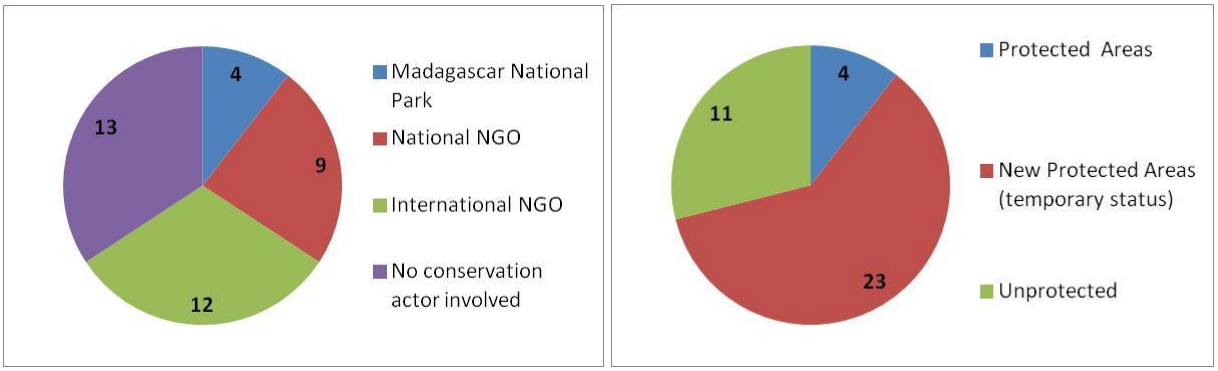
Figure 12-1: Priority Sites for CEPF Investment in Madagascar: General Map



Note: Additional maps with details of priority sites for Maurituius are presented in Appendix.

Protected areas under temporary status, requiring immediate support to implement management structures and ensure they obtain permanent protection status, represent 60 percent of the selected KBAs (see Figure 12-2**Error! Reference source not found.**). Many important orphan sites were also selected; they are generally small sites where national NGOs might intervene. A balance was also sought between national and international NGO 'implementers' of sites, again leaving the door open for collaboration and synergy between CEPF beneficiaries.

Figure 12-2: Distribution of Implementers (left) and Protection Status (right) of Priority Sites for CEPF Investment in Madagascar



Landscape of the Extreme North

This landscape is grouping together about a dozen KBAs in the extreme northern tip of Madagascar, in the Antsiranana Region. It contains marine and coastal areas as well as a mosaic of dry forests, rich in fauna and flora species, and is home to extremely rare endemic species. Most of the marine and coastal sites are presently unprotected, the marine fauna is relatively rich and varied, especially with the presence of important coral reefs. Many terrestrial sites are also unprotected. Ambodivahibe Bay is included among the important KBAs in terms of ecosystem services due to its role in supplying fish to the people of the region.

Mikea Landscape

This group of sites in the southwestern part of Madagascar consists of dry forests, xerophitic bush, wetlands, and marine and coastal areas, including in particular important mangrove forests. This diversity of habitats makes this a priority biodiversity landscape. The Mikea Forest, a protected area managed by MNP and an Alliance for Zero Extinction site, is home to 51 Endangered species. With such diverse habitats, this landscape is home to remarkable bird populations, namely populations of Bernier's teal (*Anas bernieri*) and pairs of Madagascar fish eagle (*Haliaeetus vociferoides*). It is also of major importance for reptiles, with the presence of *Pyxis arachnoides* and *P. planicauda*, Critically Endangered terrestrial tortoises. Velondriaka and Salary Nord are marine protected areas in the process of being established that are frequented by sea turtles. In addition to its biological importance, this landscape was also chosen because of its ecosystem services. Its mangroves, in a relatively densely populated area, provide many services against cyclones and are an essential element for the resilience of local communities. The marine areas are among the most important in Madagascar in terms of fish and seafood production, while the carbon stored in the forest areas is relatively high (especially for the western part of Madagascar), with great potential in terms of avoided deforestation.

This landscape also includes a set of wetlands and forests associated with the downstream part of the Onilahy River, which flows into the Saint Augustin Bay, not far from the town of Toliara. With the exception of the forest gallery of the Beza Mahafaly Special Reserve, managed by MNP, all sites have temporary or unprotected status. The WWF is the main organization present in this part of the landscape. This area is particularly important for environmental services because forests and wetlands in the area play a role of regulating water supply for household and farm use in this densely populated region. The gallery forests and dry forests in the area also represent a particular habitat subjected to population pressures.

Considering that the Global Environment Facility is launching a programme to support management of dry forests in this landscape, CEPF funding will focus on the coastal/marine areas and the wetlands – including the associated riparian vegetation, with the objective of being complementary to funding available for larger blocks of dry forests.

Northwestern Landscape

This group of Madagascar's Northwestern sites is composed of dry forests, xerophytic bush, wetlands, and marine and coastal areas, including mangrove forests. The central axis of this group of sites is the network of the Mahajamba River, which empties into the Bombetoka Bay or Mahajanga Bay, and its major sites of riparian forests and wetlands. Lake Tseny, although from another watershed, was associated with this group; it is an AZE site hosting many threatened fish species such as *Paretroplus,* whose only known population is *P. menarambo*, considered extinct in the wild before its rediscovery in 2008. The wetlands of Port Bergé, outside of the landscape, but important for their environmental services, have also been retained, noting that no implementers are present in the area. Also in this grouping is the Baie de Baly KBA, which includes the territory of the ploughshare tortoise *(Astrochelys yniphora)* and the Antrema bio-cultural reserve. The Mahavavy-Kinkony complex wetlands are extremely rich in species, with 30 species of fish, five of which are Endangered, and 133 species of birds, 10 of which are threatened. The grouping includes sites at different levels of protection from MNP-managed sites, sites supported by national NGOs (one site with an international organization) and orphan sites, including the Tseny Lake. The hydrographic network is one of the most important in the western part of the island for agricultural uses (and rice cultivation in particular), reinforcing the importance of the protection of the wetlands and the Bongolava Ankarafantsika-Ampijoroa forest corridors that also play an important role in flood prevention.

Central Highlands Group

This group includes a few sites representative of the ecosystem of the Tapia Forest, as well as the Ankaratra Manjakatompo range. These sites can be considered as the last important relics representing the Highlands ecosystems, which have largely disappeared due to livestock expansion and agricultural pressure. Three of five KBAs of the group are AZE sites. This group is particularly important for its plant diversity, as well as for amphibians. Many amphibian species with restricted distribution, such as *Boophis williamsi*, are endemic to the Ankaratra area. Protecting the high altitude areas, the sources of several of the rivers in the area, is of paramount importance for water supply services for domestic and agricultural uses.

Antsingy Landscape
The group includes the sites of the Menabe Central Corridor and Ambalibe Menabe. They are areas of high importance in terms of biodiversity, with an exceptional level of local wildlife endemism. These ecosystems of dry, dense forests are highly threatened by land clearing, illegal logging and hunting.

Menabe Landscape
This landscape consists of a set of sites particularly rich in wetlands, occurring around the Mangoky River and its tributaries, and the Kirindy Mite National Park and its extensions. The dry forests of Kirindy Mite, managed by MNP, are particularly rich with endangered species, and provide important environmental services. Ecosystems linked to the Mangoky River are particularly important for local communities and the delta area, with its mangroves, is a major fishing and nursery site of the western coast.

Group of Coastal Forests and Wetlands in the East
This group of three small KBAs on Madagascar's eastern coast was selected for its very high biological value. The Vohibola Forest is part of the coastal forest and stretches along the Pangalane Channel. It is the largest extent of nearshore sand forest between Ambila Lemaitso and Fenerive Est. The site hosts exceptional biodiversity with a high rate of local endemism and a very high threat level. There are 10 Critically Endangered species, 33 Endangered, and 36 Vulnerable species. The Pangalanes North and Ambila Lemaintso wetlands are also important in terms of biodiversity.

Other Eligible Sites in Madagascar:

Barren Islands Marine Protected Area
This group of islands, recognized as an IBA, holds temporary protected area status. It was selected due to its very high importance for supplying fish for communities in the region. The islets' conservation problem (including invasive species) also holds potential for regional collaboration. The international NGO Blue Venture has started actions in the area with local communities.

NAP Beanka (Tsingy de Beanka)
Receiving less attention than the Tsingy of Bemaraha and Namoroka managed by MNP, the Tsingy of Beanka, an exceptional karstic site, is home to numerous endemic animals and plants. Forests play a crucial role in regulating water supply in the Melaky Region.

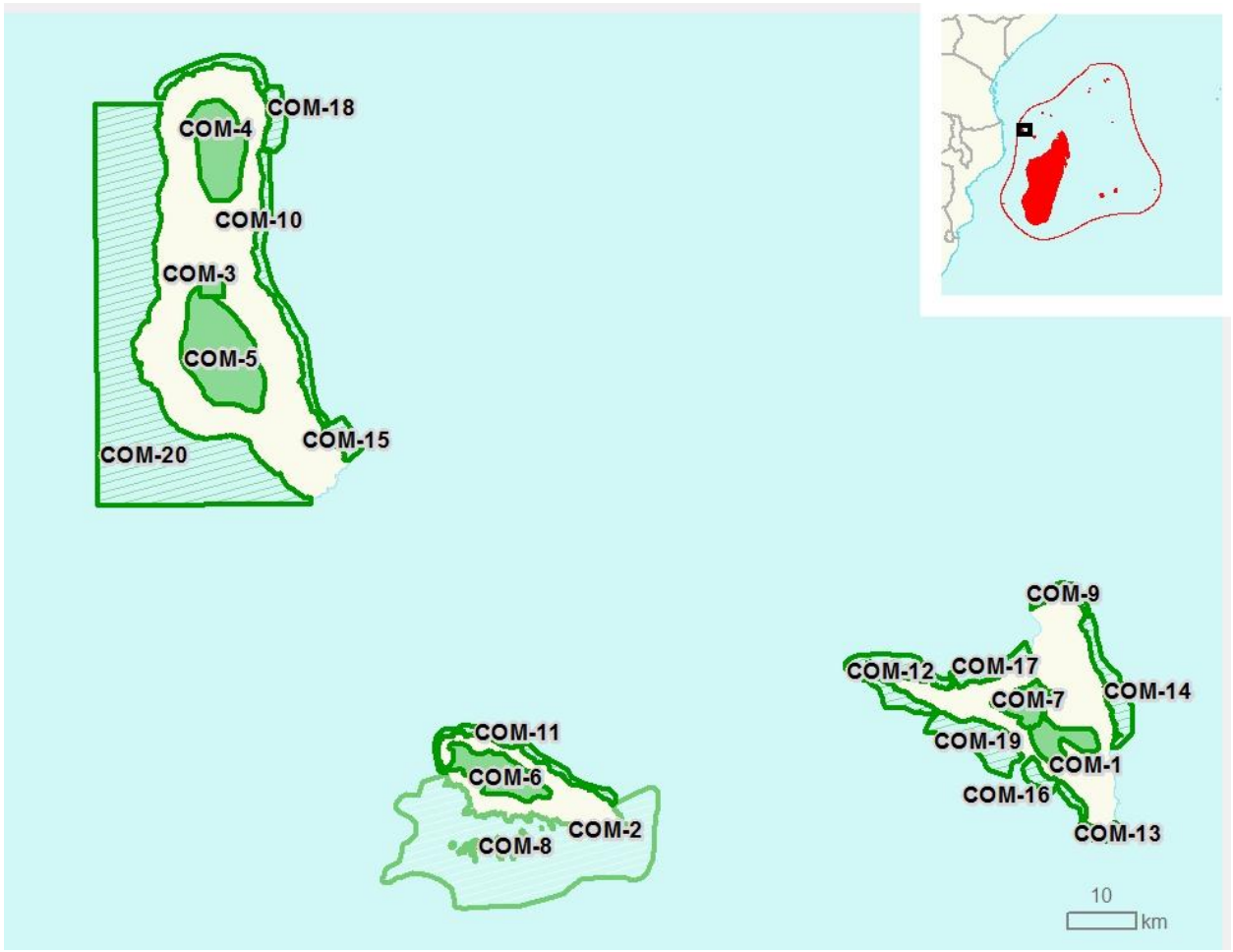
NPA Complex Tsimembo-Manambolomat-Bemamba
Very important coastal wetlands, classified as an IBA and as a RAMSAR site, this KBA has rich wildlife and flora. It is an important breeding area for the Madagascar fish eagle (*Haliaeetus vociferoides).* This site appears to be particularly important in terms of environmental services, for both fresh water and for food.

Geographic Priorities for Comoros

Sites in Comoros are characterized by very low legal protection (only one marine protected area and no terrestrial protected areas), limited international investment, low presence of international

organizations, and very few local organizations capable of ensuring effective biodiversity protection. The only site under official protection and receiving significant international support until now has been the Moheli Marine Park. At the same time, available scientific knowledge is incomplete and has not allowed for identification of a comprehensive list of key sites for biodiversity conservation. Some sites have been identified, and it is likely that the list of KBAs will increase in the future. For these reasons, it was decided to consider all sites (with the exception of Moheli National Park for the reason presented above) as eligible for CEPF funding in Comoros. This will give latitude for civil society to develop projects where the needs and opportunities will be the most important. In parallel, Comoros islands will be a priority country for research and inventory actions under Strategic Direction 2. This will allow CEPF to be flexible as the investment phase evolves, and will aid in developing synergies with other programs for developing a protected area network, funded by the Comorian government, GEF and AFD.

Figure 12-3: Priority Sites for CEPF Investment in Comoros



Geographic Priorities for the Republic of Mauritius

Black River Gorges National Park and surrounding areas

This mountain KBA hosts very important diversity of passerine bird species, many species of dragonflies, and high endemic plant diversity. The National Park itself, managed by the forestry service, has received a lot of attention from the government and international community. The attention of CEPF, which can't fund governmental agencies, will focus on the surrounding areas, hosting a very high biodiversity but not officially protected. An important area identified during the ecosystem profiling is the mist forests of Montagne Cocotte, which host large populations of endemimc species, making *in situ* conservation not only possible but also a priority. Many rivers originate in this KBA, making it a priority in terms of environmental services. Montagne Cocotte is partially protected, as part of the Black River Gorges National Park. An extension of the park to the Bassin Blanc was proposed in the 1990s. The KBA extends to the lower elevation areas, and in particular the southern flank of the unprotected Montagne Cocotte where conservation activities could be implemented in collaboration with private sector and civil society.

Le Pouce-Anse Courtois-Pieter Both- Longue Mountain

This KBA groups together several important montane sites in Mauritius including Le Pouce Natural Reserve, the Mont Longue, and the Mont Pieter Both. Parts of these sites already enjoy legal protection. The most important populations of the island's many endemic species are found on these sites, particularly plants, but also mollusks (Pieter Both and Le Pouce), orthoptera (the taxonomic group of the grasshoppers) and other insects. The area of Mont Longue has relics of dry forests and may shelter presumed extinct species. Civil society could play an important role in supporting the government departments in charge of its management, and also in improving the management or conducting restoration operations in unprotected areas in collaboration with private landowners.

Yemen-Tamataka

This KBA comprises the most extensive dry forest ecosystems in Mauritius, and contains viable populations of some endemic species of *Aloe* and *Cyphostemma*. While many private reserves exist within this KBA, including Emilie Series, increasing the protection of nearby sites would help to maintain these exceptional plant populations.

Chamarel-Le Morne

As with Yemen-Tamataka, this KBA has important relics of dry forests, unique plant biodiversity threatened by invasive species, and fragmentation. The KBA includes private land, which is not always managed adequately for biodiversity protection. In its immediate vicinity live some of the island's poorest fishing communities, many of whose ancestors arrived on the island as slaves. Le Morne is classified as a UNESCO World Heritage site, and is an important symbol of slavery abolition on Mauritius. The region is home to various native bird species, intermediate wet to semi-arid forest areas, and many populations of Endangered species including *Trochetia boutonia*, a strict endemic from the Montagne du Morne that is the national flower of Mauritius. Civil society could play an important role in raising awareness and in supporting private owners.

Bambou Mountain Range

This KBA hosts significant plant diversity and populations of endemic birds, and even an endemic snail. Deer farming, tourism development, fragmentation and invasive species are the main threats. The area includes some protected areas. There is also a diversity of stakeholders

including those from the forest and private sector (Ferney SE, Bioculture Mauritius Ltd).. This diversity provides a range of opportunities for civil society to pursue collaborative conservation activities.

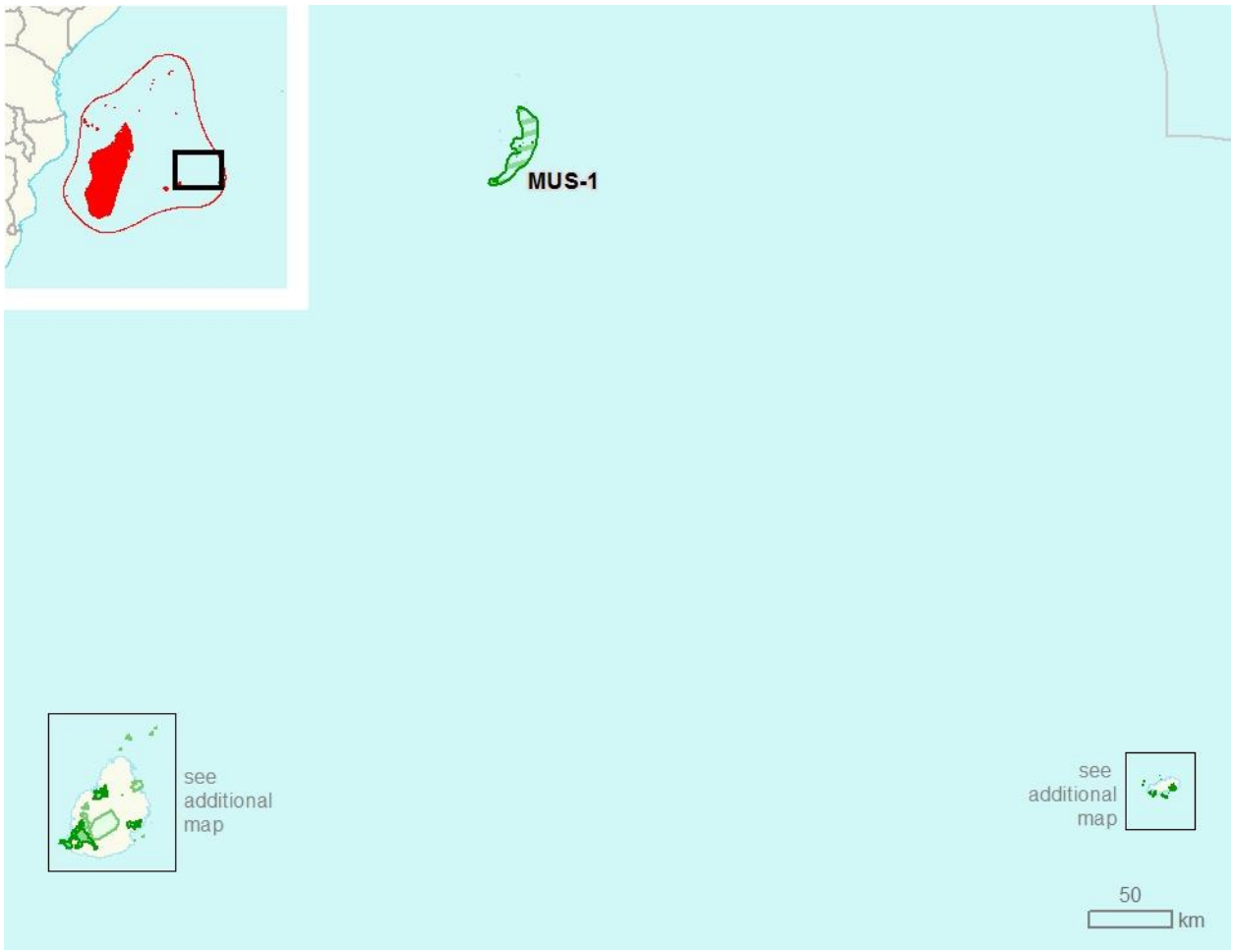
Key Biodiversity Areas of Rodrigues: South Slopes of Grande Montagne, Plaine Corail and the Rodrigues' Islets

People in Rodrigues are very dependent on natural resources. This is a small island, far from the other inhabited islands and the country's main island, and the resilience of the local population is simply not possible without sustainable management of freshwater, soil and fisheries resources. The three KBAs of the island are the Grande Montagne Southern Slopes, Plaine Corail and the Southern Islets Reserves. On Grande Montagne, freshwater and river bank biodiversity, in connection with water supply services, are paramount. La Plaine Corail has cave systems with unique biodiversity. The marine biodiversity of the Southern Islets is particularly high and the area plays a crucial role for the local fisheries. The native terrestrial biodiversity has suffered a lot from invasive species, but the ecosystems of these largely uninhabited islets could be restored with actions to combat invasives and reintroduction of species from Rodrigues island.

Cargados Carajos Shoals

This site is the most important KBA of the Republic of Mauritius in terms of marine biodiversity. The land portion is also an important area for bird conservation, with large concentrations of terns, tropicbirds and frigates, while the beaches are frequented by several species of sea turtles. There are opportunities to support protection and sustainable management actions, for instance through partnership with the Raphael Fishing company, to which some of the islets are leased. .

Figure 12-4: Priority Sites for CEPF Investment in Mauritius: General Map



Note: Additional maps with details of priority sites for Maurituius are presented in Appendix.

Geographic Priorities for Seychelles

Key Biodiversity Areas on Praslin Island: Fond Azore (Southern Slopes) to Anse Bois de Rose, and Fond Ferdinand

The first priority KBA of Praslin extends from the heights of the Fond Azore to the coastal areas of Anse Bois de Rose. Its biodiversity is exceptional, with presence of *Bwa Klate* (*Rapanea seychellarum*, CR), a tree endemic to the Seychelles, and two species of chameleons: the Seychelles' tiger chameleon (*Archaius tigris*, EN) and a new species, not yet formally described, *A. scychellensis*. This area is not currently protected. The gazettement of the Fond Ferdinand, a palm forest with very diverse flora, has been proposed by the Praslin Development Fund.

Silhouette (Silhouette National Park and Silhouette Marine National Park)

Silhouette is a granitic island and is the second highest (750 meters) in the country. Sparsely populated (a village of 100 people and the staff of a five-star hotel, Hilton-Labriz), 95 percent of its area is a national park. Silhouette is managed by the Island Development Company, the Island Conservation Society, and other partners of the Silhouette Foundation. Its biodiversity is extraordinary, especially at the upper elevation, where there are many rare endemic plant and animal species, some of which only exist on this island, such as the Mapou tree (*Pisonia*

sechellarum, EN), the centipede *Seychellonema gerlachi*, the recently discovered frog *Sooglossus pipilodryas* (CR), and one of the world's rarest bat, *Coleura seychellensis* (CR). The island is surrounded by a marine national park with outstanding diving sites.

Group of KBA in the Montagnes de Mahé

This group consists of four KBAs: Montagne Brûlée-Piton de l'Eboulis, Montagne Corail-Collines du Sud dry forests, Montagne Planneau and the Morne Seychellois National Park. These four sites, with their granitic peaks and dry forests, contain a significant portion of Seychelles' biodiversity (especially Montagne Corail and Collines du Sud). The four KBAs together host 34 VU, 27 EN and 16 CR species. These areas also play an important role in freshwater supply regulation and flood prevention. While the Morne Seychellois is a national park with strong regulatory protection with remarkable endemic wildlife and flora at the highest elevations, other important areas are unprotected or pending protection, or are still privately owned. CEPF funding will focus on these sites that require urgent attention and allow for building partnership with civil society, private sector and landowners.

Grand Police Wetlands

This KBA is one of the last large wetlands of Mahé. It is currently not protected, and is threatened by urbanization, eutrophication—a process via which water bodies receive excess nutrients that stimulate excessive plant growth—and pollution. Civil society could play an important role in conducting awareness campaigns and improving management of the site.

Ile Félicité

This privately managed island is home to at least eight species of globally threatened plants, a Vulnerable snail species, *Priodiscus costatus*, and the Seychelles' paradise flycatcher (*Terpsiphone corvina*, CR). The surrounding marine areas are also potentially rich in biodiversity, and recognized diving sites. The island's central part is the KBA zone, which is not legally protected at this time. The northern part has a tourist complex with villas.

