CRITICAL ECOSYSTEM PARTNERSHIP FUND

ECOSYSTEM PROFILE

EASTERN AFROMONTANE BIODIVERSITY HOTSPOT

FINAL VERSION
24 JANUARY 2012

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EXECUTIVE SUMMARY

Everyone depends on Earth's ecosystems and their life-sustaining benefits, such as clean air, fresh water and healthy soils. Founded in 2000, the Critical Ecosystem Partnership Fund (CEPF) has become a global leader in enabling civil society to participate in and benefit from conserving some of the world's most critical ecosystems.

CEPF is a joint initiative of l'Agence Française de Développement, Conservation International, the Global Environment Facility, the Government of Japan, the John D. and Catherine T. MacArthur Foundation, and the World Bank. As one of the founders, Conservation International administers the global program through a CEPF Secretariat.

CEPF provides grants for nongovernmental and other private organizations to help protect biodiversity hotspots, Earth's most biologically rich and threatened areas. The convergence of critical areas for conservation with millions of people who are impoverished and highly dependent on healthy ecosystems is more evident in the hotspots than anywhere else.

CEPF is unique among funding mechanisms in that it focuses on biological areas rather than political boundaries and examines conservation threats on a landscape-scale basis. From this perspective, CEPF seeks to identify and support a regional, rather than a national, approach to achieving conservation outcomes and engages a wide range of public and private institutions to address conservation needs through coordinated regional efforts.

The Eastern Afromontane biodiversity hotspot stretches over a curving arc of widely scattered but biogeographically similar mountains, covering an area of more than 1 million square kilometers and running over a distance of more than 7,000 kilometers from Saudi Arabia to Mozambique and Zimbabwe. At the beginning of the process of preparing the ecosystem profile it was estimated to contain more than 2,350 endemic plants (certainly an underestimate), with only 10.5 percent of the original vegetation remaining more or less intact, and only about 15 percent of the total area under some level of official protection. Its geographical limits are broadly defined by the eastern portion of White's 1983 Afromontane Floristic Region. Lower altitudinal limits are largely between 1,500 and 2,000 meters (lower away from the equator).

About 1,300 bird species occur in the hotspot, and about 110 of these are found nowhere else, with the highest rates of endemism being in the Albertine Rift and the Eastern Arc Mountains. The hotspot is also home to nearly 500 mammal species (more than 100 of which are endemic), including the charismatic mountain gorilla, Grauer's gorilla and the chimpanzee. Nearly 350 reptile species are found in the Eastern Afromontane, of which more than 90 are endemic, and 230 amphibian species, nearly 70 of which are endemic. The Great Rift lakes make this hotspot a phenomenally important region for freshwater fish diversity and endemism, with more than 890 species of fish, nearly 620 of which are endemic. Many more species remain to be discovered. This rich biological diversity in the hotspot is mirrored by the massive ecosystem services that it provides (particularly as watersheds for vast areas in the region, extending far beyond its formal boundaries) and that underpin development.

There is also enormous cultural, ethnic, linguistic, historical, religious and economic diversity within the hotspot. It includes one of the richest and some of the poorest countries on the planet. Several of these countries have a recent history of civil strife, and issues of governance are widespread. Despite such problems the overall economic trajectory for most of them is positive, and large-scale development initiatives are planned, necessitating an approach to conservation that engages with the development community.

Although poverty is pervasive throughout the region, most hotspot countries have undergone significant economic development in the past 15 to 20 years, with growth in gross national income and gross domestic product, an increase in employment, particularly in the service sector, and expansion of the private sector. Substantial foreign investments have also been made in many countries, particularly in the agriculture, tourism and mining sectors. Most significant is that more than $946 million in donor funds (multilateral, bilateral, trusts, foundations and corporate funding) was invested in the Eastern Afromontane Hotspot between 2007 and 2011. Some inputs have been large; for example, the Bill and Melinda Gates Foundation (BMGF) and the Rockefeller Foundation are working together to implement AGRA, Alliance for a Green Revolution for Africa, aimed at improving agricultural productivity in Africa. Overall, $400 million has been invested in 13 African countries through the initiative, a portion of it going to hotspot countries. While the investment in the region seems like a huge amount of money, it has not solved the problems of the increasing loss of biodiversity, damaged ecosystem services, reduced climate change resilience and threats to local livelihoods in the hotspot. Furthermore, other investments in the region could potentially jeopardize the health of critical ecosystems and the unique biodiversity of the Eastern Afromontane Hotspot if efforts to mainstream biodiversity conservation in development are not pushed forward. Therefore, although current investment presents a great opportunity to improve the lives of the millions of people living in the region, it is a great challenge to ensure that funding is spent in a way that will result in sustainable benefits to people and nature.

The consultation process behind the writing of this profile involved more than 200 individual stakeholders and 100 institutions. Five national workshops were organized by the BirdLife African partners in Ethiopia, Kenya, Tanzania, Rwanda (combining Rwanda, Burundi and DRC) and Uganda. A planned national workshop in Yemen could not be held because of civil unrest in the country; instead a sub-regional consultative meeting for the Arabian Peninsula was held with a select group of experts in Amman, Jordan, building on earlier stakeholder consultations and a KBA consultancy focused on plants in the Arabian Peninsula. These various meetings were supplemented by seven expert consultancies focusing on East African plants, Middle Eastern plants (as above), Southern Montane Islands (Malawi, Mozambique, Zambia and Zimbabwe), freshwater biodiversity, climate change, current investments, socioeconomics and threats. In addition, two electronic meetings were held with an International Advisory Committee comprising 21 experts from 15 institutions.

The outcome is this document, the Ecosystem Profile for the Eastern Afromontane. It presents an overview of the hotspot in terms of its biological importance in a global and regional context; its socioeconomic, civil society and policy context; major threats to and root causes of biodiversity loss; potential climate change impacts and current conservation investments. Based on this overview and the consultations, it provides a suite of measurable conservation outcomes,

identifies funding gaps and opportunities for investment, and thus identifies the niche where CEPF investment can provide the greatest incremental value. It also contains a five-year investment strategy for CEPF in the region. This investment 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 CEPF funding.

Conservation Outcomes

The conservation outcomes (KBAs and conservation corridors) represent the highest geographical priorities for biodiversity investments. Distribution data for 1,308 globally threatened or single site endemic species were used to identify 310 KBAs (261 terrestrial and 49 freshwater) occupying an area of 18,287,181 hectares and stretching from the Taif Escarpment in Saudi Arabia to the Chirinda Forest in southeastern Zimbabwe. Fifty-six of these KBAs were identified as top sites for biodiversity importance, including 25 Alliance for Zero Extinction (AZE) sites, where the last remaining population of an endangered or critically endangered species is found. In addition, 14 conservation corridors were identified. These contain major clusters of KBAs, with as much biophysical homogeneity as possible, and they serve to provide a geographical focus for investment. They also present opportunities for landscape planning to increase ecosystem resilience and maintain ecosystem services, especially in the face of climate change, and have been designed to complement earlier landscape planning initiatives focused on World Wildlife Fund (WWF) Ecoregions. Nested within them are various potential biological corridors where connectivity between fragmented populations can be restored: a number of these have already been identified by WWF, Albertine Rift Conservation Society (ARCOS), Wildlife Conservation Society (WCS) and others.

Other Important Considerations

Although the pace of development in the region has recently accelerated despite the global economic downturn, it is not yet sufficient to reduce poverty at the scale that is needed, and poverty, together with population growth, is the root cause of many of the most severe threats to biodiversity in the hotspot. Poverty generates both top-down and bottom-up pressures, the former from urgently needed development projects that frequently fail to take biodiversity into account, and the latter from the subsistence lifestyles that force local communities to rely on the “free” natural resources in their immediate surroundings. These twin pressures demand a strategy that addresses both landscape planning and local livelihood initiatives. Agriculture is simultaneously the most important means of livelihood for communities around the KBAs and the most pressing threat to biodiversity. Other important considerations include incremental and extreme threats from climate change, the capacities of civil societies in the region, and the gaps in protection and funding that past investments by donors have been unable to address, despite the granting of almost a billion dollars since 2007. Almost 40 percent of all the KBAs in the hotspot have no formal protection status.

CEPF Niche and Investment Strategy

The CEPF niche for investment has been formulated through an inclusive participatory process involving the national, subregional and expert consultations outlined above. The niche is also based on a geographical prioritization process to reduce the number of KBAs and corridors to a level commensurate with the funding that is likely to be available. This process has involved the interplay of several criteria, namely biodiversity priority, past and current donor investment levels, revenues from tourism, protection status, significant threats, civil society capacities, opportunities for poverty reduction, and manageability for CEPF and the Regional Implementation Team, the entity that will coordinate CEPF's actions on the ground.

The end result has been a primary focus on four priority corridors containing 22 KBAs: the Itombwe-Nyungwe Landscape; the Northern Lake Niassa (Malawi) Mountain Complex; the Western part of the Kaffa and Yayu Coffee Biosphere Reserve in Ethiopia, and the Lake Tana Catchment in Ethiopia, the last including three nearby KBAs with high biodiversity values under the name of the Amharic Escarpment. Two other corridors have also been identified as high priority, and will be eligible for support under some investment priorities: the Arabian Peninsula Highlands, with six top-priority KBAs and the Chimanimani-Nyanga Mountains, the latter including five smaller Zimbabwean KBAs in the vicinity and three KBAs known as the Montane Islands of Mozambique. In addition, three sites of utmost importance have also been retained, though not in priority corridors: LaLuama-Katanga-Mount Kabobo in DRC, Greater Mahale in Tanzania, and the Imatong Mountains in South Sudan. Also targeted for investment are five freshwater KBAs including Lake Malawi and Lake Tanganyika. These sites contain significant biodiversity and are immensely important as they are integral parts of several conservation corridors.

