CRITICAL ECOSYSTEM PARTNERSHIP FUND

Ecosystem Profile

Madagascar and the Indian Ocean Islands Biodiversity Hotspot

2022 Update

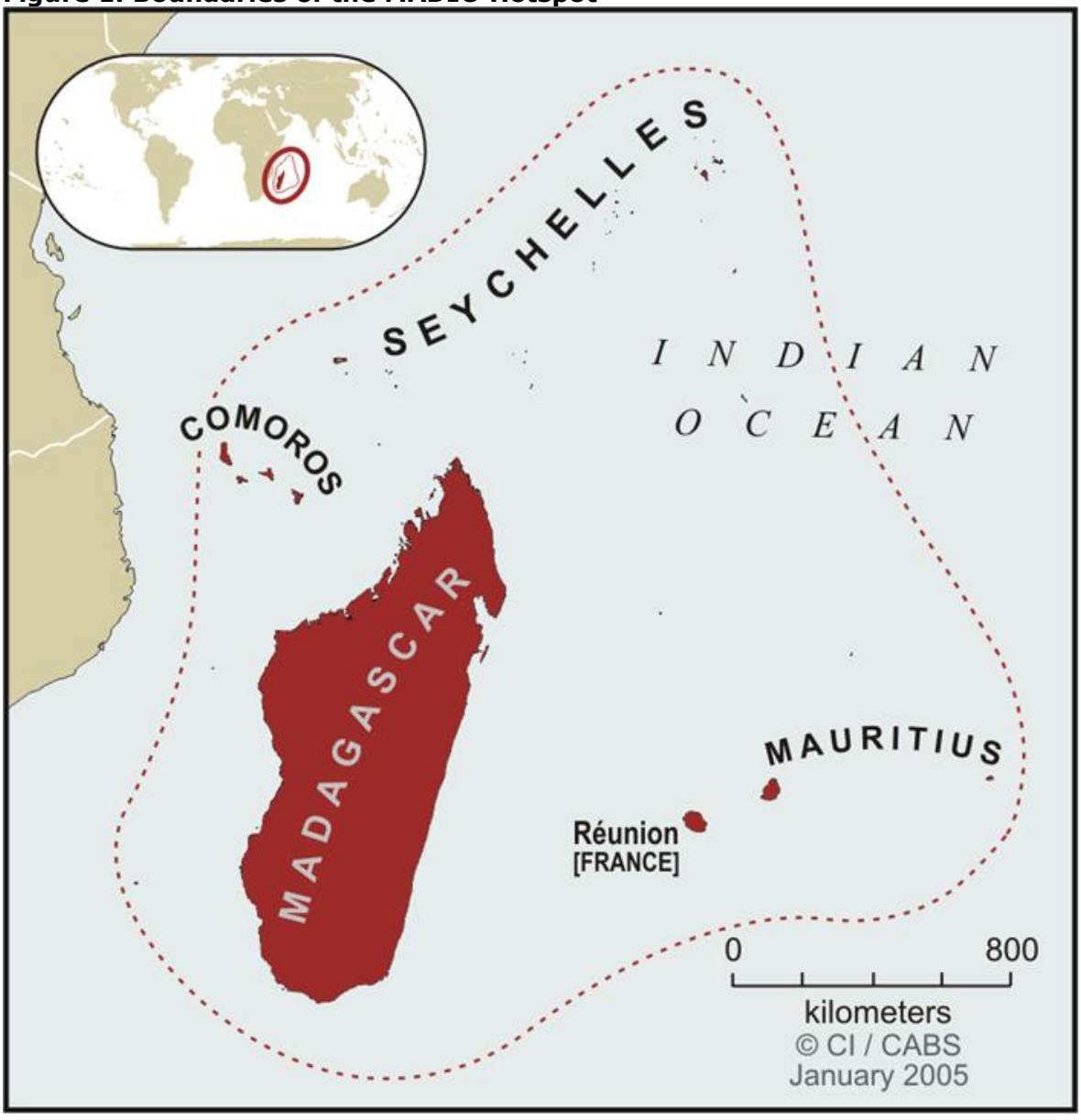
Technical Summary

DRAFT FOR CEPF DONOR COUNCIL
SEPTEMBER 2022

1. INTRODUCTION

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 (AFD), Conservation International (CI), the European Union (EU), the Global Environment Facility (GEF), the Government of Japan, and the World Bank. In the Madagascar and the Indian Ocean Islands (MADIO) Biodiversity Hotspot, CEPF is managing a 10-year program to promote Ecosystem-based Adaptation (EbA) to climate change, financed by the Green Climate Fund (GCF) through AFD.

Figure 1. Boundaries of the MADIO Hotspot



The MADIO Hotspot comprises the Union of Comoros, the Republic of Madagascar, the Republic of Mauritius, and the Republic of Seychelles plus two French overseas departments (Mayotte and Réunion), which are not eligible to receive CEPF funding (Figure 1). The hotspot is considered one of the top global priorities for biodiversity conservation due to its extreme levels of biotic diversity and endemism. For instance, the hotspot supports around 15,000 plant species, of which more than 12,000 are found nowhere else on Earth. The MADIO Hotspot is exceptional for its levels of endemicity in higher taxonomic groups, which can be attributed to distinct evolutionary mechanisms linked to the islands' isolation. Unfortunately, these high levels of biodiversity are matched by high levels of threat.

CEPF began making grants to civil society groups in the hotspot in 2001, with a sole focus on Madagascar. The first phase of CEPF grant making ran from 2001 to 2006, with a total investment of $4.25 million supporting 40 projects implemented by 18 organizations. At the end of this phase, and following a positive evaluation, the CEPF Donor Council approved a $1.4 million consolidation phase, which was implemented between 2009 and 2012.

In 2012, the MADIO Hotspot was selected for reinvestment by the CEPF Donor Council, and an ecosystem profile was prepared during 2013-2014, under the leadership of CI's Madagascar country program and with inputs from CI's Moore Center for Science and Oceans for the analysis of ecosystem services, and from the consulting firm Biotope for the Indian Ocean island states. This ecosystem profile guided a seven-year phase of grant making, from January 2015 to June 2022, with a total investment of $12.3 million. Local coordination was provided by the Tany Meva Foundation, as the Regional Implementation Team (RIT). The investment had significant cumulative impacts, among which the following were particularly notable (figures are provisional at the time of writing):

- Creation and/or extension of 1,608,020 ha of protected areas;
- Strengthened management of 3,159,544 ha of Key Biodiversity Areas (KBAs);
- Improved biodiversity management within 1,573,474 ha of production landscapes, and by extension, improved living conditions of local communities;
- Strengthened institutional capacity of 67 percent of local CSOs receiving CEPF funds, and improved gender mainstreaming by 73 percent of CEPF grantees;
- Adoption of environmentally friendly practices by 20 private sector actors.

There have been many changes in the eight years since the ecosystem profile for the MADIO Hotspot was prepared. The socio-economic context in particular has evolved significantly. Threats to biodiversity have experienced great leaps, due to interrelated factors, including climate change, stagnant or declining economies, weak governance, and an unfavorable social environment. At the same time, civil society organizations (CSOs) working in the field of biodiversity conservation have found themselves with more or less diminished resources and capacities. In addition, these CSOs have had to deal with the impacts of the COVID-19 pandemic, which emerged two years ago and continues to impact societies around the world.

2. BACKGROUND

The ecosystem profile presents an overview of the MADIO Hotspot in terms of its biodiversity conservation importance, major threats to and root causes of biodiversity loss, and the socioeconomic, policy and civil society context in which conservation takes place.

The profile also presents assessments of the implications of climate change for biodiversity conservation and the delivery of ecosystem service of importance to local populations, and of patterns of conservation investment. It defines a comprehensive suite of measurable conservation outcomes, and identifies priorities for investment within these.

Considering the central role that the ecosystem profile will play in guiding grant-making under the GCF program, the consideration of climate change, particularly adaptation, is central to this update. Improving climate resilience of local communities will be anchored by EbA actions in priority geographic areas, where civil society can add value to the work of private and public sector actors. To this end, the ecosystem profile concludes with a five-year investment strategy (2022-2027), which identifies priorities for leveraging the capacity of CSOs to implement EbA in the Comoros, Madagascar, Mauritius and the Seychelles. This strategy comprises a series of strategic funding opportunities, termed strategic directions, broken down into a number of investment priorities outlining the types of activities that will be eligible for funding. CSOs may propose projects that will help implement the strategy by addressing at least one of the investment priorities. The ecosystem profile does not include specific project concepts, as CSOs will develop these as part of their funding applications. Applicants are required to prepare detailed proposals identifying and describing the interventions and performance indicators that will be used to evaluate the success of their projects.

2.1 Process and approach for updating the Ecosystem Profile

The update of the ecosystem profile was led by a consortium among CI, Missouri Botanical Garden, Asity Madagascar and Biotope, with support from consultants recruited locally in the MADIO Hotspot throughout the process.

The team adopted a similar methodology for identifying KBAs important for the delivery of ecosystem services (so-called "KBA+" sites) to that used in the previous version of the ecosystem profile. However, the analysis was updated by using more recent datasets on ecosystem services, weighting the analysis towards ecosystem services important to local populations (i.e., relevant to the goals of the GCF program), and incorporating some new freshwater KBAs that had been identified in Madagascar in 2018.

For the definition of biological priorities, data from the IUCN Red List of Threatened Species were mainly used. However, additional data were obtained from experts and specialized organizations when necessary, such as Missouri Botanical Garden and the Moore Centre for Science and Oceans, in close collaboration with CI-Madagascar.

The thematic chapters of the ecosystem profile, which include those on socioeconomic context, political context, and civil society context, were updated to include new information and analysis drawn from the desk research and targeted interviews conducted by the profiling team.

The analyses of the competencies and needs of CSOs, and of threats to biodiversity, root causes and barriers to conservation were updated based mainly on consultations with stakeholders conducted throughout the process. These consultations were originally planned to be in person but, due to the COVID-19 pandemic, a blend of virtual and in-person consultations were held. These consultations were crucial for defining the CEPF niche and

investment strategy. Finally, data on conservation investments were collected mainly through literature review.

2.2 Consultation process

The development of the ecosystem profile was a participatory process. Consultations were organized with the participation of various government ministries, donor agencies, national and international NGOs, associations, universities and research centers.

In Madagascar, a total of 187 stakeholders from 112 institutions were consulted. In Comoros, consultation workshops were held with the participation of 40 stakeholders. In Mauritius, a consultation workshop brought together 16 stakeholders. In the Seychelles, a consultation workshop involved 30 stakeholders. The consultation process concluded with a validation workshop in Antananarivo, Madagascar, on 1 July 2022, to which civil society and government representatives from the four hotspot countries were invited to attend. Due to some technical difficulties that constrained remote participation by stakeholders from the Seychelles, a separate, English-language validation workshop was held on 18 July 2022.

3. LESSONS LEARNED FROM PREVIOUS CEPF INVESTMENT

The new phase of CEPF investment in the MADIO Hotspot will follow on more-or-less directly from the previous phase (2015-2022). It is important, therefore, that lessons are learned from the previous phase, so that effective approaches are reinforced, and pitfalls are avoided during the new phase.

Key lessons from previous phase included the following:

- CEPF investments have strengthened local actors' knowledge and experience in biodiversity research, spatial analyses, information systems, database management and community-based approaches, while improving interdisciplinary collaboration.
- In Madagascar CEPF investments have contributed to building confidence in local NGOs and strengthening partnerships and collaborations among them.
- In the other islands, there were greater barriers to involving NGOs in the implementation of the investment program, due to different operating contexts to that in Madagascar; these constraints were not fully appreciated during the preparation of the ecosystem profile.
- The mid-term evaluation was conducted too late (five and a half years into implementation), when the portfolio was already too far along in terms of resource allocations to reorient the portfolio in response to findings.
- Of the 867 Letters of Inquiry received throughout the investment phase, only 81 resulted in grant awards. The resulting award rate of 9.3 percent is considered too low, in terms of the amount of time invested by CSOs in unsuccessful applications.
- Responsibility for the RIT was assumed by Fondation Tany Meva, which experienced significant turnover in personnel during the first half of the investment phase, which had impacts on effectiveness, as new staff members had to familiarize themselves with their roles and CEPF's strategy and processes.
- In spite of these limitations and changes, the portfolio met almost all of its targets, as set out in the ecosystem profile.

From the lessons learned during the previous phase, an independent evaluation conducted by the consulting firm Emerald Network made a number of recommendations to improve the next phase of CEPF investment in the hotspot. These include the need to strengthen the RIT's presence beyond Madagascar to the Indian Ocean islands, and the need to improve communication throughout the hotspot to foster regional networking and collaboration. It was also recommended that a stronger and more established presence in all countries be put in place early in the next investment period to avoid delays. In addition, while staff changes are largely beyond the control of the RIT, delays in processes need to be identified and reported more quickly to minimize the effect on portfolio development. For the mid-term evaluation, this should ideally be conducted before the majority of grants have been awarded, so that necessary adjustments can be made at the portfolio level. Regarding the low award rate, more direct support should be provided to potential applicants, for example through an in-country workshops.

Given the size of the portfolio, another recommendation was to consider the potential benefits of concentrating investment in priority geographies, in order to maximize efficiency. Finally, having a local organization in Madagascar playing the role of the RIT brought many benefits for CSOs there, including a deeper understanding of the local context. However, relying on consultants to support applicants and grantees in the Indian Ocean islands was not highly effective, and it was recommended to identify institutional partners for the RIT in these countries.

4. BIOLOGICAL IMPORTANCE OF THE MADIO HOTSPOT

In common with all biodiversity hotspots, the MADIO Hotspot is a terrestrial conservation unit. As such, the hotspot is dominated by the island of Madagascar, which makes up nearly 99 percent of the terrestrial surface area. Due to its biological isolation from the continent of Africa, Madagascar has seen the evolution of an original and distinct fauna and flora, with a very high rate of endemism at the level of species, genera and even families. The terrestrial biodiversity of the other countries is closely linked to that of Madagascar. African influences are especially marked in the biota of the Comoros, while Asian influences are especially marked in the biota of the Seychelles. On the other hand, despite having a small land area, the other island groups in the western Indian Ocean contribute a lot to the biological diversity of the hotspot, due to the high levels of endemism typical of oceanic islands. Although the hotspot is defined in terms of its important for terrestrial biodiversity, its marine biodiversity is also exceptional, in terms both of levels of endemism and of the international importance of populations of certain widely distributed species, such as cetaceans and marine turtles.

The hotspot contains a set of extremely varied habitats, resulting from climatic variability related to latitude and altitude, as well as topography, which concentrates precipitation on the eastern slopes of the massifs. Geological and pedological differences (granitic base, ancient or recent volcanism, atolls and sandy formations, sedimentary formations, etc.) add to the diversity of habitats. In a simplified way, most of the islands contain a gradient of habitats, from grassy formations and deciduous forests at low altitude, via deciduous and evergreen forests at medium altitude, and montane forests at high altitude, to high altitude ericaceous vegetation on the highest points.

Madagascar supports exceptional levels of diversity and endemism, among species and higher taxa. For example, four families of birds are endemic to Madagascar: the mesites (Mesitornithidae); the ground-rollers (Brachypteraciidae); the asities (Philepittidae); and the Malagasy warblers (Bernieridae). Of the 231 known species of native mammal, 221 are endemic to Madagascar. Madagascar is renowned for its lemurs, and is home to 20 percent of all primate genera in the world, including five families unique to the island. Levels of endemism among reptiles are even higher, with 98 percent of the approximately 420 species described from Madagascar being found nowhere else, including several dozen species of chameleons.

Madagascar is also known for its rich indigenous flora, characterized by a high specific diversity and endemicity, with about 90 percent of vascular plant species endemic to the island, and five endemic families: the Asteropeiaceae; the Barbeuiaceae; the Physenaceae; the Sarcolaenaceae; and the Sphaerosepalaceae. Around 11,400 species of vascular plants are currently known from the island, and it is estimated that at least 3,000 species remain to be discovered or described.

Like most tropical islands, the Comoros archipelago is well known for harboring remarkable biodiversity, characterized by numerous endemic species. For example, nine out of the 96 bird species found on the archipelago are endemic, as are 14 percent of the terrestrial mammal species and 15 percent of the plant species.

Due to their volcanic origin, antiquity and isolation, there is a high diversity of flora and fauna on the Mauritian islands of Mauritius and Rodrigues, as well as a high degree of endemism. About 40 percent of the vascular plants and 72 percent of the vertebrates on Mauritius are endemic, while these figures are 31 and 88 percent, respectively, for Rodrigues. The islands of Agalega and Saint Brandon have no endemic terrestrial biodiversity.

Due to their isolation, the islands of the Seychelles are characterized by a high degree of endemism, especially in the terrestrial sphere. Among vascular plants, 24 percent of the 545 native species are endemic. While, among vertebrates, 83 percent of mammals, five percent of birds and 72 percent of reptiles are endemic.