Desnoeufs Island

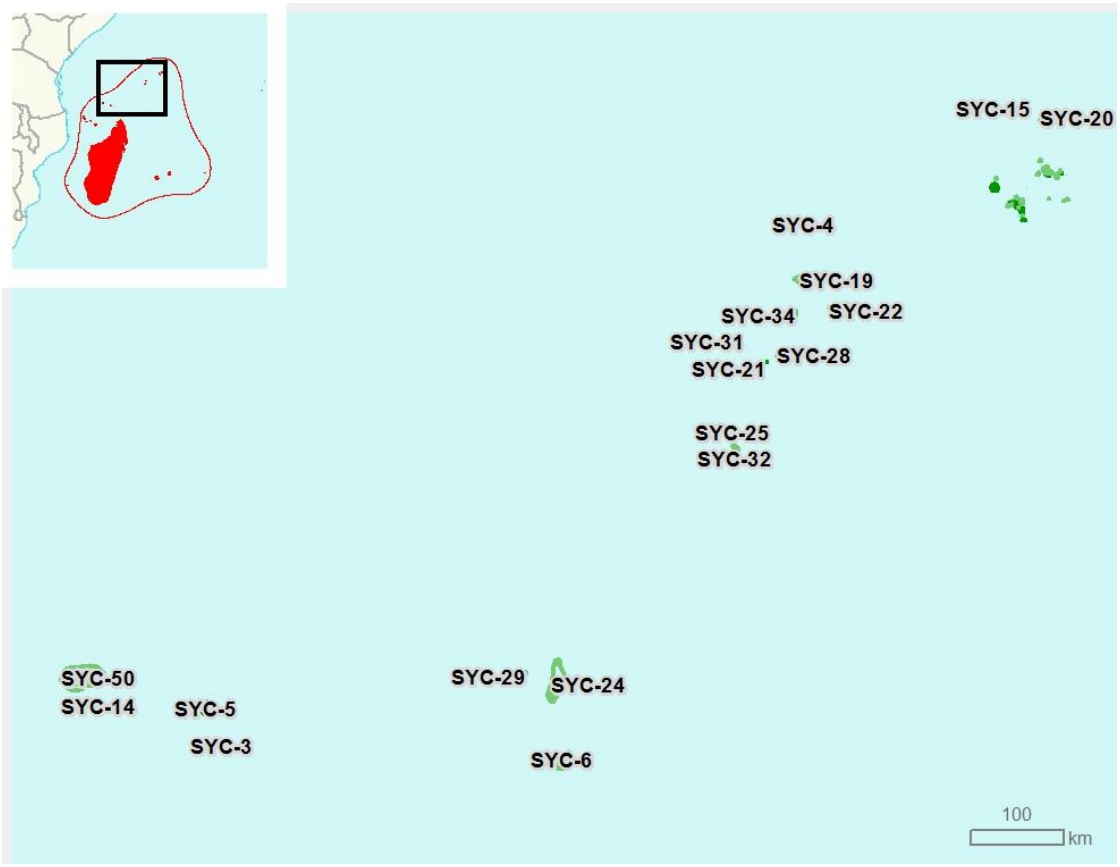
An IBA, Desnoeufs Island has been proposed as a protected area, but that status has not yet been granted. It hosts a colony of about 600,000 pairs of sooty terns (*Onychoprion fuscatus*) that is still used by humans for egg consumption. The waters in the area host high levels of biodiversity, especially for coral reefs. The beaches are important nesting sites for sea turtles.

Cosmoledo

The coral atoll of Cosmoledo consists of 13 islands and several islets around a vast lagoon (14,500 ha) that is extremely rich in marine life. The site does not include endemic terrestrial species, although several sub-species of birds endemic to Cosmoledo or the entire Cosmoledo-Aldabra area occur there. Its land area is important mainly for seabirds and marine turtles (*Chelonia mydas*, EN) that lay large numbers of eggs there. It is a nesting site of international importance for seabirds, with the largest colony of boobies (20,000 to 25,000 pairs of *Sula sula* and *s. dactylatra*) in the Western Indian Ocean, and the largest colony of sooty terns (*Onychoprion fuscatus*) in the country (1.2 million pairs). While some invasive species are present, much of the vegetation of these islands is native and undisturbed. The marine area has been subjected to several inventories (fish, corals and other invertebrates) and is recognized as

one of the richest in the region, along with Aldabra and Astove. Part of the area has been proposed as a protected area.

Figure 12-5: Priority Sites for CEPF Investment in the Seychelles: General Map



Note: Additional maps with details of priority sites for the Seychelles are presented in Appendix.

Table 12-2: List of the Biodiversity Key Areas, CEPF Investment Priorities in Madagascar

	Name of the KBA	International Standards				Protection Status	Areas (in ha)	Type of Promoter or Manager	Name of Promoter	Threatened Species			
		AZE	IBA	RAM SAR	IPA					VU	EN	CR	Total
Corridor du Paysage de Kirindy-Mangoky													
MDG-142	Kirindy Mite National Park and extension					AP	209,251.0	MADA NAT. PARKS	MNP	8	8	1	**17**
MDG-42	Mangoky River				X	non	10,504.9			0	1	0	**1**
MDG-90	Complex Lac Ihotry- Delta of Mangoky NPA		X			APT	176,104.5	NATIONAL NGO	ASITY	5	4	3	**12**
MDG-92	Complex Mangoky-Ankazoabo NPA		X			APT	58,228.5	NATIONAL NGO	ASITY	5	4	0	**9**
Corridor du Paysage de Mikea													
MDG-9	North Salary MPA					APT	108,627.1	INT. NGO	WCS	1	3	2	**6**
MDG-11	Tsinjoriake-Andatabo AMP					APT	5,400.9	NATIONAL NGO	ASE/TAMIA	1	1	0	**2**
MDG-12	Velondriake AMP					APT	94,573.4	INT. NGO	Blue Ventures	6	3	3	**12**
MDG-67	Amoron'i Onilahy et Rivière Onilahy NPA					APT	15,659.5	INT. NGO	WWF	4	0	1	**5**
MDG-127	Sept Lacs NPA					APT	7,850.2	INT. NGO	WWF	1	5	1	**7**
MDG-175	Beza Mahafaly Special Reserve					AP	30,922.4	MADA NAT. PARKS	MNP	3	2	2	**7**
Corridor du Paysage de Menabe													
MDG-2	Ambalibe Menabe				X	non	109,115.8			0	0	1	**1**
MDG-97	Menabe Central Corridor NPA	X	X			APT	77,719.4	NATIONAL NGO	FANAMBY	10	14	1	**25**
Corridor du Paysage de l'Extrême Nord													
MDG-16	Ampombofofo	X	X			non	2,992.81			1	2	4	**7**
MDG-8	Ambodivahibe Bay MPA					APT	181,600.41	INT. NGO	CI	1	1	0	**2**
MDG-33	Rigny Bay Complex				X	non	9,406.6			3	17	2	**22**
MDG-122	Montagne des Français NPA	X				APT	3,743.4	NATIONAL NGO	SAGE	11	10	2	**23**
MDG-123	Oronjia NPA	X				APT	2,503.61	INT. NGO	MBG	9	25	8	**42**
MDG-36	Coastal area East of Antsiranana					non	12,257.6			0	1	0	**1**
Corridor du Paysage du Nord-ouest													

MDG-54	Lake Tseny	X				non	935.6			1	0	2	**3**
MDG-83	Antrema NPA					APT	20,655.5	INT. NGO	MNHN	8	11	4	**23**
MDG-85	Bombetoka Bay - Marovoay NPA		X			APT	78,813.9	NATIONAL NGO	FANAMBY	7	10	3	**20**
MDG-105	Bongolava Classified Forest (Marosely) NPA					APT	57,936.4			4	5	0	**9**
MDG-130	Mahavavy-Kinkony wetlands NPA		X	X		APT	275,978.7	NATIONAL NGO	ASITY	10	14	3	**27**
MDG-132	Port-Bergé wetlands NPA		X			APT	80,536.8			1	3	0	**4**
MDG-143	Baly Bay National Park	X	X			AP	396,788.7	MADA NAT. PARKS	MNP	9	8	3	**20**
MDG-141	Ankarafantsika National Park and Ampijoroa	X	X			AP	135,085.0	MADA NAT. PARKS	MNP	16	19	5	**40**
MDG-211	Maevatanana-Ambato-Boeny wetlands		X			non	23,313.0			4	1	2	**7**
MDG-4	Ambato-Boeny					non	12,754.5			0	1	1	**2**
Groupe des forêts et zones humides littorales de l'Est													
MDG-137	North Pangalane		X			non	6,119.0			1	1	0	**2**
MDG-209	Ambila-Lemaintso wetland				X	non	823.7			17	11	2	**30**
MDG-107	Vohibola Classified Forest NPA	X				APT	2,224.9	NATIONAL NGO	MATE	32	32	7	**71**
Groupe des Hautes Terres du Centre													
MDG-5	Ambatofinandrahana				X	non	37,367.9			5	12	4	**21**
MDG-112	Ibity NPA	X				APT	7,032.1	INT. NGO	MBG	19	33	5	**57**
MDG-113	Itremo NPA	X				APT	100,115.9	INT. NGO	Kew	7	7	5	**19**
MDG-121	Manjakatompo-Ankaratra Massif NPA	X	X			APT	2,660.9	NATIONAL NGO	VIF	25	32	11	**68**
Autres sites													
MDG-13	Barren Islands MPA	X	X			APT	74,929.7	INT. NGO	Blue Ventures	4	6	2	**12**
MDG-86	Beanka NPA	X				APT	18,340.2	INT. NGO	BCM	1	4	0	**5**
MDG-93	Tsimembo-Manambolomaty-Bemamba Complex NPA		X	X		APT	50,845.6	INT. NGO	TPF	6	8	2	**16**

Table 12-1: List of the Key Biodiversity Areas, CEPF Investment Priorities in Comoros, Mauritius and Seychelles

	KBA name	International standards				Protection Status	Surface (ha)	Type of manager (or stakeholders involved)	Name of Manager / stakeholder	Threatened species			
		AZE	ZICO	RAM SAR	ZICP					VU	EN	CR	Total
Comoros													
COM-1	Moya Forest					non	3,486.0			2	5	2	**9**
COM-2	Dziani-Boudouni Lake			X		non	20.4			0	1	0	**1**
COM-3	Hantsongoma Lake			**X**		non	1,122.2			1	4	0	**5**
COM-4	La Grille Mountains		**X**			non	8,724.9			3	5	0	**8**
COM-5	Karthala Mountains	X	**X**	**X**		non	14,228.3			6	8	2	**16**
COM-6	Mont Mlédjélé (Mwali highlands)	X	**X**			non	6,268.3			3	6	2	**11**
COM-7	Mont Ntringui (Ndzuani highlands)	X	**X**	**X**		non	2,649.9			2	5	2	**9**
COM-9	Anjouan coral reefs					non	2,087.5			28	0	0	**28**
COM-10	Grande Comore coral reefs					non	7,956.7			30	0	0	**30**
COM-11	Mohéli coral reefs - outside of Marine Park					non	3,268.8			28	0	0	**28**
COM-12	Bimbini area and la Selle Islet					non	5,695.5			2	4	2	**8**
COM-13	Chiroroni area					non	1,141.3			1	3	1	**5**
COM-14	Domoni area					non	4,113.5			0	1	1	**2**
COM-15	Malé area					non	1,764.3			0	1	1	**2**
COM-16	Moya area					non	1,273.6			0	2	1	**3**
COM-17	Mutsamudu area					non	2,257.0			1	3	2	**6**
COM-18	Ndroudé area and Ilot aux Tortues					non	2,313.9			0	1	1	**2**
COM-19	Pomoni area					non	5,749.0			29	1	0	**30**
COM-20	Coelacanthe area					non	68,089.2			3	4	2	**9**

Mauritius													
Saint Brandon													
MUS-1	Cargados Carajos Shoals		X			PROPOSE E	43,793.7	GOUVERN EMENT/PRI VE	Raphael Fishing	0	1	1	**2**
Mauritius Island													
MUS-2	Bambou Mountain Range		X			PARTIELLE	1,740.9	GOUVERN EMENT/PRI VE	Ferney SE/La Vallee de FERNEY Trust/ Bioculture/Forest ry Service	32	17	14	**63**
MUS-3	Chamarel - Le Morne					PARTIELLE	2,900.3	GOUVERN EMENT/PRI VE	Bioculture Mauritius/Forestr y Service	30	15	15	**60**
MUS-9	Le Pouce - Anse Courtois - Pieter Both - Longue Mountain		X			PARTIELLE	2,582.2	GOUVERN EMENT	Forestry Service	41	24	29	**94**
MUS-17	Yemen-Takamaka					non	741.2	PRIVE	Medine SE	10	6	5	**21**
MUS-12	Black River Gorges National Park and surrounding areas		X			PARTIELLE	6,059.5	GOUVERN EMENT/PRI VE/ONG	Forestry Service - Private owners -MWF	76	43	26	**145**
Rodrigues													
MUS-13	Plaine Corail	X	X			PARTIELLE	57.1	GOUVERN EMENT/ON G/PRIVE	Forestry Service/ MWF/Bioculture Mauritius	0	8	22	**30**
MUS-16	South Slopes of Grande Montagne	X	X			PARTIELLE	612.4	GOUVERN EMENT	Forestry Service/MWF	0	7	28	**35**
MUS-6	Rodrigues' Islets	X	X			PROPOSE E	222.9	GOUVERN EMENT	Forestry Service/ RRA	1	4	4	9

Seychelles													
Silhouette													
SYC-42 and SYC-49	Silhouette (Silhouette National Park and Silhouette Marine National Park		X			AP	1,851.8	PARAPUBLIC/ONG /PRIVE	IDC/ICS/S NPA	40	20	21	**81**
Praslin													
SYC-9	Fond Ferdinand					PROPOSE E	128.9	PARAPUBLIC	Praslin Dvlpt Fund	12	6	1	**19**
SYC-7	Fond Azore southern slopes to Anse Bois de Rose		X			PROPOSE E	320.2			14	4	2	**20**
Malé													
SYC-13	Grand Police wetlands					non	18.5	PRIVE	Private company	4	1	0	**5**
SYC-43	Morne Seychellois National Park	X	X			AP	2,536.1	PARAPUBLIC	SNPA	29	21	13	**63**
SYC-36	Montagne Brûlée-Piton de l'Eboulis					PROPOSE E	114.2			21	9	3	**33**
SYC-11	Montagne Corail-Collines du Sud dry forests					PROPOSE E	298.9			12	1	1	**14**
SYC-38	Montagne Planneau (Grand Bois-Varigault-Cascade)	X	X			PROPOSE E	1,435.7			31	16	10	**57**
Other islands													
SYC-5	Cosmoledo		X			PROPOSE E	15,359.1	PARAPUBLIC/ONG	IDC/ICS	0	0	0	**0**
SYC-21	Desnoeufs Island		X			PROPOSE E	38.5	PARAPUBLIC/ONG	IDC/ICS	0	0	0	**0**
SYC-26	Félicité Island					non	141.4	PRIVE	Private company	9	0	1	**10**

12.2 Strategic Directions and Investment Priorities

The CEPF strategy in the Madagascar and Indian Ocean Islands Hotspot intends to support complementary actions at three levels:

- At the local level, by providing practical answers to conservation and development issues, working with local communities at priority sites (Strategic Direction 1);
- At the national level, by supporting national civil society organizations to increase their influence on decisions affecting biodiversity, through strengthening partnerships with the private sector and government authorities (Strategic Direction 2);
- At the regional level, by supporting the emergence of a regional conservation community, allowing organizations throughout the region to share experiences, taking advantage of the diversity of situations and expertise in the Indian Ocean (Strategic Direction 3).

At the local level, activities will focus on priority sites, which represent ecosystems so far relatively neglected in terms of conservation investment, and of great importance in terms of environmental services for local populations. The objective of CEPF is to support pilot projects demonstrating that environmental protection and healthy economic development can go hand in hand and reinforce each other. This will include support to land use planning and natural resource management plans (including the establishment of protected areas under appropriate statutes) and support for environmentally sustainable economic activities. In parallel, CEPF will support the emergence of civil society networks, with the goal of developing, for each corridor or cluster of sites, collaboration between various stakeholders (farmers' or fishermen's organizations, village associations, local NGOs, cooperatives, private sector, etc.). CEPF's objective is to strengthen the capacities of individual organizations to ensure the sustainability of their common actions.

The second level of CEPF's intervention is the national level. The experience of CEPF in Madagascar shows the importance of supporting national NGOs in the implementation of their own programs of work, at a wider scale than the field-based projects. Currently, many national organizations focus on field projects in response to requests from donors, and can hardly focus on developing partnerships on a larger scale with the government parties and the private sector. CEPF aims to help a limited number of national organizations to invest in these broader issues of relationship between development and conservation, with the aim of strengthening a network of national champions that can contribute to a better consideration of conservation issues in decision making. CEPF will support these organizations in building their capacities with the objective that these organizations could deal with emerging threats in the future. Work at this level of intervention is intended to complement the local level. The regional implementation team will support the establishment of strong relationships between the beneficiaries at the local and at the national level, to make sure that feedback from the field benefits the national actions and vice versa.

The third level is the level of regional integration. To address the need to strengthen the technical and managerial capabilities of a new generation of professionals in the field of conservation, CEPF's strategy is to make the regional diversity an asset, making the best of the range of training opportunities, and introducing organizations and young professionals to different

situations and projects. Insisting on concrete regional cooperation programs, directly addressing the needs of the organizations, CEPF also intends to create conditions for strengthening interpersonal and inter-organizational relationships, with the objective to support the emergence of a regional conservation community, able to raise new ideas and concepts – following the natural principle of cross-pollination.

Table 12-2: Strategic Directions and CEPF Investment Priorities for 2014-2020

Strategic Directions	Investment Priorities
1. Empower local communities to protect and manage biodiversity in priority key biodiversity areas.	1.1 Support local communities to design and implement locally relevant conservation and sustainable management actions that respond to major threats at priority sites. 1.2 Support the development of economic models to improve both livelihoods and biodiversity conservation. 1.3 Build the technical, administrative and financial capacity of local organizations and their partners.
2. Enable civil society to mainstream biodiversity and conservation into policy making and business practices.	2.1 Support local research institutions to improve basic knowledge of biodiversity of priority ecosystems. 2.2 Support civil society to disseminate biodiversity information and influence political and economic decision-makers in favor of biodiversity and conservation priorities. 2.3 Explore partnerships with private sector stakeholders to promote sustainable practices that deliver positive impacts for conservation.
3. Strengthen civil society capacity at national and regional levels through training, exchanges and regional cooperation.	3.1 Foster the emergence of a new generation of conservation professionals and organizations through small grants for technical and practical training. 3.2 Encourage exchanges and partnerships between civil society organizations to strengthen conservation knowledge, organizational capacity, management and fundraising skills.
4. Provide strategic leadership and effective coordination of CEPF investment through a regional implementation team.	4.1 Make operational and coordinate the allocation and monitoring process of the CEPF grants to ensure effective implementation of the strategy. 4.2 Foster the emergence of a conservation community beyond institutional and political boundaries to achieve conservation objectives.

Strategic Direction 1: Empower local communities to protect and manage biodiversity in priority key biodiversity areas.

Local community involvement in biodiversity conservation and natural resources management is growing in importance, in particular in Madagascar and Comoros. This involvement is seen as essential to empower local stakeholders to address sustainable resource use, sites and species protection, and even site management and co-management. Consensus on this issue is clear and based on substantial evidence showing that limited community involvement is a major cause of failure. Experience shows it leads to the discontinuation of support to local communities by sponsoring organizations, as well as a lack of resources, lack of information and awareness, planning and implementation of projects without participation of local communities, and absence of involvement of local decision-makers and elected officials.

CEPF funding is an opportunity to develop models in several phases, with small grants serving to help lay the foundation for larger projects, thus maximizing the chances of success.

The very low capacity of local communities is a significant factor limiting effective involvement. It is unrealistic at present for CEPF to fund most of these community-based organizations directly, even with a small grants program, in part due to lack of bank accounts or legal status. Therefore, it will be necessary to work through local associations, and national or international NGOs that have a local presence, at least initially. Support to these organizations to train local communities (including local women groups, farmers associations or any relevant groups of local stakeholders) in management and administration is an area of intervention that will set the stage for future increased involvement of local communities in conservation.

It is imperative that local communities take greater responsibility and support the management of the KBAs that provide the environmental services that these communities receive directly, and that benefit more broadly the neighboring communities, their fellow countrymen and people around the globe. Actions taken under this strategic direction will lead to improved awareness about the importance of the sites that local communities manage, and will contribute to the development of mechanisms that will generate maximum direct benefits for people, to ensure their long-term commitment these important sites.

The list of priority KBAs is provided for in Tables 12-2 and 12-3.

Investment Priority 1.1: Support local communities to design and implement locally relevant conservation and sustainable management actions that respond to major threats at priority sites

The objective of this priority investment is to support the emergence and implementation in priority KBAs or their surroundings, of natural resources management plans enabling the long-term conservation of ecosystems and target species. These plans should take into consideration the development needs of local communities. Given the grassroots organizations' capabilities, these actions would have to be supported initially by national and international organizations playing the role of mentor. Considerable attention will be paid to the legitimacy of these mentoring organizations with the local communities. To be eligible for CEPF funding, projects must demonstrate effective participation of local communities in the early stages of project design, consideration of local expectations for development, and ownership by all stakeholders, including the local authorities, farmers or fishermen associations and women groups.

When necessary, CEPF will encourage organizations to undertake participatory planning and preparation, for example through a small grant (<$20,000). This could entail conducting baseline studies when necessary, or developing the detailed action plans necessary for additional support, in concert with local stakeholders.

CEPF will devote special attention to projects that allow:
- Establishment of locally managed protected areas.
- Implementation mechanisms for protection or sustainable management by private landowners (especially in Seychelles and Mauritius).
- Strengthening of local participation in protected-area management mechanisms.

The consultations highlighted the lack of understanding by local village communities of the importance of biodiversity and natural resources, and the profile recognizes this as an important factor affecting their motivation to engage effectively in protection of their environment. This is

not only the case in dire economic situations encountered in Madagascar and Comoros, but also in Seychelles and Mauritius, particularly for private landowners who are key players in the management of important sites for biodiversity (see Chapters 9 and 10). Awareness raising may be conducted as a complement to or as support for conservation efforts. The most appropriate local media (which may include radio, community theater, etc). will be favored, as will exchanges between village communities in targeted KBAs and areas where the environment is more degraded. Actions should aim to strengthen the integration of cultural and economic factors into conservation. To be eligible, awareness activities should include a monitoring and evaluation component to assess the validity of the approach and to measure impact in terms of behavioral change.

Investment Priority 1.2: Support the development of economic models to improve both livelihoods and biodiversity conservation.

It is also necessary to develop and support models that strengthen the link between biodiversity conservation and local livelihoods. In the absence of a direct link between these two issues, the success of long-term conservation actions cannot be guaranteed.

Considering the economic importance of this sector in the hotspot (see Chapter 7), CEPF would consider projects on promoting ecotourism, especially in the coastal portions of the priority geographic areas. However, due to the limited funding available, CEPF will not finance the construction of accommodations or the provision of large equipment. Actions funded by CEPF must also demonstrate a positive impact on the natural resources and biodiversity management—for example, by linking the establishment of an ecotourism program to stakeholders' commitments to conservation.

Projects involving incentives for conservation action will also be considered and could include support to commercialization of sustainably harvested natural product with high added-value, voluntary certification, and establishment of conservation agreements, possibly in connection with payments for environmental services. Partnerships and exchanges of experience between organizations in the hotspot will be promoted under this investment priority.

Investment Priority 1.3: Build the technical, administrative and financial capacity of the local organizations and their partners.

All consultations highlighted the low capacity of local organizations as one of the major obstacles to the adoption and implementation of local management plans, or natural resource management transfers in the case of Madagascar. The objective of this investment priority is to support the emergence of a network of competent community-based organizations with improved governance systems, management and organizational capabilities. This is a necessary step to enable local organizations to pursue the implementation of conservation activities for the long run.

It is common that even the most active and influential organizations at the local level do not yet have sufficient experience or technical capacities to effectively implement conservation actions. This is the case of many rural development groups, farmers associations, women groups, water management organizations and religious associations (see Chapter 8). CEPF will consider activities to build the technical capacity of these organizations in natural resources management and biodiversity monitoring. Community-based organizations engaging in actions for the

protection and sustainable management of natural resources could be supported to become legally established, to improve their governance structures and accounting systems, and to build the capacities of their members.

Strategic Direction 2: Enable civil society to mainstream biodiversity and conservation into political and economic decision-making.

Lack of availability, access and utilization of information about biodiversity has been identified as one of the most important barriers to efficient conservation action across the hotspot. Basic knowledge is still deficient for many species and sites. Even when information is available, it is not used or it is misunderstood by many decision-makers, with immediate consequences on ecosystems (cf. Chapters 6, 7 and 9).

Civil society has an important role to play to generate and disseminate information on biodiversity to stakeholders outside of the field of conservation, in particular to government authorities, the private sector and the development sector. This strategic direction aims at supporting the efforts of the conservation community to reach out to decision-makers, in order to influence economic choices and help mainstream biodiversity conservation. This could be done at three levels: by improving the knowledge base when needed; by facilitating access to data on biodiversity; and by using the adequate avenue to inform the choices of the decision-makers.

Investment Priority 2.1: Support local research institutions to improve basic knowledge of biodiversity of priority ecosystems.

It is clear that significant gaps remain in terms of basic knowledge about specific sites. In the absence of this information, some of these sites did not qualify for the status of KBA, although it is likely that further studies would generate the data to justify KBA status. Some of these sites might be threatened by current or future economic development, be it infrastructure, agricultural development or mining. In the absence of data, implementing appropriate conservation measures is very challenging. In Madagascar for example, there are significant gaps in knowledge on the marine environment, freshwater biodiversity, and botanical inventories (cf. Chapters 3 and 4). The situation is even more critical in the Republic of Comoros, where basic biological data are very limited, making it difficult to identify priority areas and to undertake biodiversity management planning, both at the site and national levels.

Under this investment priority, scientific programs inventorying biodiversity, and mapping of habitats, possibly linked with research on natural resources use by local populations, will be eligible. The activities will be implemented primarily by organizations from the hotspot, possibly in association with international researchers when local capacities are insufficient. CEPF will pay specific attention to activities which include young professionals from the region and promote regional cooperation. All research results funded by CEPF will be made publicly available, unless the diffusion of this information could result in adverse impacts on conservation (such as in the case distribution of species subjected to wildlife trafficking, for instance).

In the case of private or public investment in existing or potential KBAs, CEPF will not support the preparation of biological assessments that should be undertaken as part of the legal requirements under the Environmental Impact Assessment national regulations, and should therefore be paid for by the investors.

Activities under this investment priority are not restricted to CEPF priority KBAs, but the emphasis will be on

i) Freshwater biodiversity and marine/coastal biodiversity in CEPF priority KBAs.
ii) Potential important plant areas in neglected and/or underfunded areas.
iii) Biodiversity inventories for sites under an emerging direct threat (for instance, by mining or infrastructure development – with the limitations given above).