CEPF Strategic Directions and Investment Priorities

The following four strategic directions and 12 investment priorities will guide CEPF's five-year investment in the region. The national workshops made initial suggestions for strategic directions that were reconsidered and prioritized during the subregional workshops and finalized through discussions based on the other considerations described above and detailed in the profile.

Strategic Directions	Investment Priorities
1. Mainstream biodiversity into wider development policies, plans and projects to deliver the co-benefits of biodiversity conservation, improved local livelihoods and economic development in priority corridors.	1.1 Enhance civil society efforts to develop and implement local government and community-level planning processes to mainstream biodiversity conservation, and leverage donor and project funding for livelihood activities that explicitly address causes of environmental degradation in and around priority KBAs in priority corridors.
	1.2 Promote civil society efforts and mechanisms to mainstream biodiversity conservation into national development policies and plans, and into territorial planning in priority corridors and countries.
	1.3 Support civil society to build positive relationships with the private sector to develop sustainable, long-term economic activities that will benefit biodiversity and reduce poverty in priority corridors.

2. Improve the protection and management of the KBA network throughout the hotspot.	2.1 Increase the protection status (via creation or expansion of protected areas) and/or develop, update and implement management plans for terrestrial priority KBAs.
	2.2 Support the role of civil society organizations in the application of site safeguard policies and procedures including the strengthening of environmental impact assessment implementation in order to address ongoing and emerging threats to priority KBAs, including freshwater KBAs.
	2.3 Advance the identification and prioritization of KBAs in Africa and the Arabian Peninsula.
3. Initiate and support sustainable financing and related actions for the conservation of priority KBAs and corridors.	3.1 Support civil society organizations to develop forest carbon partnerships and projects that advance biodiversity conservation in priority KBAs in Africa.
	3.2 Support civil society organizations to develop partnerships and projects for non-carbon PES schemes and other market mechanisms in priority KBAs in Africa, in particular priority freshwater KBAs that influence freshwater biodiversity, livelihoods and health.
	3.3 Support training for civil society organizations in fundraising and project management, including civil society at all levels, especially with respect to emerging opportunities for sustainable financing for biodiversity conservation and ecosystem management in Africa.
	3.4 Support the institutional development of civil society organizations in Eritrea, South Sudan and Yemen, and their role in the conservation of KBAs in their respective countries.
4. Provide strategic leadership and effective coordination of CEPF investment through a regional implementation team.	4.1 Build a broad constituency of civil society groups working across institutional and political boundaries toward achieving the shared conservation goals described in the ecosystem profile.
	4.2. Act as a liaison unit for relevant networks throughout the Eastern Afromontane Hotspot to harmonize investments and direct new funding to priority issues and sites.

Conclusion

The Eastern Afromontane Hotspot is one of the biological wonders of the world, with globally significant levels of diversity and endemism. Its ecosystems provide tens of millions of people with freshwater and other ecosystem services that are essential to their survival. Despite its wealth in natural resources, the region is characterized by intense and pervasive poverty. The grip of poverty impedes sound, sustainable development as local people and governments adopt development models and initiatives with short-term unsustainable gains. CEPF will provide a source of funding in the hotspot that is designed to reach civil society in a way that complements funding going to government agencies and inspires innovative conservation activities, in particular those that demonstrate the link between biodiversity benefits and sound development. By using an integrated approach to pursue conservation and sustainable development goals, and by providing funds to mainstream of biodiversity conservation into government plans and policies and private sector initiatives, CEPF will augment efforts to address the immediate threats of poverty and unsustainable development, and contribute to long-term conservation in the hotspot.

1. INTRODUCTION

Everyone depends on Earth's ecosystems and their life-sustaining benefits, such as clean air, fresh water and healthy soils. Founded in 2000, the Critical Ecosystem Partnership Fund (CEPF) has become a global leader in enabling civil society to participate in and benefit from conserving some of the world's most critical ecosystems.

CEPF is a joint initiative of l'Agence Française de Développement, Conservation International (CI), the Global Environment Facility, the Government of Japan, the John D. and Catherine T. MacArthur Foundation and the World Bank. As one of the founders, CI administers the global program through a CEPF Secretariat. CEPF provides grants for nongovernmental and other private organizations to help protect biodiversity hotspots, Earth's most biologically rich yet threatened areas. The convergence of critical areas for conservation with millions of people who are impoverished and highly dependent on healthy ecosystems for their survival is more evident in the hotspots than anywhere else. CEPF equips civil society groups to conserve their environment and influence decisions that affect lives, livelihoods and, ultimately, the global environment for the benefit of all.

CEPF is unique among funding mechanisms in that it focuses on biological areas rather than political boundaries and examines conservation threats on a landscape-scale basis. From this perspective, CEPF seeks to identify and support a regional, rather than a national, approach to achieving conservation outcomes and engages a wide range of public and private institutions to address conservation needs through coordinated regional efforts.

Prior to awarding grants in each biodiversity hotspot selected for investment, CEPF prepares an ecosystem profile. This document includes an overview of the biological importance and an assessment of the highest priorities for conservation. The profile also provides an analysis of the socioeconomic and institutional context, threats to biodiversity, climate change and current conservation investments.

Conservation outcomes are identified at three scales representing (i) the globally threatened species within the region, (ii) the sites that sustain them (key biodiversity areas, or KBAs),[1] and (iii) the landscapes necessary to maintain the ecological and evolutionary processes upon which those sites depend—the corridors. Respectively, these outcomes are: "extinctions avoided," "areas protected" and "corridors created." In defining outcomes at the species, site and corridor levels, CEPF aims to identify targets that are quantitative, justifiable and repeatable.

The ecosystem profiles then recommend and articulate an investment strategy for each hotspot that will address a priority subset of these targets. This involves local, national and international stakeholders in a participatory process to determine what needs to be done and funded so that the final outcome is owned and used by stakeholders in the region. The decisions that are reached are based on an analysis of the conservation outcomes, the underlying causes of biodiversity loss

[1]Among the KBAs is a subset of sites identified by the Alliance for Zero Extinction (AZE) (Chapter 4) that provide homes to the last remaining populations of critically endangered or endangered species. AZE sites have high priority in the selection of conservation outcomes at a species and site level.

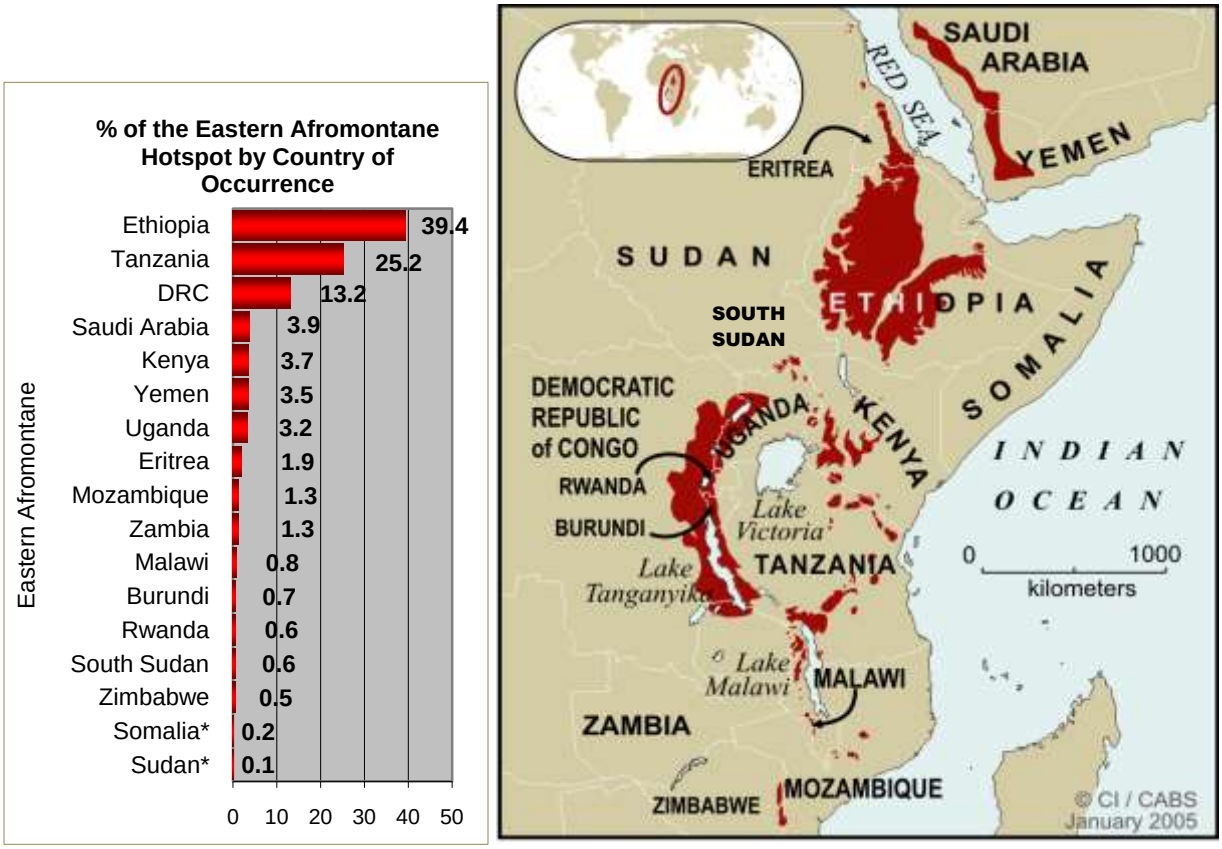
and the current investments in each hotspot. This analysis enables CEPF to determine what the conservation priorities are, and specifically, which ones would be the most appropriate to receive CEPF investment.