5. CONSERVATION OUTCOMES DEFINED FOR THE HOTSPOT

Because of CEPF's focus on global biodiversity hotspots, the process to set conservation outcomes is based on global standards. The principal basis for defining species outcomes for this document is the global threat assessments contained within the IUCN Red List. Thanks to a considerable amount of Red Listing activity over the decade since the previous ecosystem profile was prepared, these data were comprehensively updated. The total number of species assessed has increased almost three-fold, from 3,833 in 2013 to 10,778 in 2022, with a corresponding increase in the number of species assessed as globally threatened.

Many species are best conserved through the protection of a network of sites at which they occur, so the next stage is to define a set of Key Biodiversity Areas (KBAs): sites that contribute significantly to the global persistence of biodiversity. KBAs are identified for individual elements of biodiversity, such as globally threatened species or ecosystems.

Multiple approaches have been used by conservation organizations to identify such sites. These were consolidated into a single methodology by the IUCN Species Survival Commission and IUCN World Commission on Protected Areas in association with the IUCN Global Species Programme, resulting in the *Global Standard for the Identification of Key Biodiversity Areas* (IUCN 2016).

With some exceptions, the site outcomes in the MADIO Hotspot were identified prior to the adoption of the new KBA Standard. Significant additional work will be required to update the KBA analysis for the hotspot to meet the KBA Standard. This work requires considerably more time and resources than were available during the process to update the ecosystem profile. Nevertheless, available data on 23 freshwater KBAs in Madagascar, which were identified in 2018 by the IUCN Freshwater Biodiversity Unit following the new standard, were incorporated.

While the protection of a network of sites would probably be sufficient to conserve most elements of biodiversity in the medium term, the long-term conservation of all elements of biodiversity requires the protection of inter-connected landscapes of sites, or conservation corridors. Conservation corridors were defined wherever it was considered necessary to increase the area of actual or potential natural habitat in order to maintain evolutionary and ecological processes. Given limitations of time, paucity of relevant data, and absence of detailed criteria, emphasis was placed on maintaining continuums of natural habitat across altitudinal and latitudinal gradients, in order to increase the resilience of ecological processes to the impacts of climate change. Given the scale of the islands that make up the Comoros, Mauritius and the Seychelles, it was not considered necessary to define terrestrial conservation corridors in these countries.

5.1 Species outcomes

The previous ecosystem profile listed 1,251 species outcomes in the MADIO Hotspot, based on the 2013 IUCN Red List of Threatened Species. Based on the IUCN Red List as of 27 June 2022, there are now 4,344 globally threatened species that occur in the hotspot (Table 1). The majority (70 percent) of the species currently assessed in the hotspot are plants, which draws attention to the importance of plants both as conservation outcomes in their own right and as the building blocks of ecosystems that provide services essential to local populations and enhance their resilience to climate change. Among animals, the groups with the greatest number of globally threatened species are reptiles (with 168), insects (with 167), arachnids (with 162), amphibians (with 152), fishes (with 147) and mammals (with 146).

This net change of 3,093 species assessed as globally threatened represents a net increase of 247 percent over nine years. The majority of this increase is due to species being assessed for the first time. For plants, in particular, there has been a huge leap in the number of species assessed, from 903 in 2013 to 5,063 in 2022. There have also been numerous taxonomic revisions over the period, leading to species being split into several species. Nevertheless, some of the increase is due to genuine deterioration in the conservation status of species. Finally, it should be mentioned that, thanks to concerted efforts by conservationists, the global conservation status of a handful of species has actually increased over the period.

In summary, Madagascar and the Indian Ocean Islands are on the frontlines of the species extinction crisis, with 621 Critically Endangered, 1,462 Endangered and 944 Vulnerable species. These are greater numbers than for any other biodiversity hotspot on the planet.

Table 1. Globally threatened species in the MADIO hotspot as of 27 June 2022

Taxonomic group	Species assessed	EX species	EW species	CR species	EN species	VU species
ANIMALS	5,715	101	0	259	569	489
Mammals	288	5	0	35	64	47
Birds	515	37	0	7	35	36
Reptiles	476	14	0	28	64	76
Amphibians	329	0	0	23	85	44
Fishes	2,081	2	0	29	58	60
Insects	664	2	0	45	82	43
Malacostracans	123	0	0	0	2	6
Arachnids	213	9	0	40	82	40
Diplopodans	166	3	0	32	26	9
Maxillopodans	2	1	0	0	0	0
Hexanauplians	2	1	0	0	0	1
Chilopodans	10	0	0	3	5	1
Mollusks	385	26	0	17	54	45
Cnidairians	384	0	0	0	8	76
Echinoderms	76	0	0	0	4	5
Nemertodes	1	1	0	0	0	0
PLANTS	**5,063**	**3**	**2**	**621**	**1,462**	**944**
TOTAL	**10,778**	**104**	**2**	**880**	**2,031**	**1,433**

5.2 Site outcomes

A total of 329 KBAs have been identified in Madagascar and the Indian Ocean islands, covering a combined area of 9.6 million hectares (Table 2 and Figures 2 to 5). This area comprises 7.1 million hectares of terrestrial and freshwater ecosystems plus 2.5 million hectares of marine ecosystems. The country with the most KBAs is Madagascar, which accounts for 71 percent of the total number and 95 percent of the total area.

Table 2. Summary of Key Biodiversity Areas in the MADIO Hotspot

	Madagascar	Comores	Maurice	Seychelles	TOTAL
Number of KBAs	235	20	17	57	329
Land area (ha)	6,872,323	36,500	37,853	192,838	7,139,514
Marine area (ha)	2,285,924	149,453	43,794	11,780	2,490,951
Total area (ha)	9,158,307	185,953	81,647	204,618	9,630,525

Figure 2. KBAs in Madagascar

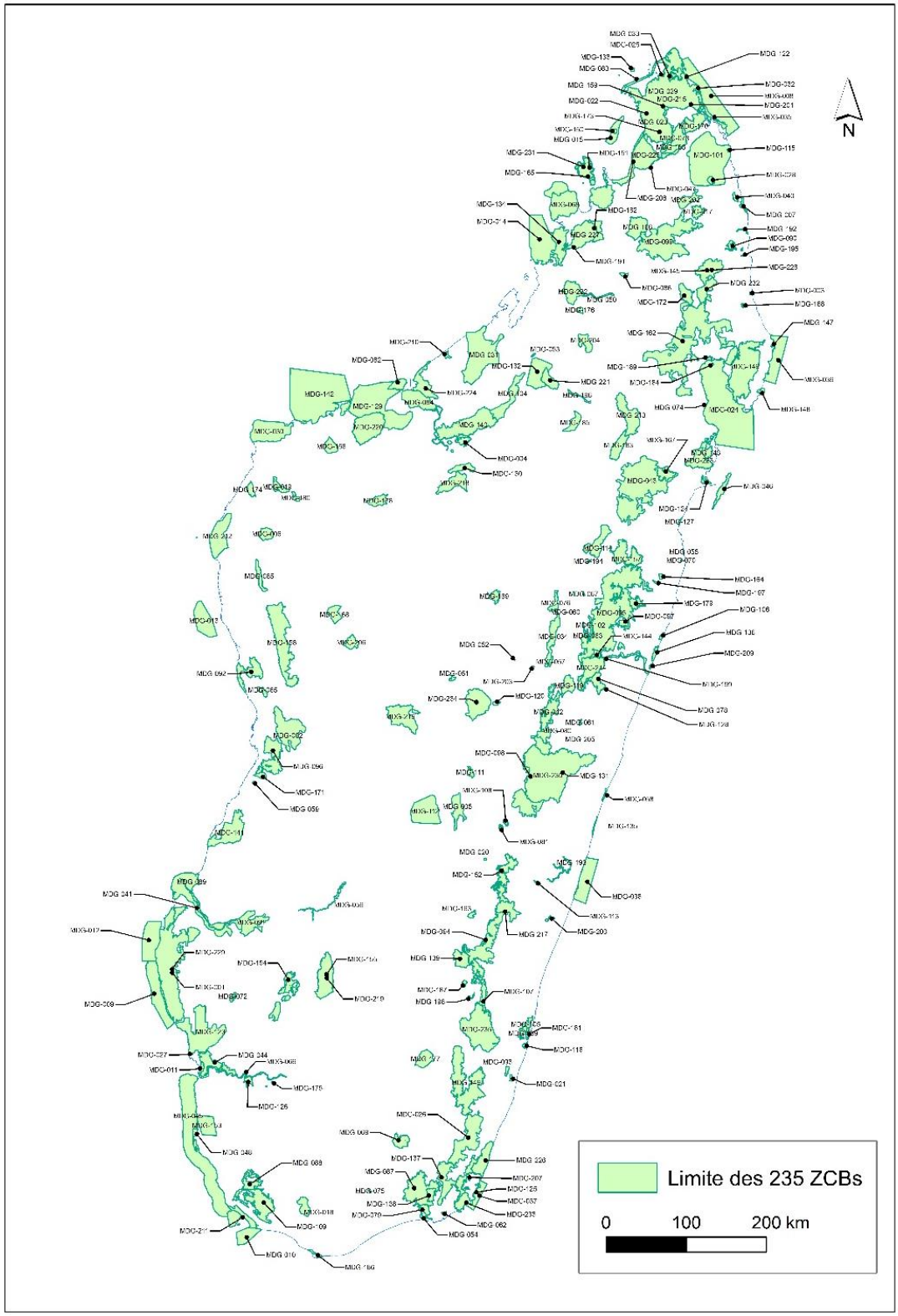


Figure 3. KBAs in the Comoros

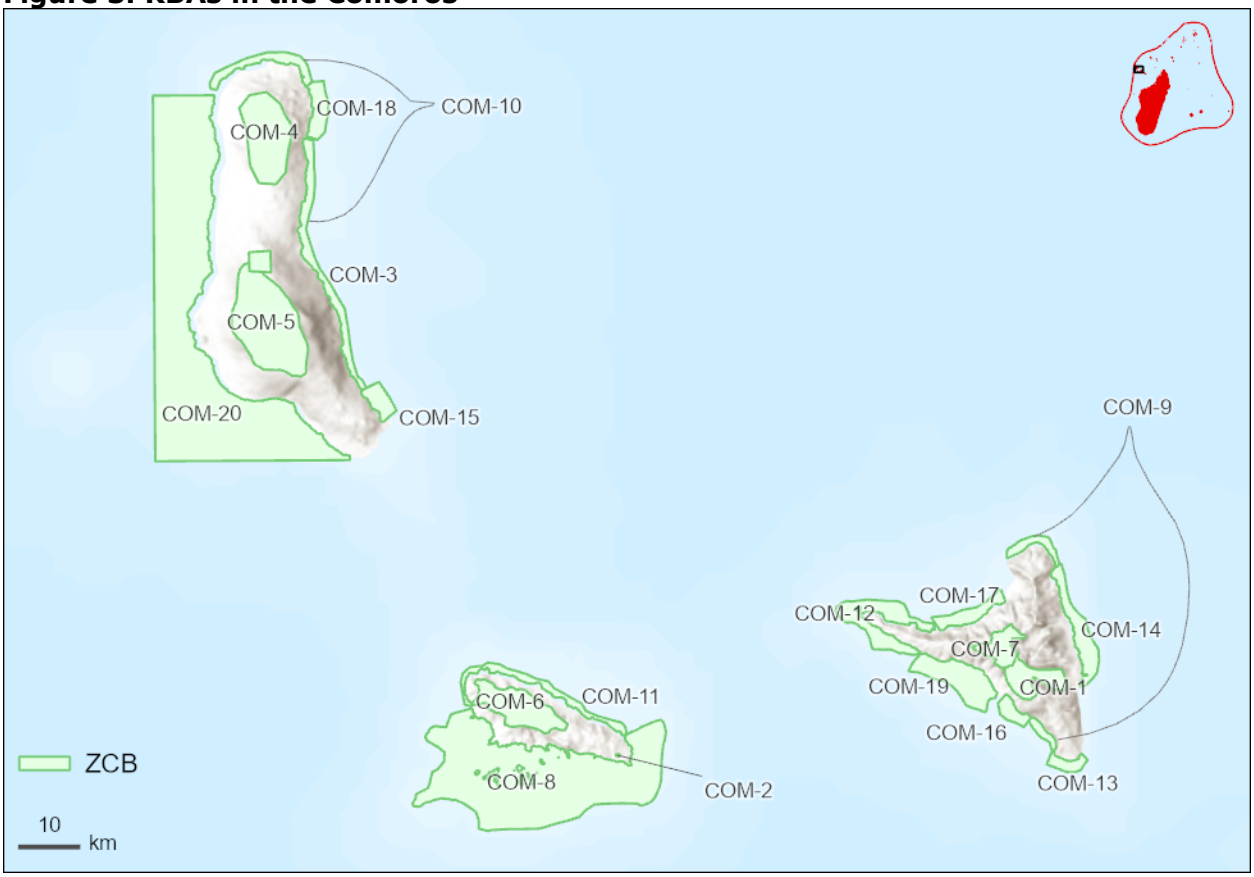


Figure 4. KBAs in Mauritius

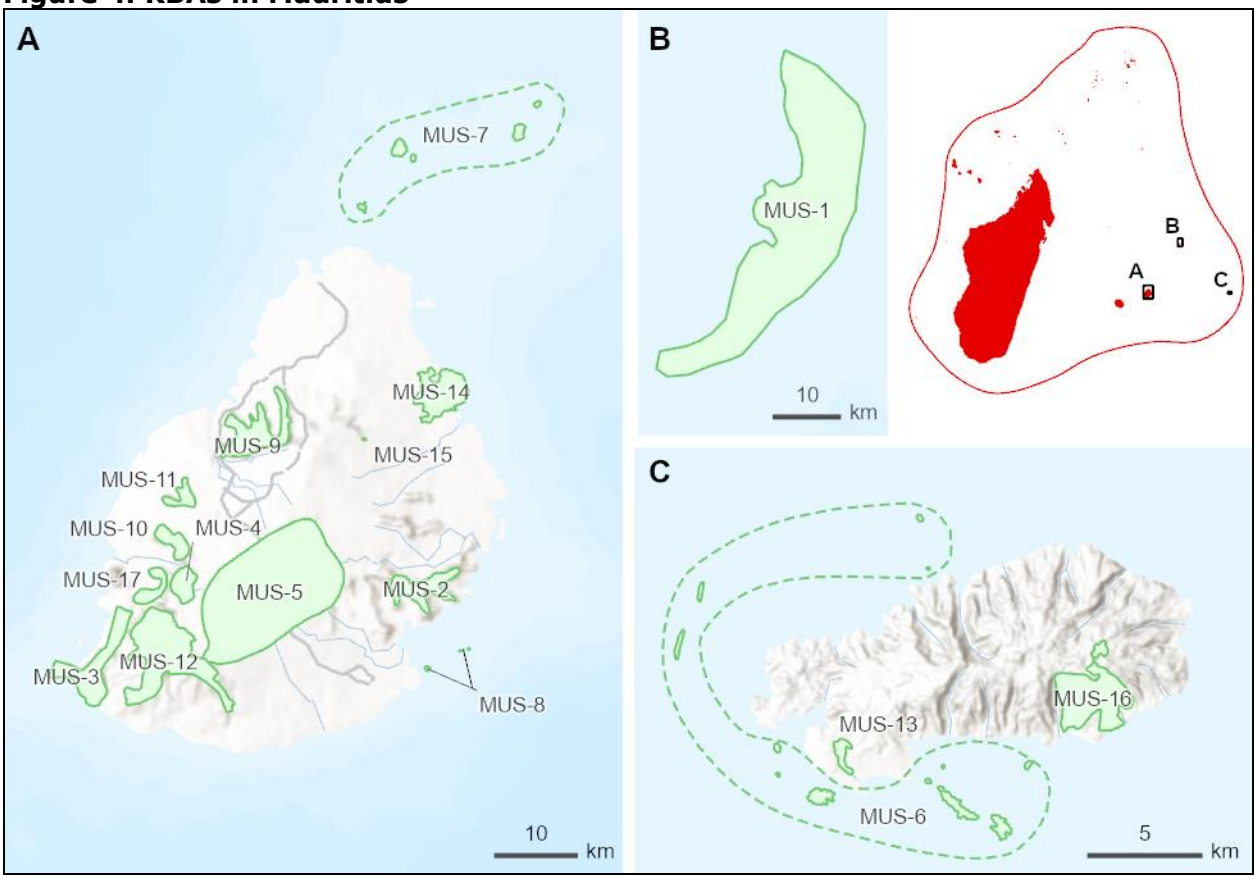
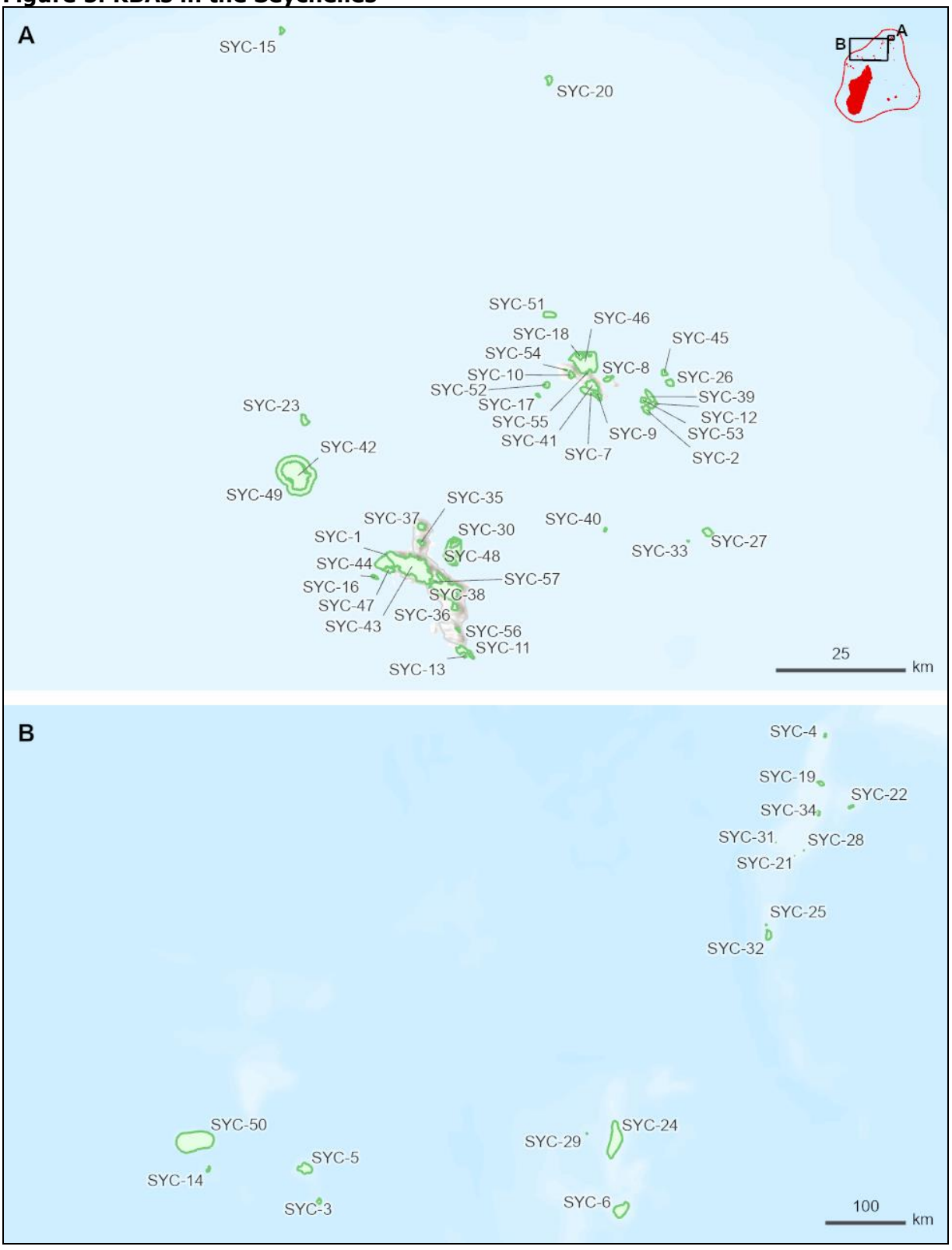