Investment Priority 2.2: Support civil society to disseminate biodiversity information and influence political and economic decision-makers in favor of biodiversity and conservation priorities.

Beyond the knowledge generation, the profile highlighted the need to strengthen the dissemination of information, i.e. the communication of the value of biodiversity to stakeholders outside of the field of conservation, in particular to decision-makers, the private sector and the development sector. Projects seeking to raise awareness and influence decision-making have great potential to impact conservation, especially in relation to the agriculture, fisheries or extractive sectors.

This investment priority will also allow for projects that respond to emerging opportunities and threats. The following examples are indicative:

- Support civil society participation in consultations for economic development plans, in environmental impact studies, and in appropriate fora to strengthen the consideration of conservation priorities.
- Initiate information campaigns on threats or unsustainable practices, or campaigns to promote the benefits of conservation to development actors, the private sector and government authorities (including by using the Red List tool when appropriate).
- Initiate dialogues with government authorities, establish multi-stakeholder discussion platforms, or support preparatory actions to support the adoption of legislation on specific issues.

The consultations also highlighted the difficulties encountered across the hotspot in accessing and sharing information on the hotspot's biodiversity. Efforts to increase access to information useful to the scientific community as well as to political and private decision-makers, ideally at a regional level, would be of great benefit for the hotspot.

This investment priority is not directly related to CEPF priority sites. However, establishing linkages with ongoing activities involving these sites, where justified, should be established.

Investment Priority 2.3: Explore partnerships with private sector stakeholders to promote more sustainable practices that deliver positive impacts for conservation.

Economic development is advancing steadily across the hotspot, with national strategies prioritizing development that may have an impact on the status of biodiversity. In particular, tourism, aquaculture, fishing and mining pose threats to biodiversity. These activities can however provide benefits to local communities and national economies, provided that adequate safeguards are in place to minimize and mitigate negative impacts, and to maximize positive impacts.

This investment priority will support civil society organizations to explore and develop partnerships with private companies operating in fisheries and aquaculture, export agriculture, mining, energy, infrastructure and tourism in order to identify and implement pilot actions to improve environmental and social practices. These projects will rely on global standards for sustainable business practices, for voluntary certification schemes, or other mechanisms adapted to the context of the hotspot. Under this investment priority, CEPF will consider projects from all eligible countries (Comoros, Madagascar, Mauritius and Seychelles).

More specifically, CEPF will seek to fund innovative mechanisms that could provide sustainable financial incentives to local communities, or to benefit sustainable conservation. CEPF is willing to fund initiatives that will test new approaches and tools, and encourages civil society in the region to explore new mechanisms, alliances and forms of partnership.

Strategic Direction 3: Strengthen civil society capacity at local and regional levels through training, exchanges and regional cooperation.

The analysis and consultations for the chapter on the civil society context (Chapter 8) indicate clearly that in spite of efforts in several countries, the general capacities of national organizations for biodiversity in the hotspot still need to be strengthened. Where civil society plays an important role in conservation—such as in Madagascar—the conservation community is still dominated by a few large international organizations (even if these organizations employ mostly country nationals). National civil society organizations are very few and with little capacity in Mauritius or in the Comoros. Two important barriers have been identified that limit the ability of the civil society to support long-term conservation activities.

The first barrier is the insufficient pool of young professionals with technical capacities in fields related to natural resources management and conservation. In many cases, organizations have to rely on experts from other countries, putting at risk the sustainability of their activities. Supporting the emergence of a new generation of young professionals is therefore key to consolidating and sustaining the regional conservation community. It is also an important element for mainstreaming of conservation through governments and private sectors in the long term.

The second important barrier pertains to the overall capacities of national organizations in terms of administration, management and fundraising. While national organizations often have an understanding of the local situation and strong relations with local communities, their organizations' capacities affect their efficiency, limit their access to funding, and threaten their sustainability as well as their independence.

On the positive side, the profile also underlined the exceptional diversity of experiences and skills in the hotspot, which offers great potential for regional collaboration. For instance, Madagascar has substantial experience in engagement with local communities and joint management of protected areas. Mauritius has learned much in the face of serious loss of habitat, and has experimented with innovative techniques for ecosystem restoration. Seychelles has experience in invasive species eradication on the islets, and in partnering with the private sector. The Comoros have a very dynamic network of community-based organizations involving young

people. The French departments host high-level research centers and have great experience in engagement with local governments.

Investment Priority 3.1: Foster the emergence of a new generation of conservation professionals and organizations through small grants for technical and practical training.
Opportunities for conservation-related training exist today in La Réunion, Mauritius, Madagascar, and recently in Seychelles. With this investment priority, CEPF aims to expand the training opportunities, especially by supporting the creation of short programs for community leaders, development professionals, or other relevant stakeholders, and by supporting the participation of the beneficiaries in these trainings. Small grants, including grants for scholarships, may be given to young professionals in order to promote the active participation of these future professionals in conservation programs across the region. Exchanges between the hotspot countries will be favored.

For procedural reasons, CEPF can't support students or organizations of the French departments. However, it can support students or organizations in other countries to receive training or participate in exchanges and internships in the French departments and territories of the hotspot.

Under this priority, CEPF could also support national organizations to strengthen their institutional capacity by providing funding to complement conservation actions with training and specific activities tailored to improving organizational capacity.

Investment Priority 3.2: Encourage exchanges and partnerships between civil society organizations to strengthen conservation knowledge, organizational capacity, management and fundraising skills.
Under this investment priority, programs of exchange or mentorship, as well as establishment of platforms and/or networks for technical cooperation, will be supported. The focus will be on "doing together" rather than "sitting together". Priority areas for such actions shall be the following:

- Management of marine and coastal areas
- Management of wetlands
- Restoration of island ecosystems
- Eradication of invasive species
- Conservation action planning for Critically Endangered species
- Participation of local communities and joint management

The issue of sustainable financing has emerged as a priority for which civil society feels the need to strengthen its capacity. At present time, the "project approach" remains the main sources of funding. Projects are still primarily funded official development assistance - while private foundations tend to increase their presence. However, accessing these funds remains complex and only a small number of organizations, mainly international, manage to get grants. CEPF will support specific actions to strengthen the operational capacity of national civil society in the areas of project preparation, fundraising, programming and budget management, human resources and associative governance - in order to allow these organizations greater access to diverse sources of funding (public development assistance, foundations, etc). CEPF would encourage support to enhance the capacities of national organizations to explore other

sustainable funding mechanisms, such as payments for environmental services. These training opportunities will be open as much as possible to regional participation.

Strategic Direction 4: Provide strategic leadership and effective coordination of CEPF investment through a regional implementation team.

A global evaluation of CEPF found that the regional implementation teams are particularly effective at connecting the essential elements of a complex and integrated set of interventions. With the support of CEPF grant directors, the regional implementation teams effectively anchor large projects to small local initiatives, government cooperation and sustainable funding, enabling stronger and longer-lasting results that are greater than the sum of the outputs of individual interventions.

In each hotspot approved since 2007, CEPF supports a regional implementation team to put the ecosystem profile plans in the form of a coherent grants portfolio whose impacts exceed the sum of its parts. Each regional implementation team will include one or more of the active civil society organizations in the region. For example, the team can take the form of a partnership of civil society groups. It can also be a primary organization with an official mission to involve other bodies overseeing the implementation, for example through an Advisory Committee.

The regional implementation team will be chosen by the CEPF Donor Council on the basis of approved terms of reference, via a competitive procedure and selection criteria available on website at www.cepf.net. The team will operate transparently and openly, in accordance with the CEPF mission and all the provisions of the CEPF Operations Manual. Member organizations of the regional implementation team will not qualify for other CEPF grants in the same hotspot. Requests for official affiliated organizations having an independent Board of Directors will be accepted and subjected to an additional external review.

Investment priority 4.1: Make operational and coordinate the allocation and monitoring process of the CEPF grants to ensure effective implementation of the strategy.

One of the main objectives of the regional implementation team is to provide local coordination and support to the grant process. The main functions and specific activities of the team will be detailed in the approved terms of reference. The principal roles of the regional team under this priority are:

- Assist civil society groups in developing, implementing, and repeating successful conservation activities.
- Review all grant applications and manage external reviews with technical experts and the advisory committees.
- Approve grants up to $20,000 and make decisions jointly with the CEPF Secretariat for all other applications.
- Coordinate the monitoring and evaluation of individual projects through standard tools, sites visits and meetings with grantees, and provide assistance to the CEPF Secretariat for portfolio monitoring and evaluation.

The regional implementation team plays a crucial support role supporting and complementing the CEPF Secretariat. The regional team is the main contact for applicants and grantees, and with its knowledge of the region, plays a role of conduit between the field and the CEPF Secretariat—from project selection through evaluation. In particular, the regional implementation team has a

very important role to play in soliciting and reviewing project proposals. This role encompasses a wide range of activities, such as the publishing calls for proposals and establishing a group of experts tasked with recommending proposal approval or rejection. While such tasks could be considered as administrative, they have significant programmatic importance and require technical expertise. Their proper implementation is essential to the quality and consistency of the projects portfolio, which in turn is key to achieving CEPF's goals.

The regional implementation team also assumes significant administrative responsibilities as manager of the CEPF small grants mechanism for grants under $20,000. Its tasks in this context include budgeting, processing of proposals, drafting contracts, and monitoring and evaluation of small projects. Small grants play an extremely important role in the CEPF portfolio. These grants can be used for the preparation of larger actions, allow CEPF to engage with local groups that do not have the capacity to implement large grants, and can be used to quickly address emerging threats. The role played by these grants should not be underestimated. Strategic oversight of the small grants portfolio is necessary to ensure consistency with the overall grants portfolio, as well as with other actions carried out by CEPF donors and other players in the hotspot.

This investment priority also covers monitoring and evaluation. This involves collecting data on the portfolio performance, ensuring compliance with procedures, ensuring that recipients understand and comply with social and environmental safeguard policies, and of course reviewing project progress reports. Concerning follow-up and evaluation, the regional team is required to visit projects to identify capacity-building needs and help build links between the various projects. This is a crucial component for efficient project implementation and the global monitoring of CEPF, requiring technical expertise and experience.

Investment priority 4.2: Foster the emergence of a conservation community beyond institutional and political boundaries to achieve conservation objectives.

This investment priority covers the two functions of the regional implementation team terms of reference that are programmatic in nature:

- Coordinate and communicate the CEPF investment, build partnerships and promote exchange of information in the hotspot.
- Strengthen the capacity of the beneficiaries.

These functions include programmatic tasks that directly support the strategic development of the grant portfolio and contribute to achieving the conservation objectives. These functions include facilitating the exchange of experiences between beneficiaries and other stakeholders, identifying opportunities for co-financing for CEPF and for grantees, and aligning CEPF investment with other donors' investments. These programmatic functions require that the regional implementation team maintains internal conservation expertise to ensure that CEPF funds are strategically channeled to optimize the achievement of conservation objectives.

An essential programmatic function is to coordinate CEPF investments and facilitate the establishment of partnerships between the various actors. The regional implementation team will be responsible for identifying and contacting the active civil society organizations in priority sites, facilitating partnerships between themselves and the best placed national and international civil society organizations to provide technical and financial support, and facilitating the creation

of networks of civil society organizations at the national and regional levels to address issues of common interest.

The creation of linkages with other donors is also an important goal, particularly in the context highlighted in the investment niche, to support the preparation of programs and projects that can and or will later receive external assistance. The role of the regional implementation team will thus be crucial to ensuring a continuing dialogue with the donors present in the hotspots in order to promote opportunities to leverage their actions with CEPF's strategy. In the Madagascar and Indian Ocean Islands Hotspot, the RIT will pay a specific attention at building strong relationship with the on-going and future programmes of CEPF's donors as well as of important Foundations, such as the Helmsley Charitable Trust. Programmes with which the RIT will be asked to develop strong collaboration include the GEF-AFD-Government of Comoros programme to establish the National System of Protected Areas in the Comoros, the GEF programme on protection of threatened endemic and economically valuable species in Madagascar, the GEF programme on Atsimo-Andrefana Spiny and Dry Forest Landscape, the Regional Programme for the Management of Biodiversity of the Indian Ocean Commission funded by the EU and the French GEF among others. Collaboration will also be sought with the GEF Small Grant Programme in all the countries. In Madagascar, the RIT will work closely with the Madagascar Biodiversity Fund to ensure synergies, in particular for activities to be implemented in and around the protected areas managed by Madagascar National Parks. The RIT will maintain a continuous dialogue with the Donors' community in order to support the emergence of positive collaborations for the benefit of the civil society partners of the hotspot. Chapters 7 and 10 provides for more detailed information on existing projects and initiatives with which synergies should be sought.

This investment priority also covers capacity building, a function that is at the heart of the regional implementation team responsibilities. It makes the regional implementation team central to strategy implementation by making it responsible for the coordination, communication, collaboration and liaison with donors, partners, governments and other stakeholders. It also puts the regional implementation team in charge of ensuring that the CEPF grant portfolio aims to achieve the goals set in the ecosystem profile. It includes the promotion of synergies between the CEPF objectives and local, national and regional initiatives.

This function focuses on strengthening national civil society organizations' capacity to access CEPF funds. It is important in this context that the team ensures that the partners have the institutional capacity to design and implement projects that contribute to the investment strategy objectives. Experience has shown that these capacity-building efforts are essential to ensure good projects are integrated into the broader hotspot strategy and a common vision for conservation. Capacity building occurs at the level of project design, implementation and drafting of reports, which helps prepare organizations to later benefit from other sources of funding, be they private foundations or institutional donors as mentioned in Chapter 10. Other more specific aspects of civil society capacity building are addressed by Strategic Directions 1 and 3.

13. SUSTAINABILITY

Sustainability is achieved if the impacts of CEPF's investments are maintained beyond the lifetime of the funding, and if the desired outcomes are ultimately achieved. Strategies for sustainability must be built into the very fabric of the investment. The approach suggested for the Madagascar and the Indian Ocean Islands Hotspot has been developed with this in mind. Some of the key factors in achieving sustainability are:

- Mainstreaming (of biodiversity issues outside of the conservation world)
- Capacity (of all the stakeholders to work efficiently)
- Commitment (of conservation actors but also of decision-makers and citizens)
- Sustainable financing (to support recurrent costs of conservation action)
- Partnerships (to maximize synergies of the actions)

Mainstreaming suggests that the key components, outputs and lessons learned of a project or initiative become part of the long-term program of established conservation agencies within the country or region. The most important of these are governments and local communities. Governments will always be there, defining policies that affect biodiversity, and communities will always be there, managing their local environment on a day-to-day basis. The importance of these stakeholders has been reflected in the process to develop the investment strategy, during which involving government officials and local civil society organizations was emphasized. Moreover, the process has paid particular attention to ensuring that the investment strategy aligns with national conservation strategies and supports the efforts of the governments to achieve their international commitments, in line with commitments under the 2005 Paris Declaration on Aid Effectiveness.

The CEPF investment strategy is designed to strongly support the implementation of actions under national conservation strategies of the four beneficiary countries. Specifically, the CEPF investment strategy aligns with the main goals of the Malagasy government under the Durban Declaration, with particular attention given to support of the gazettement of new protected areas. Strategic Direction 1 puts an emphasis on local communities, in line with the legal framework from the *Vision Madagascar Naturellement*, and specifically the mechanisms for Transfer of Management of Natural Resources (TRGN).

Organizations in the hotspot may lack appropriate capacity and staying power; many work on a project-by-project basis, in particular at the local level, and face difficulties to engage in long-terms approaches. A key focus of the investment strategy is to build longevity in such groups through support for the implementation of on-the-ground activities and capacity building for local actors (Strategic Direction 1). Larger national NGOs are also targeted under Strategic Direction 3, with the objective of supporting the creation of a regional conservation community. International NGOs and research centers that have extensive capacity can act as mentors, forming long-term partnerships to build capacity in national and local organizations (Investment Priority 3.2) and also in key individuals in leadership roles (Investment Priority 3.1). In a hotspot characterized by the very diverse situations regarding conservation, CEPF has paid close attention to supporting exchanges and collaborations at the regional level, with the goal of building on the strengths of each country. Capacity building and support to partnerships was universally identified as an important need during the stakeholder consultations. However, it

should be recognized that capacity building is a long process, particularly when working at the community level, and this is one reason why the CEPF Secretariat proposed a five-year investment period.

It is increasingly recognized that a key success factor is meaningful community engagement and commitment in the conservation process. It is critical that all projects funded by CEPF reflect this and, wherever relevant, adopt a bottom-up participatory approach, involving local communities from the very identification of projects. The extended timeframe will allow national, regional and international organizations able to provide technical and financial support to build relationships and trust at the community level, and, over time, support the emergence of strong local institutions that can implement sustainable conservation actions. In order to be effective, conservation actions not only need to be long-term, but also relevant to local people and in line with their development needs. For this reason, community well-being is identified as a key approach in the investment strategy. This can be achieved by projects that increase income for communities, which is the primary focus of Investment Priority 1.2.

Conservation will always cost money, so sustainable financing is a key component of the CEPF investment strategy. The involvement of the private sector (Investment Priority 2.3) has the potential to make a long-lasting difference—and has already demonstrated its value in some of the countries of the hotspot, in particular in the Seychelles and Mauritius. Exploring innovative partnerships between civil society and the private sector is a challenging goal, to the achievement of which CEPF, with the flexibility of its granting mechanism, could make a significant contribution.

Overall, CEPF's focus on building partnerships—from supporting exchanges and collaboration at the level of corridors to mentoring and exchanges of experience at the regional level—can provide lasting support for conservation goals and will be critical to achieving sustainability.

14. CONCLUSION

In terms of species richness and especially endemism, the Madagascar and the Indian Ocean Islands Hotspot is one of the most biologically important regions on the planet, as well as one under the highest threats. The causes of these threats are different from one country to another. In Madagascar and the Comoros, both members of the Least Developed Countries, the mainly rural population relies heavily on biodiversity for food security and livelihoods – yet threats to these necessary resources have increased in recent decades, mainly through agricultural expansion and fuelwood collection boosted by demographic growth. In parallel, Seychelles, Mauritius and the French overseas territories appear to be in a better situation regarding conservation. Yet, in these countries, too, landowners, the private sector and sometimes authorities do not always measure how their livelihoods and economies rely heavily on the diversity of their nature, threatened by invasive species and fragmentation of the habitats.

In spite of these differences, all the countries within the hotspot have a lot in common –in terms of biodiversity of course, but also as regards their language, history and cultural heritage. They share similar challenges, such as fisheries management in a common seascape, as well as opportunities, for instance to make their countries a unique tourism destination. But as mentioned during the consultations, direct and practical collaborations in biodiversity conservation have been rare thus far. The ecosystem profile, insisting on this regional dimension, has shown that all countries have their strengths and weaknesses in terms of conservation, coming from their own political context and history. Reinforcing regional collaboration that is mutually beneficial to each country and supporting the emergence of a regional conservation community should therefore be an important objective for all stakeholders involved in biodiversity conservation.

The profile put a specific emphasis on the services provided by the ecosystems and biodiversity. The concept of "KBA+", developed by CEPF and the CI's Moore Center for Science and Oceans, has been tested for the first time, and proved immensely useful to prioritize sites where interventions will not only preserve the most important species and habitats, but also secure important services for the benefit of local populations – and humanity. This approach will continue to be used during the implementation of the CEPF program in the hotspot, in the coming six years, to support locally adapted measures to support conservations and livelihoods, as well as with advocacy activities targeting authorities and the private sector, to mainstream the importance of sustainable management of natural resources.

In this context, there are significant opportunities for CEPF to support biodiversity conservation in ways that deliver significant, meaningful benefits to local communities. This will require a commitment to capacity building at multiple levels, a readiness to support and test innovative mechanisms and an engagement to consider together development needs with conservation of biodiversity, ecosystems and the services they provide to local communities and economies.

To develop its strategy, CEPF commissioned a nine-month consultative process that involved an expert roundtable meeting and nine stakeholder consultation workshops, and engaged more than 100 stakeholders from CSOs, research centers and universities, government institutions and donor agencies.

The process resulted in a common conservation vision for the hotspot and an five-year investment strategy for CEPF. This strategy comprises 10 investment priorities, grouped under four strategic directions. The successful implementation of this strategy will require time, persistence and, above all, a commitment to genuine and lasting partnership. The cooperation and common vision that has been witnessed through the ecosystem profiling process inspires confidence that such success will be achieved.

MADAGASCAR AND INDIAN OCEAN ISLANDS HOTSPOT: LOGICAL FRAMEWORK

Objective	Targets	Means of Verification	Important Assumption
Engage civil society in the conservation of globally threatened biodiversity through targeted investments with maximum impact on the highest conservation priorities. Total amount: $ 7,500,000	40 Key Biodiversity Areas, covering 2.8 million hectares, have new or strengthened protection and management. At least 10 Key Biodiversity Areas that were unprotected or under temporary protection gain officially declared permanent protected status, covering 1 million hectares. At least 10 partnerships and networks formed among civil society, government and communities to leverage complementary capacities and maximize impact in support of the ecosystem profile. At least 40 civil society organizations, including at least 30 local organizations, actively participate in conservation actions guided by the ecosystem profile.	Grantee and regional implementation team performance reports Annual portfolio overview reports; portfolio midterm and final assessment reports Protected Areas Tracking Tool (SP1 METT) Official decrees of creation of new protected areas	The CEPF ecosystem profile will effectively guide and coordinate conservation action in the hotspot. Investments by other donors will support complementary activities that reduce threats to priority sites and species. Political stability will facilitate the implementation of conservation initiatives and improve the operating environment for civil society. Civil society organizations and private companies will be willing to engage in biodiversity conservation, form new partnerships and adopt innovative approaches.
Outcome 1: Local communities empowered to protect and manage biodiversity at priority Key Biodiversity Areas. $ 2,700,000	Threat levels to at least 25 priority sites reduced through locally relevant conservation actions implemented by local communities. Awareness of the values of biodiversity and the nature of threats and drivers raised among local communities in at least 25 priority sites. Effective participation of local communities in the management of at least 10 new protected areas at priority sites. Mechanisms for effective participation of private landowners in improved biodiversity management on private lands for at least four	Grantee and regional implementation team performance reports CEPF Secretariat supervision mission reports Protected Areas Tracking Tool (SP1 METT) Community agreements designating new conservation areas	Local communities will be willing to play an active role in site-based conservation. Increased awareness of biodiversity values will translate into increased local community support for conservation initiatives. Government policies will continue to provide for community management of forests, fisheries and other natural resources.

	priority sites. Economic tools and models improving livelihoods while preserving natural capital and biodiversity (ecotourism, payments for ecosystem services, conservation agreements, etc). piloted and implemented in at least eight priority sites. At least 75 percent of local communities targeted by site-based projects show tangible well-being benefits. Capacities of local community organizations in charge of conservation and local development improved in at least 20 sites, allowing for increased sustainability and efficiency of these organizations.	Baseline survey reports Human well-being monitoring reports Civil Society Organizational Tracking Tools (applied to community-based organizations)	Suitable and sufficient funding sources will be available for conservation incentives models. Appropriate, cost-effective site-based monitoring protocols for human well-being impacts can be developed. Sufficient civil society capacity to implement site-based conservation exists or can be built.
Outcome 2: Civil society organizations have enhanced the knowledge base for biodiversity conservation and influence decision-makers for improved mainstreaming of biodiversity conservation. $ 2,000,000	Baseline studies, inventories and mapping of important biodiversity areas completed for at least six sites—with at least three sites in the Comoros. At least three platforms or dialogues positively engaging stakeholders from development agencies, government and local authorities and private sector, in place and delivering results for mainstreaming biodiversity in decision-making. Civil society actively participating in and influencing at least five local development strategies, environmental impact assessments or other appropriate decision processes. At least 12 national organizations improve their skills in advocacy and engagement with authorities and/or private sector. At least five partnerships between civil society organizations and private sector companies or	Grantee and regional implementation team performance reports CEPF Secretariat supervision mission reports Annual portfolio overview reports; portfolio midterm and final assessment reports Baseline survey reports Civil Society Organizational Tracking Tools Official reports of governments	

	professional organizations lead to concrete actions benefitting biodiversity conservation.	Annual reports (or other means) produced by private companies	
Outcome 3: Regional and national capacity to conserve biodiversity increased through civil society partnerships, within the conservation community and with other stakeholders. $ 1,300,000	At least 40 community leaders and/or development professionals with improved capacities and engagement to preserve biodiversity. At least 15 students—including at least six from the Comoros—successfully achieve a degree in a field related to conservation. At least 12 organizations engaged in a lasting mentoring or partnering relationship at the regional level. At least one regional network is created or reinforced allowing exchange of experience and mutual support at the regional level, enabling collective responses to priority and emerging threats. At least 20 local civil society organizations demonstrate improvements in organizational capacity, project development and institutional fundraising.	Grantee and regional implementation team performance reports Study reports from interns and graduates CEPF Secretariat supervision mission reports Civil Society Organizational Capacity Tracking Tool Training needs assessments and evaluation reports	The operating environment for civil society will remain constant or improve across the hotspot. The key capacity limitations of civil society organizations can be addressed through a combination of capacity building and grant support. National civil society organizations are willing to take on a leadership role. Domestic academic institutions continue to provide short-term training courses in relevant fields. Immigration policies of the hotspot countries allow for regular exchanges and visits of individuals
Outcome 4: A regional implementation team provides strategic leadership and effectively coordinates CEPF investment in the Madagascar and Indian	At least 40 civil society organizations, including at least 30 local organizations actively participate in conservation actions guided by the ecosystem profile. At least 80 percent of local civil society organizations receiving grants demonstrate more effective capacity to design and implement	Regional implementation team performance reports CEPF Secretariat supervision mission reports Civil Society	Qualified organizations will apply to serve as the regional implementation team in line with the approved terms of reference and the ecosystem profile. The CEPF call for proposals will elicit appropriate proposals that

Ocean Islands Hotspot. $ 1,500,000	conservation actions. At least 20 civil society organizations supported by CEPF secure follow-up funding from other donors. At least two participatory assessments are undertaken and lessons learned and best practices from the hotspot are documented.	Organizational Capacity Tracking Tool	advance the goals of the ecosystem profile. Civil society organizations will collaborate with each other, government agencies, and private sector actors in a coordinated regional conservation program in line with the ecosystem profile. Private foundations and other donors continue to allocate funds to hotspot countries.