The result is an agile and flexible funding mechanism, defined by a set of broad strategic funding directions that can be implemented by civil society to contribute to the conservation of biodiversity in the hotspot. By taking into account current investments, the profile ensures that efforts complement existing strategies and frameworks established by local, regional and national governments, conservation organizations and donors. Throughout the profiling process, and during the subsequent investment, CEPF promotes working alliances among community groups, nongovernmental organizations (NGOs), governments, academic institutions and the private sector, combining unique capacities and eliminating duplication of efforts for a comprehensive approach to conservation. It also targets transboundary cooperation when areas rich in biological value straddle national borders, or in areas where a regional approach will be more effective than a national approach.

The Eastern Afromontane biodiversity hotspot (Figure 1) is an example of this transboundary approach, as it crosses multiple national boundaries. It encompasses several widely scattered, but bio-geographically similar mountain ranges in eastern Africa and the Arabian Peninsula, from Saudi Arabia and Yemen in the north to Zimbabwe in the south. The main part of the hotspot's 1,017,806 square kilometers is made up of three ancient blocks of massifs (the Eastern Arc Mountains and Southern Rift, the Albertine Rift, and the Ethiopian Highlands) plus the volcanic highlands of Kenya and Tanzania. Only 10.5 percent (106,870 square kilometers) of the original vegetation remains more or less intact, with about 15 percent of the total area (154,132 square kilometers) under some level of official protection.

The hotspot has been broadly defined by the eastern portion of White's 1983 Afromontane Floristic Region, with a flora that shows much uniformity and continuity (though changing in composition with increasing altitude) and a lower altitudinal limit largely between 1,500 and 2,000 meters (lower away from the equator). The most widespread tree genus is *Podocarpus*, although *Juniperus* is commonly found in drier forests of northeastern and eastern Africa, and a zone of bamboo is often found between 2,000 and 3,000 meters, above which there is often a *Hagenia* forest zone up to 3,600 meters. Many species common in montane forests have economic importance, while several crops including coffee and teff (a cereal crop) from the Ethiopian Highlands have been domesticated. The region also has extraordinarily valuable ecosystem services—the tangible benefits, in the form of goods and services, that people receive from nature. Among the most important ecosystem services the region provides is fresh water via the major watersheds it houses over vast areas of eastern Africa and the Arabian Peninsula

Figure 1.1. The Eastern Afromontane Biodiversity Hotspot



Overall, the hotspot holds nearly 7,600 species of plants, of which more than 2,350 are endemic. The Albertine Rift alone is home to about 14 percent (about 5,800 species) of mainland Africa's plant species, with more than 300 endemic species; the Eastern Arc has even more endemics (550 species). About 1,300 bird species occur in the hotspot, and about 110 of these are found nowhere else, with the highest rates of endemism being in the Albertine Rift and the Eastern Arc Mountains. The Albertine Rift is extremely rich in species, providing a home for more than half of Continental Africa's birds. The hotspot is also home to nearly 500 mammal species (more than 100 of which are endemic), including the charismatic flagship mountain gorilla, Grauer's gorilla and chimpanzees. Nearly 350 reptile species are found in the Eastern Afromontane, of which more than 90 are endemic, and 230 amphibian species, nearly 70 of which are endemic. The Great Rift lakes make this hotspot a phenomenally important region for freshwater fish diversity and endemism, with more than 890 species of fish, nearly 620 of which are endemic.

The CEPF Donor Council has approved the Eastern Afromontane as a priority for CEPF investment as part of a major expansion of the global program. This document comprises the ecosystem profile for this hotspot.

Figure 1.2. Eastern Afromontane Hotspot: Subregions and important geographical features

2. BACKGROUND

This chapter describes the process behind the development of the Eastern Afromontane Ecosystem Profile and the partners involved. The profiling process has involved a rapid assessment and evaluation of the current causes of biodiversity loss throughout the Eastern Afromontane Hotspot, coupled with an inventory of actual conservation and development investments taking place within the region. The ecosystem profile was prepared by BirdLife International, with technical contributions from Conservation International and other partners. The main activities that comprise the profiling process are:

- Definition of conservation outcomes for the Eastern Afromontane Hotspot.
- Analysis of socioeconomic, policy and civil society context, and assessment of threats (with a particular focus on climate change) and current conservation investments in the hotspot.
- Consultation with a wide range of national and international stakeholders knowledgeable about the hotspot.
- Formulation of a CEPF niche and five-year investment strategy for the hotspot.

Results were obtained by synthesizing and analyzing existing biological and thematic information to inform a participatory priority-setting process that sought to include all key players in the Eastern Afromontane biodiversity conservation community. The purpose was to secure broad-based scientific agreement on the biological priorities for conservation and then to define a strategy with specific conservation targets and actions for future CEPF (and other international) investments with diverse stakeholders.

CI's Conservation Priorities and Outreach (CI-CPO) unit defined the biological priorities, with the support of BirdLife International. This engaged experts from numerous disciplines, as well as government agencies, nongovernmental organizations, key communities, donor organizations and other stakeholders in agreeing on the subset of conservation outcomes for which funding could have the greatest impact. The profiling has also capitalized on priority-setting processes that have already taken place in a number of the countries, such as the development of National Biodiversity Strategies and Action Plans (NBSAPs), national protected areas strategies and national biodiversity gap analyses. The profiling team secured and analyzed up-to-date information on current activities and threats affecting biodiversity conservation in the hotspot, as well as current levels of investment and other data to formulate a conservation strategy. This data-gathering process included consultations with many stakeholders. The profile was drafted from this analysis and the results of the participatory review process. It includes a logical framework that outlines "strategic directions" and specific investment priorities developed for the countries in the hotspot, as well as broad indicators to measure impact.

An international advisory committee (IAC) gave overall guidance in preparing the profile. The IAC comprised the following organizations: WWF's Eastern & Southern Africa Office, Frankfurt Zoological Society, MacArthur Foundation, Wildlife Conservation Society, the Royal Botanic Garden Edinburgh, the Albertine Rift Conservation Society, the African Conservation Centre and the Royal Society for the Protection of Birds. BirdLife International, Conservation International and CEPF were also de facto members of the IAC. It met on two occasions (February and June 2011), provided overall guidance on the profiling process, advised on key

stakeholders to be invited to the subregional meetings, communicated the purpose of the ecosystem profiling process and the proposed schedule to various constituencies, and advised on key issues facing the ecosystem profiling team.

2.1 The Consultation Process

Ecosystem profiles bring together three key constituencies in order to maximize conservation impacts: national and international scientific experts; donors; and national and regional stakeholders in the hotspot. The last constituency includes stakeholders such as civil society organizations, national government agencies and academic institutions to ensure that they have a sense of ownership of the CEPF strategy and that the profile is fully informed by on-the-ground knowledge and expertise.

Scientific Expert Consultations

Scientific experts have been engaged in the development of the CEPF profile through electronic communication, participation in national and subregional meetings, consultancies and the IAC. Five major consultancies were commissioned on climate change; socioeconomic and threats analyses; plant key biodiversity areas (KBA) analysis; freshwater biodiversity KBA analysis; and the Southern Montane Islands and the Arabian Peninsula. The personnel involved are identified in the "Drafted by ecosystem profiling team" list in the beginning of this profile.

CI-CPO has been responsible for the species assessment, definition of KBAs and identification of corridors, in close collaboration with BirdLife International and its partners.

National Meetings and Consultations

The participatory process that is key for a successful conclusion to the profiling exercise involved two stages: i) national meetings and consultations that set the context for the investment; and ii) subregional and international meetings and consultations that designed and approved the ultimate investment strategy.

The national partners organized five workshops between December 2010 and February 2011 in Ethiopia, Kenya, Tanzania, Rwanda (combining Rwanda, Burundi and DRC) and Uganda. The national workshop in Yemen could not be held because of civil unrest in the country at the time that it was planned. The workshops involved a total of 162 participants representing 50 national CSOs, 62 government institutions (including universities and research institutions) as well as representatives from international organizations, donors and the profiling team (Table 2.1).

Table 2.1. National Consultation Workshops

Country	Date	Number of Participants	Number of Institutions				
			Total	National CSO	National Government Officials	Regional	International
Ethiopia	Dec. 15, 2010	**37**	**21**	8	6	2	5
Kenya	Jan. 24, 2011	**37**	**11**	4	6	0	2
Rwanda Burundi DRC	Feb. 3-4, 2011	**34**	**27**	10	11	2	5
Tanzania	Jan.27, 2011	**20**	**9**	3	5	0	3
Uganda	Feb. 8, 2011	**35**	**24**	5	7	3	10
Total		**163**	**92**	30	35	7	18[a]

a: this value is less than the sum of international institutions attending each workshop, as some institutions were represented in more than one workshop.