Figure 5. KBAs in the Seychelles



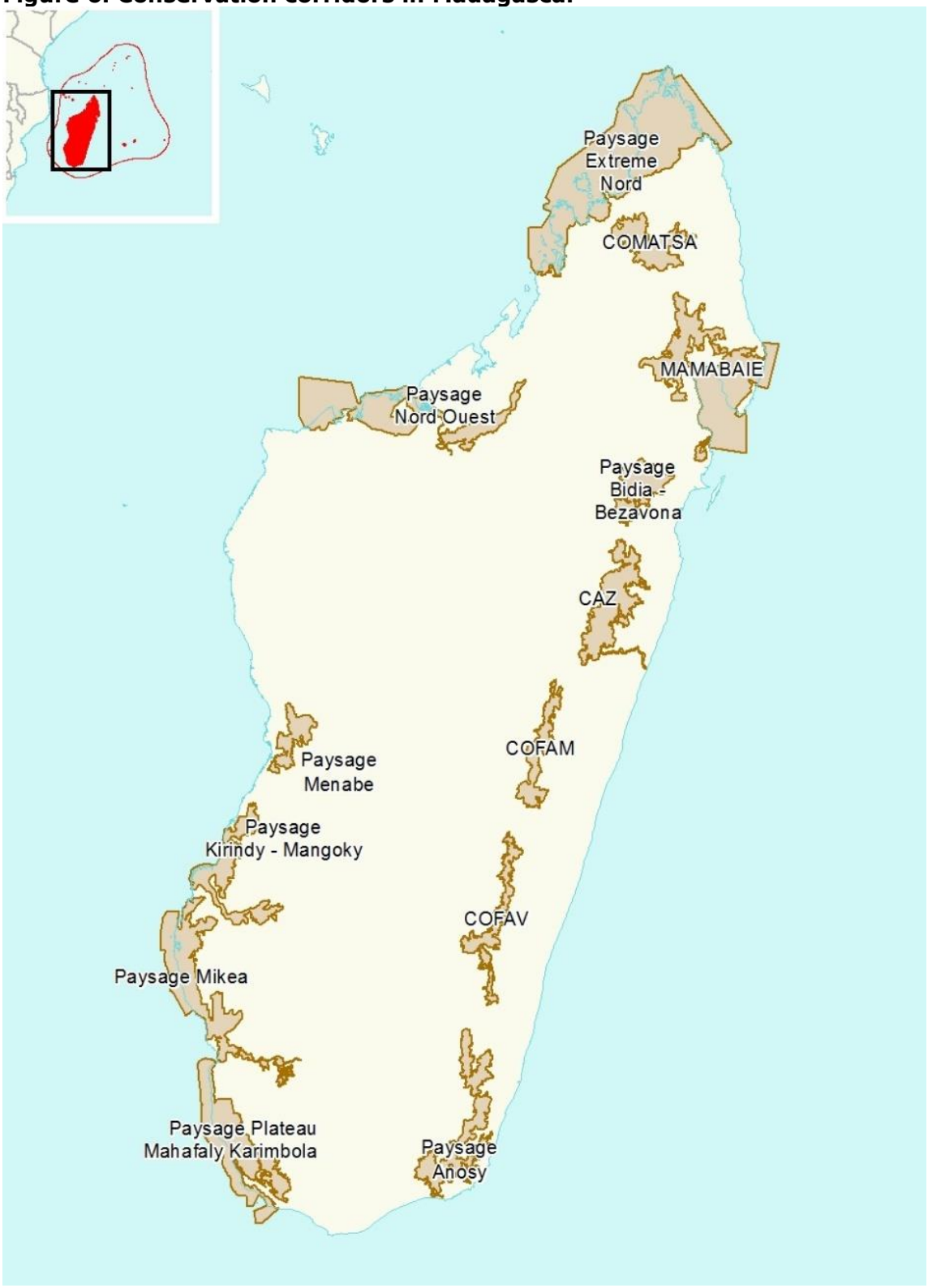
5.3 Corridor outcomes

In the small island states of the Indian Ocean, the concept of conservation corridors did not seem relevant, due to the size of the islands and the KBAs. However, the issue of ecological continuity remained at the heart of the approach, and groups of terrestrial sites were identified where a global approach would better achieve conservation objectives. Thus, in Mauritius and the Seychelles, the terrestrial KBAs often encompass several small protected areas, along with the unprotected areas that surround them. The principle of preserving biological continuity has, therefore, been maintained, even if the areas concerned do not justify the identification of explicit corridors.

In the case of Madagascar, 13 corridors were identified (Figure 6). These corridors cover a combined area of 8,979,603 ha. In Madagascar's eastern ecoregion, large forest blocks still exist, linking protected areas along the eastern slopes of the central cordillera. In this ecoregion, seven conservation corridors have been identified that are necessary to ensure ecological continuity. These corridors are of great importance in terms of biodiversity, as they include most of the country's remaining rainforests. They also play an important role in terms of ecosystem services, including carbon storage and water supply.

In other ecoregions, natural ecosystems are much more fragmented, and ecological continuity would be often difficult, if not impossible, to restore. Nevertheless, some regions have a number of important sites, sometimes small but of very high biological value, that share certain biological traits, and often share the same species. Even if the natural ecosystems are not contiguous, genetic exchanges between fragmented sites are still possible for some species. These exchanges could even be reinforced in the long term by human intervention. Moreover, biodiversity conservation in these regions would benefit from a broader vision, rather than a "site-by-site" approach. River systems in these regions play an important role in maintaining environmental flows among sites and require coordinated management to maintain water quality for aquatic species, as well as for the maintenance of essential ecosystem services. This is particularly the case for the important river systems of the Mahajanga River (Northwest Landscape), the Mangoky River (Kirindy-Mangoky Landscape) and the Onilahy River (Mikea Landscape). For this part of the country, where sites are more fragmented, the term "landscape" (*paysage*) was chosen, following a term commonly used in the Malagasy conservation community, to differentiate these corridors from the contiguous forest blocks of the eastern ecoregion.

Figure 6. Conservation corridors in Madagascar



6. ECOSYSTEM SERVICES AND KBA+

In each of the hotspot countries, ecosystem services were identified and then ranked, according to the relative importance of their contribution to the resilience of human populations to climate change. This was done through literature reviews and stakeholder consultations, resulting in the establishment of priority ecosystem service lists. These lists of priority ecosystem services are, thus, the product of "expert opinion". Managers and experts directly involved in ecosystem service issues at KBAs were consulted first. The methodology used was the "KBA+" methodology, originally developed in Madagascar by scientists at CI's Moore Center for Science and Oceans during the preparation of the previous ecosystem profile.

Thanks to previous work on KBA+ in Madagascar, spatial datasets on many ecosystem services were available for use in this analysis. For the Indian Ocean islands, however, assessments of ecosystem services are relatively underdeveloped. Although the importance of ecosystem services is affirmed in various strategic documents, they have not been sufficiently assessed to provide quantitative data to evaluate objectively their scientific, ecological and financial contributions to local populations. In this situation, the identification of ecosystem services and the relative weighting given to each were necessarily subjective.

In each country, once a list of 5 to 10 essential ecosystem services had been prepared, datasets were produced that could be overlaid on the layer of KBAs, thereby allowing the relative importance of each KBA for each ecosystem service to be assessed. Different sources of data in different formats were used to compile these datasets. Where spatial data were available, these were converted into GIS shapefiles and overlaid with the KBA boundaries to infer, by addition, the importance of each KBA for ecosystem services. In cases where spatial data were unavailable, expert opinion was used to assign relative importance to KBAs for a particular service.

Before any meaningful comparison could be made, data normalization was necessary. Two normalizations were performed on the data. Some ecosystem services were normalized by relative importance: each parameter value was divided by the maximum value for that parameter, giving a value between 0 and 1 for each KBA. Other ecosystem services were normalized by presence/absence, giving a value of 0 (if the service is absent) or 1 (if it is present) for each KBA. This process results in a table containing in KBAs in columns and ecosystem services in the rows, with the values in the cells indicating the relative importance of each KBA for each ecosystem service.

Given that all ecosystem services do not make equal contributions to the resilience of human populations to climate change, expert opinion was then used to weight each service. The weightings were then applied to the individual scores for each ecosystem service in the table, and the weighted scores were then summed to give an overall score based on this multi-criteria analysis. The results of this analysis are presented below. The relative importance of KBAs for ecosystem services that contribute to the resilience of human populations to climate change is shown in Figures 7 to 10. The ranking of KBAs following the KBA+ methodology is shown in Tables 3 to 6.

Figure 7. Relative importance of KBAs in Madagascar for ecosystem services

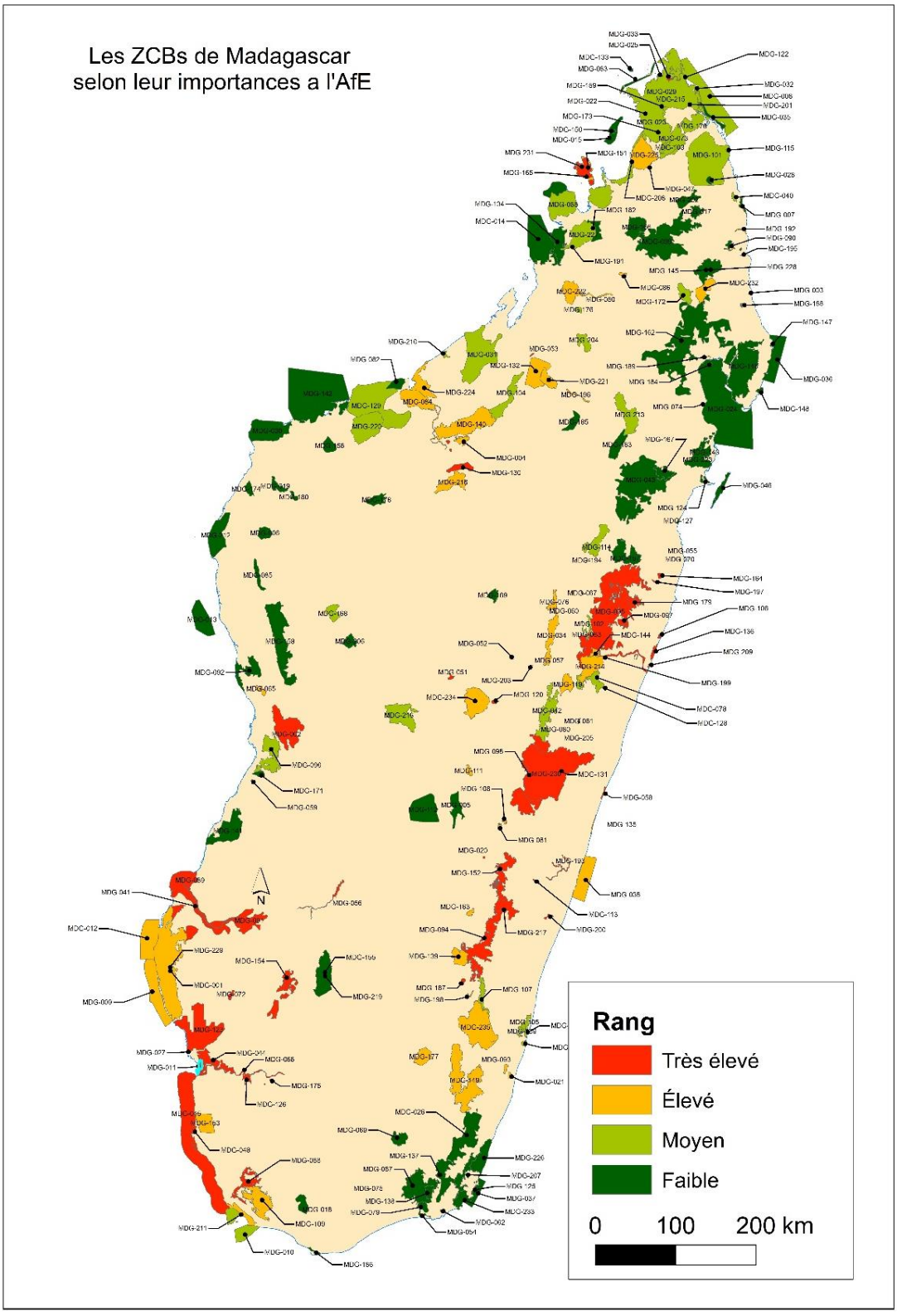


Table 3. KBA+ ranking in Madagascar based on multi-criteria analysis

KBA code	KBA name	Multi-criteria score
MDG-199	Mangoro and Rianala Rivers	4.75
MDG-110	Forest of Sahafina (Anivorano Brickaville)	4.18
MDG-097	Analamay-Mantadia Forest Corridor	3.43
MDG-131	Wetland of Nosivolo	3.29
MDG-066	Amoron'i Onilahy and Onilahy River	3.17
MDG-041	Mangoky River	3.12
MDG-098	Fandriana-Marolambo Forest Corridor	3.11
MDG-094	Ambositra-Vondrozo Corridor	3.11
MDG-051	Lake Itasy	3.09
MDG-055	Mahatsara (Mahambo Foulpointe)	3.05
MDG-197	Ivoloina River	3.00
MDG-179	Special Reserve of Mangerivola	2.88
MDG-164	Integral Nature Reserve of Betampona	2.80
MDG-095	SAPM Ankeniheny-Zahamena Corridor	2.79
MDG-123	PK32-Ranobe	2.78
MDG-136	North Pangalane	2.63
MDG-230	Ramsar site of Nosivolo	2.61
MDG-027	Belalanda	2.58
MDG-130	Wetlands of Maevatanana Ambato Boeny	2.55
MDG-020	Ankafina (Ambohimasoa)	2.54
MDG-154	Zombitse-Vohibasia National Park	2.52
MDG-011	Tsinjoriake-Andatabo MPA	2.48
MDG-128	Vohibe-Ambalabe (Vatomandry)	2.43
MDG-089	Lake Ihotry Complex - Mangoky Delta	2.42
MDG-072	Analavelona	2.41
MDG-152	Ranomafana National Park and extension	2.37
MDG-217	Source of Faraony	2.26
MDG-056	Makay	2.21
MDG-070	Analalava Foulpointe	2.20
MDG-193	River of Mananjary	2.18
MDG-106	Classified Forest of Vohibola	2.17
MDG-091	Mangoky-Ankazoabo Complex	2.14
MDG-203	Angavokely Forestry Station	2.13
MDG-045	Great reef of Toliary	2.06
MDG-200	Namorona-Faraony rivers	2.02
MDG-209	Wetland of Ambila-Lemaintso	2.01
MDG-088	Mahafaly Plateau Forest Complex	2.01

KBA code	KBA name	Multi-criteria score
MDG-033	Three Bays Complex	1.97
MDG-175	Special Reserve of Beza Mahafaly	1.97
MDG-187	Special Reserve of the Peak of Ivohibe	1.97
MDG-053	Lake Tseny	1.97
MDG-044	Saint-Augustin Forest	1.96
MDG-120	Massif of Manjakatompo-Ankaratra	1.95
MDG-126	Seven Lakes	1.91
MDG-113	Kianjavato	1.90
MDG-002	Ambalimbe Menabe	1.89
MDG-058	Nankinana (Ambodibonara-Masomeloka)	1.84
MDG-052	Lake Tsarasaotra	1.82
MDG-048	Itampolo West - Mahafaly	1.79
MDG-231	Group of Islands of Nosy-Be	1.76

Note: For brevity, only the top 50 ranked KBAs are shown.