APPENDIX 1: LIST OF ACRONYMS

ACCE: Action Communication Cultural Environment
AFD: French Development Agency
AIDE: Association of Intervention for Development and Environment
AIM: Inter-cooperation Association of Madagascar
ANAE: National Association for Environmental Action
APG: Association for the Preservation of Gombesa
ARSIE: Association of Environmental Information System Network
ARVAM: Marine Valorization and Research Agency
ASG: Amphibian Specialist Group
AVG: Alliance Voahary Gasy
AVSF: Agronomes et Vétérinaires Sans Frontières (Agronomists and Veterinarians without Borders)
AZE: Alliance for Zero Extinction
CAS: Californian Academy of Science
CAZ: Ankeniheny - Zahamena Corridor
CBNM: Conservatoire Botanique National de Mascarin (Réunion Island)
UNFCCC: United Nations Framework Convention on Climate Change
CEPF: Critical Ecosystem Partnership Fund
CETAMAD: Association for the Protection of Marine Mammals in Madagascar
CFM: Contractualized Forest Management
CI: Conservation International
CICES: Common International Classification of Ecosystem Services
CIRAD: Centre International de Recherche pour l'Agriculture et le Développement (International Center for Agricultural Research for Development)
CITES: Convention on International Trade in Endangered Species of Wild Fauna and Flora
CMA: Conservation Management Areas
CMP: Multi-Local Planning Committee
CNRE: National Center for Environmental Research
CNDRS: National Center for Documentation and Scientific Research (Comoros)
COAP: Code for Protected Areas
COBA: Community-Based Organization
COFAM: Fandriana - Marolambo Corridor
COFAV: Ambositra - Vondrozo Corridor
COMATSA: Marojejy - Tsaratanàna Corridor
COMESA: Common Market for Eastern and Southern Africa
CRVOI: (Research center on emerging diseases in the Indian Ocean)
CSO: Civil Society Organization
DAAF: Directorate for Food, Agriculture and Forestry
DBA: Department of Animal Biology
DBEV: Plant Biology and Ecology
DEAL: Direction of the Environment, Agriculture and Housing
DEFRA: Department for Environment, Food and Rural Affairs
DEVCO: Directorate General for Development and Cooperation, European Commmission
DOM: French Overseas Department
DREF: Regional Directions of Environment and Forests
DRFP: Department of Forestry and Fishfarming Research
ECDD: Community Engagement for Sustainable Development Project
EDF: European Development Fund
EIA: Environmental Impact Assessment
ENS: Sensitive Natural Area
EPIC: Public Industrial and Commercial Institution
ESSA - Forestry: Department of Water and Forestry of the Ecole Supérieures des Sciences Agronomiques
FAO: Food and Agriculture Organization
FAPBM: Madagascar Biodiversity Fund
FCC: Federation of Comoran Consumers
FDI: Foreign Direct Investment
FFEM: French Global Environment Fund
FOFIFA: Foibe Fikarohana momba ny Fambolena
FSC: Forest Stewardship Council

GEF: Global Ecosystem Facility
GEIR: Invasive Species Group (La Réunion)
GELOSE: Gestion Locale Sécurisée (Secured Local Management)
GEPOMAY: Group for the Study and Protection of Birds in Mayotte
GERP: Primates Study and Research Group
GIS: Geographic information systems
GRET: Group for Research and Technological Exchange
GTCC: Climate Change Technical Group
HDI: Human Development Index
IBA: Important Bird Area
IPA: Important Plant Area
ICFM : Initiative for Certifying Forest in Madagascar
ICS: Island Conservation Society (Seychelles)
ICZM: Integrated Coastal Zone Management
IDC: Island Development Company (Seychelles)
IEDOM: Issuing Institution of the French Overseas Departments
IFREMER: French Research Institute for Exploitation of the Sea
IWRM: Integrated Water Resource Management
IHSM: Institut Halieutique des Sciences Marines
INSEE: National Institute of Statistics and Economic Studies
INRAPE: National Research Institute for Agriculture, Fisheries and Environment
INSTAT: National Institute of Statistics
IOC: Indian Ocean Commission
IRD: Institut de Recherche pour le Développement (Research Institute for development)
KBA: Key Biodiversity Areas
LCAOF: Liz Claiborne Art Ortenberg Foundation
LUNGOS: Liaison Unit for Non-Governmental Organizations
MAMABAIE: Makira Masoala Baie d'Antongil
MATE: Man and The Environment
MAVOA: Madagasikara Voakajy
MBG: Missouri Botanical Garden
MBP: Madagascar Biodiversity Partnership
MCSO: Moore Center for Science and Oceans
MECIE: Mise en compatibilité des investissements avec l'environnement (ensuring compatibility of investment with the environment)
MEE: Ministry of Environment and Energy
MEF: Ministry of Environment and Forests
MFW: Mauritius Wildlife Foundation
MICET : Madagascar Institute for Tropical Ecosystem Conservation
MNHN: National Museum of Natural History
MNP: Madagascar National Parks
MOI: Mauritius Oceanography Institute
MPA: Marine Protected Areas
MPSG: Madagascar Plants Specialist Group
MRIS: Marine Research Institute, Seychelles
NAP: New Protected Areas
NGO: Non-Governmental Organization
NPCS: National Parks and Conservation Services
NPTS: Nature Protection Trust of Seychelles
NTPF: Non-Timber Forest Products
OECD: Organization for Economic Cooperation and Development
WHO: World Health Organization
ONE: Office National de l'Environnement (National Office for the Environment)
ONF: Office National des Forêts
PAPC: Priority Areas for Plant Conservation
PBZT: The Botanical and Zoological Park of Tsimbazaza
PCA: Plant Conservation Action group
PCDBA : Plateforme de Conservation pour le Développement du Baie d'Antongil
PEIII: Third National Programme on Environment (Madagascar)
GDP: Gross Domestic Product
PLACAZ: Plateforme pour le Corridor Ankeniheny - Zahamena
LDC: Least Developed Countries

PNAE: National Plan for Environmental Action
PES: Payment for Ecosystem Services
QMM: Qit Madagascar Minerals
REBIOMA: Réseau pour la Biodiversité de Madagascar (Network for Madagascar Biodiversity)
REDD: Reducing Emissions from Deforestation and Forest Degradation
REEM: Report on the state of environment in Madagascar
REPC: Network of Conservation Educators and Practitioners
RNI: Integral Natural Reserve
RS: Special Reserve
ORs: Outermost Regions
SADC: Southern African Development Community
SAGE: Service for the Management of the Environment
SAPM: System of Protected Areas of Madagascar
SCV: Direct seeding mulch-based
SEOR: Society for Ornithological Study in La Réunion
SFA: Seychelles Fishing Authority
SIF: Seychelles Islands Foundation
SNAC: National Union of Comorian Farmers
SNGDB: National Strategy for the Sustainable Management of Biodiversity
SNPA: Seychelles National Parks Authority
NBSAP: National Biodiversity Strategy and Action Plan
SREPEN: Society for the Study and Conservation of Nature (La Réunion)
SRFS: Shark Research Foundation, Seychelles
SRI: System of Rice Intensification
TAAF: French Southern and Antarctic Lands
TGRN: Natural Resources Management Transfer
TPF: The Peregrine Fund
TRASS: Terrestrial Restoration Action Association of Seychelles
TSA: Turtle Survival Alliance
UICN: International Union for Conservation of Nature
UNDP: United Nations Development Programme
UNEP: United Nations Environment Programme
VIF: Vondrona Ivon'i Fampandrosoana
WAVES: Wealth Accounting and the Valuation of Ecosystem Services
WCS: Wildlife Conservation Society
WWF: World Wildlife Fund
ZICP: Important Areas for Plant Conservation
ZNIEFF: Zone Naturelle d'Intérêt Ecologique, Faunistique ou Floristique (Natural area of ecological, zoological or botanical interest)

APPENDIX 2: TABLE OF FIGURES

APPENDIX 3: BIBLIOGRAPHY AND REFERENCES

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APPENDIX 4: ADDITIONAL INFORMATION ON CIVIL SOCIETY ORGANIZATIONS

Tableau A4-1: Réseaux et Plateformes impliquant les organisations de la société civile à Madagascar

Nom du Réseau / Plateforme	Nombre de membres	Typologie des membres	Zone d'intervention	Domaines d'intervention
Alliance Voahary Gasy (AVG) www.alliancevoaharygasy.mg	30	Associations, ONGs et fondation	National	Asseoir une bonne gouvernance environnementale et une bonne gestion des ressources naturelles pour le développement durable par le bais de: (i) renforcement de capacités, (ii) Réseautage, (iii) Veille / campagne / plaidoyers, (iv) justice environnementale et (v) Communication.
Fatidran'ny Ala Maiky sy ny Riake (FAMARI)	55	ONGs, Communautés de base et Associations	Région Atsimo Andrefana	Plateforme régionale œuvrant dans la gouvernance environnementale mise en place d'une structure de base aux niveaux des Districts / Communes pour la gestion et la bonne gouvernance des ressources naturelles au niveau local gardiennage de la charte commune des organisations de la société civile dans la région Atsimo-Andrefana, instauration et développement de structures de dialogue et de coopération avec les différents partenaires dans la résolution des Questions d'Intérêt Public (QIP), Plaidoirie / veille/ interpellation
Komanga	20	ONGs, Communautés de base Association Club Vintsy	Région Boeny	Plateforme régionale œuvrant dans la gouvernance environnementale gouvernance dans l'industrie extractive gouvernance dans la filière Bois-Energie et lutte contre la déforestation lutte contre le trafic des espèces protégées plaidoirie / veille/ interpellation
OSCE – DIANA (Organisation de la Société Civile Environnementale –de la Région de Diana)	45	Personnes physiques et entités morales	Région Diana	Plateforme sur la gouvernance environnementale intervenant au niveau de la Région, communes et districts Interpellation vis-à-vis respectivement de la filière Bois-énergie de la Région et des menaces grandissantes au niveau des Aires Protégées
Comité Multi-local de Planification CMP Tandavanala	24	Personnes Physiques Associations	5 Régions: Haute Matsiatra, Vatovavy Fitovinany, Amoron'i Mania, Ihorombe et Atsimo Atsinanana. 42 Communes	La mission du CMP est de promouvoir un développement durable et équitable de toutes les couches sociales à Madagascar. Les domaines d'interventions sont (i) appuis des communautés locales dans l'amélioration de leur condition de vie, (ii) renforcement de la bonne gouvernance environnementale, (iii) information, éducation et communication ainsi que (iv) valorisation d'une manière rationnelle et équilibrée des ressources naturelles et de la biodiversité
Plateforme du Corridor Ankeniheny Zahamena (PLACAZ)		Association ONG Collectivités territoriales Décentralisées Services	Corridor Forestier Ankeniheny Zahamena	PLACAZ est une structure de concertation œuvrant dans les domaines de l'environnement et du développement social de la population riveraine du Corridor Forestier Ankeniheny Zahamena.

		Techniques Décentralisés Secteur Privé		
Groupe d'étude et de Recherche sur les Primates (GERP)	200	Chercheurs Institutions de recherche Etudiants	National International	C'est une association qui a principalement comme objectif les recherches scientifiques sur les lémuriens par les différentes études sur leur répartition géographique, la mise en place des plans de conservation et la participation à la découverte des nouvelles espèces. Le groupe intervient aussi dans la production des articles scientifiques, les renforcements de capacité et l'éducation environnementale
REBIOMA Réseau Pour la Biodiversité de Madagascar http://www.rebioma.net			National	L'objectif du réseau est de fournir un accès facile aux informations et données sur la biodiversité ainsi que les outils de planification de conservation aux communautés scientifiques et aux décideurs. REBIOMA a été établi entre autres pour apporter un appui technique au processus de la Vision Durban et servir le SAPM (Système des Aires Protégées de Madagascar) dans l'identification des futures aires protégées terrestre et marine. REBIOMA a aussi développé un web data portal qui consiste à mettre en ligne des données d'occurrence (spécimen et/ou observation) des espèces qui seront des données distribuées. De même un atlas numérique du système des aires protégées de Madagascar est aussi disponible
Tafo Mihaavo Réseau des Fokonolona Gestionnaire des Ressources Naturelles	482	Fédérations Confédérations des organisations communautaires	National (actuellement 17 Régions / 22)	Créée en mai 2012, c'est un réseau de communautés de base œuvrant pour une gouvernance efficace et une gestion durable des ressources naturelles basées sur les valeurs de Fokonolona[1]. Le principal objectif est le développement et la mise en œuvre d'une stratégie nationale sur la gouvernance et la gestion communautaire des ressources naturelles
REPC – MD Réseau d'Educateurs et des Professionnels de la Conservation – Madagascar		Ministère Université Institution de recherche ONG nationales et internationales Associations Individus	National	Ce réseau international est un lieu d'échange entre les différents acteurs de l'environnement (académiciens, professionnels, étudiants) et intervient dans le renforcement de capacité à multi-niveaux. Depuis son implantation à Madagascar en 2003 (avec la décision de tripler la superficie des aires protégées), le réseau a initié 52 sessions de formations thématiques et ponctuelles aux niveaux des différents acteurs (communauté de base, professionnels (Administration, secteur privé, société civile). Environ 1000personnes ont bénéficié. 48 modules de formation (destiné spécifiquement pour la formation des formateurs et adaptables à des situations réelles) ont été développé et accessible sur le site web. Dans le cadre spécifique de l'Aire Protégée, REPC a appuyé le développement d'un standard de compétences pour appuyer la professionnalisation des gestionnaires des sites et les autres acteurs qui y interviennent. La certification des techniciens et leaders communautaires intervenant dans la gestion des AP est en cours de mise en place
Voahary Salama	12	Associations	National (actuellement 12/22 Régions)	Plate forme intervenant dans le domaine de l'intégration Santé-Population-Environnement afin que la population malgache soit responsable, en bonne santé, heureuse et vivent en parfaite harmonie avec son environnement
PCDBA		Organisation	Région Atsinanana	La PCDBA est chargée de la coordination de la mise en œuvre des activités relatives au

[1] *Le fokonolona est une communauté villageoise. Traditionnellement, le fokonolona (de foko, clan ou ethnie et olona personne, être humain) réunissait les membres d'un ou de plusieurs clans, résidant sur un territoire délimité. Chaque fokonolona bénéficiait d'une large autonomie de gestion, y compris sur le plan sécuritaire et judiciaire, et fonctionnait selon un mode démocratique, avec la participation des femmes et des enfants, les décisions sont prises à l'unanimité suivant le code de la Dina (pacte social) (source : Wikipédia)*

Plateforme de Conservation et de Développement de la Baie d'Antongile		communautaire, Association ONG CTD, STD, secteur Privé		processus de la Gestion Intégrée des Zones Côtières pour la Baie d'Antongil. Elle a pour objectifs d'asseoir une bonne gouvernance des ressources naturelles, de promouvoir les défis de développement durable de la Baie d'Antongil, de favoriser un climat socio-économique et environnemental favorable aux investissements publics et à l'amélioration du cadre de vie de la population
Confédération Nationale KoloHarena Sahavanona	950	Associations	National (	La Confédération regroupe 26 000 membres et intervient principalement dans la protection des bassins versants, l'agriculture et l'élevage respectant l'environnement et les renforcements de capacité
Plateforme Nationale des Organisations de la Société Civile de	2000	ONG, Associations Fédération	National Avec des ramifications régionales	Plateforme Nationale traitant des diverses thématiques dont genre, protection sociale, environnement et gestion des ressources naturelles, santé, …
Réseau GIP / GGCDRN (Groupe d'Intérêt Public pour la Gouvernance et Gestion Communautaire Durable des Ressources Naturelles	7	Fondation Association Observatoire	National	Réseau met en relation les acteurs Malagasy œuvrant dans la gestion durable des ressources. Naturelles. Avec l'appui de l'IUCN, un cadre de développement du concept de gestion communautaire a été défini.
Mihari Réseau de LMMA	18	Communautés locales	National	Réseau National des zones marines gérées par les communautés locales ou Locally Managed Marine Areas (LMMA)
Réseau des institutions de recherches	En cours de création			

APPENDIX 5: ADDITIONAL INFORMATION ON CURRENT INVESTMENTS

Tableau A5-1: Global Environment Facility (GEF) Projects in the Hotspot, 2000-2013

Numero FEM	Pays	Titre du Projet	Agence d'execution	Budget FEM	co-finan-cements	Statut	Statut (FEM)	Date demarrage	Date fin
3925	Seychelles	Strengthening Seychelles' Protected Area System through NGO Management Modalities	UNDP	2,100,000	3,527,000	validation	CEO Endorsed, 2011		
3687	Madagascar	Madagascar's Network of Managed Resource Protected Areas	UNDP	6,000,000	9,075,000	validation	CEO Endorsed, 2010		
3773	Madagascar	Support to the Madagascar Foundation for Protected Areas and Biodiversity (through Additional Financing to the Third Environment Support Program Project (EP3)	IBRD	10,000,000	34,300,000	validation	CEO Endorsed, 2011		
5062	Comoros	Development of a National Network of Terrestrial and Marine Protected Areas Representative of the Comoros Unique Natural Heritage and Co-managed With Local Village Communities	UNDP	4,246,000	19,985,000	validation	Council Approved, 2012		
3254	Seychelles	Mainstreaming Prevention and Control Measures for Invasive Alien Species into Trade, Transport and Travel Across the Production Landscape	UNDP	2,000,000	4,605,000	validation	IA Approved, 2007		
4689	Seychelles	National Biodiversity Planning to Support the Implementation of the CBD 2011-2020 Strategic Plan in Seychelles	UNDP	200,000	210,000	en cours	IA Approved	2012	
5418	Mauritius	National Biodiversity Planning to Support the Implementation of the CBD 2011-2020 Strategic Plan in Mauritius	UNDP	220,000	142,000	en cours	CEO Approved, 2013	2013	
2483	Comoros	Capacity Needs Assessment for the implementation of the National Biodiversity Strategy and support to the Clearing House Mechanism	UNDP	274,000	0	en cours	CEO Approved	2004	

3526	Mauritius	Expanding Coverage and Strengthening Management Effectiveness of the Terrestrial Protected Area Network on the Island of Mauritius	UNDP	4,000,000	6,000,000	en cours	Under Implement ation	2009	
1620	Seychelles	Mainstreaming Biodiversity Management into Production Sector Activities	UNDP	3,700,000	7,593,360	en cours	Under Implement ation	2007	
816	Mauritius	Restoration of Round Island	IBRD	750,000	831,401	clos	Project Closure	2000	2005
800	Seychelles	Marine Ecosystem Management Project	IBRD	747,000	656,000	clos	Project Closure	2000	2004
2577	Madagascar	Biodiversity Enabling Activities Add-on: Assessment of Capapcity Building Needs and Establishment of a National Clearing House Mechanism	UNEP	191,000	50,000	clos	Project Closure	2004	2008
1246	Mauritius	Partnerships for Marine Protected Areas in Mauritius	UNDP	978,000	3,365,260	clos	Project Completion	2003	2012
1471	Seychelles	Improving Management of NGO and Privately Owned Nature Reserves and High Biodiversity Islands in Seychelles	IBRD	814,000	1,074,700	clos	Project Completion	2004	2007
1884	Madagascar	Third Environment Programme	IBRD	13,500,000	135,350,000	clos	Project Completion	2004	2009
1929	Madagascar	Participatory Community-based Conservation in the Anjozorobe Forest Corridor	UNDP	975,000	570,000	clos	Project Completion	2004	2008
2822	Mauritius	Support the Implementation of the National Biosafety Framework	UNEP	427,800	207,900	clos	Under Implement ation	2006	2011

Source: FEM, base de données accédée en janvier 2014.

Tableau A5-2: Projets supported by Darwin Initiative (DEFRA) in the hotspot between 2007 and 2013

Investing in island biodiversity through increasing capacity fo conservation medicine Wildlife Vets International	**£2,440**	2010 – 2011	Seychelles
Conserving endemic threatened and evolutionary distinct biodiversity in the Seychelles ZSL - Zoological Society of London	**£3,000**	2010 – 2011	Seychelles
A cutting-EDGE approach to saving Seychelles' evolutionarily distinct biodiversity	**£256,085**	2012 – 2015	Seychelles
NBSAPs: mainstreaming biodiversity and development Environmental Affairs Department, IIED	**na**	2012 – 2015	Botswana, Namibia, Seychelles, Ouganda
A participatory conservation programme for the Comoro Islands Bristol Conservation & Science Foundation	**£238,805**	2009 - 2012	Comores
Guarding genetic biodiversity of exploited SW Indian Ocean marine resources Royal Holloway University of London	**£1,870**	2010 – 2011	Maurice
Bushmeat hunting in Madagascar: linking science, policy and local livelihoods Bangor University, CI Madagascar,Institut Pasteur, Madagasikara Voakajay	**£299,475**	2009 – 2012	Madagascar
Chameleon trade and conservation in Madagascar CI Madagascar, DICE - Uni of Kent, Anthropology, Madagasikara Voakajay	**£249,225**	2009 – 2012	Madagascar
Saving the Madagascar Pochard: the world's most endangered duck Asity Madagascar, DWCT - Durrell Wildlife Conservation Trust	**£282,441**	2010 – 2014	Madagascar
Implementing CITES in Madagascar DICE - Uni of Kent, Anthropology,Madagasikara Voakajay	**£254,788**	2012 – 2015	Madagascar
Leveraging markets to conserve mangrove biodiversity and alleviate poverty in Madagascar Blue Ventures	**£226,839**	2012 – 2015	Madagascar
Madagascar Agroforestry Livelihoods Project Feedback Madagascar: Ny Tanintsika - FBN/NT, RBG Kew - SC	**£263,344**	2013 – 2016	Madagascar
The Marine Expansion of Kirindy Mite National Park, Madagascar University of Warwick, Life Sciences	**£1,850**	2010 – 2011	Madagascar
Hanta Julie Razafimanahaka University of Aberdeen - Biological Sciences	**£27,264**	2007 – 2008	Madagascar
TOTAL	**£12,107,426**		

Tableau A5-3: Principales activités et réalisations initiées par la Fondation des Aires Protégées et de la Biodiversité de Madagascar en 2012

	Nom de l'aire protégée	Gestionnaire	Principales activités	Financements octroyés en 2012 USD
Financements à partir des revenus du capital				
1	Oronjia (NAP)	MBG	Redynamisation des comités de pilotage et des communautés locales Elaboration des documents nécessaires à la demande de statuts définitifs Formations sur les techniques d'élevage Validation du plan d'aménagement et de gestion écotouristique Délimitation et signalisation de la NAP	28 000
2	Parc National Ankarana	MNP	Infrastructures touristiques: réhabilitation 13 Km de piste Renforcement des missions de patrouilles avec les officiers de police judiciaire et brigade mixte Formation de Comité Local de Parc (CLP) dans 14 fokontany	54 000
3	Réserve Naturelle Intégrale Tsaratanana	MNP	1er soutien de la FAPBM à l'aire protégée Infrastructures: 10 postes de gardes et 40km de limites externes, entretien de 25 km de limites du noyau dur	44 000
4	Parc Naturel Makira	WCS	Mise en place de 16 pépinières villageoises (30 000 plants de girofliers et autres) Sécurisation: démantèlement des camps d'exploitation illicite de pierre précieuse, déplacement des paysans installés dans le parc Poursuites judiciaires	69 000
5	Complexe Mahavavy Kinkony (NAP)	Asity	Mise en place des structures de gestion de la NAP Suivis écologiques T0 des poissons Appuis à l'extension des filières porteuses Renforcement de capacité des communautés: conduite de projet, production et transformation des produits	85 000
6	Parc National Masoala	MNP	Recherche: suivis écologiques terrestre et marin, transects d'observation des lémuriens Sensibilisation au niveau de 14 villages durant la Journée Mondiale de l'Environnement JME Renouvellement des membres du COSAP (Comité d'Orientation et de soutien de l'Aire Protégée) Certification BIO de la campagne 2012/2013 de vanille et girofle	65 000
7	Parc National Mananara Nord	MNP	Mise en place et mise en œuvre d'un plan de suivi écologique participatif (suivis écologiques mensuels dans chaque terroir et transects d'observation des lémuriens Formation de 41 surveillants villageois Financement des missions des brigades mixtes et gestion des plaintes (exploitations de bois de rose et de quartz, actes de braconnage, …)	44 000
8	Analalava (NAP)	MBG	Appuis à l'Association Velonala Conservation et recherche: mise en place de Dina (gestion pisciculture et pépinière) Renforcement des patrouilles de contrôle et de surveillance Création d'activités génératrices de revenus Promotion de l'écotourisme	18 000