Questionnaires were also completed by experts on the Southern Montane Island nations (Malawi, Mozambique and Zimbabwe) through a separate consultancy team. The responses provided much of the information needed for the profile sections on biodiversity, policy, civil society, threats and current investments. A follow-up period of electronic consultations with the partners and scientific experts ensured that the remaining information gaps were addressed.

Subregional and International Meetings and Consultations

This stage involved further subregional (see Table 2.2) consultation workshops and two international consultations (in Addis Ababa, Ethiopia and Amman, Jordan) on a refined first draft of the Eastern Afromontane profile following the first stage of the participatory process and its review by the CEPF secretariat. The Addis Ababa consultation (April 27 and 28, 2011) involved 61 people representing 42 different government and nongovernment agencies (including three donor representatives), national and international organizations (NGOs and networks), universities, consultants, and projects from 11 countries from the hotspot). The Amman consultation (July 28 and 29, 2011) gathered representatives of regional stakeholders, members of the profiling team and one donor representative. In both international meetings, participants discussed the conservation outcomes in light of the overall context for investment in the hotspot and gaps in current funding. On the basis of these discussions they recommended the strategic directions and investment priorities for CEPF during the five-year investment period.

Table 2.2. Sub-regional Consultation Workshops

	Country	Number of Participants	Number of Institutions			
			National Civil Society Organizations	National Government Officials	Regional	International
Africa Workshop	Burundi	3	3	0	0	0
	DRC	5	3	1	0	0
	Ethiopia	18	6	4	0	2
	Kenya	10	1	2	1	6
	Malawi	1	1	0	0	0
	Rwanda	1	1	0	0	0
	Tanzania	5	2	3	0	0
	Uganda	3	2	0	0	0
	Zambia	1	1	0	0	0
	Zimbabwe	2	1	1	0	0
	Advisory Committee, Donors and Profiling team	13	0	0	3	10
Arabian Peninsula Workshop	Yemen	2	2			
	Saudi Arabia	2		2		
	Regional Experts, Donors and Profiling Team	6			3	3
	Total	70[a]	23	13	7	21[a]

a. Total is not equal to the sum as some participants fall in several categories, and some participated in both meetings.

2.2 Production and Approval of the Profile

A second draft of the full profile (with additional chapters describing the investment strategy) was circulated to all stakeholders in June 2011 and was followed by a third draft in September. This led to a stakeholder-approved third and pre-final draft that the CEPF Working Group reviewed in November 2011 and presented to the CEPF Donor Council for approval in November 2011.

3. BIOLOGICAL IMPORTANCE OF THE HOTSPOT

The Eastern Afromontane biodiversity hotspot was first recognized as globally important for species conservation by Mittermeier *et al.* (2004) when the global hotspot total was raised from 25 to 34, following a reappraisal in light of additional data. One of the results of this reappraisal was to divide the original Eastern Arc Mountains and Coastal Forests of Tanzania and Kenya (EACF) Hotspot between two newly defined hotspots—the Eastern Afromontane and the Coastal Forests of Eastern Africa.[2] The Eastern Arc Mountains were thus absorbed into a much larger hotspot, while the Coastal Forests Hotspot was expanded to Somalia and Mozambique.

The Eastern Afromontane Hotspot is enormously important for people. Although it is only slightly more than a million square kilometers, it provides water for vast areas of Eastern Africa and the Arabian Peninsula. Its montane "islands" (including the highest peaks in Africa and Arabia) and extensive plateaus extend over 44 degrees of latitude and are bisected by the equator. Its exceptional economic and biodiversity values arise from this broad latitudinal and altitudinal range and a turbulent geological history. Geological events have produced an extreme topography that dictates patterns of rainfall in the region and provides altitudinal gradients in ambient temperatures, offering a breadth of climatic and edaphic regimes that support a variety of biomes and human enterprises. Localized volcanoes have fertile soils on their margins, supporting intense and productive agriculture, for example on the slopes of Kilimanjaro.

3.1 Geography, Geology and Climate

The hotspot mountains are a discontinuous and divided chain scattered across 7,000 kilometers from the Asir Mountains of southwest Saudi Arabia and the highlands of Yemen in the north to Mozambique and Zimbabwe in the south. The Ethiopian and Arabian Peninsula highlands and mountains originated as a dome of ancient rocks that was uplifted some 55 million to 75 million years ago by the force of magma from Earth's mantle. Around 30 million years ago, much of this dome was covered with a thick layer of flood basalt and was subsequently (13 million years ago) split into three parts by the rifting process that produced the Great Rift Valley as the African continental crust pulled apart. Southeast of the ancient Ethiopian and Albertine massifs, more recent volcanic activity has produced the mountains of the Kenyan and Tanzanian highlands (Mounts Kilimanjaro, Meru, Kenya and Elgon, and the Aberdare range). Farther south, the Eastern Arc and Southern Rift mountains form another ancient massif, running from the Taita Hills in Kenya through the Eastern Arc in Tanzania to Mounts Ntchisi and Mulanje in Malawi. Farther outliers of the Eastern Afromontane, known here as the Southern Montane Islands, are found in the Chimanimani highlands of eastern Zimbabwe, Mounts Gorongosa, Namuli, Mabu and Chiperone in Mozambique, and the Mafinga Mountains that straddle the Malawi-Zambia border.

[2] CEPF invested $7 million in 103 projects in the EACF between 2004 and 2009, and the region will receive consolidation investment in 2011. Projects and sites that received funding under the allocation for the EACF are not eligible for funding under the new allocation for the Eastern Afromontane Hotspot.

Parts of the Eastern Afromontane Hotspot straddle the Great Rift Valley, which comprises at least four separate African rifts, or cracks in the African continental surface (Southern, Western/Albertine, Eastern and Ethiopian). The Rift Valley has had a major influence on this hotspot. The Ethiopian Rift opens deep and wide around the Afar triangle where it overlaps Eritrea, the Afar region of Ethiopia and Djibouti. The Ethiopian Rift Valley then ascends gently toward central Ethiopia, bisecting the Ethiopian land mass. In these higher elevations the rift is occupied by a series of eight disconnected and mostly alkaline lakes traditionally known as the Ethiopian Rift Valley lakes (such as Lakes Abaya, Shala, Abijata, Langano, Zeway and Awasa). Most importantly, the northwestern Ethiopian Highlands provide the source of the Blue Nile, which arises from Lake Tana at almost 1,800 meters above sea level; this supplies two-thirds of the water of the Nile proper during the June-September rains.

Farther south and to the west, the Albertine Rift was similarly formed from the uplifting of Precambrian basement rocks and the more recent volcanic activity (starting about 20 million years ago) that resulted from the formation of the Great Rift Valley, and which continues to this day, with occasional minor eruptions from the Virunga volcanoes (most recently from the Nyamuragira Volcano in January 2010). The Kenyan and northern Tanzanian mountains to the east are volcanic in origin, dating back 30 million years and associated with the development of the Great Rift Valley. Their sharper topography and greater altitudes reflect this more recent origin. The Eastern Arc and Southern Rift mountains are mostly composed of Precambrian granite, gneiss and schist, with a few volcanic peaks (e.g. Mount Rungwe) and range in altitude from around 1,200 meters to a little less than 3,000 meters.

The wide latitudinal (roughly 22°S to 22°N) and altitudinal ranges of the Eastern Afromontane ensures a diversity of climatic regimes, with opposite summer and winter seasons on either side of the equator. Temperatures are determined by the season, latitude, topography and altitude, ranging from below freezing to more than 30°C. Rainfall distribution is similarly highly variable and is governed by the Inter-Tropical Convergence Zone oscillating between its northern and southern limits and interacting with the rugged topography of the hotspot. In the Asir Mountains of Saudi Arabia, average rainfall varies between 600 millimeters to more than 1,000 millimeters, while in the rain-shadowed plains to the east, it drops to 500 to100 millimeters. The high mountains in the Ibb region of Yemen are the wettest in Arabia with an average rainfall of more than 1,500 millimeters. The western escarpments of both Saudi Arabia and Yemen between 1,000 to 2,000 meters and 2,500 meters are characterized by a fog zone (the "coffee zone"). Seasonality in precipitation here and in the Ethiopian Highlands is strongly influenced by the Inter-Tropical Convergence Zone with the main rains falling between June and September and originating from both the East Indian monsoon and tropical West Africa. Lighter and cooler rains fall between March and May as a result of northern winds bringing moisture from the Red Sea.

In eastern Democratic Republic of Congo (DRC), Uganda, Kenya and Tanzania, the climate is dominated by the passage of the Inter-Tropical Convergence Zone north and south during its annual cycle, producing a generally bimodal rainfall distribution (with the main rains between May and June and minor rains from September to December). This general pattern varies with local conditions, and in some places (such as the Rwenzori Mountains in eastern DRC) it is influenced by the convergence of moist air masses from both the Indian and Atlantic oceans. Farther south, the climate is generally hot and wet in summer and cold and dry in winter. This

pattern results from the lower latitudes together with an anticyclonic high pressure system over the continent during winter and an intermittent thermal trough during summer. The summer trough covers the eastern side of the landmass and brings rainfall to this area with moisture from the tropical Indian Ocean. The shifting and merging of anticyclones over the Atlantic and Indian oceans are largely responsible for the dry conditions that characterize much of the continent and Madagascar.