Figure 8. Relative importance of KBAs in the Comoros for ecosystem services

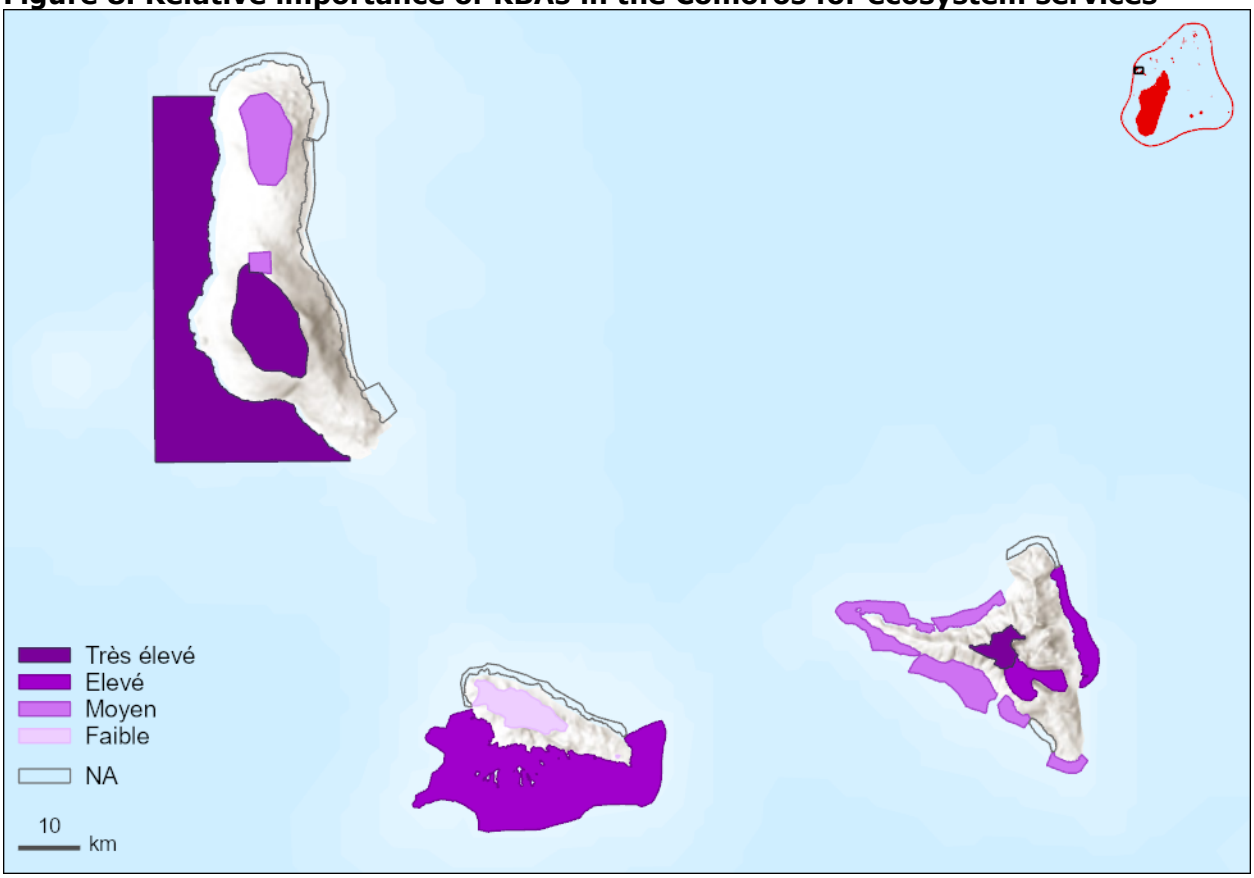


Table 4. KBA+ ranking in the Comoros based on multi-criteria analysis

KBA code	KBA name	Multi-criteria score
COM-7	Mount Ntringui (Ndzuani Heights)	0.54
COM-5	Karthala Massif	0.45
COM-20	Coelacanth Zone	0.43
COM-1	Moya Forest	0.27
COM-14	Domoni area	0.25
COM-4	Massif de la Grille	0.22
COM-8	Ex-Marine Park of Moheli	0.21
COM-12	Bimbini area and Ilot de la Selle	0.19
COM-19	Pomoni area	0.18
COM-16	Moya area	0.17
COM-10	Coral reefs of Grande Comore	0.16
COM-17	Mutsamudu area	0.15
COM-3	Lake Hantsongoma	0.14
COM-9	Coral reefs of Anjouan	0.14
COM-13	Chiroroni area	0.13
COM-15	Male Zone	0.12
COM-6	Mount Mlédjélé (Heights of Mwali)	0.11
COM-18	Zone of Ndroudé and Ilot aux Tortues	0.10
COM-11	Coral reefs of Moheli - outside the Marine Park	0.09
COM-2	Lake Dziani-Boudouni	0.05

Figure 9. Relative importance of KBAs in Mauritius for ecosystem services

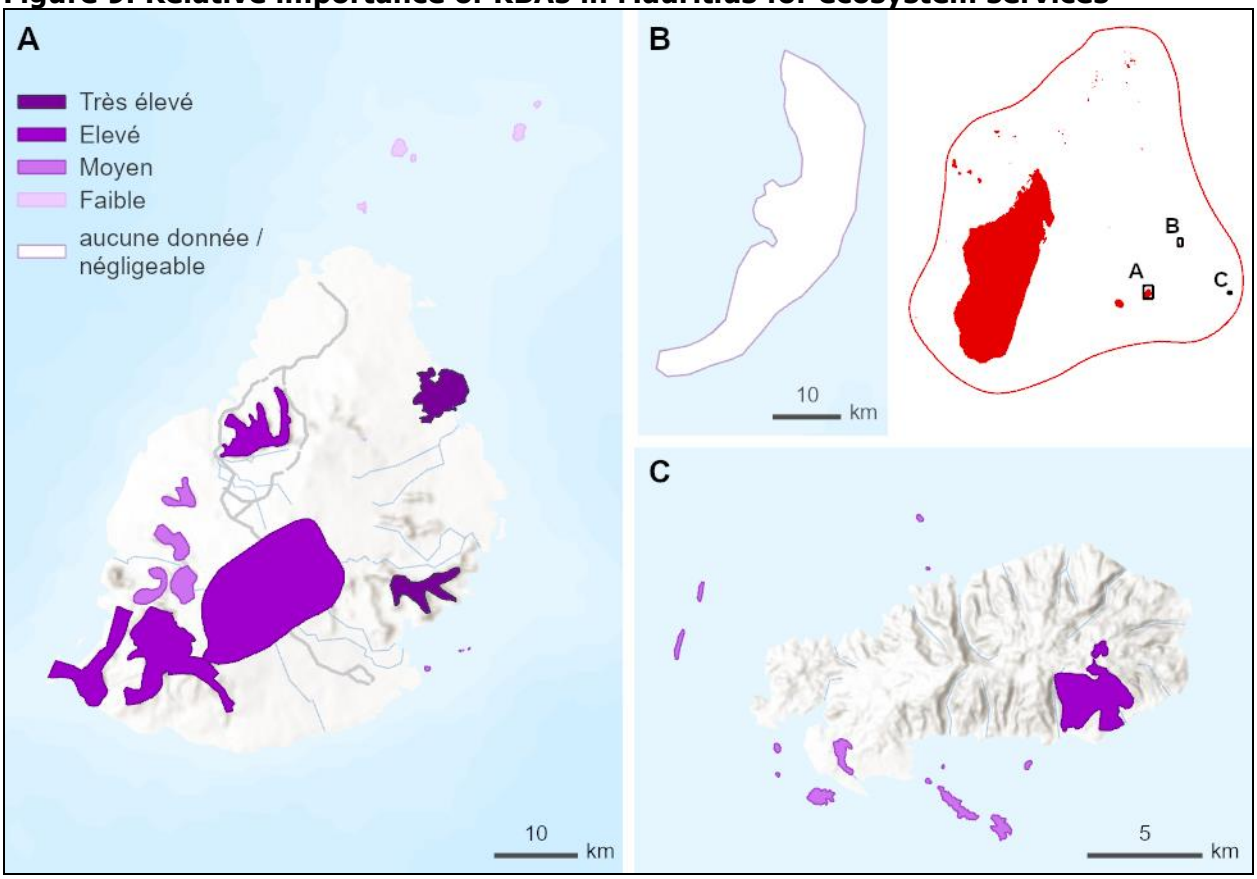


Table 5. KBA+ ranking in Mauritius based on multi-criteria analysis

KBA code	KBA name	Multi-criteria score
MUS-2	Bamboo Mountain Range	0.655
MUS-5	Relict Forests of the Central Plateau	0.550
MUS-14	Plaine des Roches - Bras d'Eau	0.537
MUS-12	Black River Gorges National Park and surrounding areas	0.520
MUS-3	Chamarel - Le Morne	0.503
MUS-8	Mauritius South-Eastern Islets	0.395
MUS-16	South Slopes of Grande Montagne	0.364
MUS-17	Yemen-Takamaka	0.353
MUS-11	Montagne Corps de Garde	0.343
MUS-6	Rodrigues' Islets	0.308
MUS-4	Tamarind Falls / Mount Simonet / Cabinet Nature Reserve	0.290
MUS-9	Le Pouce - Anse Courtois - Pieter Both - Longue Mountain	0.280
MUS-7	Mauritius Northern Islets	0.260
MUS-10	Mondrain - Magenta - Trois Mamelles - Mont du Rempart	0.225
MUS-13	Coral Plain	0.220
MUS-1	Cargados Carajos Shoals	0.200
MUS-15	Good God Bridge	0.167

Figure 10. Relative importance of KBAs in the Seychelles for ecosystem services

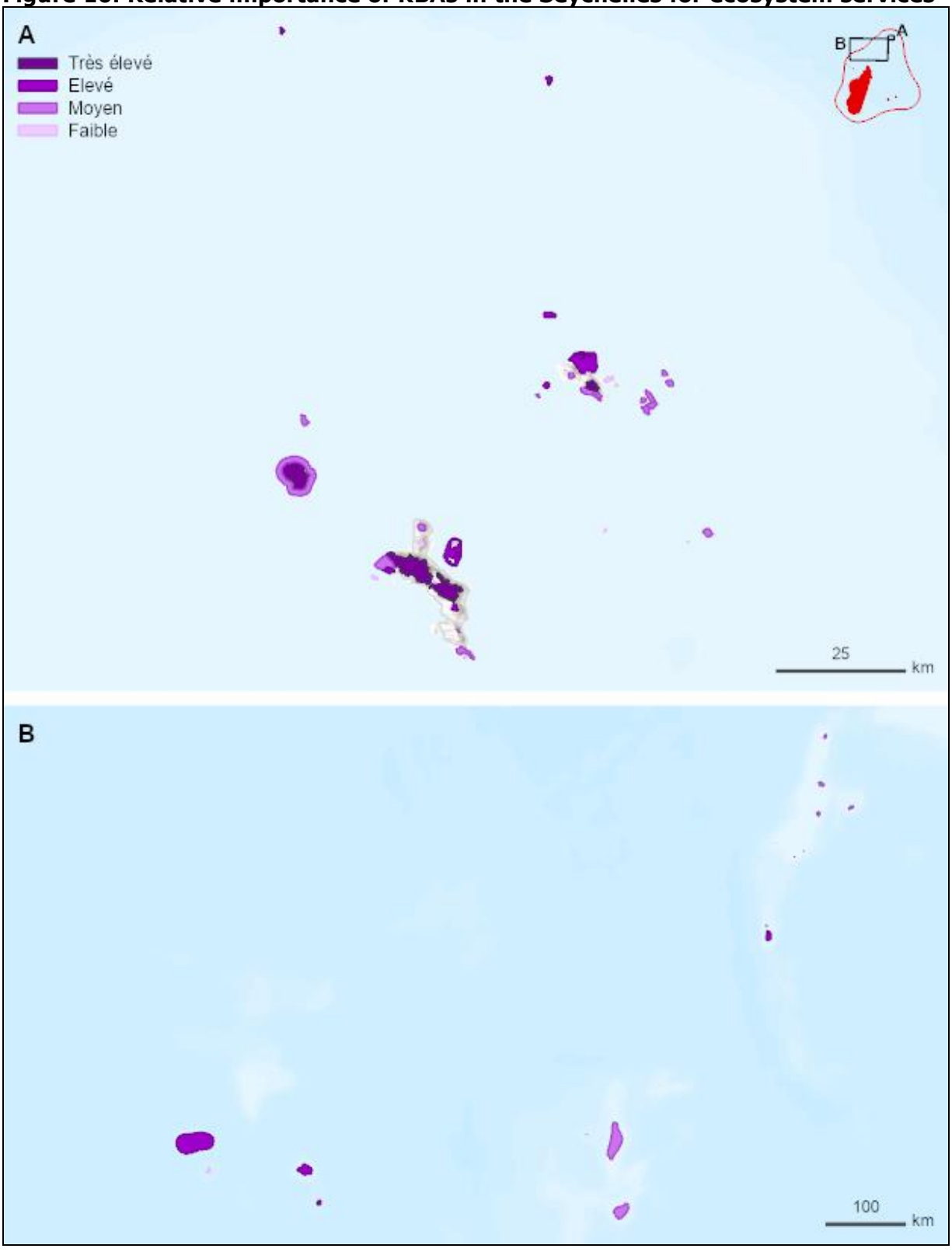


Table 6. KBA+ ranking in the Seychelles based on multi-criteria analysis

KBA code	Island group	Terrestrial /Marine	KBA name	Multi-criteria score
SYC-43	Inner	T	Morne Seychellois National Park	0.719
SYC-38	Inner	T	Montagne Planneau (Grand Bois-Varigault-Cascade)	0.633
SYC-41	Inner	T	Praslin National Park	0.586
SYC-42	Inner	T	Silhouette National Park	0.563
SYC-36	Inner	T	Montagne Brûlée-Piton de l'Eboulis	0.500
SYC-50	Aldabra	M/T	Aldabra Special Reserve	0.469
SYC-47	Inner	M	Port Launay Marine National Park and coastal wetlands	0.469
SYC-15	North edge	T	Bird Island (Ile aux Vaches)	0.469
SYC-5	Cosmoledo	M/T	Cosmoledo	0.453
SYC-51	Inner	M/T	Aride Island Special Reserve	0.445
SYC-52	Inner	M/T	Cousin Island Special Reserve	0.445
SYC-48	Inner	M	Sainte-Anne Marine National Park (SAMNP)	0.438
SYC-20	North edge	T	Denis Island	0.430
SYC-46	Inner	M	Curieuse Island Marine National Park	0.406
SYC-32	Amirantes	M/T	Saint-François and Bijoutier Islands	0.406
SYC-3	Cosmoledo	M/T	Astove	0.398
SYC-18	Inner	T	Curieuse Island	0.391
SYC-19	Amirantes	M/T	D'Arros Island and Saint Joseph Atoll	0.383
SYC-6	Farquhar	M/T	Farquhar - South Island and islets	0.375
SYC-9	Inner	T	Fond Ferdinand	0.352
SYC-49	Inner	M	Silhouette Marine National Park	0.344
SYC-22	Amirantes	M	Desroches Island - surrounding reefs	0.344
SYC-25	Amirantes	M/T	Alphonse Island and Lagoon	0.344
SYC-39	Inner	T	Nid d'Aigle (ridge and eastern slopes)	0.336
SYC-23	Inner	T	North Island (Ile du Nord)	0.336
SYC-56	Inner	T	Val d'Endor	0.328
SYC-26	Inner	T	Félicité Island	0.320
SYC-17	Inner	T	Cousine Island	0.320
SYC-27	Inner	T	Frégate Island	0.313
SYC-2	Inner	T	Anse Source d'Argent-Anse Marron	0.313
SYC-44	Inner	M	Cap Ternay / Baie Ternay Marine National Park	0.305
SYC-7	Inner	T	Fond Azore southern slopes to Anse Bois de Rose	0.305
SYC-34	Amirantes	M	Poivre Lagoon and surrounding reefs	0.297
SYC-45	Inner	M	Ile Cocos Marine National Park	0.289