9	Tsimembo Manambolomaty (NAP)	TPF	Conservation et recherche: suivi journalier de la production de pêche (supérieure à 100 tonnes) Renforcement des contrôles et surveillances des feux et des coupes Reforestation: 38 000 pieds Développement et écotourisme: achats de 500 nouveaux filets et plus d'une dizaine de pirogues en fibre de verre Réhabilitation et dotation en matériels et équipements	80 000
10	Complexe Mangoky Ihotry (NAP)	Asity	Recrutement d'un Responsable de développement des communautés Consultations locales sur les filières porteuses Conservation: mission de suivis périodiques sur la taille des poissons, missions de suivis et de contrôles menées par les OSC locales dans le Lac Ihotry et ses environs Appuis à la mise en place des Communautés locales de base Uniformisation du Dina	60 000
Financement sur sinking fund KfW				
11	Parc National Marojejy (en cogestion avec Anjanaharibe Sud)	MNP	Charges salariales Frais de fonctionnement	154 081
12	Parc National Ankarafantsika	MNP	Charges salariales Frais de fonctionnement	95 444
13	Parc National de Kirindy Mite (en cogestion avec la Reserve Spéciale d'Andranomena)	MNP	Charges salariales Frais de fonctionnement	57 789
14	Parc National d'Andringitra (en cogestion avec le Pic d'Ivohibe)	MNP	Charges salariales Frais de fonctionnement	143 394
15	Parc National de Tsimanampetsotsa	MNP	Charges salariales Frais de fonctionnement	54 789
			TOTAL	1 051 498

(Source: FAPBM, 2013)

Tableau A5-4: Principales activités et réalisations initiées par la Fondation TANY MEVA en 2011

FONDATION TANY MEVA	Principales réalisations 2011	Nouveaux projets initiés 2011	Engagements financiers 2011 (nouveaux projets) – USD
Gestion durable des ressources naturelles			
Appuis aux 6 Aires Protégées Makira, Bezà Mahafaly Amoron'i Onilahy (NAP) Mikea Tsimanampetsotsa Tsinjoriake Andatabo (NAP)	*AP Mike (MNP), Tsimanampetsotsa (MNP) et les NAP à gestion communautaire Tsinjoriake – Andatabo (ASE/ TAMIA) et Amoron'i Onilahy (WWF) dans la Région Atsimo Andrefana* Accompagnement aux communautés locales autour des aires protégées Renforcement de capacités et compétences des organisations locales vis-à-vis des de la gestion des projets communautaires 100 projets communautaires cofinancés avec Global Environment Facility[2]: 20 TGRN pour une superficie de 73 000ha, suivi écologique, activités génératrices de revenus comme élevage, pisciculture, adduction d'eau potable, activités de lutte contre le changement climatique (agriculture durable, protection des bassins versants), …	7	236 364
	Parc Naturel Makira (WCS) Renforcement de la ceinture verte: 45 TGRN pour 180 000ha Collaboration avec une institution de microfinance pour le développement des AGR: fonds injectés par Tany Meva 13136 USD ; crédits alloués 53 773USD pour 105 crédits		
	Réserve Spéciale Bezà Mahafaly (MNP) (Suite à son extension) Renforcement des activités de conservation et de recherche Amélioration de l'infrastructure du centre de recherche Renforcement du développement de partenariats (locaux, nationaux et internationaux)		
Reboisement – restauration / Carbone forestier			
Reboisement à vocation énergétique Reboisement communautaire Protection des bassins versants Projet Carbone	Reboisement communautaire de 500ha par 5 Organisations (région Analamanga) Reboisement et restauration à Tsiazompaniry (600ha) avec l'Association Tsarafara (Région Analamanga) Reboisement à vocation énergétique dans 3 Communes rurales de la Région Atsimo Andrefana (en collaboration avec WWF) Enregistrement officiel du Projet Ankotrofotsy / Région Menabe dans le registre American Carbon Registry. Appui à 20ha de restauration pour la protection du bassin versant du lac Andraikiba (Antsirabe) / Région Vakinankaratra) en vue de sa conservation et du développement des activités agricoles aux alentours	4	105 455
Energie écologique			
Renforcement dans la mise en œuvre du Programme national d'électrification rurale	Mise en place de pico centrales hydroélectriques pour l'électrification du fokontany d'Ankaraobato / Commune Rurale de Milenaky / Région Atsimo Andrefana (5Kw pour desservir 160 ménages, 1 CSB et 1 EPP) et des fokontany d'Analaroa et d'Ambohidreny / CR Analaroa / District Anjozorobe / Région Analamanga	11	235 909

[2] Small Grants Programme

	(15Kw pour desservir 245 ménages – soient 26 percent des ménages du village, 1 Mairie, 1 Centre de santé de Base, 5 écoles, 10 églises, 16 éclairages publics, 1 poste avancée). Sensibilisation et diffusion des kits à énergies renouvelables (foyers à biomasse et bougies à jatropha) Dotation des foyers à biomasse auprès de 96 cantines scolaires (en collaboration avec le Program Alimentaire Mondiale (PAM)		
Education environnementale appliquée (EDENA)			
Changement de comportement Amélioration de cadre de vie Amélioration des revenus au sein de l'établissement d'enseignement	Promotion et développement des échanges communautaires: Visites de 3 représentants des communautés méritantes au Sénégal Bourse de financement de recherche 20 700 élèves et étudiants issus de 186 établissements sensibilisés (Région Atsimo Andrefana) Dotation d'outils pédagogiques et sensibilisation de 300 élèves et parents (Régions Alaotra Mangoro et Boeny) Mise en place des petites infrastructures de base telles que latrine, lavoir, canal de drainage, jardin ou espace vert, aire des jeux … Appui à la mise en application d'une innovation primée en 2010 (concours Tosika Meva): valorisation de déchets plastiques sous forme de pavés autobloquants (Association MIHARISOA).	199	198 182
Prix aux innovations environnementales			
Tany Meva encourage les efforts nationaux dans la recherche de solutions pratiques face aux problématiques environnementales cruciales.	Foyer à éthanol à faible concentration (fonctionnant avec l'alcool à 45-50°) Jeu éducatif de société destiné aux élèves Malle pédagogique pratique pour l'éducation environnementale appliquée ou classe ver	8	7 273
	TOTAL (Nouveaux projets 2011)	**229**	**783 182**
	Financements pour les projets antérieurs	**291**	**3 554 091**

(Source: Tany Meva, 2012)

Tableau A5-5: Interventions de la Coopération décentralisée française sur Madagascar dans les domaines de l'environnement et de l'éco-tourisme

Coopération décentralisée	Projet	Budgets engagés	Partenaires	Etat des la coopération
CR Auvergne - Vakinankaratra	-Développement territorial local par le biais du tourisme villageois (création et formation d'associations villageoises) -Actions d'intégration territoriale -Consolidation de l'accueil touristique en milieu urbain	**Volet1 (2007-2009**): 692 832€ dont 582 832 € CR Auvergne; 150 000 € Région Vakinankaratra ; 110 000 € MAEE **Volet2 (2007-2009): 554.720€** dont 232.360 € CR Auvergne; 90.000 € district Ambatolampy ; 192 000 € MAEE **736 000 € (2010-2012) dont** 473 310 € CR Auvergne, 195 000 € MAEE, 25 500 € Région Vakinankaratra 10 500 € CG Finistère	-France Volontaire -GRET -Alliance française -PIC -ORTVA -Lycée Chamalières -Chambre de Commerce et d'Industrie d'Antsirabe -CG Finistère -MAEE	Phase de restructuration
CG Finistère - Diana	Ecotourisme	367 900 € (2010-2012) dont 198 100 € CG Finistère 73 580 € Diana, 70 000 € MAEE	MAEE ONG Fanamby Conservatoire National de Brest (CNB) France volontaire	En cours
CR Bretagne /CG Finistère /CG Ille et Vilaine - Analanjirofo/Diana/ Alaotro Mangoro	Valorisation du site de Tampolo et facilitation d'un cadre de concertation Régionale	260 000 € (2007-2009) dont 130 000 € MAEE 30 000 € (2011) 82 500 € (2011-2013)	-DRDR -ORN -ONG MATEZA -ESSA Forêt -Conservatoire Botanique National de Brest -CG Finistère -CG Ille et Vilaine -CBNB -ONG Antongil Conservation	Terminé
CR Nord Pas de Calais - Région Analanjirofo	1) Mise en place des Aires protégées et appui à l'écotourisme (Sainte Marie	94 400€ (2009-2011) dont 50 000 € NPDC	Office Régional du tourisme de Sainte Marie -ONG Fanamby -PNUD /FEM	En cours

	2) Implication de la communauté d'Ambodiforaha au développement de l'écotourisme (Parc Masoalo – Maroantsetra)	24 910 € (2008-2009) dont 11 500 € NPDC, 10 000 € MAEE	Ambassade d'Allemagne MNP MASOALA WCS SCAC	
	3) Education Environnementale (Station Tampolo et Maroantsetra)	NPDC: 94 400€ (2009 ; 2010)	-Espace Régionaux NPDC -ESSA Forêt (université de Tana) - MNP	
	4) Pharmacologie et ethnobotanique dans la station de Tampolo	NPDC: 30 000 € (2009-2011)	Mairie de Lille ; FSDIE ; Association pour la Valorisation des Plantes Médicinales Tropicales et Méditerranéenne (AVERTEM)	
CR Basse Normandie/Rhône Alpes – Atsinanana	Inventaire et schéma régional du tourisme Ecotourisme sur le canal des Pangalanes	53 200 € (2008) 212 000 € (2010-2012) dont 55 000 € en 2010 102 000 € en 2011	MAEE Le Port (La réunion) Tetraktys	Démarrage
CR Ile de France - Antananarivo	Appui Ecotanana: -Circuits éco-touristiques -Village Artisanal place Andohalo	40 000 € (2008) 75 000 € (2009) 150 000 € (2011)	Planet finance Ecotanana	En cours
CG Ille et Vilaine - Aloatra Mangoro	Structuration et renforcement de l'Office Régional du Tourisme - Organisation des sites pilotes, - Formation/accompagnement des acteurs	25 000 € (2009) 60 000 € (2010) 110 000 € (2011)	-Office Régional du Tourisme -ONG du CG 35 (PSF, DEFI, AMB...) -SCD	En cours
CR Aquitaine - Itasy	Ecotourisme Appui à l'ORT (Office Régional du Tourisme)	40 000 € (2009-2010) 27 615 € (2011)	Université Bordeaux III CITE	En cours
IRCOD - Mahajanga	Appui à la biodiversité et au développement touristique (ex: rénovation maison Eiffel)	40 000 € (2010-2012) dont 8000 € en 2010	ONG Fanamby ; ville et Zoo de Mulhouse ; Office Régional du tourisme ; MAEE	En cours

CR La Réunion	Ecotourisme: relance de la destination tourisme de la SAVA			En cours
CG Gard - Nosy be	Tourisme solidaire	-	CG Finistère –TAHONA -Direction Départementale du Tourisme du Gard	En cours d'élaboration
Morangis - Imerina Imady	Tourisme rural			
Communauté de communes du pays de St Aubigné - Imerimandroso	Construction d'un chalet écotouristique	5000 € (2010)		En cours

(Source: Ambassade de France, 2012)

APPENDIX 6: LIST OF THE KEY BIODIVERSITY AREAS OF THE MADAGASCAR AND INDIAN OCEAN ISLANDS HOTSPOT

KBA #	KBA (English name)	Island	AZE	IBA	RAMSAR	IPA	Protection Status	Surface (ha)	Type of Manager (or promoteur)	Manager or "promoteur"	VU	EN	CR	TOTAL
COM-1	Moya Forest	Anjouan					non	3,486.0			2	5	2	**9**
COM-2	Dziani-Boudouni Lake	Mohéli			X		non	20.4			0	1	0	**1**
COM-3	Hantsongoma Lake	Mohéli			**X**		non	1,122.2			1	4	0	**5**
COM-4	La Grille Mountains	Grande Comore		**X**			non	8,724.9			3	5	0	**8**
COM-5	Karthala Mountains	Grande Comore	X	**X**	**X**		non	14,228.3			6	8	2	**16**
COM-6	Mont Mlédjélé (Mwali highlands)	Mohéli	X	**X**			non	6,268.3			3	6	2	**11**
COM-7	Mont Ntringui (Ndzuani highlands)	Anjouan	X	**X**	**X**		non	2,649.9			2	5	2	**9**
COM-8	Mohéli Marine Park	Mohéli					APMC	43,742.6	GOV.	Ministere Environnement	67	9	2	**78**
COM-9	Anjouan coral reefs	Anjouan					non	2,087.5			28	0	0	**28**
COM-10	Grande Comore coral reefs	Grande Comore					non	7,956.7			30	0	0	**30**
COM-11	Mohéli coral reefs - outside of Marine Park	Mohéli					non	3,268.8			28	0	0	**28**
COM-12	Bimbini area and la Selle Islet	Anjouan					non	5,695.5			2	4	2	**8**
COM-13	Chiroroni area	Anjouan					non	1,141.3			1	3	1	**5**
COM-14	Domoni area	Anjouan					non	4,113.5			0	1	1	**2**
COM-15	Malé area	Anjouan					non	1,764.3			0	1	1	**2**
COM-16	Moya area	Anjouan					non	1,273.6			0	2	1	**3**
COM-17	Mutsamudu area	Anjouan					non	2,257.0			1	3	2	**6**

COM-18	Ndroudé area and Ilot aux Tortues	Grande Comore					non	2,313.9			0	1	1	**2**
COM-19	Pomoni area	Anjouan					non	5,749.0			29	1	0	**30**
COM-20	Coelacanthe area	Grande Comore					non	68,089.2			3	4	2	**9**
ATF-1	Bassas da India	îles éparses					AP	8,504.2	GOUVERNEMENT	TAAF	2	2	0	4
ATF-2	Europa	îles éparses		**X**	**X**		AP	4,341.6	GOUVERNEMENT	TAAF	6	7	1	14
ATF-3	Juan de Nova	îles éparses		**X**			AP	506.4	GOUVERNEMENT	TAAF	7	4	1	12
ATF-4	Glorieuses Islands	îles éparses		**X**			AP	6,055.8	GOUVERNEMENT	TAAF	7	4	1	12
ATF-5	Glorieuses Islands Marine Natural Park	îles éparses					APMC	4,343,078.6	GOUVERNEMENT	TAAF	6	8	1	15
ATF-6	Tromelin	îles éparses		**X**			AP	109.0	GOUVERNEMENT	TAAF	0	1	1	2
MYT-1	Hajangoua Bay	Mayotte					AP	62.2	GOUVERNEMENT		1	1	1	3
MYT-2	Dzoumogné and Longoni Bay	Mayotte					AP	134.6	GOUVERNEMENT		1	1	1	3
MYT-3	Petite Terre Craters	Mayotte					AP	250.0	GOUVERNEMENT		0	1	1	2
MYT-4	Dziani Karihani	Mayotte					AP	3.7	GOUVERNEMENT		1	1	0	2
MYT-5	Karoni Islet	Mayotte					AP	15.7	GOUVERNEMENT		0	1	1	2
MYT-6	Dembeni Islets	Mayotte					AP	8.4	GOUVERNEMENT		0	1	0	1
MYT-7	La Passe Islets	Mayotte					AP	7.0	GOUVERNEMENT		0	1	1	2
MYT-8	Ambato-Mtsangamouli Lagoon	Mayotte					APMC	4.5	GOUVERNEMENT		0	2	1	3
MYT-9	Bouéni Bay Mangroves	Mayotte					AP	249.4	GOUVERNEMENT	Conservatoire du Littoral	1	1	0	2
MYT-10	Mayotte Marine Natural Park	Mayotte					APMC	6,837,715.1	GOUVERNEMENT	Conseil de gestion du parc	3	3	1	7

										marin				
MYT-11	Beaches and Capes of Saziley and Charifou	Mayotte					AP	68.7	GOUVERNEMENT		0	1	1	2
MYT-12	Majimbini Forest Reserve	Mayotte					AP	1,311.3	GOUVERNEMENT	Conseil général	2	1	0	3
MYT-13	Songoro Mbili Forest Reserve	Mayotte					AP	700.0	GOUVERNEMENT	Conseil général	2	1	0	3
MYT-14	Crêtes du Nord Forest Reserve	Mayotte					AP	728.1	GOUVERNEMENT	Conseil général	2	1	0	3
MYT-15	Crêtes du Sud Forest Reserve	Mayotte					AP	1,744.6	GOUVERNEMENT	Conseil général	2	1	0	3
MYT-16	Mount Bénara Forest Reserve	Mayotte					AP	1,536.0	GOUVERNEMENT	Conseil général	2	1	0	3
MYT-17	Bouzi Islet National Natural Reserve	Mayotte					AP	142.8	GOUVERNEMENT		1	1	1	3
MYT-18	Badamiers mudflats	Mayotte			**X**		AP	104.9	GOUVERNEMENT		0	2	0	2
MYT-19	N'Gouja Protected Area	Mayotte					APMC	235.9	GOUVERNEMENT		0	1	1	2
REU-1	ENS Archambeaud	Réunion					AP	1.8	GOUVERNEMENT	Conseil Général	0	1	1	2
REU-2	ENS Bras des Calumets	Réunion					AP	39.9	GOUVERNEMENT	Conseil Général	0	0	1	1
REU-3	ENS Grande Ravine des Lataniers	Réunion					AP	14.9	GOUVERNEMENT	Conseil Général	0	2	0	2
REU-4	ENS Le Tremblet	Réunion					AP	10.5	GOUVERNEMENT	Conseil Général	0	1	0	1
REU-5	ENS Les Orangers	Réunion					AP	4.4	GOUVERNEMENT	Conseil Général	0	1	0	1
REU-6	ENS Piton de Montvert	Réunion					AP	0.6	GOUVERNEMENT	Conseil général	1	4	2	7
REU-7	ENS Plaine des Grègues	Réunion					AP	3.5	GOUVERNEMENT	Conseil Général	1	1	4	6
REU-8	ENS Plateau du Dimitile	Réunion					AP	15.0	GOUVERNEMENT	Conseil Général	0	1	2	3
REU-9	ENS Ravine Renaud	Réunion					AP	6.8	GOUVERNEMENT	Conseil Général	0	1	0	1

REU-10	Basse-Vallée Departemental-State Forest	Réunion					AP	388.4	PARAPUBLIC	ONF	1	2	4	7
REU-11	Sainte-Rose State Forest	Réunion					AP	116.8	PARAPUBLIC	ONF	0	1	1	2
REU-12	Saint-Philippe Coast State Forest	Réunion					AP	221.6	PARAPUBLIC	ONF	0	1	1	2
REU-13	Marine de Vincendo	Réunion					AP	40.4	PARAPUBLIC		0	1	0	1
REU-14	La Réunion National Park	Réunion	X				AP	105,445.1	GOUVERNEMENT	Parc National	4	8	9	21
REU-15	La Réunion Marine Natural Reserve	Réunion					APMC	3,514.9	GOUVERNEMENT	GIP RNNM	4	2	2	8
REU-16	Saint-Paul Wetlands National Natural Reserve	Réunion					AP	446.4	GOUVERNEMENT	Commune/Etat/ Département Réunion	2	1	0	3
REU-17	ZNIEFF Bras Leclerc	Réunion					non	40.4			0	1	2	3
REU-18	ZNIEFF Confluent de la Riv. des Pluies et la Ravine Montauban	Réunion					non	9.8			0	1	0	1
REU-19	ZNIEFF Etang Saint-leu	Réunion					non	0.8			0	1	0	1
REU-20	ZNIEFF Four à chaux	Réunion					non	5.2			0	1	0	1
REU-21	ZNIEFF Grande Ravine (Montagne)	Réunion					non	17.1			0	2	0	2
REU-22	ZNIEFF La Butte - Terrain Couilloux (Montagne)	Réunion					non	7.3			0	2	0	2
REU-23	ZNIEFF Ligne d'Equerre	Réunion					non	13.6			1	1	2	4
REU-24	ZNIEFF Passerelle de la Mare d'Affouches (geological site)	Réunion					non	1.9			0	1	0	1
REU-25	ZNIEFF Petite Ravine des Lataniers	Réunion					non	36.8			0	2	0	2
REU-26	ZNIEFF Pierrefonds	Réunion					non	1.5			0	1	0	1
REU-27	ZNIEFF Piton Armand	Réunion					non	20.4			1	2	0	3
REU-28	ZNIEFF Piton Bernard (Matouta)	Réunion					non	36.3			1	2	4	7
REU-29	ZNIEFF Ravine de l'Hermitage	Réunion					non	12.1			1	3	2	6

REU-30	ZNIEFF Ravine de la Chaloupe	Réunion					non	34.1			0	1	0	1
REU-31	ZNIEFF Ravine des Chênes	Réunion					non	16.8			1	0	4	5
REU-32	ZNIEFF Ravine des Colimaçons	Réunion					non	33.5			0	1	2	3
REU-33	ZNIEFF Ravine Divon	Réunion					non	22.4			0	2	0	2
REU-34	ZNIEFF Ravine du Cap	Réunion					non	3.8			0	1	0	1
REU-35	ZNIEFF Ravine la Veuve	Réunion					non	6.5			0	1	0	1
REU-36	ZNIEFF Ravine Petit Etang	Réunion					non	1.7			0	2	0	2
REU-37	ZNIEFF Ravine Précipice	Réunion					non	13.8			0	1	0	1
REU-38	ZNIEFF Ravine Trois Bassins	Réunion					non	55.6			0	1	2	3
MDG-1	Mikea Protected Area	Madagascar	X	X			AP	292,611.5	MADA NAT. PARKS	MNP	20	17	1	38
MDG-2	Ambalibe Menabe	Madagascar				**X**	non	109,115.8			0	0	1	1
MDG-3	Ambanitazana (Antsiranana)	Madagascar				**X**	non	247.6			0	2	0	2
MDG-4	Ambato-Boeny	Madagascar					non	12,754.5			0	1	1	2
MDG-5	Ambatofinandrahana	Madagascar				**X**	non	37,367.9			5	12	4	21
MDG-6	Ambereny	Madagascar				**X**	non	20,977.8			2	2	0	4
MDG-7	Ambondrobe (Vohemar)	Madagascar				**X**	non	5,314.3			10	8	0	18
MDG-8	Ambodivahibe Bay MPA	Madagascar					APT	181,600.0	ONG INT.	CI	1	1	0	2
MDG-9	North Salary MPA	Madagascar					APT	108,627.1	ONG INT.	WCS	1	3	2	6
MDG-10	Nosy Ve Androka MPA	Madagascar					APMC	62,714.6	MADA NAT. PARKS	MNP	2	4	1	7
MDG-11	Tsinjoriake-Andatabo MPA	Madagascar					APT	5,400.9	ONG NATIONAL E	ASE/TAMIA	1	1	0	2
MDG-12	Velondriake MPA	Madagascar					APT	94,573.4	ONG INT.	Blue Ventures	6	3	3	12
MDG-13	Barren Islands MPA	Madagascar	X	X			APT	74,929.7	ONG INT.	BLue Ventures	4	6	2	12
MDG-14	Iranja-Ankazoberavina-Russian Bay MPA	Madagascar					APT	189,915.7	ONG INT.	WCS	3	4	2	9
MDG-15	Mitsio-Tsarabanjina MPA	Madagascar					APT	681,109.6	ONG INT.	WCS	3	4	2	9
MDG-16	Ampombofofo	Madagascar	X	X			non	2,992.0			1	2	4	7
MDG-17	Andravory (Andrafainkona)	Madagascar				**X**	non	16,503.0			1	0	0	1

MDG-18	Anena (Beloha)	Madagascar				**X**	non	23,520.4			2	2	0	4
MDG-19	Angodoka-Ambakoa (Besalampy)	Madagascar				**X**	non	16,382.5			1	4	1	6
MDG-20	Ankafina (Ambohimasoa)	Madagascar					non	625.2			0	0	1	1
MDG-21	Ankarabolava-Agnakatriky	Madagascar				**X**	non	2,424.1			0	1	0	1
MDG-22	Antanifotsy Nord (Diana)	Madagascar				**X**	non	1,392.6			4	2	0	6
MDG-23	Antanifotsy Sud (Diana)	Madagascar				**X**	non	1,188.9			1	6	0	7
MDG-24	Antongil Bay	Madagascar					non	440,543.6	ONG INT.	WCS	3	3	1	7
MDG-25	Diego Bay	Madagascar					non	13,820.0			0	1	0	1
MDG-26	Loza Bay	Madagascar		X			non	57,733.6			2	4	1	7
MDG-27	Beampingaratsy	Madagascar				**X**	APT	116,069.3	ONG INT.	WWF	13	16	8	37
MDG-28	Belalanda	Madagascar	X				non	162.2	ONG INT.	WWF	2	0	3	5
MDG-29	Bobakindro (Salafaina)	Madagascar				**X**	non	6,120.7			0	2	0	2
MDG-30	Cap d'Ambre	Madagascar					non	6,084.7			2	4	1	7
MDG-31	Cap Saint-André	Madagascar		X			non	110,261.4			1	0	1	2
MDG-32	Mahajamba Bay - Anjavavy Complex	Madagascar				**X**	non	186,636.9			5	7	3	15
MDG-33	Rigny Bay Complex	Madagascar				**X**	non	9,406.6			3	17	2	22
MDG-34	Three Bays Complex	Madagascar					non	1,178.0			1	5	1	7
MDG-35	Anjozorobe-Angavo-Tsinjoarivo Corridor	Madagascar					non	42,806.6			5	2	4	11
MDG-36	Coastal area East of Antsiranana	Madagascar					non	12,257.6			0	1	0	1
MDG-37	Coastal area between Antalaha-Mahavelona	Madagascar					non	82,585.7			1	1	1	3
MDG-38	Coastal area between Lokaro and Lavanono	Madagascar					non	27,956.9			4	5	1	10
MDG-39	Mananjary coast	Madagascar					non	86,269.6			0	3	0	3
MDG-40	Efatsy (Farafangana)	Madagascar				**X**	non	5,624.1			6	11	5	22
MDG-41	Fanambana (Vohemar)	Madagascar				**X**	non	3,983.4			4	10	5	19
MDG-42	Mangoky River	Madagascar				**X**	non	10,504.9			0	1	0	1
MDG-43	Onive Classified Forest	Madagascar		X			non	76,972.3			3	0	1	4