3.2 "Ecoregions," Habitats and Ecosystems

The Eastern Afromontane represents a merging of several of the "ecoregions" recognized by WWF (Burgess *et al.* 2004a) including the East African Montane forests, Southern Rift Montane Forest-Grassland mosaic, the Albertine Rift and the Ethiopian Upper Montane Forests, Woodlands, Bushlands and Grasslands, and the addition of the Southern Montane "islands" in Malawi, Zimbabwe and Mozambique. The choice of these ecoregions and the boundaries of the hotspot were broadly guided by the eastern portion of White's 1983 Afromontane Floristic Region, with the boundaries refined to take into account newer data on plant endemism from the Centers of Plant Diversity study (WWF/IUCN 1994) and a broader definition of the Albertine Rift (Plumptre *et al.* 2003a, Mittermeier *et al.* 2004). The highest point is on Mount Kilimanjaro, which reaches 5,895 meters above sea level, and forests and woodlands included within the ecoregions forming the hotspot extend as low as 300 meters altitude in some areas, although 800 to 1,000 meters is a more typical lower altitudinal limit.

At the highest elevations, glaciers and rocks predominate, below which Afro-alpine vegetation (including moorlands, bogs and grasslands) is found, with giant senecios (*Dendrosenecio* spp.) and lobelias such as *Lobelia giberroa*, followed by zones of heathers (*Erica* spp.), bamboo, montane forest, mid-altitude forest, lowland forest, woodland and savanna. In the Aberdare, Rwenzori, Bale and Simien mountain ranges as well as on Mounts Elgon, Kilimanjaro and Kenya, Afro-alpine vegetation typically occurs above 3,400 meters. Upper montane habitats include evergreen mountain forest and grassland mosaics. In the southern Ethiopian Highlands with high rainfall, there is a cloud forest zone between 2,000 and 2,500 meters, while farther north in the Simien Mountains there is evergreen broadleaf montane forest characterized by the presence of myrtles (*Syzygium guinieense*), junipers (*Juniperus procera*) and African olive trees (*Olea africana*) (Burgess *et al.* 2004a). In drier areas the forest is dominated by *Podocarpus* trees as well as juniper and African redwood trees (*Hagenia abyssinica*). The foothills support woodland vegetation, while forests at slightly higher elevations are dominated by introduced conifers.

In the Eastern Arc Mountains, ranging from about 300 to 2,600 meters, vegetation types include upper montane, montane, submontane and lowland forests, with Afromontane grassland and heathland plant communities at higher altitudes. Grasslands are the primary habitats of the Southern Rift, while forests are found in sheltered valleys and along mountain ridges. The Albertine Rift also has *Cyperus* and *Carex* wetlands, as well as hot springs and a peculiar type of sclerophytic vegetation that colonizes old lava flows in the Virunga National Park in eastern DRC. The hotspot also contains many Rift Valley lakes, including Tanganyika and Malawi, which are among the deepest in the world.

In the Arabian Peninsula, vegetation at lower altitudes (300 to 1,500 meters) is a patchy mosaic of drought-deciduous open woodland (lower altitudes), succulent shrubland, species-rich riparian woodland or "valley forest" (Hall *et al.* 2008 and 2009). At higher altitudes on the escarpments (1,600 to 2,200 meters), the vegetation is dominated by evergreen bushland and thicket and riparian, evergreen woodland. This is the species-rich, mist-affected "coffee zone," where large trees provide shade around the terraces and fields; such habitats are rich in endemic plant species. The highlands (2,200 to 3,700 meters) are again heavily terraced with only small patches of drought-deciduous montane woodland remaining, including *Acacia origena*, along with even fewer relictual stands of *Juniperus procera*.

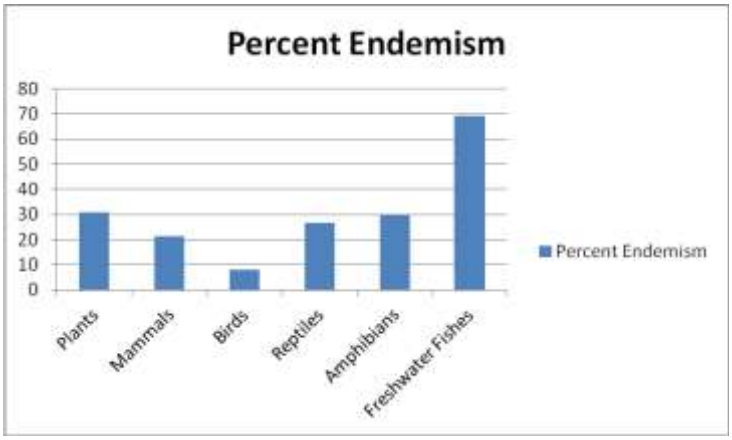
3.3 Species Diversity and Endemism

Table 3.1 summarizes the available knowledge on species diversity and endemism (a table summarizing globally threatened species is presented in Chapter 4). Figure 3.1 summarizes the proportion of known species that are endemic to the hotspot. Of the 10,856 species in the table, almost a third (30.8 percent) are endemic.

Taxonomic Group	Number of Species	Number of Endemic Species
Amphibians	229	68
Birds	1,299	106
Freshwater Fishes	893	617
Mammals	490	104
Plants	7,598	2,356
Reptiles	347	93
All Taxa	10,856	3,344

Table 3.1 Species Diversity and Endemism in the Eastern Afromontane Hotspot (Based on Mittermeier *et al*. 2004)

Figure 3.1 Percent of All Known Species that Are Endemic to the Eastern Afromontane Hotspot (Data Based on a Database Developed for Mittermeier *et al*. 2004).



Plants

Overall the hotspot holds nearly 7,600 species of plants, of which more than 2,350 are endemic. The Albertine Rift alone is home to about 15 percent of mainland Africa's plant species, with at least 300 endemics.

The Eastern Arc Mountains have 3,473 species in 800 genera, of which at least 453 species and around 40 genera are believed to be endemic, including trees, shrubs and herbs. There are also high rates of endemism in the nonvascular plants, with 32 known endemic bryophytes. Among

the best-known flowering plants of this part of the hotspot are the African violets (*Saintpaulia* spp.) and the African primroses (*Streptocarpus* spp.). In the Albertine, there are more than 10 endemic species of impatiens.

Endemism is lower in the Southern Rift, with perhaps only 100 endemic species. However, the grasslands are particularly rich in orchids, including more than 500 species, and plants of the genus protea. The Nyika Plateau supports nearly 215 orchid species, of which about four species are endemic. Farther south, the Chimanimani Mountains have a quartzite grassland that holds at least 73 plants found nowhere else in the world (Mapaura and Timberlake in Golding 2002); similarly Mount Mulanje holds at least 71 endemic plant species (Strugnell 2006).

The Ethiopian Highlands harbor an estimated 5,200 plant species, of which at least 200 are endemic. The genus *Senecio* is particularly diverse, with half of the two dozen species found nowhere else.

Within the Arabian Peninsula portion of the hotspot, 110 plant species are known to be endemic, with a substantial number of additional endemic plant species still to be described. The Eastern Afromontane area, in particular the Ibb and Udayn key biodiversity areas, are the most species-rich sites in the whole of the Arabian region, also having the highest levels of plant species endemism. In this portion of the hotspot, and particularly in Yemen, plant endemism is often associated with what may be thought of as "disturbed areas" on terrace walls, around villages and in patches of waste ground. The terraced landscapes that cover much of Yemen act as moist refugia for endemic species in a largely arid landscape. With traditional terrace agriculture in decline**,** there is a significant threat to biodiversity and to local livelihoods (Varisco 1991, and see Chapter 8).

Birds

Although birds are better known than almost any other taxa, the total numbers recorded from the hotspot can be expected to grow as more areas are surveyed, especially in DRC. The total number now exceeds the 1,300 species initially reported by Mittermeier et al. (2004), and includes 157 endemics (Lincoln Fishpool, personal communication), 102 of which are restricted range species found within the eight Endemic Bird Areas (EBAs) recognized by BirdLife International (Table 3.2).[3] New species continue to be discovered, particularly from the Eastern Arc Mountains of Tanzania (Bowie *et al*. 2004, 2009). Here DNA techniques are showing that there are various cryptic species in different mountains, particularly in dense forest-dwelling groups such as greenbuls, flycatchers and sunbirds.

[3] An Endemic Bird Area encompasses the overlapping breeding ranges of restricted-range species, such that the complete ranges of two or more restricted-range species are entirely included within its boundary; a restricted-range species is one with a distribution of less than 50,000 square kilometers.