KBA code	Island group	Terrestrial /Marine	KBA name	Multi-criteria score
SYC-21	Amirantes	T	Desnoeufs Island	0.289
SYC-12	Inner	T	Grand Anse-Petite Anse-Fond Piment	0.281
SYC-53	Inner	T	La Veuve Special Reserve	0.273
SYC-28	Amirantes	T	Marie-Louise Island	0.258
SYC-10	Inner	T	L'Amitié Forest	0.250
SYC-37	Inner	T	Montagne Glacis - When she comes	0.242
SYC-4	Amirantes	M	African Banks	0.242
SYC-24	Farquhar	M/T	Providence Island and Bank	0.234
SYC-29	Inner	T	Sainte-Anne Island	0.234
SYC-11	Inner	T	Montagne Corail - Collines du Sud dry forests	0.227
SYC-13	Inner	T	Grand Police wetlands	0.219
SYC-1	Inner	M	Anse Major / Anse Jasmin (marine area of MSNP)	0.219
SYC-14	Aldabra	M/T	Assumption Island	0.219
SYC-31	Amirantes	T	Etoile and Boudeuse Islands	0.211
SYC-57	Inner	T	La Misère-Dauban area: La Misère	0.195
SYC-8	Inner	T	Fond Diable and Pointe Josephine	0.188
SYC-40	Inner	T	Recif Island National Park	0.148
SYC-35	Inner	T	Mount Signal	0.148
SYC-33	Inner	T	Ilot Frégate	0.125
SYC-16	Inner	T	Conception Island	0.125
SYC-54	Inner	T	Kerlan River	0.109
SYC-55	Inner	T	Anse Petite Cour Boulders	0.078
SYC-30	Farquhar	T	Saint-Pierre Island	0.055

7. THREAT ASSESSMENT

The assessment of threats to biodiversity and their root causes was developed on the basis of information gathered from literature, interviews with experts, and assessments conducted during the national consultations. The threats that affect biodiversity can be anthropogenic or natural in nature. Anthropogenic threats include agriculture, mining, unsustainable collection of natural resources, fire, urbanization and invasive alien species, while natural events include cyclones, storms, floods and drought. The intensity and frequency of natural phenomena, as well as some anthropogenic threats, are exacerbated by climate change.

7.1 Madagascar

Madagascar faces significant environmental challenges, including deforestation, degradation of natural areas, land and coastal erosion, accelerated depletion of natural resources, disappearance of endemic species, and climate change. These threaten the ecological

functions and ecosystem services that ensure the wellbeing and socio-economic development of local populations.

The main cause of deforestation is the traditional agricultural technique known as *tavy*, whereby fields are cleared by burning, used for crops, and then left fallow for 10 years. When long cycles are respected, this practice can be effective and productive for subsistence agriculture. However, population pressure has led farmers to shorten fallow cycles and expand *tavy* onto steep slopes with low yields and high potential for soil erosion. Such practices result in large abandoned areas that are quickly colonized by weeds or invasive species.

Overgrazing is also a major driver of deforestation and forest degradation, particularly in the western and southern regions of Madagascar. Grasslands are expanding at the expense of natural habitats, due to population growth and economic and cultural pressures that favor increased herd size. In addition, the burning of grasslands before the rainy season to stimulate growth often results in uncontrolled fires that destroy forests and other natural habitats.

Finally, demand for fuelwood (firewood and charcoal) is an important factor in the degradation of forest ecosystems, as fuelwood represents 92 percent of the energy sources used by the Malagasy population.

Other major threats to terrestrial biodiversity include mining, soil erosion, sedimentation and pollution. Rising global mineral prices and economic stimulus policies have led to an increase in mining operations, both large and small, which can have a significant impact on natural ecosystems. Although the area of natural forest lost directly to mining is relatively small, the indirect impacts may be more significant, including pollution of watercourses and in-migration of people to mining areas. Soil erosion is one of the biggest environmental problems in Madagascar. Deforestation in the highlands, coupled with the alteration of natural geological and soil conditions, results in widespread soil erosion, which can reach 400 tonnes per hectare per year in some areas.

Freshwater ecosystems are threatened by major changes in land use, especially expansion of agriculture in watershed areas, as well as diversion of rivers by dams, dykes, pipelines and other infrastructure. The loss of freshwater ecosystems can occur very rapidly in Madagascar. For example, following the designation of the Torotorofotsy wetland complex as a protected area in 2015, 38 percent of the intact marshes had been illegally converted to rice fields within a year despite its status as a Ramsar site since 2005.

Threats to coastal and marine biodiversity include pollution from domestic, agricultural and industrial sources, particularly near to urban areas and ports. The proliferation of smallscale, unregulated mining operations along rivers also exposes downstream marine and coastal ecosystems to intense disturbance. Pollution, including accidental oil spills, is also not negligible in some coastal regions of Madagascar, particularly the east, southeast and south.

Illegal and unregulated exploitation of natural resources continues to be a scourge for Madagascar’s biodiversity conservation efforts. Some of this is driven by illegal trade in timber (particularly rosewood and ebony) and wildlife (particularly turtles, chameleons, orchids and succulents). Although it has been illegal to kill or keep lemurs as pets since

1964, they are widely hunted today, except in areas where they are protected by local taboos.

7.2 Comoros

Terrestrial ecosystems (natural forests, heather steppe and savannas) in the Comoros are threatened by uncontrolled and unsustainable logging, exploitation of minerals (basaltic slags), land clearance for agriculture and bushfires set to clear land for pasture or shifting cultivation. Root causes include insecurity of tenure over cultivable land, high population growth, inadequate forestry legislation, and incomplete and unenforced environmental legislation.

The clearing of land for food crops does not spare sensitive areas or those with steep slopes, which very often leads to intense erosion and landslides. Both phenomena contribute to land degradation and considerable loss of habitats and biodiversity. For historical and technical reasons, the lower slopes, which are most suitable for food crops, are largely occupied by cash crops grown for export, mainly clove and ylang ylang. This poor use of space, aggravated by unsuitable cultivation techniques, has resulted in the degradation of cultivable land and forced farmers to encroach on forests areas.

Bush fires are common and originate most often in crop plots and pasture lands. Repeated wildfires are more destructive and give little chance for biodiversity to recover. In addition to direct damage, fires often pave the way for the establishment of invasive alien species.

Freshwater biodiversity is threatened by deforestation and soil erosion, directly related to increasing demographic pressure. Anjouan island is currently facing a serious problem of loss of surface water resources. While 30 perennial streams were recorded in 1970, only four remain today. On Grande Comore island, where the soil is porous, surface water resources are almost non-existent.

Coastal and marine biodiversity is threatened by erosion, exploitation of natural materials (sand, pebbles) for construction, pollution by household waste (waste water and plastic packaging) and discharge of wastewater in urban areas. Coral islands, banks and reefs are threatened by habitat destruction due to unsustainable fishing methods and excessive sedimentation due to soil erosion following deforestation, compounded by oceanic warming and acidification. Seagrass beds, which are the staple food of globally threatened sea turtles and dugongs, are threatened by oxygen depletion in the water caused by reef destruction and temperature increases. Mangroves are threatened by cutting of trees for construction materials and charcoal making.

Demographic pressures are a major constraint for any biodiversity conservation efforts in the Comoros. The proportion of unskilled, unemployed and landless adults is growing steadily, and these (often young) people have limited economic alternatives to exploiting natural resources in unsustainable ways.

7.3 Mauritius

The main threats to terrestrial biodiversity in Mauritius are invasive alien species, pests and diseases, land-use change, habitat fragmentation, fire and climate change. The main threats

to freshwater biodiversity include reclamation of marshes, sedimentation, pollution, eutrophication, loss of forest cover, invasive alien species and climate change. With regard to marine and coastal biodiversity, a longer list of threats was identified, including overexploitation of natural resources, unsustainable tourism development, illegal fishing, bycatch of turtles and other threatened species, erosion and sedimentation due to land-cover change, run-off of pollutants from the land, oil spills and, once again, climate change. Root causes include overcrowding, pressures on available land, low priority for public funding given to biodiversity conservation, lack of awareness of the values of native species and ecosystems, and lack of capacity and funding among conservation organizations.

In Mauritius, economic growth, as well as changing patterns of production, consumption and service delivery are putting pressure on the environment as never before. Some of important sectors, such as health, education, energy, food, sanitation and transport, while contributing to a vibrant economy, have not sufficiently integrated measures necessary for preservation of the islands' native biodiversity and ecosystems. For example, while the island of Mauritius has one of the highest proportions of built-up areas in the world and a population that endures water shortages on a daily basis, the drive to replace greenery, including forest, with concrete, has accelerated since the previous ecosystem profile. Water scarcity is also a critical issue on Rodrigues island.

Overall, there is low government commitment to conservation, resulting in low allocation of funds and lack of trained personnel for proper monitoring and enforcement. Policy makers and civil society have a low appreciation and understanding of the need for environmental protection and conservation of indigenous biodiversity. Not surprisingly, there are still too few active NGOs. Corporate social responsibility funds are only available to registered NGOs, which excludes other actors who could contribute, such as research institutes or universities.

7.4 Seychelles

Invasive alien species are the most significant threat to terrestrial biodiversity in the Seychelles, and their impact is compounded by other factors, such as land-use change, increased international and inter-island trade and transportation, the development of the tourism and hiking industry, and climate change. The impacts of all these factors affect forests on a large scale and over the long term, and can lead to dramatic consequences in terms of habitat loss, extinction of endemic species, and alteration of ecosystem functions. Among invasive alien species, diseases and vectors represent a formidable threat that can have dramatic consequences both ecologically and economically (as well as for public health, for example with the increased abundance of the Tiger mosquito, responsible for transmission of dengue fever and Chikungunya).

Other threats to terrestrial biodiversity in the Seychelles include land-use change (clearing of forest for infrastructure or residential development), fire and climate change. The root causes include economic development and lack of management capacity for implementation of environmental policies.

The main threats to freshwater biodiversity are drainage and canalization of wetlands, sedimentation, pollution/eutrophication, invasive alien species and climate change. For drainage and canalization, the causes include economic development, residential development, and agricultural expansion. Sedimentation is caused by deforestation in the

watersheds of streams and non-flowing wetlands, while pollution/eutrophication is caused by a lack of water treatment, low awareness of the impacts of pollution and accumulation of persistent organic pollutants. For all of these threats, stakeholders identified lack of management capacity for policy implementation as an indirect cause.

In marine and coastal ecosystems, the main threats to biodiversity are overexploitation of natural resources, bycatch of turtles, sharks and other threatened species, pollution and debris (fishing gear and other non-biodegradable solids), climate change and, potentially, invasive alien species. The causes of overexploitation include economic development, overcapacity in the fishing fleet and inappropriate/perverse incentives. The main causes of pollution and debris include economic development, urbanization, inadequate industrial and domestic sanitation, and waste management practices on fishing vessels. Again, identified lack of management capacity for policy implementation was identified as an indirect cause throughout.

8. SOCIOECONOMIC CONTEXT

Based on the most recent available data, the population of the four countries in the MADIO Hotspot totals more than 30 million people, 93 percent of whom live in Madagascar. Population density is higher in the three Indian Ocean island countries (Mauritius: 638 persons/km^2; Comoros: 342 persons/km^2; Seychelles: 218 persons/km^2) than in Madagascar (48 persons/km^2). In terms of population growth, however, it is Madagascar and the Comoros that stand out, with annual growth rates around 3 and 2 percent, respectively. At this rate, it is estimated that Madagascar's population will be well over 33 million by 2030, up from 28 million in 2018. The arrival of five million more people will place additional pressures on the already stressed and depleted ecosystems of the country.

Madagascar's Human Development Index (HDI) score of 0.528 places the country 164th out of 189 countries and territories. In 2020, 71.5 percent of Madagascar's population was living in poverty, according to the National Survey on the Monitoring of the Millennium Development Goals. After recording a real-terms growth in GDP of 4.4 percent in 2019, the country entered a recession in 2020, due to the COVID-19 pandemic Covid-19, when real-terms GDP declined by 4 percent.

At 0.554, the HDI score for the Comoros is slightly higher than for Madagascar. Nevertheless, the country is characterized by extreme poverty, which affects a quarter of the population, and an overall poverty rate of 42.4 percent. There is also persistent inequality, with the Gini coefficient dropping from 0.55 to 0.45 between 2004 and 2014. Poverty and inequality are, in large part, explained by the prevailing economic context in Comoros but also by the absence of a reliable social security system.

As for the Republic of Mauritius, its HDI score of 0.804 gives it a ranking of 66th among the 189 countries and territories assessed. Inequality still exists within the country, although the incidence of absolute poverty is relatively low, despite pockets still prevailing in some suburban and coastal areas of both Mauritius and Rodrigues islands. Pockets of poverty are in some ways correlated with where most descendants of enslaved people live, such as traditional coastal fishing communities. These communities are particularly vulnerable because government investment is more focused on higher education in an attempt to

promote economic growth. Yet children from poorer families, such as those found on the coasts of Mauritius and Rodrigues islands, are less likely to benefit from this policy.

Social and economic indicators in Seychelles are also relatively good. The country's social indicators have remained strong and its HDI score is 0.796. Nevertheless, poverty and deprivation still exist in Seychelles but are difficult to measure or have not been measured sufficiently in the past. According to World Bank data, the poverty rate is about 2.5 percent, but a 2020 study by the Seychelles National Statistical Office found that 12 percent of the population was multi-dimensionally poor and suffered from deprivations related to standard of living, education, health and employment.

The countries of the MADIO Hotspot have not been spared from the global economic crises caused by recent global events, including the COVID-19 pandemic and the war in Ukraine. The economies of each country have been impacted by increasing fuel and commodity prices and severe reductions in visitor arrivals.

In Madagascar, although nearly 80 percent of the population is engaged in agricultural activities, this sector does not contribute significantly to economic development. One reason for this is low agricultural productivity, due to insufficient use of modern technology, lack of connectivity to markets and sometimes unfavorable weather conditions. Apart from agricultural work, rural households have few alternative activities that can generate sufficient income to mitigate the impact of crop failure and weather shocks. Hence, they can resort to unsustainable and destructive forms of natural resource use.

Nonetheless, Madagascar generates export revenues from vanilla, cloves and other spices. The country is also known for its mineral wealth, and two major mining companies are established in the country and involved in the exploitation of nickel, cobalt and ilmenite. Another important foreign exchange earner is fishing. In 2018, the fisheries sector accounted for nearly 7 percent of Gross Domestic Product (GDP) and 6.6 percent of exports. Finally, tourism, particularly ecotourism, was the third largest foreign exchange earner prior to COVID-19, contributing up to 10 percent of GDP. Visits to protected areas (national parks) and scuba diving take precedence over beach tourism, demonstrating the importance of recreation as an ecosystem service.

The Comorian economy is dominated by the agriculture and trade sectors. The agriculture sector is focused on the production of three crops of high commercial value, which together provide around 95 percent of the country's export earnings: vanilla; cloves; and ylang ylang. Food production (mainly bananas, copra and tubers, as well as fishing for local consumption) remains underdeveloped. Agriculture provides employment for a large part of the Comorian population but is little mechanized and marked by low productivity, and most farmers live in a state of economic insecurity.

The Comorian economy faces several problems related to the size of demand, supply, transaction and transport costs, and the weakness of economies of scale in defining profitable production choices. The access of enterprises to productive resources is very limited, as financial institutions do not offer services that enable them to acquire the operating goods they require. Industry in the Comoros is in an embryonic state, and the income of Comorian households is increasingly boosted by remittances from family members living in other countries.

In Mauritius, the main economic sectors are textiles, construction, manufacturing, tourism and financial services. The service sector accounts for 68 percent of GDP. The economy is diversifying as a result of expansion of information and communication technology, and business process outsourcing. Other economic sectors that are expanding are seafood, real estate, and energy. Mauritius is also investing in becoming a health tourism destination and a regional center for higher education. Mauritius is considered an investor-friendly country and enjoys a number of competitive advantages over other African countries.