MDG-44	Bidia-Bezavona Classified Forest	Madagascar		X			non	297,778.4			4	2	0	6
MDG-45	Saint Augustin Forest	Madagascar		X			non	48,562.8			1	2	2	5
MDG-46	Toliary Great Reef	Madagascar					non	306,768.5			0	0	0	0
MDG-47	Sainte-Marie Island (Ambohidena)	Madagascar				**X**	non	19,236.2			0	1	1	2
MDG-48	Ilevika (Matsaborilava)	Madagascar				**X**	non	1,055.5			0	2	0	2
MDG-49	West Itampolo - Mahafaly	Madagascar				**X**	non	11,118.1	ONG NATIONALE	MBP	1	0	0	1
MDG-50	Lake Andranomalaza	Madagascar					non	417.9			0	1	0	1
MDG-51	Lake Andrapongy and Anjingo River	Madagascar					non	10,013.7			0	3	0	3
MDG-52	Lake Itasy	Madagascar		X			non	2,963.6			3	3	1	7
MDG-53	Lake Tsarasaotra	Madagascar			X		non	40.1	PRIVE	RANARIVELO	0	1	0	1
MDG-54	Lake Tseny	Madagascar	X				non	935.6			1	0	2	3
MDG-55	Lakes Anony and Erombo	Madagascar		X			non	3,189.0			1	1	0	2
MDG-56	Mahatsara (Mahambo Foulpointe)	Madagascar				**X**	non	293.3			14	6	1	21
MDG-57	Makay	Madagascar					non	9,339.0	ONG INT.	NATURE EVOLUTION	2	2	0	4
MDG-58	Mandraka	Madagascar					non	3,559.4	ONG NATIONALE	ESSA_Forêts	0	2	0	2
MDG-59	Nankinana (Ambodibonara-Masomeloka)	Madagascar				**X**	non	2,194.8			7	4	0	11
MDG-60	Avenue of the Baobabs NPA	Madagascar					APT	320.5	ONG NATIONALE	FANAMBY	0	1	0	1
MDG-61	Ambakoana/Analabe NPA	Madagascar					APT	39.6	ONG NATIONALE	ACCE	1	0	0	1
MDG-62	Ambatofotsy (Anosibe An'Ala) NPA	Madagascar	X				APT	1,212.0	ONG NATIONALE	MAVOA	1	0	1	2

MDG-63	Ambatotsirongorongo NPA	Madagascar					APT	779.8	ONG NATIONALE	ASITY	2	3	1	6
MDG-64	Ambohidray NPA	Madagascar					APT	2,330.4	ONG NATIONALE	ACCE	0	3	4	7
MDG-65	Ambohipiraka NPA	Madagascar				**X**	non	538.2			2	7	2	11
MDG-66	Ambondrombe (Belo sur Tsiribihana) NPA	Madagascar					APT	6,931.4	ONG INT.	DURRELL	1	5	2	8
MDG-67	Amoron'i Onilahy and Onilahy River NPA	Madagascar					APT	15,659.5	ONG INT.	WWF	4	0	1	5
MDG-68	Ampananganandehibe-Beasina (Andilanatoby) NPA	Madagascar					APT	709.7	ONG NATIONALE	MAVOA	1	0	0	1
MDG-69	Ampasindava - Rigny Bay (East) NPA	Madagascar					APT	162,611.0	ONG NATIONALE	SAGE	1	5	1	7
MDG-70	Anadabolava-Betsimalaho (Anosy) NPA	Madagascar					APT	25,704.3	ONG INT.	MBG	13.000	7.000	2.000	22.000
MDG-71	Analalava Foulpointe NPA	Madagascar					APT	317.4	ONG INT.	MBG	27	26	5	58
MDG-72	Analalava-Analabe-Betanantanana (Ambatosoratra) NPA	Madagascar					APT	865.2	ONG NATIONALE	MAVOA	1	0	0	1
MDG-73	Analavelona NPA	Madagascar		X			APT	4,769.0	ONG INT.	MBG	10	10	2	22
MDG-74	Andrafiamena NAP	Madagascar					APT	58,824.2	ONG NATIONALE	FANAMBY	0	0	1	1
MDG-75	Andreba NPA	Madagascar					APT	29.1	ONG INT.	WCS	0	1	1	2
MDG-76	Angavo Androy NPA	Madagascar					APT	565.9	ONG INT.	WWF	1	0	0	1
MDG-77	Anjozorobe NPA	Madagascar		X			APT	13,435.6	MADA NAT. PARKS	MNP	6	9	2	17
MDG-78	Ankafobe NPA	Madagascar	X				non	157.6	ONG INT.	MBG	2	1	1	4
MDG-79	Ankeniheny-Lakato NPA	Madagascar		X			APT	45,766.9	ONG INT.	CI	3	6	0	9
MDG-80	Ankodida NPA	Madagascar					APT	10,547.3	ONG INT.	WWF	17	26	8	51

MDG-81	Ankorabe (Antadonkomby) NPA	Madagascar					APT	81.1			2	0	2	4
MDG-82	Antoetra NPA	Madagascar	X				APT	2,188.2	ONG NATIONALE	MATE	2	0	1	3
MDG-83	Antrema NPA	Madagascar					APT	20,655.5	ONG INT.	MNHN	8	11	4	23
MDG-84	Cape Anorontany Archipelago NPA	Madagascar		X			AP	13,464.0	MADA NAT. PARKS	MNP	0	0	1	1
MDG-85	Bombetoka Bay - Marovoay NPA	Madagascar		X			APT	78,813.9	ONG NATIONALE	FANAMBY	7	10	3	20
MDG-86	Beanka NPA	Madagascar	X				APT	18,340.2	ONG INT.	BCM	1	4	0	5
MDG-87	Bemanevika (Ankaizina wetlands) NPA	Madagascar	X	X			APT	3,689.2	ONG INT.	TPF	8	5	2	15
MDG-88	Ifotaky Complex NPA	Madagascar					APT	105,082.4	ONG INT.	WWF	4	1	1	6
MDG-89	Mahafaly Plateau Forest Complex NPA	Madagascar		X			APT	38,937.7	ONG INT.	WWF	6	4	0	10
MDG-90	Lake Ihotry - Mangoky Delta Complex NPA	Madagascar		X			APT	176,104.5	ONG NATIONALE	ASITY	5	4	3	12
MDG-91	Makirovana-Ambatobiribiry Complex NPA	Madagascar					APT	6,044.9	ONG INT.	MBG	19	15	3	37
MDG-92	Mangoky-Ankazoabo Complex NPA	Madagascar		X			APT	58,228.5	ONG NATIONALE	ASITY	5	4	0	9
MDG-93	Tsimembo-Manambolomaty-Bemamba Complex NPA	Madagascar		X	X		APT	50,845.6	ONG INT.	TPF	6	8	2	16
MDG-94	Vohipaho Complex NPA	Madagascar					APT	3,654.8	ONG INT.	MBG	7	8	4	19
MDG-95	Ambositra-Vondrozo Corridor NPA (COFAV)	Madagascar	X				APT	161,161.5	ONG INT.	CI	21	24	9	54
MDG-96	Ankeniheny Zahamena Corridor NPA (CAZ)	Madagascar					APT	416,760.6	ONG INT.	CI	22	16	7	45
MDG-97	Menabe Central Corridor NPA	Madagascar	X	X			APT	77,719.4	ONG NATIONALE	FANAMBY	10	14	1	25
MDG-98	Analamay-Mantadia Forest	Madagascar					non	7,962.9	PRIVE	Ambatovy	5	1	4	10

	Corridor NPA (CFAM)													
MDG-99	Fandriana-Marolambo Forest Corridor NPA (COFAM)	Madagascar					APT	194,127.7	MADA NAT. PARKS	MNP	15	8	2	25
MDG-100	Tsaratanana-Marojejy Corridor NPA (COMATSA)	Madagascar					APT	210,203.0	ONG INT.	WWF	29	20	5	54
MDG-101	Nosy Be Crater NPA	Madagascar					non	5,314.3	ONG NATIONALE	MATE	5	0	0	5
MDG-102	Daraina-Loky Manambato NPA	Madagascar	X	X			APT	256,013.3	ONG NATIONALE	FANAMBY	2	3	1	6
MDG-103	Fierenana NPA	Madagascar	X	X			APT	7,782.4	ONG INT.	CI	2	2	1	5
MDG-104	Andavakoera Classified Forest NAP	Madagascar		X			APT	15,849.6	ONG NATIONALE	FANAMBY	1	1	2	4
MDG-105	Bongolava Classified Forest (Marosely) NPA	Madagascar					APT	57,936.4			4	5	0	9
MDG-106	Manombo Classified Forest NPA	Madagascar					APT	10,005.8	ONG INT.	DURRELL	2	1	3	6
MDG-107	Vohibola Classified Forest NPA	Madagascar	X				APT	2,224.9	ONG NATIONALE	MATE	32	32	7	71
MDG-108	Vondrozo Classified Forest NPA	Madagascar		X			APT	36,292.3	ONG INT.	CI	2	0	1	3
MDG-109	Zafimaniry Classified Forest NPA	Madagascar	X	X			APT	2,362.9	ONG INT.	CI	1	2	1	4
MDG-110	Menarandra Forest/Vohindefo NPA	Madagascar		X			APT	80,968.3	ONG INT.	WWF	7	5	2	14
MDG-111	Sahafina Forest (Anivorano-Brickaville) NPA	Madagascar	X				APT	752.4	ONG INT.	BCM	0	0	1	1
MDG-112	Ibity NPA	Madagascar	X				APT	7,032.1	ONG INT.	MBG	19	33	5	57
MDG-113	Itremo NPA	Madagascar	X				APT	100,115.9	ONG INT.	Kew	7	7	5	19
MDG-114	Kianjavato NPA	Madagascar	X				non	765.6	ONG INT.	CI	1	1	2	4
MDG-115	Lake Alaotra NPA	Madagascar	X	X	X		APT	50,878.6	ONG INT.	DURRELL	4	3	1	8
MDG-116	Lake Sahaka-Analabe NPA	Madagascar					APT	277.8	ONG NATIONALE	FANAMBY	0	2	1	3

MDG-117	Mahabo Mananivo NPA	Madagascar					APT	2,577.1	ONG INT.	MBG	21	17	1	39
MDG-118	Mahialambo NPA	Madagascar					APT	355.6	ONG NATIONALE	MAVOA	1	0	0	1
MDG-119	Mandena NPA	Madagascar					APT	230.3	PRIVE	QMM	2	8	1	11
MDG-120	Mangabe-Ranomena-Sasarotra NPA	Madagascar					APT	26,813.5	ONG NATIONALE	MAVOA	0	0	4	4
MDG-121	Manjakatompo-Ankaratra Massif NPA	Madagascar	X	X			APT	2,660.9	ONG NATIONALE	VIF	25	32	11	68
MDG-122	Montagne des Francais NPA	Madagascar	X				APT	3,743.4	ONG NATIONALE	SAGE	11	10	2	23
MDG-123	Oronjia NPA	Madagascar	X				APT	2,503.6	ONG INT.	MBG	9	25	8	42
MDG-124	PK32-Ranobe NPA	Madagascar					APT	168,610.0	ONG INT.	WWF	7	0	1	8
MDG-125	Pointe à Larrée NPA	Madagascar					APT	4,414.3	ONG INT.	MBG	18	20	1	39
MDG-126	Sainte-Luce - Ambato Atsinanana NPA	Madagascar					APT	1,309.5	PRIVE	QMM	2	4	1	7
MDG-127	Seven Lakes NPA	Madagascar					APT	7,850.2	ONG INT.	WWF	1	5	1	7
MDG-128	Tampolo NPA	Madagascar					APT	1,403.4	ONG NATIONALE	ESSA_Forêts	0	1	1	2
MDG-129	Vohibe-Ambalabe (Vatomandry) NPA	Madagascar					APT	349.3	ONG INT.	CI	39	20	3	62
MDG-130	Mahavavy-Kinkony wetlands NPA	Madagascar		X	X		APT	275,978.7	ONG NATIONALE	ASITY	10	14	3	27
MDG-131	Nosivolo wetland NPA	Madagascar			X		APT	6,890.7	ONG INT.	DURRELL	3	0	1	4
MDG-132	Port-Bergé wetlands NPA	Madagascar		X			APT	80,536.8			1	3	0	4
MDG-133	Tambohorano wetland NPA	Madagascar		X	X		APT	83,441.3	ONG INT.	TPF	0	3	1	4
MDG-134	Nosy Foty	Madagascar		X			non	1,438.1			0	0	0	0
MDG-135	Nosy Manitse Future SAPM Marine and surrounding wetlands	Madagascar		X			non	23,327.8			1	1	0	2

MDG-136	Nosy Varika	Madagascar				**X**	non	1,920.9			6	6	1	13
MDG-137	North Pangalane	Madagascar		X			non	6,119.0			1	1	0	2
MDG-138	Andohahela National Park - Section I	Madagascar	X	X			AP	59,639.4	MADA NAT. PARKS	MNP	23	36	4	63
MDG-139	Andohahela National Park - Section II	Madagascar		X			AP	12,769.0	MADA NAT. PARKS	MNP	7	19	3	29
MDG-140	Andringitra National Park	Madagascar	X	X			AP	32,083.1	MADA NAT. PARKS	MNP	18	9	3	30
MDG-141	Ankarafantsika National Park and Ampijoroa	Madagascar	X	X			AP	135,085.0	MADA NAT. PARKS	MNP	16	19	5	40
MDG-142	Kirindy Mite National Park and extension	Madagascar					AP	209,251.0	MADA NAT. PARKS	MNP	8	8	1	17
MDG-143	Baly Bay National Park	Madagascar	X	X			AP	396,788.7	MADA NAT. PARKS	MNP	9	8	3	20
MDG-144	Mananara-North National Park	Madagascar	X	X			AP	25,594.4	MADA NAT. PARKS	MNP	16	8	10	34
MDG-145	Mantadia National Park and Analamazaotra Special Reserve	Madagascar		X			AP	16,342.6	MADA NAT. PARKS	MNP	30	12	7	49
MDG-146	Marojejy National Park	Madagascar	X	X			AP	59,763.4	MADA NAT. PARKS	MNP	40	15	6	61
MDG-147	Masoala National Park	Madagascar	X	X			APMC	207,058.1	MADA NAT. PARKS	MNP	32	21	8	61
MDG-148	Masoala National Park - Section II	Madagascar	X				APMC	67,735.3	MADA NAT. PARKS	MNP	7	5	1	13
MDG-149	Masoala National Park - Section III	Madagascar					APMC	10,742.6	MADA NAT. PARKS	MNP	14	9	2	25
MDG-150	Midongy South National Park	Madagascar		X			AP	167,072.1	MADA NAT. PARKS	MNP	7	4	2	13
MDG-151	Nosy Mitsio National Park	Madagascar		X			APMC	29,878.3	MADA NAT. PARKS	MNP	1	0	1	2
MDG-152	Nosy Tanihely National Park	Madagascar	X	X			AP	39,822.7	MADA NAT. PARKS	MNP	4	1	3	8
MDG-153	Ranomafana National Park and extension	Madagascar		X			AP	57,494.1	MADA NAT. PARKS	MNP	19	17	5	41
MDG-154	Tsimanampetsotse National Park and extension	Madagascar		X			AP	260,856.3	MADA NAT. PARKS	MNP	9	6	2	17
MDG-155	Zombitse-Vohibasia National	Madagascar	X	X			AP	56,274.4	MADA NAT.	MNP	11	3	0	14

	Park and extension								PARKS					
MDG-156	Isalo National Park	Madagascar	X				AP	86,647.6	MADA NAT. PARKS	MNP	9	7	3	19
MDG-157	Tsingy de Namoroka National Park	Madagascar	X	X			AP	22,070.2	MADA NAT. PARKS	MNP	6	5	1	12
MDG-158	Zahamena National Park and Strict Reserve	Madagascar		X			AP	63,899.0	MADA NAT. PARKS	MNP	12	6	4	22
MDG-159	Tsingy de Bemaraha National Park and Strict Nature Reserve	Madagascar	X	X			AP	156,626.8	MADA NAT. PARKS	MNP	16	20	3	39
MDG-160	Montagne d'Ambre National Park and Special Reserve	Madagascar	X	X			AP	27,161.2	MADA NAT. PARKS	MNP	18	14	3	35
MDG-161	Sahamalaza-Radama Islands National Marine Park	Madagascar	X	X			AP	56,878.4	MADA NAT. PARKS	MNP	2	3	5	10
MDG-162	Makira Natural Park	Madagascar		X			AP	370,531.7	ONG INT.	WCS	30	12	5	47
MDG-163	Anja Community Reserve	Madagascar					non	5,026.5	ONG NATIONAL E	VOI	0	1	0	1
MDG-164	Betampona Strict Nature Reserve	Madagascar		X			AP	2,915.8	MADA NAT. PARKS	MNP	21	12	3	36
MDG-165	Lokobe Strict Nature Reserve	Madagascar	X				AP	1,584.1	MADA NAT. PARKS	MNP	11	0	2	13
MDG-166	Tsaratanana Strict Nature Reserve and extension	Madagascar	X	X			AP	140,836.0	MADA NAT. PARKS	MNP	23	14	3	40
MDG-167	Ambatovaky Special Reserve	Madagascar		X			AP	24,865.7	MADA NAT. PARKS	MNP	17	12	5	34
MDG-168	Ambohijanahary Special Reserve	Madagascar					AP	24,315.5	MADA NAT. PARKS	MNP	2	3	0	5
MDG-169	Ambohitantely Special Reserve	Madagascar	X				AP	13,398.5	MADA NAT. PARKS	MNP	4	4	2	10
MDG-170	Analamerana Special Reserve	Madagascar		X			AP	42,031.5	MADA NAT. PARKS	MNP	18	13	4	35
MDG-171	Andranomena Special Reserve	Madagascar					AP	7,849.8	MADA NAT. PARKS	MNP	4	2	0	6
MDG-172	South Anjanaharibe Special Reserve and extension	Madagascar		X			AP	28,919.0	MADA NAT. PARKS	MNP	20	9	3	32
MDG-173	Ankarana Special Reserve	Madagascar		X			AP	25,330.1	MADA NAT. PARKS	MNP	23	26	7	56

MDG-174	Bemarivo Special Reserve	Madagascar					AP	12,035.1	MADA NAT. PARKS	MNP	4	1	1	6
MDG-175	Beza Mahafaly Special Reserve	Madagascar					AP	30,922.4	MADA NAT. PARKS	MNP	3	2	2	7
MDG-176	Bora Special Reserve	Madagascar					AP	4,055.7	MADA NAT. PARKS	MNP	5	8	2	15
MDG-177	Kalambatritra Special Reserve	Madagascar	X	X			AP	31,241.6	MADA NAT. PARKS	MNP	8	5	0	13
MDG-178	Kasijy Special Reserve	Madagascar		X			AP	22,970.1	MADA NAT. PARKS	MNP	3	2	0	5
MDG-179	Mangerivola Special Reserve	Madagascar		X			AP	10,721.0	MADA NAT. PARKS	MNP	14	9	4	27
MDG-180	Maningoza Special Reserve	Madagascar		X			AP	5,970.8	MADA NAT. PARKS	MNP	2	1	0	3
MDG-181	Manombo Special Reserve	Madagascar	X				AP	5,261.3	MADA NAT. PARKS	MNP	5	3	6	14
MDG-182	Manongarivo Special Reserve and extension	Madagascar	X	X			AP	41,598.3	MADA NAT. PARKS	MNP	13	13	2	28
MDG-183	Marotandrano Special Reserve	Madagascar		X			AP	40,744.6	MADA NAT. PARKS	MNP	8	5	3	16
MDG-184	Nosy Mangabe Special Reserve	Madagascar					AP	605.6	MADA NAT. PARKS	MNP	2	4	1	7
MDG-185	Tampoketsa-Analamaintso Special Reserve	Madagascar					AP	22,579.6	MADA NAT. PARKS	MNP	1	0	0	1
MDG-186	Cape Sainte Marie Special Reserve and extension	Madagascar		X			AP	12,613.2	MADA NAT. PARKS	MNP	3.000	1.000	3.000	7.000
MDG-187	Pic d'Ivohibe Special Reserve	Madagascar					AP	3,635.8	MADA NAT. PARKS	MNP	6	2	0	8
MDG-188	Ankavia-Ankavanana River (Antalaha)	Madagascar					non	871.7			1	0	0	1
MDG-189	Antaimbalana-Andranofotsy River (Maroantsetra)	Madagascar					non	1,136.2			1	0	0	1
MDG-190	Bemarivo River	Madagascar					non	1,454.1			3	0	0	3
MDG-191	Maevarano River	Madagascar					non	2,733.3			0	1	0	1
MDG-192	Mahanara River	Madagascar					non	1,939.6			4	0	0	4

MDG-193	Mananjary River	Madagascar					non	7,303.2			1	0	0	1
MDG-194	Mangarahara-Amboaboa River	Madagascar					non	559.1			2	0	0	2
MDG-195	Sambava River	Madagascar					non	231.4			0	0	1	1
MDG-196	Sofia River	Madagascar					non	5,400.1			2	0	1	3
MDG-197	Ivoloina River	Madagascar					non	1,184.0			1	1	0	2
MDG-198	Mananara South River	Madagascar					APT	1,562.6	ONG INT.	CI	1.000	0.000	1.000	2.000
MDG-199	Mangoro-Rianila rivers	Madagascar					APT	15,796.3	ONG INT.	CI	2	1	0	3
MDG-200	Namorona-Faraony rivers	Madagascar					APT	2,097.4	ONG INT.	CI	2	0	1	3
MDG-201	Sahafary (Andranomena Antsiranana)	Madagascar				**X**	non	1,209.8	ONG NATIONALE	MBP	8	14	1	23
MDG-202	Sorata	Madagascar				**X**	non	28,452.8			3	6	0	9
MDG-203	Angavokely Forest Station	Madagascar					non	201.7			2	0	0	2
MDG-204	Anjiamangirana Forest Station	Madagascar					non	24,436.2			0	3	0	3
MDG-205	Tarzanville (Moramanga)	Madagascar					non	193.5			0	0	1	1
MDG-206	Tsinjoarivo	Madagascar					non	19,383.5	ONG NATIONALE	SADABE	0	0	2	2
MDG-207	Tsitongambarika NPA	Madagascar	X	X			APT	54,101.6	ONG NATIONALE	ASITY	9	13	4	26
MDG-208	Ambavanankarana wetland	Madagascar		X			non	51,441.7			0	3	1	4
MDG-209	Ambila-Lemaintso wetland	Madagascar				**X**	non	823.7			17	11	2	30
MDG-210	Ankobohobo wetland	Madagascar		X			non	3,497.3			0	1	1	2
MDG-211	Maevatanana-Ambato-Boeny wetlands	Madagascar		X			non	23,313.0			4	1	2	7
MDG-212	Torotorofotsy Wetlands	Madagascar		X	X		non	1,483.1	ONG NATIONALE	Mitsinjo	1	4	5	10
MUS-1	Cargados Carajos Shoals	Saint Brandon		**X**			PROPOSEE	43,793.7	GOV./PRIVE	Raphael Fishing	0	1	1	**2**
MUS-2	Bambou Mountain Range	Maurice		**X**			PART	1,740.9	GOV./PRIV	Ferney SE/La	32	17	14	**63**

							IELLE		E	Vallee de FERNEY Trust/ Bioculture/Forestry Service				
MUS-3	Chamarel - Le Morne	Maurice					PARTIELLE	2,900.3	GOV./PRIVE	Bioculture Mauritius/Forestry Service	30	15	15	**60**
MUS-4	Tamarind Falls / Mount Simonet / Cabinet Nature Reserve	Maurice					PARTIELLE	894.7	GOV./PRIVE	Forestry Service/Central Electricty Board	24	9	9	**42**
MUS-5	Relict Forests of the Central Plateau	Maurice		**X**			PARTIELLE	17,571.7	GOV./PRIVE		4	3	1	**8**
MUS-6	Rodrigues' Islets	Rodrigues	X	**X**			PROPOSEE	222.9	GOV.	Forestry Service/ RRA	1	4	4	**9**
MUS-7	Mauritius Northern Islets	Maurice		**X**			AP	590.9	GOV./ONG	MWF	6	5	1	**12**
MUS-8	Mauritius South-Eastern Islets	Maurice		**X**			PARTIELLE	36.3	GOV./ONG	MWF	2	1	0	**3**
MUS-9	Le Pouce - Anse Courtois - Pieter Both - Longue Mountain	Maurice		**X**			PARTIELLE	2,582.2	GOV.	Forestry Service	41	24	29	**94**
MUS-10	Mondrain - Magenta - Trois Mamelles - Mont du Rempart	Maurice		**X**			AP	798.8	GOV.	NPCS	29	14	13	**56**
MUS-11	Corps de Garde Mountain	Maurice					PARTIELLE	576.7	GOV.	Forestry Service	25	10	10	**45**
MUS-12	Black River Gorges National Park and surrounding areas	Maurice		**X**			PARTIELLE	6,059.5	GOV./PRIVE/ONG	Forestry Service - Private owners -MWF	76	43	26	**145**
MUS-13	Plaine Corail	Rodrigues	X	**X**			PARTIELLE	57.1	GOV./ONG/ PRIVE	Forestry Service/ MWF/Bioculture Mauritius	0	8	22	**30**
MUS-14	Plaine des Roches - Bras d'Eau	Maurice		**X**			PARTIELLE	2,457.6	GOV./PRIVE		1	0	0	**1**
MUS-15	Pont Bon Dieu	Maurice		**X**			PARTIELLE	10.3	GOV.	Forestry Service/ MWF/Bioculture Mauritius	2	0	0	**2**