Table 3.2. Endemic Bird Areas in the Eastern Afromontane Biodiversity Hotspot

Endemic Bird Area	Countries	Number of Restricted-range Species	Examples
Southwest Arabian mountains	Saudi Arabia, Yemen	7	**Philby's partridge** *Alectoris philbyi* **Yemen warbler** *Sylvia buryi* **Yemen thrush** *Turdus menachensis* **Arabian waxbill** *Estrilda rufibarba* **Yemen accentor** *Prunella fagani*
Central Ethiopian Highlands	Eritrea, Ethiopia	4	**Harwood's francolin** *Francolinus harwoodi* **Rueppell's chat** *Myrmecocichla melaena* **Yellow-throated seedeater** *Serinus flavigula* **Ankober serin** *Serinus ankoberensis*
South Ethiopian Highlands	Ethiopia	5	**Prince Ruspoli's turaco** *Tauraco ruspolii* **Nechisar nightjar** *Caprimulgus solala* **Sidamo lark** *Heteromirafra sidamoensis* **White-tailed swallow** *Hirundo megaensis* **Ethiopian bush crow** *Zavattariornis stresemanni*
Albertine Rift Mountains	Burundi, DRC, Rwanda, Tanzania, Uganda	37	**Handsome francolin** *Francolinus nobilis* **Ruwenzori turaco** *Ruwenzornis johnstoni* **Congo bay-owl** *Phodilus prigoginei* **Dwarf honeyguide** *Indicator pumilio*
Kenyan mountains	Kenya, Tanzania, Uganda	9	**Jackson's francolin** *Francolinus jacksoni* **Hunter's cisticola** *Cisticola hunteri* **Aberdare cisticola** *Cisticola aberdare* **Hinde's pied-babbler** *Turdoides hindei* **Sharpe's longclaw** *Macronyx sharpei*
Tanzania-Malawi mountains	Kenya, Tanzania, Malawi, Mozambique, Zambia	37	**Udzungwa forest-partridge** *Xenoperdix udzungwensis* **Mrs Moreau's warbler** *Bathmocercus winifredae* **Sharpe's alakat** *Sheppardia sharpei* **Spot throat** *Modulatrix stictigula*
Eastern Zimbabwe mountains	Mozambique, Zimbabwe	3	**Briar warbler** *Prinia robertsi* **Chirinda apalis** *Apalis chirindensis* Swynnerton's robin *Swynnertonia swynnertoni*

Several of the endemic species have tiny ranges. For example, the Taita thrush (*Turdus helleri*, Critically Endangered) and Taita Apalis (*Apalis fuscigularis*, Critically Endangered) are limited to only some 3.5 square kilometers and 1.5 square kilometers respectively of remaining forest fragments in the Taita Hills, while the Uluguru bush-shrike (*Malaconotus alius*, Critically Endangered) lives only in a single nature reserve in the Uluguru Mountains, where it occupies less than 100 square kilometers of forest.

The Albertine Rift is extremely rich in birds; more than 1,074 species in 368 genera have been recorded from the area. Of these, 43 are restricted-range species endemic to the rift area, and these include three monotypic endemic genera: *Pseudocalyptomena*, *Graueria*, and *Hemitesia*. Both the African green broadbill *(Pseudocalyptomena graueri*, Vulnerable*)* and short-tailed warbler *(Hemitesia neumanni)* are more closely related to Asian species than they are to any

birds in Africa, while the affinities of Grauer's Warbler *(Graueria vittata)* remain uncertain. A fourth species confined to the rift, the Congo bay-owl *(Phodilus prigoginei*, Endangered*),* is one of only two species in the genus *Phodilus*.

The Tanzania-Malawi (Eastern Arc and Southern Rift) mountains are almost as rich in endemic bird species as the Albertine Rift, with some 31 species. The Eastern Arc component has 21 endemic species and three endemic genera (*Xenoperdix*, *Sceptomycter*, and *Modulatrix*). The Udzungwa forest-partridge (*Xenoperdix udzungwensis*, Endangered), unknown to science until 1994, is another endemic, monotypic genus with Asian (not African) affinities. The enigmatic genus *Modulatrix* contains two species, Dapple-throat (*M. orostruthus*, Vulnerable) and spot-throat (*M. stictigula*). Some bird species have disjunctive distribution patterns covering parts of the Eastern Arc, the Southern Rift and the Zimbabwe highlands; an example is the monotypic genus *Swynnertonia* and the long-billed tailorbird (*Orthotomus moreaui*). As noted earlier, new bird species continue to be found in the Eastern Arc, mainly through splitting existing species using studies of their DNA (e.g. Fuchs *et al.* 2011).

About 680 species of birds are found in the Ethiopian Highlands, some 30 of which are endemic. Four endemic genera are found in this part of the hotspot, including three that are relatively widespread within it (*Cyanochen, Rougetius* and *Parophasma*) and one that has a very localized distribution in the south (*Zavattariornis*). Indeed, the reasons for limited range of the Ethiopian bush-crow (*Zavattariornis stresemanni*, Endangered) are a puzzle, one that it shares with another endemic, the white-winged swallow (*Hirundo megaensis*, Vulnerable), whose range it matches very closely. A number of other species also have similarly limited distributions in this general area, although our understanding of some of them is limited by lack of detailed knowledge. The blue-winged goose (*Cyanochen cyanoptera*) is related to the sheldgeese of the alpine and temperate grasslands of South America, while the relationships of Rouget's rail (*Rougetius rougetii*, Near Threatened) and the Abyssinian catbird (*Parophasma galinieri*) have yet to be fully determined. The striking Prince Ruspoli's turaco (*Turaco ruspolii*, Vulnerable) is threatened by declining habitat.

Internationally important numbers of migratory soaring birds use the Red Sea-Rift Valley flyway on their annual migration between Eurasia and Africa. While the exact numbers passing through the hotspot are unknown, it seems likely that a significant majority of the 1.5 million birds of prey and storks using this flyway use the highlands of the Arabian Peninsula and Ethiopia as their migration corridor (Porter *et al.* 2005).

Mammals

The Eastern Afromontane Hotspot is home to nearly 500 mammal species, more than 100 of which are endemic to the region. Although several of Africa's larger flagship mammals, including the elephant (*Loxodonta africana*, Vulnerable) and leopard (*Panthera pardus*), are found in this hotspot, the majority of threatened species are primates and smaller mammals.

More than 30 of the nearly 200 mammals found in the Ethiopian Highlands are found nowhere else, including a remarkable six endemic genera, four of which are monotypic: three rodents (*Megadendromus*, *Muriculus* and *Nilopegamys*) and one primate, the gelada (*Theropithecus gelada*). The gelada is peculiar in that it is the only remaining primate to feed exclusively on

plants—mostly grasses (Gippoliti and Hunter 2008). The Ethiopian wolf (*Canis simensis*, Endangered) is an endemic species found in the Afro-alpine ecosystem of the Ethiopian Highlands; with around 440 individuals in seven small and isolated populations, this wolf is the rarest canid in the world.

Nearly 40 percent of continental Africa's mammals are found in the Albertine Rift; this comprises more than 400 species, of which 45 are endemic. Most of these endemic mammals are shrews and rodents, including two monotypic endemic genera: the Ruwenzori shrew (*Ruwenzorisorex suncoides*, Vulnerable) and Delany's swamp mouse (*Delanymys brooksi*). New species continue to be found and described, particularly in isolated highlands such as Itombwe and Kabobo in DRC.

However, the most charismatic flagship species of the Albertine Rift, and indeed of the entire hotspot, are the great apes. The population of the well-known mountain gorilla (*Gorilla beringei beringei*, Critically Endangered) is limited to about 480 individuals in Virunga volcanoes and 300 individuals in Bwindi Impenetrable National Park. Grauer's gorilla (*G. b. graueri*, Endangered) was estimated to number about 16,900 in eastern DRC in 1996, but has since suffered major declines as a result of hunting, as well as habitat loss and diseases. Although there are robust chimpanzee (*Pan troglodytes schweinfurthii*, Endangered) populations in many of the Albertine Rift forests and ranging into western Tanzania, their numbers are generally small.

The forests of the Albertine Rift are also home to at least 27 other primate species, including Hoest's monkey (*Cercopithecus lhoesti*) and the owl-faced monkey (*C. hamlyni*). Other mammals include the Ruwenzori duiker (*Cephalophus rubidus*, Endangered), which is restricted to the Ruwenzori Mountains, and the Ruwenzori otter shrew (*Micropotamogale ruwenzorii*, Endangered), one of only three representatives of the family *Tenrecidae* on the African mainland (the others are found only in Madagascar).

The Eastern Arc Mountains hold 12 endemic mammal species (Burgess *et al*. 2007). Four species of primates are endemic to the Eastern Arc Mountains and Southern Rift: the kipunji monkey (*Rungwecebus kipungji*, Critically Endangered), the sanje mangabey (*Cercocebus sanjei*, Endangered), the Udzungwa red colobus (*Procolobus gordonorum*, Vulnerable) and the mountain dwarf galago (*Galago orinus*). Six shrew species are endemic to this part of the hotspot, including the desperate shrew (*Crocidura desperate*, Endangered), found only in the Udzungwa and Rungwe mountains, and *Congosorex phillipsorum* (Critically Endangered), known only from the highest altitude areas in the Udzungwa Mountains. Other notable mammals in the Eastern Arc include Abbott's duiker (*Cephalophus spadix*, Endangered) and the eastern tree hyrax (*Dendrohyrax validus*, Vulnerable). Several new mammal species have also been discovered in the past decade, including two possibly new species of dwarf galago (*Galagoides* spp.) in the Taita Hills and on Mount Rungwe, and the grey-faced elephant shrew (*Rhynchocyon udzungwensis*, Vulnerable) in the Udzungwa Mountains.