The tourism industry in Mauritius grew in economic importance from the 1970s onwards, as the government encouraged the establishment of hotels with tax incentives, to diversify the economy and reduce dependence on sugar exports. These incentives led to an increase in tourist arrivals, a trend that has continued to the present, with almost 1.4 million arrivals in 2019 (the last year unaffected by the pandemic). The Mauritian tourism industry focuses on high-end, quality tourism. As a result, most tourist spending is captured by large hotels, with little revenue distributed to smaller businesses.

The main agricultural product is sugarcane. While the sugarcane industry accounts for less than 1 percent of GDP, it employs around 3.5 percent of the population. In the last two decades, as the price of sugar has fallen, Mauritius has shifted the focus of the sugarcane industry to electricity generation and the production of specialty sugars for export. The area devoted to sugarcane has reduced.

The most important sectors of the Seychelles economy are tourism and fishing. Prior to the COVID-19 pandemic, tourism provided 19 percent of formal employment, and over 25 percent of GDP; the majority of revenue was in foreign currency. Some tourist facilities play an important direct role in nature conservation programs, particularly on private islands, by co-funding programs to eradicate invasive alien species (particularly rats) and restore habitats, as well as to conserve or reintroduce native wildlife.

Industrial fishing is the country's largest source of foreign exchange after tourism (and the largest during the COVID-19 pandemic, which significantly reduced the number of visitors). Prior to the pandemic, fishing provided about 17 percent of formal employment, and contributed between 8 and 20 percent of GDP. Fishery products account for 92 percent of national exports. Tuna fishing is the main fishing activity in the country, and the port of Victoria is the largest port in the Indian Ocean for tuna landings.

Other important economic sectors in the Seychelles include transport, storage, communication and information (16 percent of GDP), government services (13 percent), and financial activities, insurance and real estate (9 percent). Agriculture accounts for only 1.3 percent of GDP, while the forestry sector is almost non-existent. Downstream oil is an important economic sector, with the potential for oil and gas in Seychelles. Exploration has taken place over the past decade and has provided interesting prospects.

9. POLICY CONTEXT

Independent since 1960, Madagascar is a semi-presidential republic with a bicameral legislative system in a multi-party context. The country is subdivided into six provinces, 23 regions, 119 districts, 1,579 communes and 17,485 fokontany (the smallest administrative division). Theoretically, the regions and communes benefit from a certain autonomy within

the framework of a decentralization policy. Madagascar experienced political crises in 1972, 1991, 2001-2002 and 2009, each lasting several months. After a long period of transition, Madagascar has experienced a certain stability since 2013.

After the Comoros gained independence in 1975, the country entered into a cycle of political crises and conflicts, punctuated by a multitude of coups and attempted coups. In 2001, a new constitution was adopted, following the reconciliatory Fomboni Agreement, which granted each island a large measure of internal autonomy and established the principle of a rotating presidency among the islands. Despite some ongoing disagreements, the Fomboni Agreement allowed the country to enter an era of relative institutional and political stability, marked in particular by three democratic changes of head of state. A national inter-Comorian dialogue process is ongoing and aims at national reconciliation and the construction of a lasting peace through a global political consensus.

Mauritius gained independence in 1968 and became a republic in 1992. The republic is based on a democratic parliamentary system, in which the President and Vice-president are elected by the National Assembly and the Prime Minister is the head of government. Following the adoption of a Statute of Autonomy in 2002, Rodrigues has a Regional Assembly of 18 members, which appoints a Chief Commissioner to act as head of the local government.

Seychelles became independent in 1976. Following a coup the following year, the country was run as a socialist one-party state until 1991, when a multiparty system was reinstated. The country is a republic, whose President, elected by universal suffrage, is the head of state and government. The inner islands, which are the most densely populated part of the country, are divided into 25 districts, while the outer islands are not part of any district.

Each country in the hotspot has established a national environmental policy and introduced relevant legislation. Madagascar developed its National Environmental Action Plan in the early 1990s, which was implemented until the mid-2000s over three program phases, and which continues to inspire actions in favor of environmental protection. The Union of the Comoros has had a National Environmental Policy in place since 1994, together with an Environmental Action Plan and strategies to implement this policy. A revision of the National Environment Policy, to bring it in line with the Sustainable Development Goals, the Sendai framework and the Paris Climate Agreement, is currently being considered. Conservation efforts in Mauritius are hindered by the dispersed legal and institutional context for environmental protection and biodiversity conservation. The Forests and Reserves Act of 1983, updated in 2003, contains conservation provisions while the Environmental Protection Act of 1991 provides the general framework for environmental protection in Mauritius. In the Seychelles, the main pieces of legislations under which nature conservation and protected areas are regulated are the National Parks and Nature Conservation Act of 1969, the Protected Areas Act of 1967, and the Environmental Protection Act, which was originally passed in 1994 and then repealed and replaced in 2016.

Each country has put in place a legal and institutional framework for designating and managing protected areas. Madagascar’s protected areas are grouped within the Madagascar Protected Area System (SAPM), which, in 2021, included 124 terrestrial and marine protected areas, covering about 12 percent of the national territory. Madagascar National Parks (a parastatal organization attached to the Ministry of the Environment and Sustainable Development) plays a particularly important role in establishing, conserving and

managing the SAPM. In the Comoros, the framework law on the environment was adopted in 1994. Among other things, this framework law lays down the general principles for the creation of parks and nature reserves on the national territory. The first protected area, Mohéli National Park, was established in 2001 but two decades went by before the protected area system was significantly expanded, with the designation of five more national parks (including three marine protected areas) in 2022. In Mauritius, the Native Terrestrial Biodiversity and National Parks Act of 2015 replaced the Wildlife and National Parks Act of 1993, with the aim of strengthening conservation practices and management of native terrestrial biodiversity and complying with international conventions acceded to by the country. Formal protected areas in the country are all on state land, while informal private reserves also exist on both Mauritius and Rodrigues. There are no protected areas on either Agalega or Saint Brandon. The management authority for most of the protected areas and both botanical gardens in the Seychelles is the Seychelles Parks and Gardens Authority. The only official national policy specific to protected areas is the Seychelles Conservation Policy of 1971. The different types of protected areas under this policy were redefined and harmonized with the IUCN protected area categories in 2014.

Each country has also established the necessary frameworks to combat climate change. In Madagascar, under the supervision of the General Secretariat of the Ministry of the Environment and Sustainable Development, the National Office for the Fight against Climate Change and REDD (BNCCREDD) is in charge of the local coordination of strategic initiatives and policies for the fight against climate change. As the Designated National Authority (DNA) of the GCF, BNCCREDD is responsible for coordinating all initiatives and actions related to climate change and REDD+. In Mauritius, the ministry responsible for climate change is the Ministry of Environment, Solid Waste Management and Climate Change (MACCE). This ministry is directly involved in environmental protection through the administration of environmental impact assessments, pollution reduction activities, public awareness and environmental education, and initiatives to strengthen resilience to climate change. In the Seychelles, the need to conserve critical species and ecosystems is indicated in climate change policies, such as the 2020 Seychelles National Climate Change Policy. Particular attention is given to ecosystems that are critical to climate resilience, such as coral reefs and coastal vegetation. In all countries in the hotspot, there is still work to be done to develop more actions and policies related to climate change mitigation and adaptation, and to facilitate the transition to climate-change-resilient societies.

The policy context in each country creates an enabling environment for civil society to play an active role in environmental protection and the conservation and restoration of natural ecosystems. In Madagascar, public participation in environmental management is defined in the constitution, while the Charter of the Environment, adopted in 1990, provided for transfer of responsibility for management of natural resources, including protected areas, to non-state actors. In the same way, the 2004 National Reforestation Strategy allows reforestation to be initiated by local communities, farmers associations, families, individuals, local associations and NGOs, as well as communes, in order to increase forest cover, protect watersheds related to agricultural production or meet energy needs. In the Comoros, the strategy for the implementation of the National Environmental Policy is based on the establishment of a genuine partnership between the state, NGOs, the private sector and local authorities. In both Mauritius and the Seychelles, CSOs play an important role in environmental governance, especially since some of them own, manage or co-manage protected areas or islands with high biodiversity value.

10. CIVIL SOCIETY CONTEXT

Although it is difficult to put an exact figure on the number of CSOs working in the environment sector in Madagascar, they are quite numerous at both the level of the 23 regions and at the central level. The National Platform of Civil Society Organizations in Madagascar (PFNOSCM) has 3,000 member associations, many of which are partially or totally involved in environmental issues. There are also multiple international NGOs active in Madagascar, many with long-established national programs. In general, the major international NGOs work and collaborate with local CSOs and local communities.

CSOs working in the field of conservation in Madagascar are relatively powerful in terms of their capacity to intervene effectively in many areas. There is a diversity of structures in the country that intervene at multiple levels in the fields of sustainable natural resource management, biodiversity conservation, ecosystem service provision, research, education and advocacy. Training programs, set up initially by international organizations and then progressively by national organizations, have facilitated the emergence of a dynamic and well trained generation of Malagasy conservation professionals. However, it was emphasized during the consultation process that the conservation community in Madagascar remains organized around large international organizations, which have greater access to international funding and support from their respective headquarters. The weak capacity of local CSOs to mobilize funds means that they have difficulty implementing activities in the field in a sustainable manner. As a result, local organizations lack funds for their recurrent and operational costs, pay their employees relatively little, and have little flexibility to respond to emerging threats or opportunities.

Environmental conservation and protection in the Comoros are part of a broader framework that involves both state institutions and CSOs. CSOs are key actors in the development of conservation and sustainable development activities. There is a multitude of associations for the defense and protection of nature that play the role of relays to mobilize communities, particularly youth, towards the environmental cause.

CSOs in Comoros face two problems: weak governance and lack of funding. In terms of governance, the biggest challenge is accountability: only a small proportion produce activity and financial reports. Several reasons are put forward by CSOs to explain this absence, including lack of know-how, negligence of leaders and deliberate desire of some association leaders to avoid accountability for fear of being ousted. In terms of lack of funding, this problem arises from various sources. Most CSOs are reliant on various dues and fees paid by their members as their main source of income. International grantmaking agencies is another major source of funding but few CSOs are experienced at accessing these funds and managing them accountably. Moreover, contributions from the state budget are almost non-existent.

In Mauritius, there are nearly 11,000 voluntary organizations listed in the States-Registry of Associations. These include several hundred that fit the characteristics of NGOs. Although there are a large number of NGOs, very few are active in the field of biodiversity conservation and environmental sustainability. The main local funding source for NGOs in Mauritius is the Corporate Social Responsibility (CSR) funds that all profitable companies are required to establish. There are about 440 approved NGOs that can receive CSR funds, of which about 10 are working on environmental issues and only three on conservation.

The main problem facing conservation-focused CSOs in Mauritius is their small number. From the beginning, conservation efforts in the country were dominated by a local elite and led from the outside by international NGOs. The creation of the Mauritian Wildlife Foundation (MWF) in 1984 made possible a local response to the conservation challenges of the time, such as avoiding the extinction of Mauritius kestrel and pink pigeon. The organization was well managed, professionally run, professionally staffed, successful in fundraising and became a benchmark. MWF covered the ground well in Mauritius and Rodrigues but there was little interest in conservation beyond the organization until recent years, as former MWF staff left the organization to create or work in other CSOs, replicating the MWF model. Nevertheless, there are no more than four active terrestrial conservation organizations in Mauritius today. There is room for other civil society and private sector actors to emerge.

In the Seychelles, civil society engagement with environmental issues has been in place for more than four decades and has increased significantly over the past 10 years. The increase in public awareness of environmental issues and climate change can be seen through the lens of this growing civil society engagement. Civil society actors in environmental conservation are diverse and include national NGOs, private companies and universities.

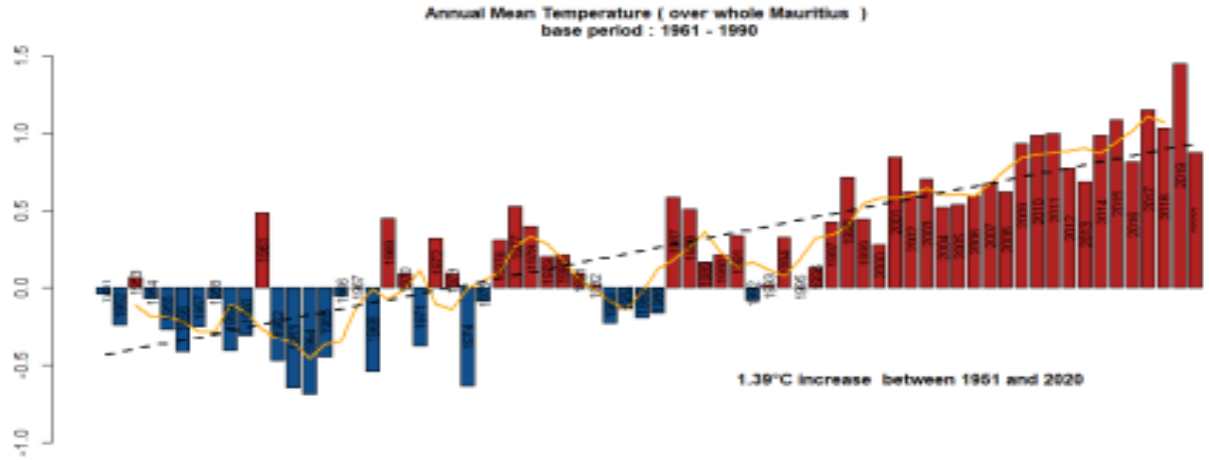
The main limitations to the work of CSOs in biodiversity conservation in the Seychelles are financial. The CSR tax, which had been an important source of funding for NGOs and foundations, was abolished in 2021, leading to a significant loss in revenue. Also, while many KBAs managed by NGOs benefit from ecotourism activities, this revenue stream is not guaranteed, as was seen during the COVID-19 pandemic, and cannot be relied on to support conservation efforts at these sites. Moreover, following the designation of the Seychelles as a high-income country in 2018, CSOs in the country are no longer eligible to apply to certain funding schemes that had been available in the past. Stakeholders explained that this has resulted in a loss of revenue for conservation projects, inputs that have not really been replaced due to lack of local funds.

11. CLIMATE CHANGE ASSESSMENT

The Indian Ocean is the third most affected region in the world by extreme weather events. In the populated islands of the southwest, these phenomena are expected to increase in frequency and intensity under the effects of climate change. Over the last 50 years, an average warming of surface air temperature of nearly 1°C has been observed in the islands of the southwest Indian Ocean (see for example data from Mauritius in Figure 11). This warming has accelerated over the past decade, with the result that episodes of sudden, intense rainfall are already regularly affecting islands with steep relief.

At the global level, the IPCC (2021) predicts a rise in sea level but highlights in its reports an average rise by ocean basin, including the Indian Ocean. Analysis of tide gauge data from Port Mathurin in Mauritius shows an average sea level rise of 6.4 mm per year over the period between 1988 and 2020. Similar trends have been recorded at other gauges in the region. The rise in sea level and the intensification of extreme climatic events will continue to cause erosion of beaches and other coastal ecosystems. Erosion is a phenomenon that is already present in the Indian Ocean islands but has been little studied compared to other climate-change impacts, although it is especially important for Small Island Developing States, where the majority of the population lives on the coast.

Figure 11. Average annual air temperature in Mauritius between 1961 and 1990



Another pronounced and visible impact of climate change in the region is coral bleaching. According to studies, the probability that these bleaching episodes will multiply with the sustained increase in sea surface temperature is very high. Indeed, some studies predict that corals in the Indian Ocean may disappear completely within 20 to 50 years as a result of increasingly frequent bleaching events. Through the degradation of corals, the whole marine ecosystem is affected.

At present, there is unfortunately not enough data on the observed or potential socio-economic implications of climate change on communities in the MADIO Hotspot. The hotspot countries have very high population densities in low-lying areas along their coastlines. A combination of sea level rise, loss of the natural protection provided by coral reefs, degradation of watershed forests and increase in the number and intensity of cyclones could have dramatic consequences for the safety and livelihoods of a large number of people living in coastal areas. The displacement of coastal populations inland would constitute a new increase in land pressure, which could generate numerous social problems and jeopardize the last remaining areas of natural vegetation.

The ecosystem profile identifies priorities for adaptation in the hotspot countries. The examples from Madagascar are illustrative of the hotspot as a whole. With regard to those that could be delivered through ecosystem-based approaches, adaptation priorities for fisheries include: establishing marine protected areas; and protecting coral reefs and mangroves. For water resources, they include: implementation of integrated water resources management; better management of flood and erosion risks in urban and rural areas; and supporting sustainable water management in times of drought, especially in the southern part of the country. For terrestrial forests and biodiversity, they include: maintaining existing forest cover; establishing a network of forest corridors; and implementing large-scale restoration for the most threatened ecosystems. Finally, for coastal areas, they include development and promotion of sustainable economic activities in coastal areas; reinforcing the fight against erosion and marine submersion; and implementation of Integrated Coastal Zone Management.