MUS-16	South Slopes of Grande Montagne	Rodrigues	X	**X**			PARTIELLE	612.4	GOV.	Forestry Service/MWF	0	7	28	**35**
MUS-17	Yemen-Takamaka	Maurice					non	741.2	PRIVE	Medine SE	10	6	5	**21**
SYC-1	Anse Major / Anse Jasmin (marine area of MSNP)	Mahé					non	6.4			0	1	1	**2**
SYC-2	Anse Source d'Argent-Anse Marron	La Digue	X	**X**			non	157.7	PARASTATAL	L'Union Pty Ltd	1	1	1	**3**
SYC-3	Astove	Astove		**X**			non	2,335.1	PARASTATAL/ONG	IDC/ICS	0	0	0	**0**
SYC-4	African Banks	Bancs Africains		**X**			AP	822.0	PARASTATAL/ONG	ICS/IDC	0	0	0	**0**
SYC-5	Cosmoledo	Cosmoledo		**X**			PROPOSEE	15,359.1	PARASTATAL/ONG	IDC/ICS	0	0	0	**0**
SYC-6	Farquhar - South Island and islets	Farquhar		**X**			PROPOSEE	21,236.2	PARASTATAL/ONG	IDC/ICS	0	0	0	**0**
SYC-7	Fond Azore southern slopes to Anse Bois de Rose	Praslin		**X**			PROPOSEE	320.2			14	4	2	**20**
SYC-8	Fond Diable and Pointe Joséphine	Praslin					non	107.9			3	1	0	**4**
SYC-9	Fond Ferdinand	Praslin					PROPOSEE	128.9	PARASTATAL	Praslin Dvlpt Fund	12	6	1	**19**
SYC-10	L'Amitié Forest	Praslin					non	102.4			4	0	0	**4**
SYC-11	Montagne Corail-Collines du Sud dry forests	Mahé					PROPOSEE	298.9			12	1	1	**14**
SYC-12	Grand Anse-Petite Anse-Fond Piment	La Digue	X				non	159.2			3	0	1	**4**
SYC-13	Grand Police wetlands	Mahé					non	18.5	PRIVE	Private company	4	1	0	**5**
SYC-14	Assomption Island	Assomption					PROPOSEE	1,407.9	PARASTATAL/ONG	IDC/ICS	0	0	0	**0**
SYC-15	Bird Island (Ile aux Vaches)	Ile aux vaches		**X**			non	75.3	PRIVE	Private company	0	0	0	**0**
SYC-16	Conception Island	Conception		**X**			non	61.4	PRIVE		1	1	0	**2**
SYC-17	Cousine Island	Cousine		**X**			non	29.3	PRIVE	Private company	2	1	0	**3**
SYC-18	Curieuse Island	Curieuse					non	152.7	PARASTATAL	SNPA	9	2	1	**12**

SYC-19	D'Arros Island and Saint Joseph Atoll	D'Arros/St Joseph		X			PROP OSEE	2,438.7	PRIVE/ONG	Save our Seas	0	0	0	**0**
SYC-20	Denis Island	Ile denis		X			non	136.2	PRIVE	Private company	1	1	1	**3**
SYC-21	Desnoeufs Island	Desnoeufs		X			PROP OSEE	38.5	PARASTATAL/ONG	IDC/ICS	0	0	0	**0**
SYC-22	Desroches Island - surrounding reefs	Desroches					PROP OSEE	765.6	PARASTATAL/ONG/PRIVE	IDC/ICS	0	0	0	**0**
SYC-23	North Island (Ile du Nord)	Ile du Nord		X			non	194.7	PRIVE	Wilderness Safaris	0	1	0	**1**
SYC-24	Providence Island and Bank	Providence		X			non	45,956.6	PARASTATAL/ONG	IDC/ICS	0	0	0	**0**
SYC-25	Alphonse Island and Lagoon	Alphonse		X			non	160.0	PARASTATAL/ONG/PRIVE	ICS/IDC/Hotel	0	0	0	**0**
SYC-26	Félicité Island	Félicité					non	141.4	PRIVE	Private company	9	0	1	**10**
SYC-27	Frégate Island	Frégate		X			non	199.1	PRIVE	Private company	1	3	1	**5**
SYC-28	Marie-Louise Island	Marie-Louise		X			non	56.9	PARASTATAL/ONG	IDC/ICS	0	0	0	**0**
SYC-29	Sainte-Anne Island	Sainte Anne					non	169.5	PRIVE	Private company	3	0	0	**3**
SYC-30	Saint-Pierre Island	Saint Pierre					non	44.4	PARASTATAL/ONG	IDC/ICS	0	0	0	**0**
SYC-31	Etoile and Boudeuse Islands	Etoile & Boudeuse		X			AP	1.9	PARASTATAL/ONG	ICS/IDC	0	0	0	**0**
SYC-32	Saint-François and Bijoutier Islands	Saint François & Bijoutier		X			PROP OSEE	5,582.7	PARASTATAL/ONG/PRIVE	ICS/Hotel	0	0	0	**0**
SYC-33	Ilot Frégate	Ilot Frégate		X			AP	5.6	PRIVE	Fregate Island	0	0	0	**0**
SYC-34	Poivre Lagoon and surrounding reefs	Poivre					PROP OSEE	1,312.0	PARASTATAL/ONG/PRIVE	IDC/ICS	0	0	0	**0**
SYC-35	Mont Signal	Mahé					non	75.6			2	0	0	**2**
SYC-36	Montagne Brûlée-Piton de	Mahé					PROP	114.2			21	9	3	**33**

	l'Eboulis						OSEE							
SYC-37	Montagne Glacis - When she comes	Mahé		**X**			non	140.1			10	0	0	**10**
SYC-38	Montagne Planneau (Grand Bois-Varigault-Cascade)	Mahé	X	**X**			PROP OSEE	1,435.7			31	16	10	**57**
SYC-39	Nid d'Aigle (ridge and eastern slopes)	La Digue	X	**X**			non	206.0			6	0	0	**6**
SYC-40	Recif Island National Park	Ile aux récifs		**X**			AP	22.5	PARASTATAL	SNPA / MEE	0	0	0	**0**
SYC-41	Praslin National Park	Praslin		**X**			AP	92.2	PARASTATAL	SNPA / SIF	16	7	3	**26**
SYC-42	Silhouette National Park	Silhouette		**X**			AP	1,851.8	PARASTATAL/ONG/PRIVE	IDC/ICS/SNPA	40	20	21	**81**
SYC-43	Morne Seychellois National Park	Mahé	X	**X**			AP	2,536.1	PARASTATAL	SNPA	29	21	13	**63**
SYC-44	Cap Ternay / Baie Ternay Marine National Park	Mahé					APMC	617.7	PARASTATAL	SNPA	0	0	0	**0**
SYC-45	Ile Cocos Marine National Park	Félicité					APMC	85.5	PARASTATAL	SNPA	0	0	0	**0**
SYC-46	Curieuse Island Marine National Park	Curieuse					APMC	1,462.2	PARASTATAL	SNPA	0	0	0	**0**
SYC-47	Port Launay Marine National Park and coastal wetlands	Mahé					APMC	163.5	PARASTATAL	SNPA	0	0	0	**0**
SYC-48	Sainte-Anne Marine National Park (SAMNP)	Sainte Anne					APMC	968.7	PARASTATAL	SNPA	0	0	0	**0**
SYC-49	Silhouette Marine National Park	Silhouette					APMC	2,131.4	PARASTATAL/ONG/PRIVE	SNPA	0	0	0	**0**
SYC-50	Aldabra Special Reserve	Aldabra	X	**X**	**X**		AP	92,271.7	PRIVE	SIF	2	2	0	**4**
SYC-51	Aride Island Special Reserve	Aride		**X**			APMC	211.7	ONG NATIONALE	ICS	2	2	2	**6**
SYC-52	Cousin Island Special Reserve	Cousin		**X**			APMC	102.1	ONG NATIONALE	Nature Seychelles	2	1	0	**3**
SYC-53	La Veuve Special Reserve	La Digue	X	**X**			AP	83.9	PARASTAT	SNPA	0	0	1	**1**

									AL					
SYC-54	Kerlan River	Praslin					non	11.8			7	0	0	**7**
SYC-55	Anse Petite Cour Boulders	Praslin					non	8.3			4	1	0	**5**
SYC-56	Val d'Endor	Mahé					non	22.4			5	0	0	**5**
SYC-57	La Misère-Dauban area: La Misère	Mahé	X	**X**			non	20.0			6	1	1	**8**

APPENDIX 7: LIST OF TRIGGERED SPECIES FOR EACH KBA

This appendix could be downloaded as a separate pdf document on CEPF website. Excel copy of this appendix available on request to the CEPF Secretariat.