Further research on mammal species is certainly needed. For instance, a recent paper argues that the subspecies of golden jackal (*Canis aureus*), previously known as the Egyptian jackal (*C. a. lupaster*), is actually not a jackal at all, but rather more closely related to the gray wolf (*Canis lupus*) (Rueness *et al.* 2011).

Reptiles
Nearly 350 reptile species are found in the Eastern Afromontane Hotspot. More than 90 species are endemic, most of which are chameleons. Around 177 (14 percent) of Africa's reptile species live in the Albertine Rift, including about 18 endemic species. Five of these endemic species are chameleons, including the Rwenzori three-horned chameleon (*Chamaeleo johnstoni*), which looks like a miniature *triceratops* and can grow to a length of 30 centimeters. The very rare strange-horned chameleon (*Bradypodion xenorhinus*) has a circular protuberance on the end of its nose and is confined to the Rwenzori Mountains, where it has probably been over-collected for the wildlife trade (impacts not yet properly documented).

Data compiled in 2010 show that 32 species of reptiles are endemic to the Eastern Arc Mountains, the majority of these being chameleons in the genera *chamaeleo, rhampholeon* and *kinyonga* (MNRT 2011). There are also endemic species of worm snakes (*typhlops*), geckos and colubrid snakes. The Southern Rift has fewer endemic species, but there are endemic chameleons on Mounts Mabu and Mulanje, including the Mulanje mountain chameleon (*Bradypodion mulanjense*) and the Malawi stumptail chameleon (*Rhampholeon platyceps*). A new species of *Atheris* snake is also known from Mabu.

Amphibians
The hotspot is also home to more than 323 amphibian species, more than 100 of which are endemic, with more species being discovered as surveys are conducted in unstudied forest patches and their taxonomy is revised. For example, there are more than 50 endemic species of amphibians in the Eastern Arc, concentrated in the reed treefrogs (*Hyperolius*), forest treefrogs (*Leptopelis*), viviparous toads (*Nectophrynoides*), narrow-mouthed frogs (family Microhylidae) and caecilians. The Eastern Arc Mountains also hold 50 percent of the members of the caecilian family, Scolecomorphidae, among which the genus *Scolecomorphus*, with three species, is endemic. The Eastern Arc Mountains and Southern Rift contain all species of the genus *Nectophrynoides*, which includes the majority of the world's viviparous (live-bearing) frogs. Seven new species of *Nectophrynoides* have been described since 2004 (Menegon *et al.* 2004, Channing *et al.* 2005, and Menegon *et al.* 2007). Another monotypic genus of toad, *Churamiti maridadi* (Critically Endangered), was discovered in the Ukaguru Mountains in 2002. In addition, three new species in the genus *Callulina* have been recently described (Loader *et al.* 2010). Dozens of new species collected from the Eastern Arc Mountains remain to be described.

The Albertine Rift contains 143 known species of amphibians, including 38 endemic species and three monotypic endemic genera: Parker's tree toad (*Laurentophryne parkeri*), the Itombwe golden frog (*Chrysobatrachus cupreonitens*) and African painted frog (*Callixalus pictus*, Vulnerable). Six endemic genera of amphibians are found in the Ethiopian Highlands, four of which are monotypic (*Altiphrynoides, Spinophrynoides, Balebreviceps* and *Ericabatrachus*), while the fifth, *Paracassina*, is represented by two frog species.

Freshwater Fish
The geological turmoil that created the mountains of this hotspot has also yielded some of the world's most extraordinary lakes, such as Lake Tanganyika (the world's second deepest lake at 1,471 meters deep), Lake Albert, Lake Tana and Lake Malawi (Nyasa). Due to the presence of

these large and isolated lakes, a vast amount of freshwater fish diversity can be found in the Eastern Afromontane region, with more than 890 described species of fish, nearly 620 of which are endemic. Estimates including undescribed species increase the number of endemics significantly. Lake Malawi itself is potentially home to more than 800 fish species, most of which are endemic (Thieme *et al.* 2005, Darwall *et al.* 2011). Approximately 400 fish species are endemic to Lake Tanganyika, including a diversity of cichlids and at least 12 large endemic catfishes of the genus *bathyclarias*, which live in deeper areas of the lake. In the Ethiopian Highlands, Lake Tana, the source of the Blue Nile, has about 65 fish species; about a quarter of these are endemic, including a loach (*Nemacheil usabyssinicus*) and 14 large cyprinid barbs.

Invertebrates

While most invertebrates of the Eastern Afromontane are not well studied, the butterfly fauna is relatively well-known. Up to 1,300 butterfly species may occur in the Albertine Rift alone, including nearly 120 endemic species and one endemic genus, *kumothales.* Nearly 80 species of butterfly are endemic to the Eastern Arc Mountains. The African giant swallowtail *(Papilio antimachus)*, with a wingspan of 24 centimeters, is the continent's largest butterfly. Three other rare but large and conspicuous swallowtail butterflies *(P. leucotaenia*, *P. ufipa* and *Graphium gudenusi)* are important symbols for conservation in the area.

4. CONSERVATION OUTCOMES DEFINED FOR THE HOTSPOT

Conservation outcomes included in the ecosystem profile are the full set of justifiable conservation targets that need to be achieved to prevent biodiversity loss within a hotspot. CEPF uses these conservation outcomes to guide investment and to provide a baseline for monitoring the success of investments. The selection of conservation outcomes relies on the understanding that biodiversity is not measured in any single unit. Rather, it is distributed across a hierarchical continuum of ecological scales that can be categorized into three levels: species, sites and broad landscapes (or ecosystem-level units). These levels interlock geographically through the occurrence of species at sites and of species and sites within landscapes. Given threats to biodiversity at each of the three levels, targets for conservation can be set in terms of "extinctions avoided" (species outcomes), "areas protected" (site outcomes), and "corridors consolidated" (landscape outcomes).

While CEPF cannot achieve all of the outcomes identified for a region on its own, the partnership it establishes works to ensure that its conservation investments are working toward preventing biodiversity loss and that its success can be monitored and measured.

Defining conservation outcomes is a bottom-up process with a definition of species-level targets first, from which the definition of site-level targets is developed. The process requires detailed knowledge of the conservation status of individual species. Although this information has been accumulating in the global Red List of Threatened Species produced by IUCN and partners for nearly 50 years, knowledge of the population status of most threatened species is still deficient. This is especially true for plants and reptiles in the Eastern Afromontane Hotspot, where surveys and research on rare species are very limited.

The IUCN Red List is based on quantitative criteria under which the probability of extinction is estimated for each species. Species classified as "threatened" on the Red List have a high probability of extinction in the medium-term future. These include the three IUCN categories Critically Endangered, Endangered and Vulnerable. This definition excludes data-deficient species, which are considered to be priorities for further research but not necessarily for conservation action. It also excludes those species that are threatened locally and may be high national or regional priorities, but not high global priorities. Defining outcomes is a fluid process and, as data become available, species-level outcomes can be expanded to include other taxonomic groups that have not previously been assessed, as well as restricted-range species. Avoiding extinctions means conserving globally threatened species to make sure that their Red List status improves or at least stabilizes. This means that data are needed on population trends. However, for most of the threatened species, no such data currently exists.

Because most globally threatened species are best conserved through the protection of a network of sites where they occur, the process of defining conservation outcomes also focuses on identifying a comprehensive set of KBAs. The most important criterion for defining these areas is the confirmed occurrence of one or more globally threatened species. In addition to the occurrence of globally threatened species, KBAs can also be defined on the basis of the occurrence of restricted-range species and congregatory species. Sites regularly supporting significant populations of restricted-range species are global conservation priorities because there

are few or no other sites in the world where conservation action for these species can be taken. In the Eastern Afromontane Hotspot, this criterion is currently only applied rigorously in identifying KBAs for birds, as this is the only group for which the concept of restricted-range species has been quantitatively defined: species with a global breeding range of less than 50,000 square kilometers (Stattersfield *et al.* 1998). That said, the restricted-range criterion was also used to identify KBAs for a number of reptiles and plants since there is a paucity of species in these taxonomic groups in the IUCN Red List.

The starting point for defining KBAs in the Eastern Afromontane Hotspot was the network of Important Bird Areas (IBAs) in each country, identified by BirdLife International partners and collaborating organizations, starting in 1993. Completing the identification of site priorities required supplementing the IBAs by including data for other taxonomic groups through analyses of regionally available data and literature, followed by consultation with local experts in the region. The process also benefited from the KBA identification work that was conducted as part of the Eastern Arc and Coastal Forests Ecosystem Profile in 2003 (CEPF 2003), which overlaps with the Eastern Afromontane Hotspot in Kenya and Tanzania, and from biodiversity assessments in the Albertine Rift (WWF 2004). In the Arabian Peninsula portion of the hotspot, KBA identification depended primarily on plant data.

While the protection of a network of sites is sufficient to conserve many elements of biodiversity in the medium term, the long-term conservation of all elements of biodiversity requires the consolidation of interconnected landscapes of sites; such landscape-scale planning units, or "conservation corridors" are intended to support ecosystem resilience and conserve broad scale ecological and evolutionary processes, as well as to provide focal regions for CEPF engagement and investment.

In theory, within any given region, or, ultimately, for the whole world, conservation outcomes can be defined for all taxonomic groups. However, the outcomes definition is dependent on the availability of data on the global threat status of taxa and on the distribution of globally threatened species among sites and across corridors. Even for well-studied taxa such as birds, the data are never complete, so the definition of conservation outcomes is always a work in progress.