The Nationally Determined Contribution (prepared in 2015 and currently being updated) and the 2021 National Adaptation Plan provide the policy framework for Madagascar's national

response to climate change. These documents make various references to the need for approaches that can be classified as EbA, including: strengthening agricultural sector adaptation and rural resilience in the south of the country; strengthening the adaptation of the fisheries sector; improving access to safe water in urban and rural areas; accelerating reforestation through the operationalization of the REDD+ mechanism and the development of ecosystem services; improving natural forest conservation and protected area management; and protecting coastal infrastructure and economic activities (including tourism) from sea-level rise.

In the Comoros, the policy framework for the national response to climate change is formed by the Nationally Determined Contribution (prepared in 2015 and updated in 2020), the 1994 National Environmental Policy, and the National Adaptation Program of Action adopted in 2005. Given the vulnerability of the country to natural disasters (including tectonic activity), these documents place a strong emphasis on disaster risk reduction. The National Adaptation Plan is not yet fully developed and, therefore, not yet adopted.

In Mauritius, the National Determined Contribution was prepared in 2015 and updated in 2021. In addition, the government has proposed a series of laws to support the integration of climate change into key sectors, which resulted in the passage of a Climate Change Act in 2020. In 2021, a new National Climate Change Adaptation Policy Framework was approved by the government, replacing an earlier version from 2012. The updated framework focuses on the potential of nature-based solutions for adaptation, as well as the creation of green jobs, and promotes EbA, which leverages biodiversity and ecosystem services to reduce vulnerability and build resilience to climate change.

Finally, in the Seychelles, there is a well developed national policy framework for responding to climate change. In terms of adaptation, the following documents are particularly relevant: the Coastal Management Plan, developed in 2019 for a period of five years, which allows the implementation of a coastal management strategy in some areas; the Wetlands Policy and Action Plan for 2018-2022; the National Development Strategy for 2019-2023; and the updated Nationally Determined Contribution of 2021. Nevertheless, according to the Seychelles Climate Change Policy Report of 2020, there is still work to be done to further develop actions and policies related to climate change adaptation, including on: integration of climate change considerations into society, including the private sector and at all levels of government; improving (long-term) research and monitoring of climate change stressors and their impacts; and capacity building, understanding and engagement in all sections of society (government, civil society, private sector, etc.).

12. ASSESSMENT OF CURRENT INVESTMENT IN CONSERVATION AND CLIMATE ADAPTATION

Accurate, comprehensive data on investment in biodiversity conservation and climate change adaptation in the hotspot countries are almost impossible to obtain. Most major investments are integrated into large programs or sector-wide support with multiple components, only some of which are attributable to these objectives. The best available data in a consolidated form come from the BIOFIN Program in Madagascar, and cover contributions from each financial partner to public investment for biodiversity conservation during 2014-2018. Over this period, around $183 million was invested in biodiversity conservation by bilateral and multilateral donors (equivalent to $37 million per year). The

major contributors including the European Union, the World Bank, the Governments of France, Germany, Japan and South Korea, and United Nations agencies, such as FAO, UNDP and UNICEF. Over the same period, two foundations (Fondation Tany Meva and Fondation pour les Aires Protégées et la Biodiversité de Madagascar (FAPBM)) and four international NGOs (Blue Ventures, CI, Wildlife Conservation Society and WWF) invested a total of $70 million (or $14 million per year). Other sources of funding included diverse private and philanthropic foundations, private companies and the state budget, although figures are not available.

In the Comoros, the country's extreme poverty, coupled with the constraints of its international creditors, no longer allow the state to generate sufficient resources to meet it international commitments or national policy objectives regarding protection of its natural environment. Consequently, the conservation of the Comoros' biodiversity and adaptation to climate change depend on the implementation of financing agreements and multilateral or bilateral cooperation frameworks, particularly with the Government of France, which is the Comoros' main development partner in terms of investment volume. The current priorities for French-Comorian development cooperation include preservation of land and marine resources, climate change and accessibility to drinking water, all of which are amendable to EbA approaches. The European Union is another important bilateral donor to the Comoros. The priorities of its current Multiannual Indicative Program (2021-2027) include a "Green and Blue Pact", covering environmental protection, agriculture, forestry and fishing. In addition to the priority areas, the program includes actions to support civil society.

In Mauritius, sources of conservation investment have diversified since 2014, with the emergence several local sources and the engagement of new donors. Despite changes in to the rules governing Corporate Social Responsibility funds, it is still an important source of funding for conservation. Some private companies have also created their own foundations and may use part of their funds for Corporate Social Responsibility actions. New donors include the Franklinia Foundation, BIOPAMA and Botanic Gardens Conservation International, while other conservation partners have increased their technical and financial support. Multilateral donors, such as UNDP, and bilateral donors, such as the European Union, continue to be important sources of funding for both terrestrial and marine conservation. Funding from national government sources appears to have remained stable or decreased but further analysis is required to confirm trends.

In the Seychelles, there are three main sources of conservation investment: multilateral funding from donors such as the GEF and UNDP; bilateral funding from the EU, the Government of France (via AFD and FFEM) and the Government of the UK (through the Darwin Initiative); and regional funding from multi-country projects executed by a regional organization (mainly the Indian Ocean Commission). With approximately $35 million in projects, the GEF is by far the largest source of funding for biodiversity initiatives in Seychelles at present. GEF funding is channeled through AFD, UNDP, UNEP and the World Bank as Implementing Agencies. The UNDP-implemented GEF Small Grants Program enables the Seychelles to receive funding for initiatives led by community-based organizations, NGOs or other non-state actors. This combination of local and international funding is complementary and essential for financing actions aimed at preserving natural ecosystems, especially since these actions receive only a small amount of investment compared with the value of the services these ecosystems provide.

13. CEPF INVESTMENT NICHE

The ecosystem profile provides a shared situational analysis and overarching set of investment priorities that can guide investment by CEPF in biodiversity conservation and EbA actions with a leading role for civil society. The analysis in the preceding chapters shows that, while significant progress has been made with conserving the ecosystems of the MADIO Hotspot and maintaining the ecosystem services they provide, threats remain strong and degradation of ecosystems continues at a steady pace. This threatens the long-term existence of thousands of species and the wellbeing of an ever-growing population that is highly dependent on ecosystem services.

There is a need to define an investment niche to guide future CEPF investments in thematic and geographic areas that will maximize the program's impact in terms of biodiversity conservation and climate change adaptation. The definition of a CEPF niche should also reduce the risk of duplicating initiatives funded by other donors and avoid investments that would have only marginal impact.

The definition of the CEPF investment niche emerged from a highly participatory process among regional stakeholders. Based on the threats identified and prioritized in previous workshops and bilateral consultations, participants were asked to identify, organize and prioritize potential intervention themes for CEPF. These recommendations allowed for the definition of the investment strategy presented in the following chapter.

Like all island states, the four hotspot countries are extremely vulnerable to climate change. Their populations, agricultural land and infrastructure are highly exposed to climate change and, particularly in the Comoros, Mauritius and the Seychelles, tend to be concentrated in coastal areas, where sea level rise and the increased frequency and severity of extreme weather events are the most damaging.

While the combined effects of projected climate change mean that many people are at risk, the populations and economies of the program countries are highly dependent on ecosystem services, the natural ecosystems that provide these services are already under severe threat from human activities in all four countries. As a result, the resilience and capacity of these ecosystems to provide the essential services necessary for people to adapt to climate change is diminishing, further exacerbating vulnerability to climate change. Over the next five years, CEPF grant making will support EbA actions to restore and improve the management of KBAs that make the greatest contribution to the delivery of ecosystem services important to local populations. These actions will improve the resilience to climate change of the most vulnerable species, ecosystems and people in the hotspot. CEPF will work through CSOs, and grant-making will be complemented by actions to help build their capacity and assist them in developing partnerships with the private and public sectors.

13. CEPF INVESTMENT STRATEGY

13.1 Geographic priorities for CEPF investment

In each hotspot country, the KBAs were ranked based on their relative priority for the delivery of ecosystem services important for local populations, following the KBA+ methodology outlined in Chapter 6. In the case of Madagascar, some of the top-ranked

KBAs were not considered priorities for CEPF investment, either because they did not have a manager, project partner or institutional structure to support the implementation of EbA activities during the next five years (10 KBAs), or because their ecosystem service values had been degraded beyond reasonable recovery efforts (one KBA). These KBAs were removed from the list of priority sites, and the next highest ranked KBAs were moved up. In the other three countries, the top-ranked KBAs from the multi-criteria analysis were selected as priority sites for CEPF investment, and no adjustments were made. The full list of 70 priority sites is presented in Table 7 and Figures 12 to 15.

Table 7. Priority sites for CEPF investment

KBA code	KBA name	Multi-criteria score	Rank
MADAGASCAR			
MDG-199	Mangoro-Rianila River	4.75	1
MDG-110	Sahafina Forest (Anivorano-Brickaville)	4.18	2
MDG-097	Analamay-Mantadia Forest Corridor	3.43	3
MDG-131	Wetlands Nosivolo	3.29	4
MDG-066	Amoron'i Onilahy and Onilahy River	3.17	5
MDG-098	Fandriana Marolambo Forest Corridor	3.11	6
MDG-094	Ambositra Vondrozo Corridor (COFAV)	3.11	7
MDG-179	Special Reserve Mangerivola	2.88	8
MDG-164	Betampona Integral Nature Reserve	2.80	9
MDG-095	Zahamena-Ankeniheny SAPM	2.79	10
MDG-230	Ramsar site of Nosivolo	2.61	11
MDG-027	Belalanda	2.58	12
MDG-154	Zombitse-Vohibasia National Park	2.52	13
MDG-011	Tsinjoriake-Andatabo	2.48	14
MDG-128	Vohibe Ambalabe (Vatomandry)	2.43	15
MDG-089	Lake Ihotry-Mangoky Delta Complex	2.42	16
MDG-072	Analavelona	2.41	17
MDG-152	Ranomafana National Park and extension	2.37	18
MDG-217	Faraony Headwaters	2.26	19
MDG-056	Makay	2.21	20
MDG-070	Analalava Foulpointe	2.20	21
MDG-106	Vohibola classified forest	2.17	22
MDG-091	Mangoky-Ankazoabo forest complex	2.14	23
MDG-045	Great Reef of Toliary	2.06	24
MDG-200	Namorona-Faraony River	2.02	25
MDG-088	Mahafaly Plateau Forest Complex	2.01	26
MDG-033	Three-bay complex	1.97	27
MDG-175	Reserve Speciale Beza-Mahafaly	1.97	28
MDG-187	Special Reserve of Ivohibe Peak	1.97	29
MDG-053	Lake Tseny	1.97	30

KBA code	KBA name	Multi-criteria score	Rank
COMOROS			
COM-7	Mount Ntringui (Ndzuani Heights)	0.54	1
COM-5	Karthala Massif	0.45	2
COM-20	Coelacanth Zone	0.43	3
COM-1	Moya Forest	0.27	4
COM-14	Domoni area	0.25	5
COM-4	Massif de la Grille	0.22	6
COM-8	Ex-Marine Park of Moheli	0.21	7
COM-12	Bimbini area and Ilot de la Selle	0.19	8
COM-19	Pomoni area	0.18	9
COM-16	Moya area	0.17	10
MAURITIUS			
MUS-2	Bamboo Mountain Range	0.66	1
MUS-5	Relict Forests of the Central Plateau	0.55	2
MUS-14	Plaine des Roches - Bras d'Eau	0.54	3
MUS-12	Black River Gorges National Park and surrounding areas	0.52	4
MUS-3	Chamarel - Le Morne	0.50	5
MUS-8	Mauritius South-Eastern Islets	0.40	6
MUS-16	South Slopes of Grande Montagne	0.36	7
MUS-17	Yemen-Takamaka	0.35	8
MUS-11	Montagne Corps de Garde	0.34	9
MUS-6	Rodrigues' Islets	0.31	10
SEYCHELLES			
SYC-43	Morne Seychellois National Park	0.72	1
SYC-38	Planneau Mountain (Grand Bois-Varigault-Cascade)	0.63	2
SYC-41	Praslin National Park	0.59	3
SYC-42	Silhouette National Park	0.56	4
SYC-36	Burnt Mountain-Piton de l'Eboulis	0.50	5
SYC-50	Aldabra Special Reserve	0.47	6=
SYC-47	Port Launay Marine National Park and coastal wetlands	0.47	6=
SYC-15	Bird Island (Ile aux Vaches)	0.47	6=
SYC-5	Cosmoledo	0.45	9
SYC-51	Aride Island Special Reserve	0.45	10=
SYC-52	Cousin Island Special Reserve	0.45	10=
SYC-48	Sainte-Anne Marine National Park (SAMNP)	0.44	12
SYC-20	St. Denis Island	0.43	13
SYC-46	Curieuse Island Marine National Park	0.41	14=
SYC-32	Saint-François and Bijoutier Islands	0.41	14=
SYC-3	Astove	0.40	16

KBA code	KBA name	Multi-criteria score	Rank
SYC-18	Curieuse Island	0.39	17
SYC-19	D'Arros Island and Saint Joseph Atoll	0.38	18
SYC-6	Farquhar - South Island and islets	0.38	19
SYC-9	Fond Ferdinand	0.35	20