APPENDIX 8: DETAILED MAPS (INCLUDING CEPF PRIORITIES IN THE MADAGASCAR AND INDIAN OCEAN ISLANDS HOTSPOT

Figure A8-1: Madagascar: KBAs and CEPF Priorities, General Map

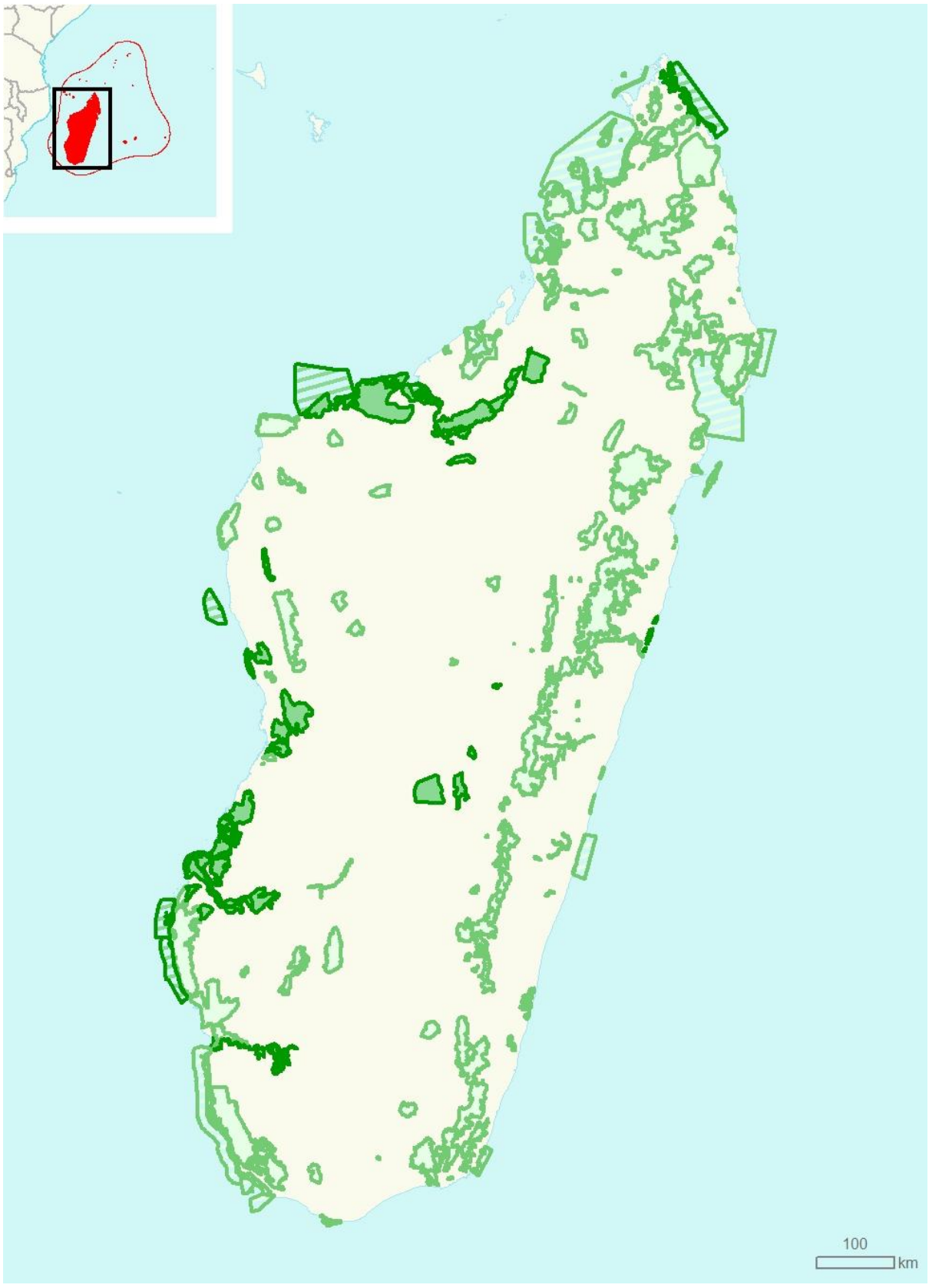

Figure A8-2: Madagascar: KBAs and CEPF Priorities, Extreme North

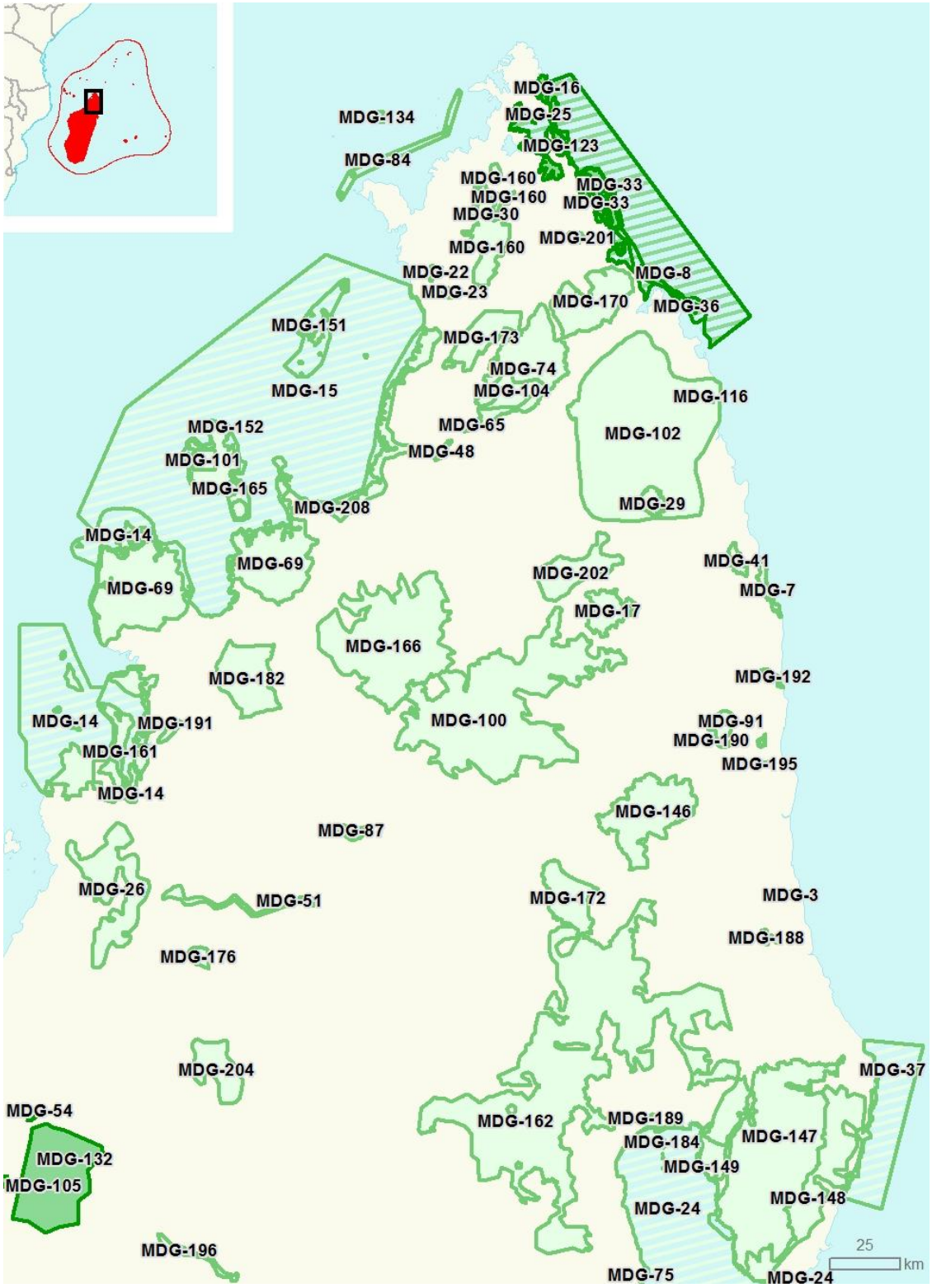

Figure A8-3: Madagascar: KBAs and CEPF Priorities, Northeast

Figure A8-4: Madagascar: KBAs and CEPF Priorities, Northwest

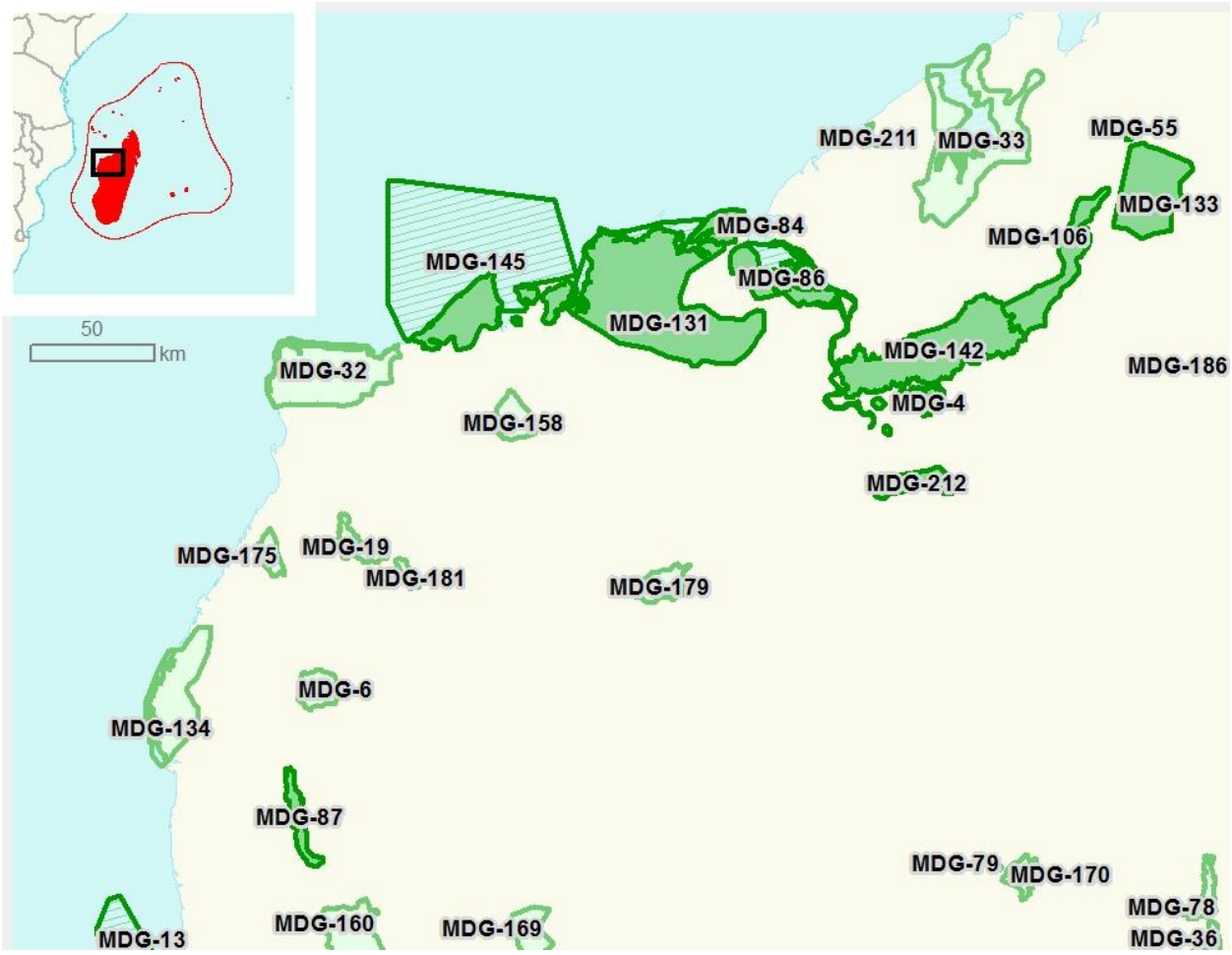

Figure A8-5: Madagascar: KBAs and CEPF Priorities, Midwest

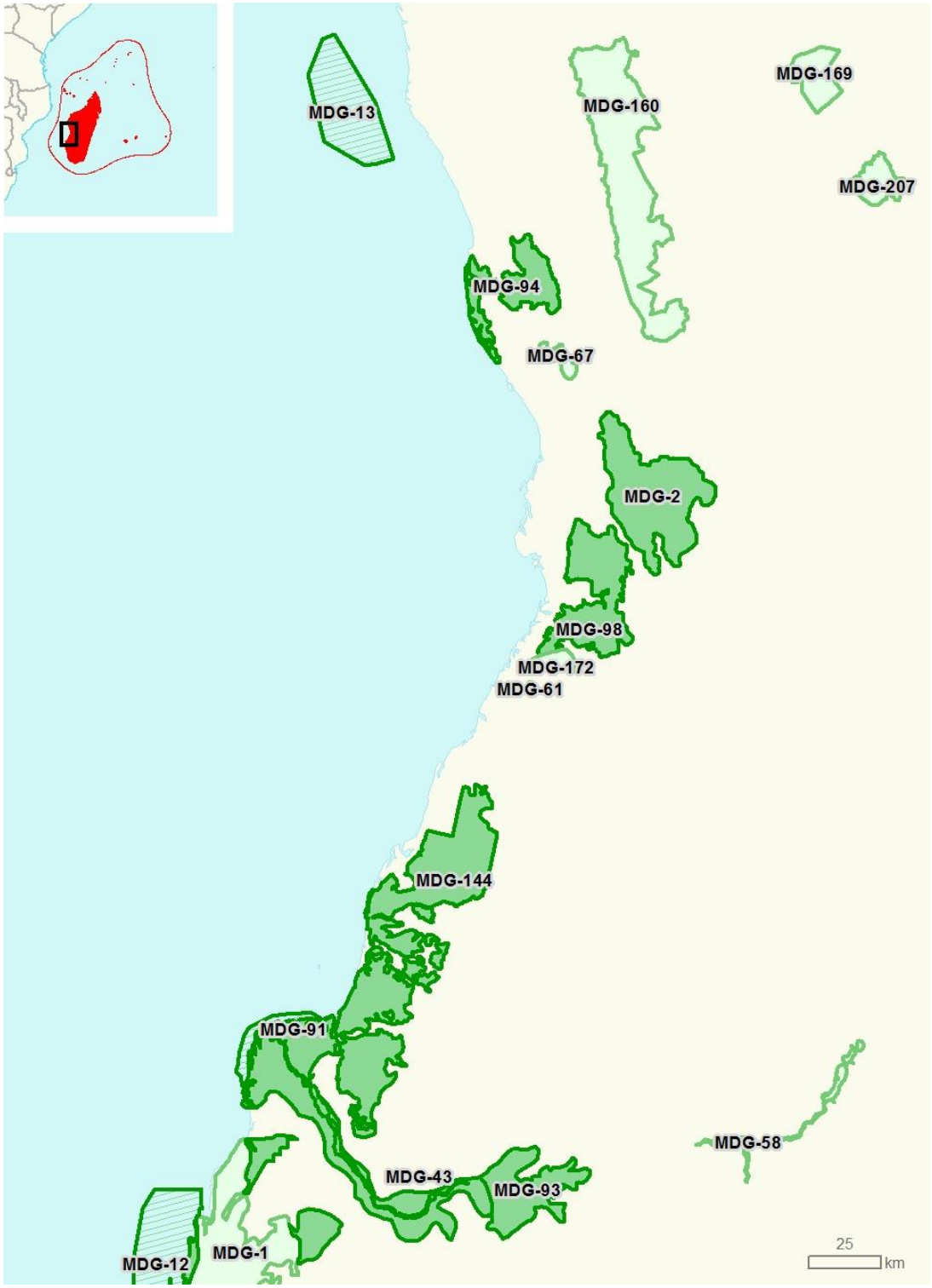

Figure A8-6: Madagascar: KBAs and CEPF Priorities, Mideast

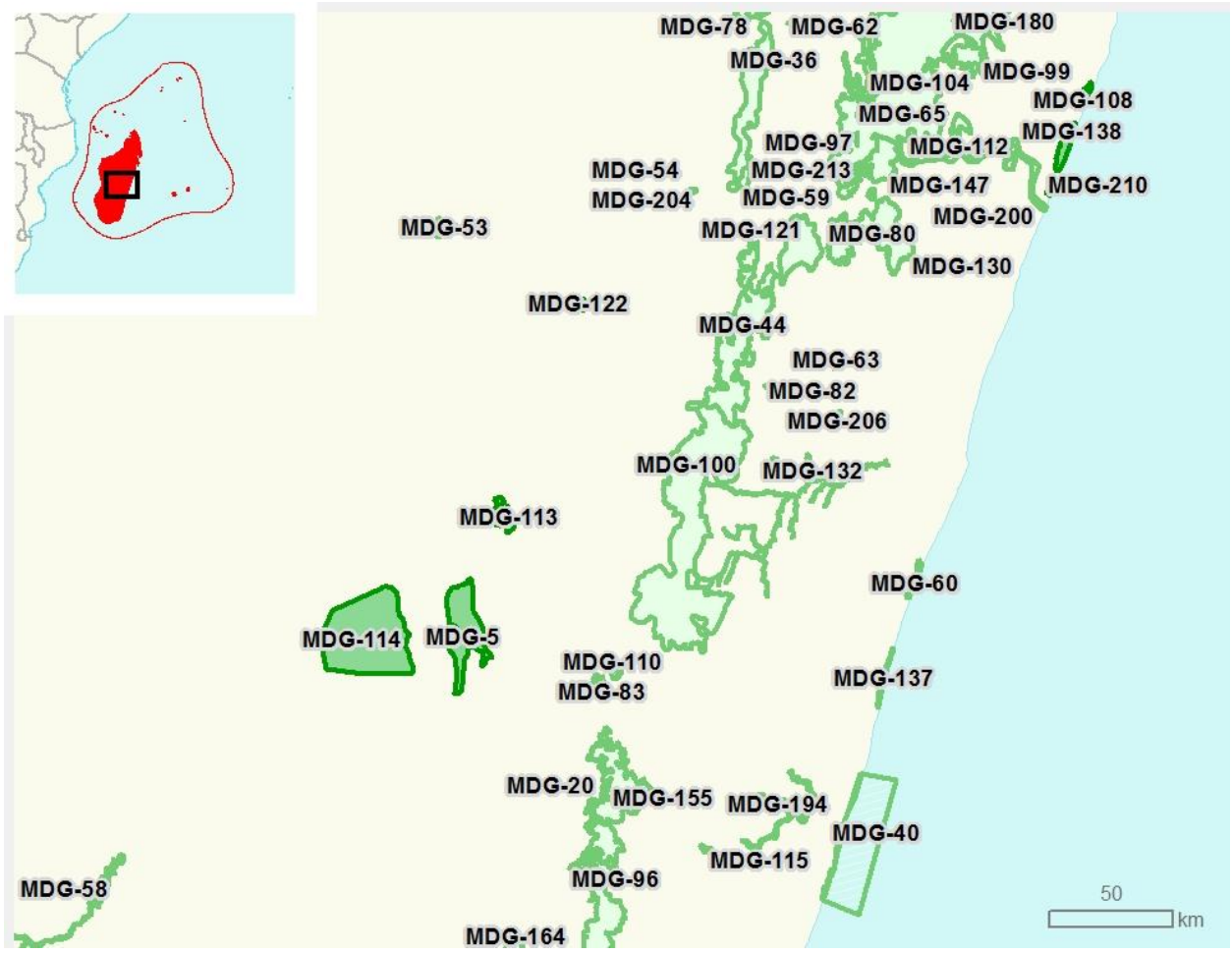

Figure A8-7: Madagascar: KBAs and CEPF Priorities, Southeast

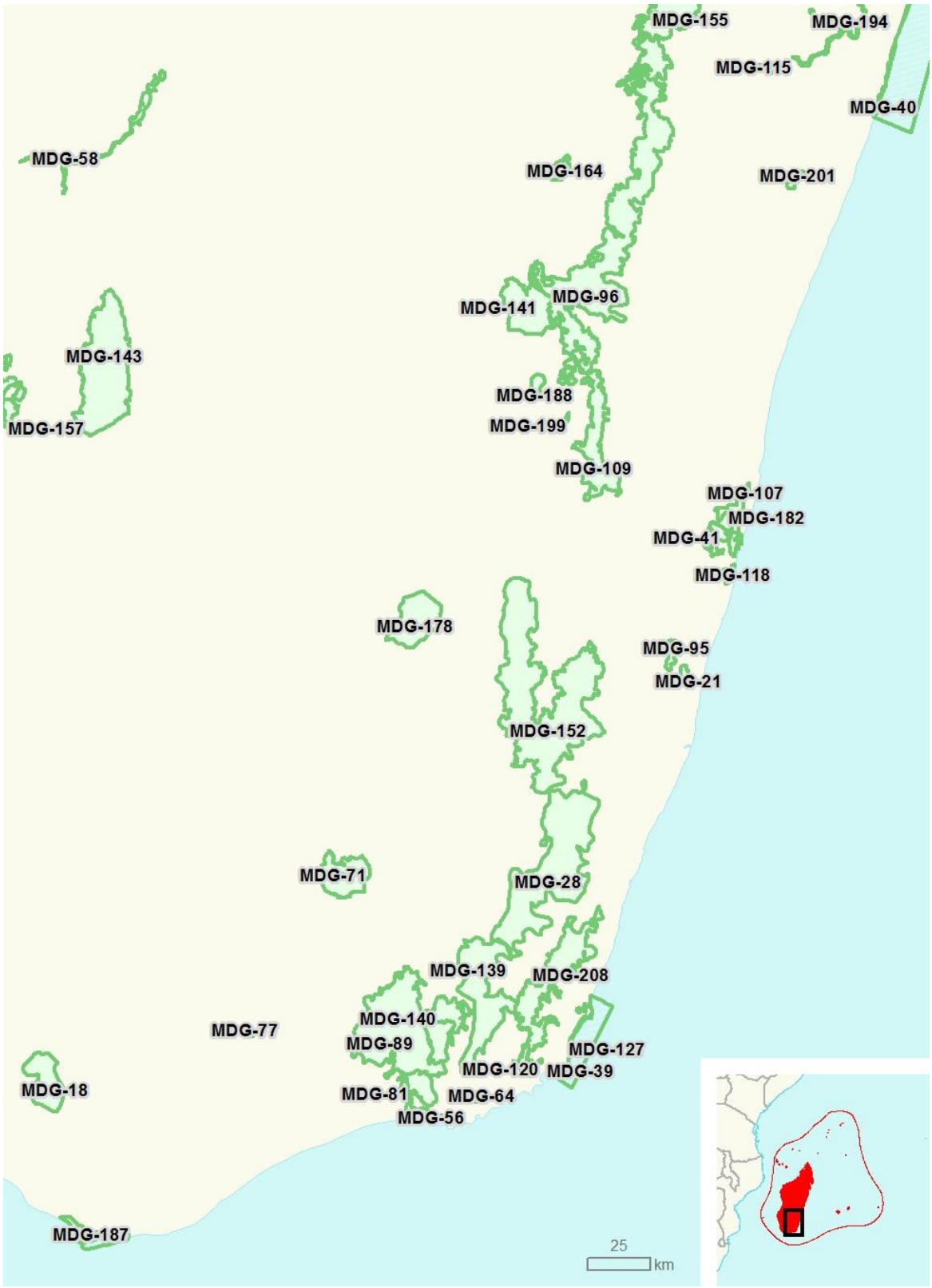

Figure A8-8 Madagascar: KBAs and CEPF Priorities, Southwest

Figure A8-9: Comoros: KBAs and CEPF Priorities

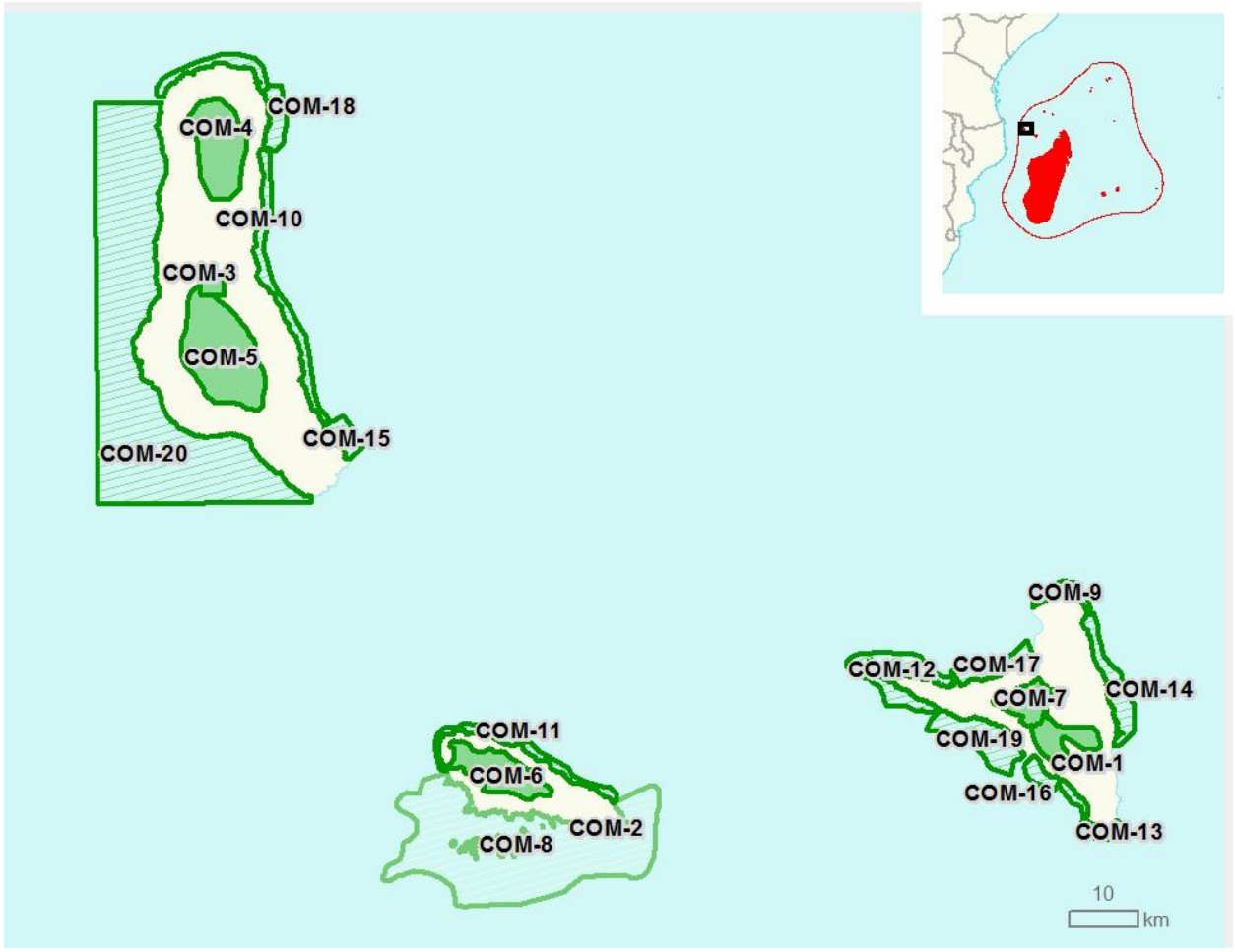

Figure A8-10: Mauritius: KBAs and CEPF Priorities, General Map

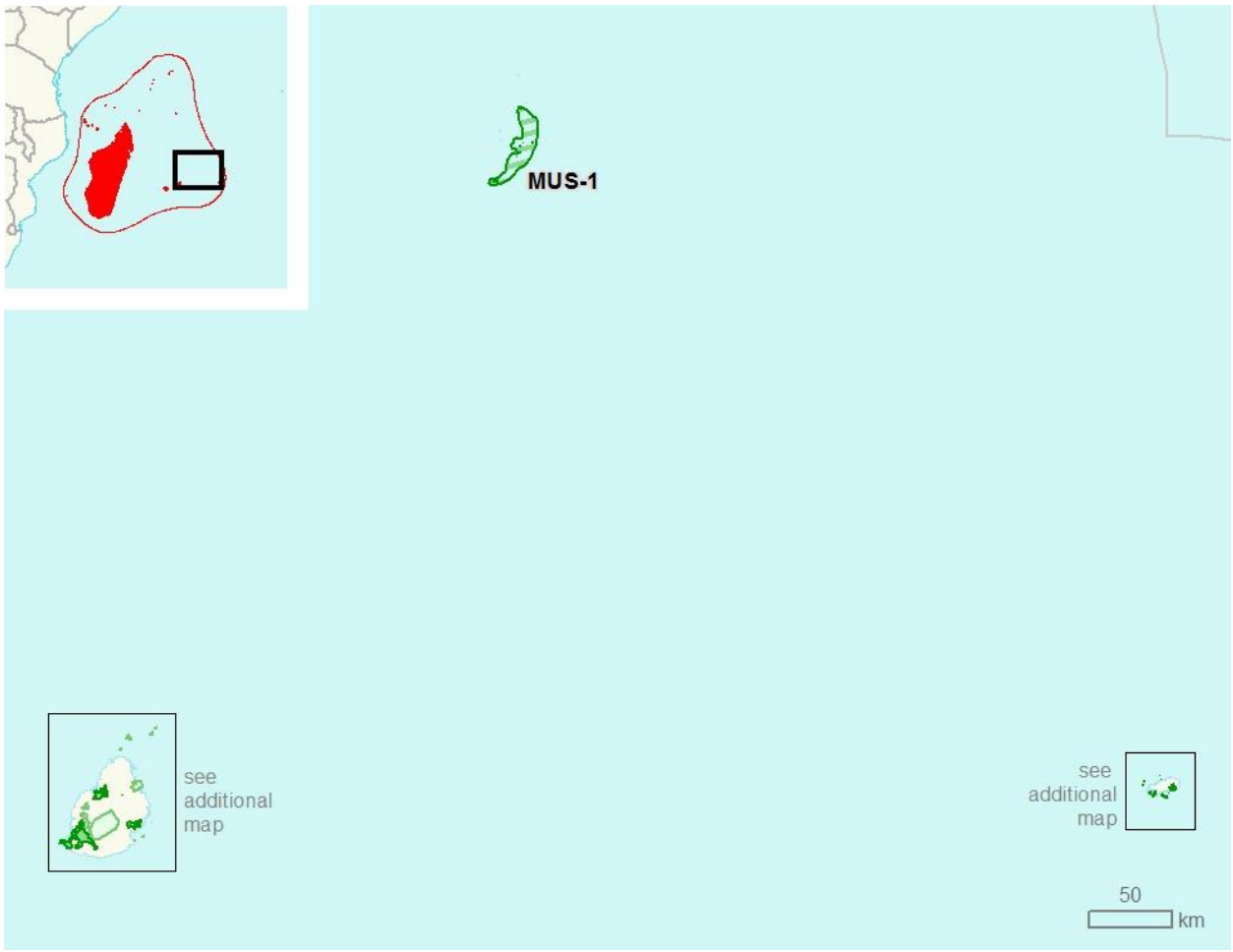

Figure A8-11: Mauritius: KBAs and CEPF Priorities, Mauritius Island

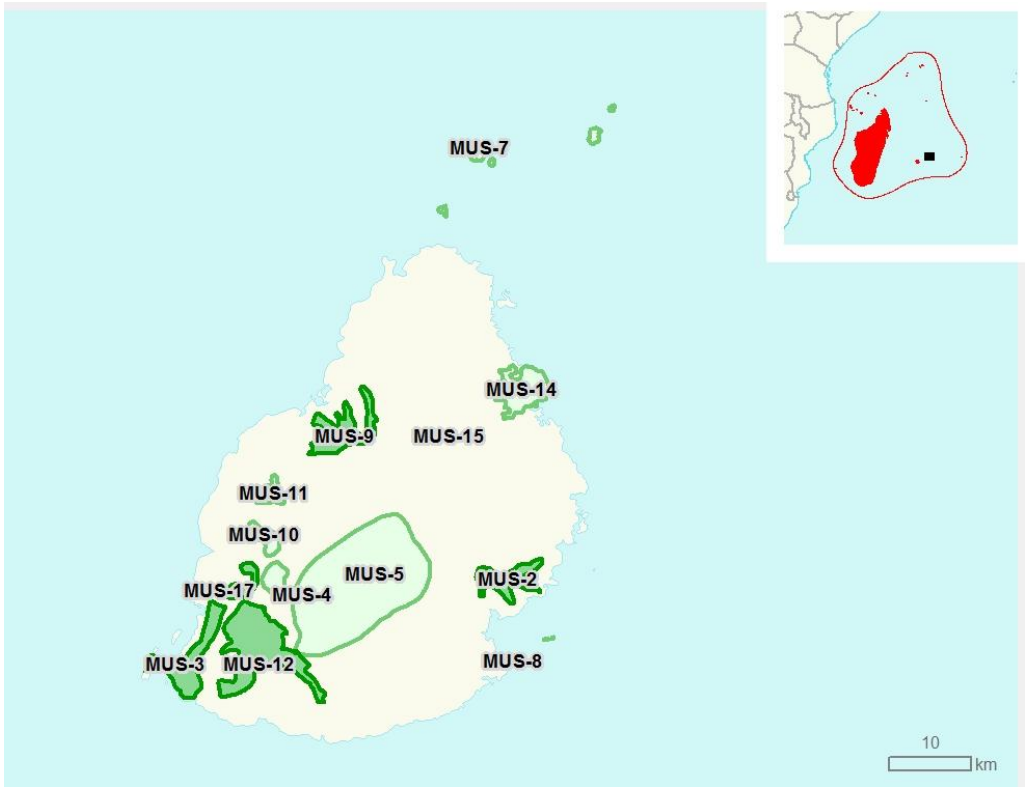

Figure A8-12: Mauritius: KBAs and CEPF Priorities, Rodrigues

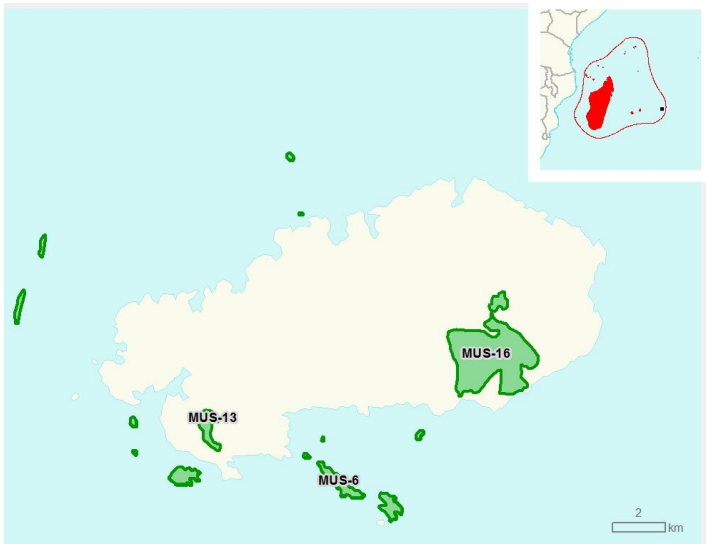

Figure A8-13: Seychelles: KBAs and CEPF Priorities, General Map

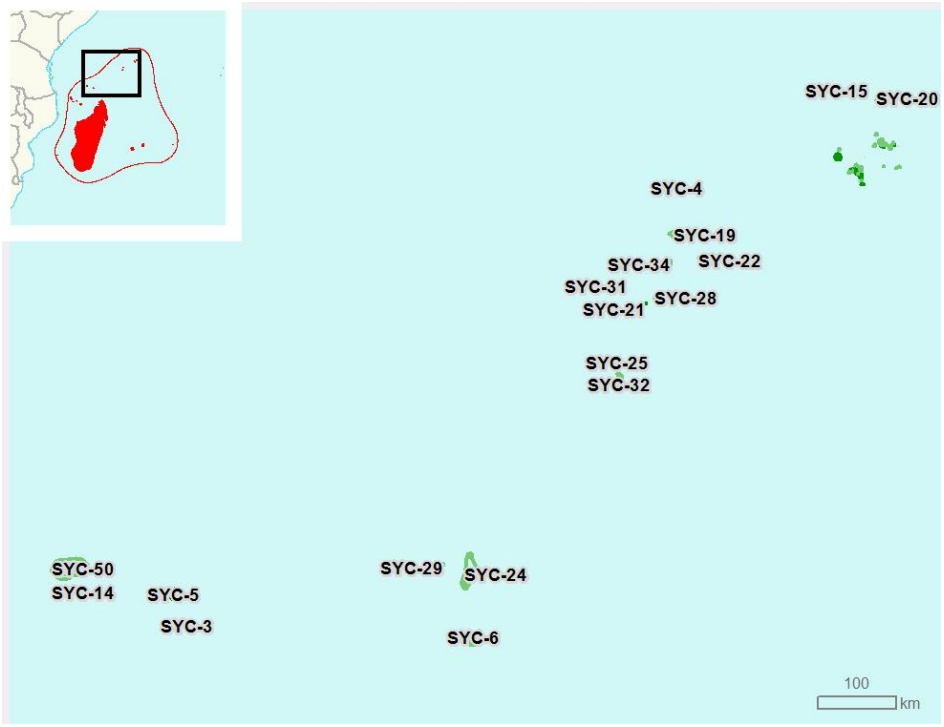

Figure A8-14: Seychelles: KBAs and CEPF Priorities, Granitic Islands (Northeast)

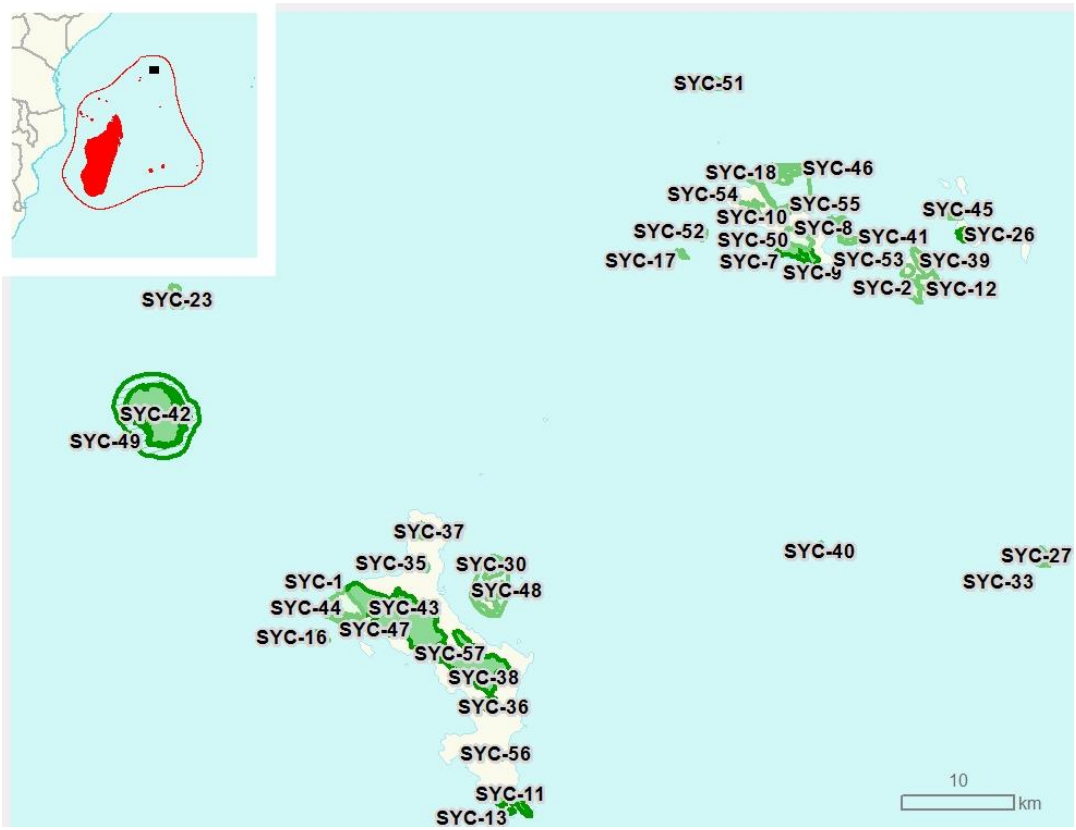

Figure A8-15: Iles Eparses (Scattered Islands) : KBAs

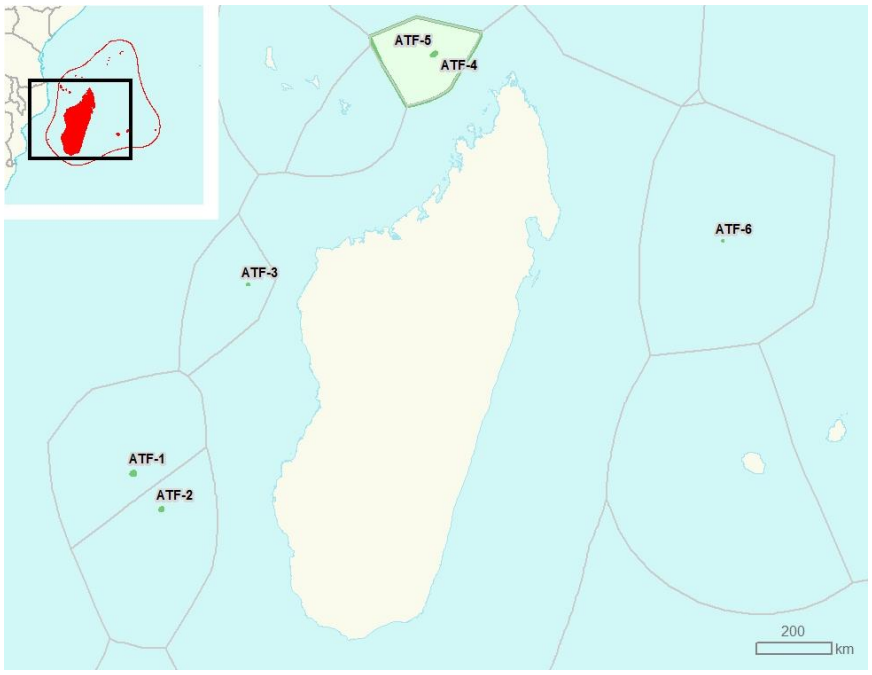

Figure A8-16: La Réunion: KBAs

Figure A8-17: Mayotte, KBAs


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