Figure 12. Priority sites for CEPF investment in Madagascar

Figure 13. Priority sites for CEPF investment in the Comoros

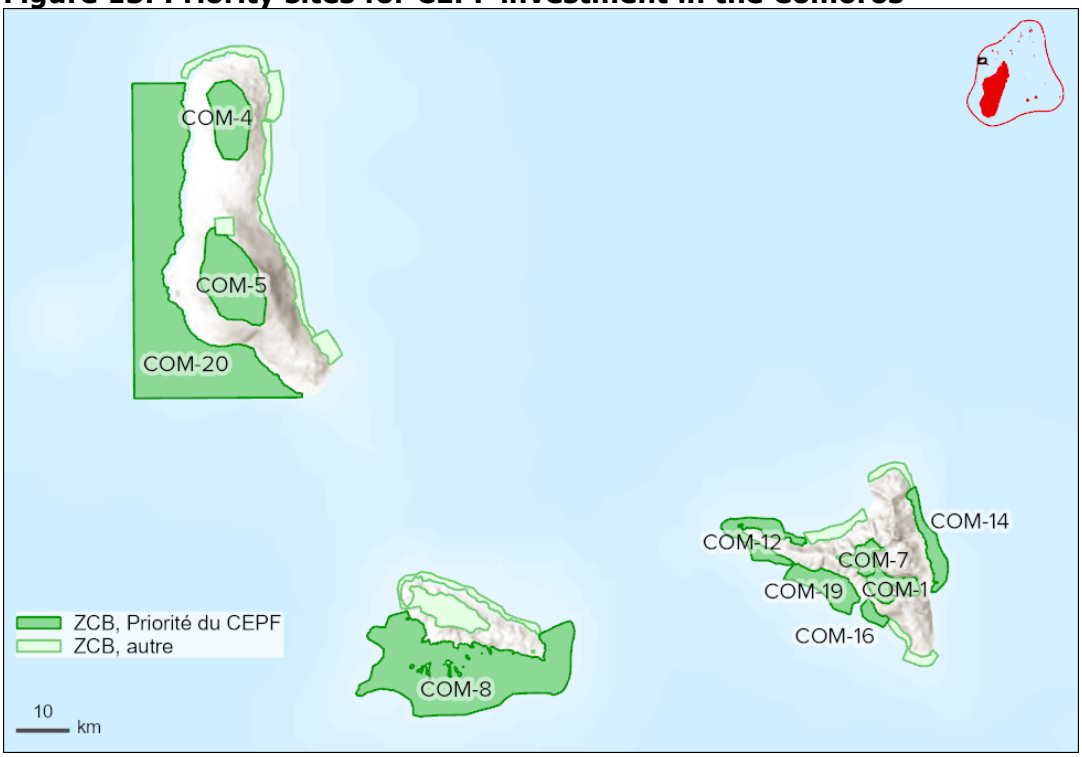


Figure 14. Priority sites for CEPF investment in Mauritius

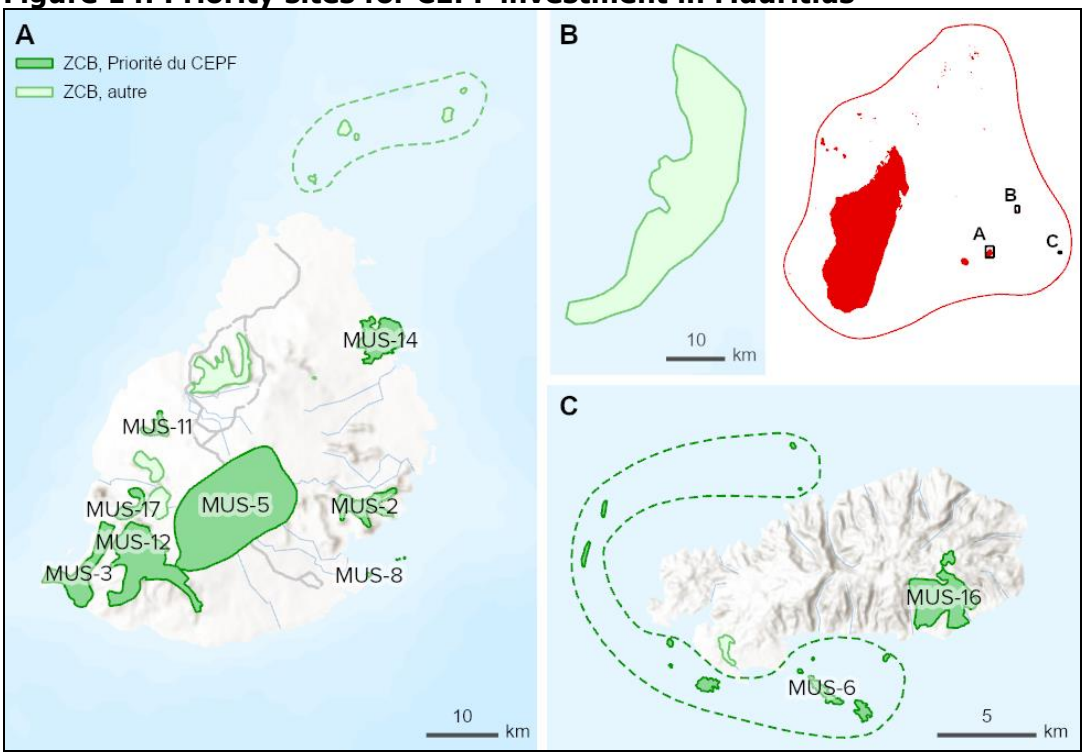
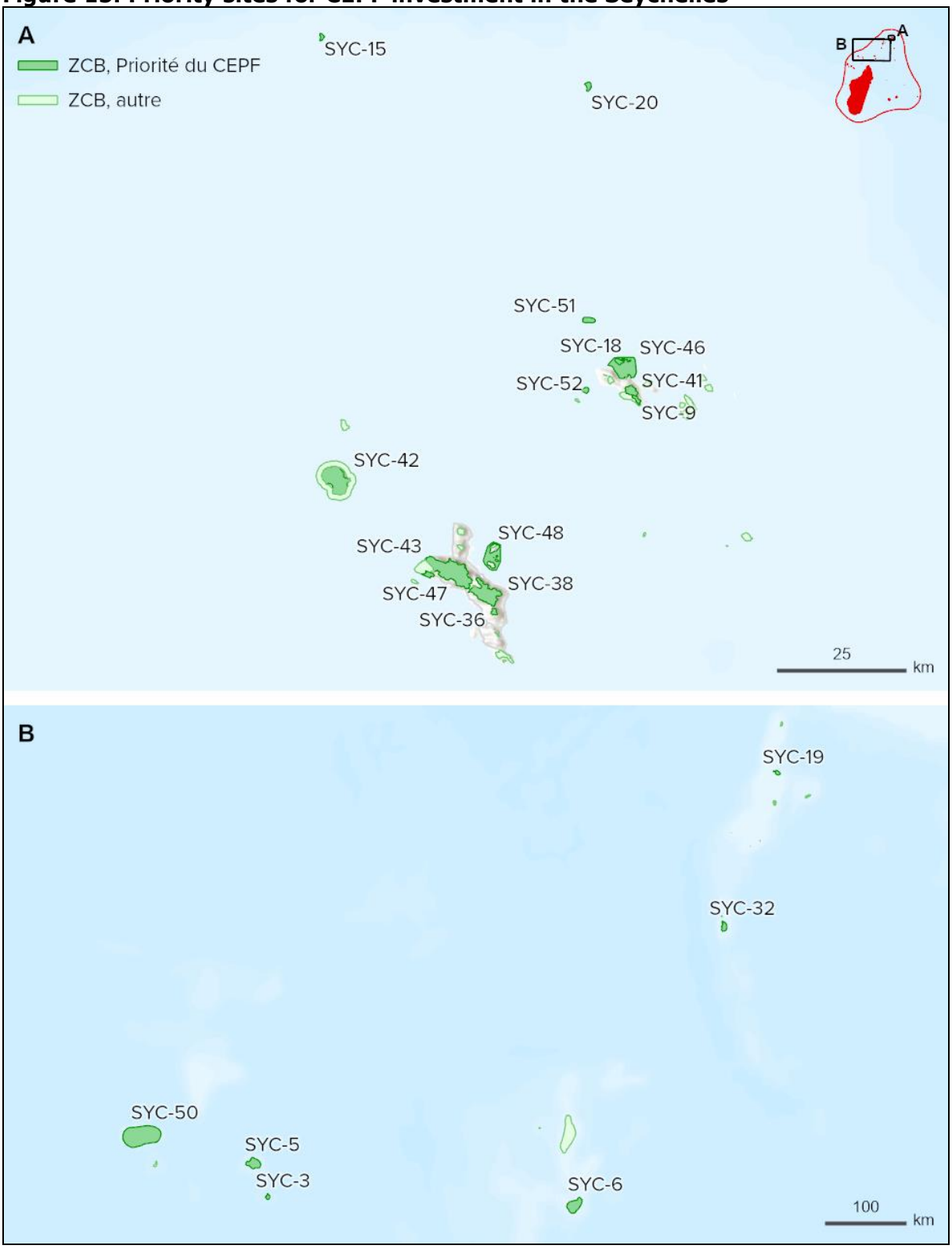


Figure 15. Priority sites for CEPF investment in the Seychelles



13.2 Thematic priorities for CEPF investment

The investment strategy for the MADIO Hotspot was comprehensively updated based on the consultations, literature review and analysis conducted during the ecosystem profiling process, and taking account of the fact that the strategy will inform grant making under the GCF program on EbA. The investment strategy comprises 13 "investment priorities": thematic priorities for CEPF grant making. These are broader than specific project concepts but are intended to provide guidance to applicants, as well as the CEPF Secretariat and RIT, on the eligibility of project ideas. The investment priorities are grouped into five strategic directions. The first four will guide the development of the CEPF grant portfolio in the hotspot; the fifth provides for the funding of the RIT (Table 3).

Table 3. CEPF Strategic Directions and Investment Priorities in the MADIO Hotspot

Strategic direction	Investment priorities
1- Empower communities and civil society to implement actions to improve the resilience of species, ecosystems, and human populations to climate change in priority KBAs	1.1 Implement EbA actions, including agroforestry, "climate smart agriculture", eradication of IAS, restoration of degraded watersheds and coastal ecosystems (including wetlands, mangroves, reefs and seagrass beds), and promotion of sustainable management of coastal and terrestrial ecosystems. Priority will be given to the following approaches: i. Promoting resilient agroforestry and developing "Climate Smart Agriculture"; ii. Promoting the sustainable management of freshwater, wetlands, and marine and coastal ecosystems (mangroves, coral reefs, seagrass beds); iii. Strengthening management of intact watershed forest ecosystems through the implementation of protected area management plans in collaboration with local communities; iv. Enhancing resilience and adaptation of ecosystems; v. Restoring degraded coastal ecosystems (wetlands, mangroves, coral reefs, sea grass beds); vi. Restoring degraded watershed forest ecosystems; vii. Promoting control and eradication of invasive alien species; and viii. Strengthening the capacity of local communities in participatory ecological monitoring of KBA target species and their habitats.
	1.2 Support the establishment and development of economic models that improve the resilience of local communities to climate change and support value chains for natural products, while strengthening ecosystem services that contribute to EbA
2- Support local communities and civil society to strengthen the integration of the EbA approach, ecosystem resilience and biodiversity conservation into political and economic decision-making processes and education	2.1 Develop engagement strategies with private sector actors for the integration of EbA into their activities, and also for the conservation and sustainable use of biodiversity and renewable natural resources
	2.2 Support civil society to disseminate information and influence political and economic decision-making processes in favor of biodiversity conservation priorities, ecosystem services and EbA
	2.3 Support civil society in the development and implementation of disaster risk reduction measures

Strategic direction	Investment priorities
3- Strengthen the capacities of local communities and civil society at regional and local levels to enhance adaptive capacity and reduce exposure to climate change risks	3.1 Strengthen the technical, administrative and financial capacities of local CSOs with missions related to the environment and the fight against climate change
	3.2 Promote exchanges and partnerships (at the national and regional levels) among CSOs working in priority KBAs, to strengthen technical, organizational, management and fundraising capacities
	3.3 Support the emergence of a new generation of conservation professionals and organizations specializing in biodiversity conservation, ecosystem services and climate change by supporting, with small grants, technical and practical training and exchange visits
4- Support research and ensure the dissemination of results for the promotion and improvement of knowledge on EbA actions and related good practices	4.1 Support applied research activities that improve understanding of the role of specific ecosystems and test the effectiveness of promising EbA techniques
	4.2 Support research activities that measure and verify the impact of the grant portfolio on ecosystem services
	4.3 Support civil society to promote public awareness and education on biodiversity, conservation priorities, climate resilience, ecosystem services and EbA
5- Provide strategic leadership and effective coordination of CEPF investment across the hotspot through a regional implementation team	5.1 Build a broad constituency of civil society groups that work across institutional and political boundaries to achieve the shared conservation goals outlined in the Ecosystem Profile
	5.2 Improve operational and monitoring processes and coordination of CEPF grant resource allocation to ensure effective implementation and strategic guidance in an accountable and transparent manner that is fit for purpose on a country-by-country basis

14. MADIO HOTSPOT LOGICAL FRAMEWORK: 2022-2027

Objective	Targets	Means of Verification	Important assumption
Engage civil society in conserving biodiversity and enhancing resilience to climate change through targeted investments that impact the most important sites for biodiversity and ecosystem services.	- At least 60 CSOs, including at least 40 national organizations actively involved in conservation actions guided by the ecosystem profile. - 22,000 women and 22,000 men benefit from the adoption of climate-resilient diversified livelihood options (including fishing, agriculture, tourism, etc.). - 915,000 hectares of ecosystems protected and enhanced in response to climate variability and change. - Five grants in the CEPF global portfolio incorporate EbA techniques developed under the program (e.g., climate-resilient agroforestry, assisted regeneration of denuded watersheds with native species, coral reef restoration with seeding units, etc.).	- Extract from CEPF's tracking tools and grants database. - Results of independent socio-economic surveys disaggregated by gender. - Results of independent ecological monitoring. - Gazette notifications of PA expansion. - Verified final reports from grantees.	- The political and economic climate remains stable, allowing CSOs to implement their activities under optimal conditions.

Outcome 1: Civil society is empowered to implement EbA actions at priority KBAs.	- 16,500 women and 16,500 men with increased income as a result of ecosystem-based livelihood activities (sustainable fishing, nature-based tourism, harvesting natural products, etc.). - 152,500 women and 152,500 men with non-monetary benefits other than formal training, as a result of strengthened ecosystem service delivery. - 20 economic models to improve the resilience of local communities to climate change developed and implemented. - 610,000 hectares of intact coastal ecosystems with enhanced management. - 300,000 hectares of intact watershed forest ecosystems with enhanced management. - 2,000 hectares of degraded coastal ecosystems restored. - 1,000 hectares of degraded watershed forest ecosystems restored. - 1,000 hectares of climate-resilient agroforestry systems implemented. - 1,000 hectares of small island ecosystems where invasive alien species have been eliminated or reduced.	- Results of independent socio-economic surveys, disaggregated by gender. - Results of independent ecological monitoring. - Management Effectiveness Tracking Tools. - Verified final reports from grantees.	- Restoration of natural ecosystems leads to increased resilience and diverse livelihood opportunities. - Civil society and beneficiary communities remain motivated in the implementation of activities and adhere to the EbA approach. - The socio-economic context allows grantees to take an interest in the new economic models that have been put in place and allows their sustainability. - Governments remain committed to increasing the coverage and strengthening the management of KBAs (e.g., by ensuring that appropriate regulations are in place, that staff are qualified, that equipment and budget are sufficient, and that a management plan is developed and implemented).

Outcome 2: Civil society has improved ability to support the integration of the EbA approach into political and economic decisions.	- Six government, private sector and/or civil society actors formally adopt KBAs critically important for ecosystem services as priorities for EbA. - 12 communities, businesses and/or public sector institutions use EbA tools, techniques and/or instruments developed under CEPF grants. - Two strategies for engagement with private sector actors for mainstreaming EbA into business practices are prepared. - Three knowledge products (manuals, videos, etc.) on the theme of ecosystem services and/or EbA prepared and disseminated in the region.	- Published public and private sector policies and commitments. - CSO strategies and public commitments. - Notification of new laws, policies and regulations in official journals. - Published private sector policies and commitments. - Verified final reports from grantees.	- Governments, the private sector, and CSOs in each country recognize the KBA+ methodology as a basis for defining common priorities. - Government organizations, the private sector, and CSOs understand the value of the EbA approach and remain motivated in its integration. - The political and economic context remains stable, allowing private sector players to take an interest in EbA. - Private sector actors understand and embrace EbA.
Outcome 3: Civil society capacity is strengthened.	- 5,500 women and 5,500 men from local CSOs have benefited from technical, administrative or financial capacity building. - 12 local CSOs with an institutional capacity score of 80 percent or higher on the CEPF Civil Society Tracking Tool. - Seven CSO training courses and/or exchange visits carried out at the national or regional level.	- Verified final reports from grantees. - Civil society tracking tools.	- The political and socio-economic context allows CSOs to carry out their activities. - The public health situation allows for regional exchanges. - CSOs are interested in regional exchanges.

Outcome 4: Research on the EbA approach is conducted and results are disseminated.	- Two research activities conducted to better understand the role of ecosystems in climate change adaptation and to test the effectiveness of EbA actions. - Two research activities conducted to measure and verify the impact of the grant portfolio on ecosystem services. - Two public awareness and education events held on biodiversity, conservation priorities, climate resilience, ecosystem services and EbA.	- Records of coverage on mass media and social media. - Verified final reports from grantees.	- Research institutions are interested and convinced by the EbA approach. - The general public is receptive to the EbA approach. - The public health situation allows the organization of events with the general public.
Outcome 5: A Regional Implementation Team provides strategic leadership and effective coordination of CEPF investment in the hotspot.	- 95 projects receive CEPF funding in the hotspot. - 60 CSOs receive CEPF funding in the hotspot. - One regional civil society network on EbA is operational and active.	- CEPF grants database. - Final report from the RIT. - Mid-term and final assessment reports. - Independent evaluation report.	- The RIT team is recruited and operational from the beginning of the project. - There is little or no turnover in the RIT and CEPF Secretariat teams. - The RIT and CEPF Secretariat keeps the motivation in the management of the funds and the animation of the network of actors.

15. CONCLUSION

The MADIO Hotspot is one of the richest regions in the world in terms of biodiversity, due to the high level of endemicity of the fauna and flora species it contains, as well as the diversity of its ecosystems. However, this hotspot is also among the most threatened, with the greatest number of species listed as globally threatened on the IUCN Red List; a situation that worsens with every update. As a result, Madagascar and the islands of the Indian Ocean have benefited for several decades from significant funding from international and (in some countries) national donors, for the conservation of natural ecosystems, the biodiversity they support and the ecosystem services they provide. Actions on the ground have targeted grassroots communities as a priority.

Despite this scale of investment, threats to biodiversity and ecosystems persist, which are exacerbated by the impacts of climate change. In addition to the proliferation of invasive alien species, which is far from being curbed, most threats are due to human activities that destroy or degrade natural ecosystems: forestry operations; expansion of agriculture; overgrazing; mining operations; urbanization; and unsustainable fishing practices.

All countries in the hotspot have some combination of high levels of poverty, high population density and rapid population growth. Also, good environmental governance is lacking, as reflected by: gaps in legislation and regulations and/or weakness in implementation; non-application of decentralization policies; insufficient integration of conservation and the fight against climate change into spatial and sectoral plans and policies; and a lack of effective engagement of local communities as actors with agency to manage natural ecosystems, rather than just benefit passively from them. There is also a need to raise awareness and change perceptions in all sections of society, to challenge the dichotomy between economic development and conservation that exists at the community level, as well as at the level of political decision-makers and private sector actors.

If these threats continue unabated, the hotspot's natural ecosystems will continue to degrade and disappear, their capacity to provide ecosystem services will erode, the region's resilience to the effects of climate change will diminish, the rate of species extinctions will accelerate, and the risk of zoonotic disease emergence will increase.

Civil society is well positioned to act in an operational manner and collaborate with stakeholders at all levels, while sensitizing private sector leaders and policy makers to the imperative of directing investments toward a sustainable vision, considering the role of ecosystems in underpinning social and economic development. In this context, the opportunities for impact for CEPF and other donors supporting biodiversity conservation and climate change adaptation based on the EbA approach are considerable.

In order to focus CEPF grant making in the MADIO Hotspot, the geographic and thematic priorities for investment have been updated. Based on an extensive process of literature review, analysis and stakeholder consultation, the CEPF investment strategy has been updated, comprising 13 investment priorities grouped into five strategic directions. CEPF investments at the ground-level will focus on 70 priority sites, selected following the KBA+ methodology. The overall objective is to engage civil society in conserving biodiversity and enhancing resilience to climate change through targeted investments that impact the most important sites for biodiversity and ecosystem services.