Mittermeier *et al.* (2004) divide the Eastern Afromontane (EAM) Hotspot into three sections: Eastern Arc and Southern Highlands (including the Kenyan and northern Tanzanian volcanic mountains), Albertine Rift and Ethiopian Highlands, to which we add a fourth section for the Highlands of the Arabian Peninsula. Dividing the hotspot this way allows us to organize the discussion of conservation outcomes in a more logical manner. Additionally, given that the outcomes definition analysis was conducted at a finer scale than the global analysis of biodiversity hotspots, we have in some cases included species and KBAs that, although not overlapping with the official hotspot boundary from "Hotspots Revisited," do meet the definition of Eastern Afromontane as interpreted by the experts involved in the analysis.

4.1 Species Outcomes

At least 677 species found in the hotspot are globally threatened according to the IUCN Red List (Table 4.1 and Appendix 1), and this number is likely to go up significantly as additional species

are assessed. Additionally, many of the species are not very well-known, as evidenced by the number of "Data Deficient" mammals (52) and amphibians (50) (IUCN 2010) and the many recent discoveries of new species. Further, as additional areas are explored in the Eastern Afromontane Hotspot, and more investigations into the taxonomic status of species are conducted, the numbers of endemic species and threatened species are both likely to rise, as is the number of overall species found in the hotspot. Species experts in the Eastern Arc estimate that there are more than 50 species of vertebrates in the Eastern Arc Mountains that are known but not yet described, mainly amphibians and reptiles, but also including birds (e.g. Fjeldså *et al*. 2010).

Table 4.1. Summary of Species Outcomes for the Eastern Afromontane Hotspot

Taxonomic Group	Critically Endangered	Endangered	Vulnerable	Total
Amphibians	7	30	35	72
Birds	4	23	40	67
Crabs		5	3	8
Dragonflies and Damselflies	3	2	6	11
Freshwater Fish	3	18	119	140
Mammals	7	26	44	77
Mollusks	5	7	10	22
Plants	32	37	207	276
Reptiles*	1	2	1	4
Total	**62**	**150**	**465**	677

*Reptiles have yet to be adequately assessed by IUCN, thus the number of threatened species will grow considerably.

Mammals

Information on the threat status and distribution of mammals is relatively good for the Eastern Afromontane biodiversity hotspot, owing largely to the recent publication of the IUCN Global Mammal Assessment (Schipper *et al.* 2008). In all there are 77 species of mammal that are threatened with extinction.

In terms of threatened endemics, the Ethiopian wolf (*Canis simensis*, Endangered), which is only found in the Ethiopian Highlands, has a total population estimated at around 440 and is threatened by continued habitat loss due to subsistence agriculture, making it the most threatened canid in the world. The Endangered Walia ibex (*Capra walie*), down-listed from Critical, is also symbolic of the Ethiopian Highlands portion of the hotspot. This highly restricted threatened species declined drastically due to trophy hunting and habitat fragmentation, but the establishment of the Simien Mountains National Park in 1969 has slowed this decline, allowing the total population to recover from a low of about 150 to approximately 500. Nevertheless, encroachment into the park by settlers continues to reduce available habitat for this species.

The Albertine Rift contains populations of threatened charismatic mammals such as the eastern gorilla (*Gorilla beringei*, Endangered) and robust chimpanzee (*Pan troglodytes*, Endangered). The Southern Highlands of Tanzania holds more than 90 percent of the population of the most recently discovered and described species of monkey in Africa. The kipunji (*Rungwecebus kipungji*, Critical) was discovered in 2003 at Mount Rungwe in the Southern Highlands, and simultaneously in the Udzungwa Mountains, and is one of the most highly threatened primates in Africa. Though known populations of the kipunji exist within protected areas, there is urgent need to strengthen the management of these areas and to reduce threats in the landscape surrounding the protected areas in the Southern Highlands (De Luca *et al.* 2010; Jones *et al.* 2005). In Mozambique, Vincent's bush squirrel (*Paraxerus vincenti*, Endangered) is found only in the mid-elevations of Mount Namuli between 1,250 and 1,800 meters above sea level (Peterhans 2008). This species requires further research regarding its distribution and taxonomy.

Birds

As is normally the case, the avian species are privileged in having more information available than other taxonomic groups (owing to the large bird-watching community). Threat and distribution data are quite good in comparison with other groups, given the semiannual updates to the IUCN Red List assessments coordinated by BirdLife International. Out of more than 1,300 bird species occurring in the Eastern Afromontane Hotspot, 67 are threatened (Mittermeier *et al.* 2004 and BirdLife International 2011).

The global population of the Sidamo lark (*Heteromirafra sidamoensis*, Critical) has been reduced to 250 individuals, making it the most threatened bird species in the Ethiopian Highlands. The species confined to a single highland grassland measuring a mere 30 square kilometers. Without immediate investment in its conservation, increasing threats could soon lead to the Sidamo lark's extinction (BirdLife International 2011).

Other threatened micro-endemics include the Taita apalis (*Apalis fuscigularis*, Critical) and Taita thrush (*Turdus helleri*, Critical), both confined to the Taita Hills in Kenya, and the Itombwe nightjar (*Caprimulgus prigoginei*, Critical) and Congo Bay-owl (*Phodilus prigoginei*, Endangered), known only from the Itombwe Mountains, an unprotected KBA in the Democratic Republic of Congo (DRC). This site is the richest single forest site for birds in Africa with 563 species recorded (Fishpool and Evans 2001); its protection is a matter of urgency. DNA analysis is also recognizing micro-endemic species of birds in the Eastern Arc of Tanzania (Bowie *et al.* 2004, 2009).

Reptiles

Approximately 347 species of reptiles occur in the Eastern Afromontane Hotspot (Mittermeier *et al.* 2004). Since reptile species have not yet been comprehensively assessed in this region, we cannot accurately list the number of globally threatened species. That said, when data were available, we have included endemic reptile species in the identification of KBAs.

Amphibians

Our knowledge of amphibian species is continually improving and has been consolidated at the global scale through the IUCN Global Amphibian Assessment, which last updated the data in

2008 (Vié *et al.* 2009). According to these data, approximately 323 amphibian species are found in the Eastern Afromontane Hotspot, of which 72 are globally threatened (IUCN 2010).

The Kihansi spray toad (*N. asperginis*, Extinct in the Wild) had been listed in 2004 by IUCN as Critically Endangered as a water diversion project threatened to reduce drastically the spray from the waterfall on which this species depended for survival. Once completed in 2000, the dam reduced the flow by 90 percent, stressing the toads to the point that they became even more susceptible to the chytrid fungus, which essentially spelled the end for the species in its original habitat. In 2009, the IUCN re-assessed the Kihansi spray toad as Extinct in the Wild. Nevertheless, reintroduction efforts are now under way in the Kihansi Gorge, with support of the Tanzanian government, following a successful captive breeding campaign at a number of zoos in the United States and Tanzania(Redford *et al.* 2011, Rija *et al.* 2010, Channing *et al.* 2009).

Freshwater Species
The global effort to assess a select group of freshwater taxa (fishes, mollusks, crabs and odonates) has been steadily progressing over the years. A comprehensive IUCN Red List assessment of these groups was recently completed across the entire African continent. Within the Eastern Afromontane Hotspot, a total of 181 freshwater species are globally threatened (comprising eight crabs, 140 freshwater fish, 22 mollusks and 11 dragonflies and damselflies).

Plants
The highlands of the Eastern Afromontane Hotspot are very rich in endemic flora and contain at least 7,600 plant species (Mittermeier *et al.* 2004). Currently, 276 species are listed as threatened. However, this number is not indicative of the proportion of threatened plants, since only a very small fraction of the total number of species has been assessed. For instance, work funded by CEPF in 2004 through 2007 showed that nearly 1,000 plants in the Eastern Arc and Coastal Forests should be placed on the Red List, so the number of threatened plants across the Eastern Afromontane is likely to exceed 1,000 species when assessment work is completed. In addition, provisional Red List assessments are available for many plant species in the Arabian Peninsula portion of the hotspot, where only 13 species are currently listed as globally threatened (see Appendix 1). Further work on Red List assessments for plants is a high priority, with notable gaps for the Ethiopian Highlands, Arabian Peninsula and other areas.

4.2 Site Outcomes

KBA Identification and Delineation

A total of 261 terrestrial KBAs and 49 freshwater KBAs have been identified for the Eastern Afromontane Hotspot (Figures 4.1 and 4.2, with more detailed maps in Appendix 12 and details in Appendix 2). The KBAs identified in the Eastern Afromontane Hotspot stretch from the Taif Escarpment in Saudi Arabia to the Chirinda Forest in southeastern Zimbabwe. While these undoubtedly comprise the core set of sites that are important for the conservation of biodiversity, it is important to emphasize that the process of identifying KBAs is iterative, and further refinement of the KBA analysis should be considered as a part of the CEPF investment in the hotspot. Additionally, given the history of civil unrest in many of the countries in the hotspot and subsequent lack of intense field research in some countries, one would expect the number of

KBAs and their trigger species to increase as additional data are gathered. Notable geographic gaps include the Arabian Peninsula, where stakeholder consultation for this profile was limited due to political unrest and other challenges.

Figure 4.1. Map of Terrestrial KBAs in the Eastern Afromontane Hotspot

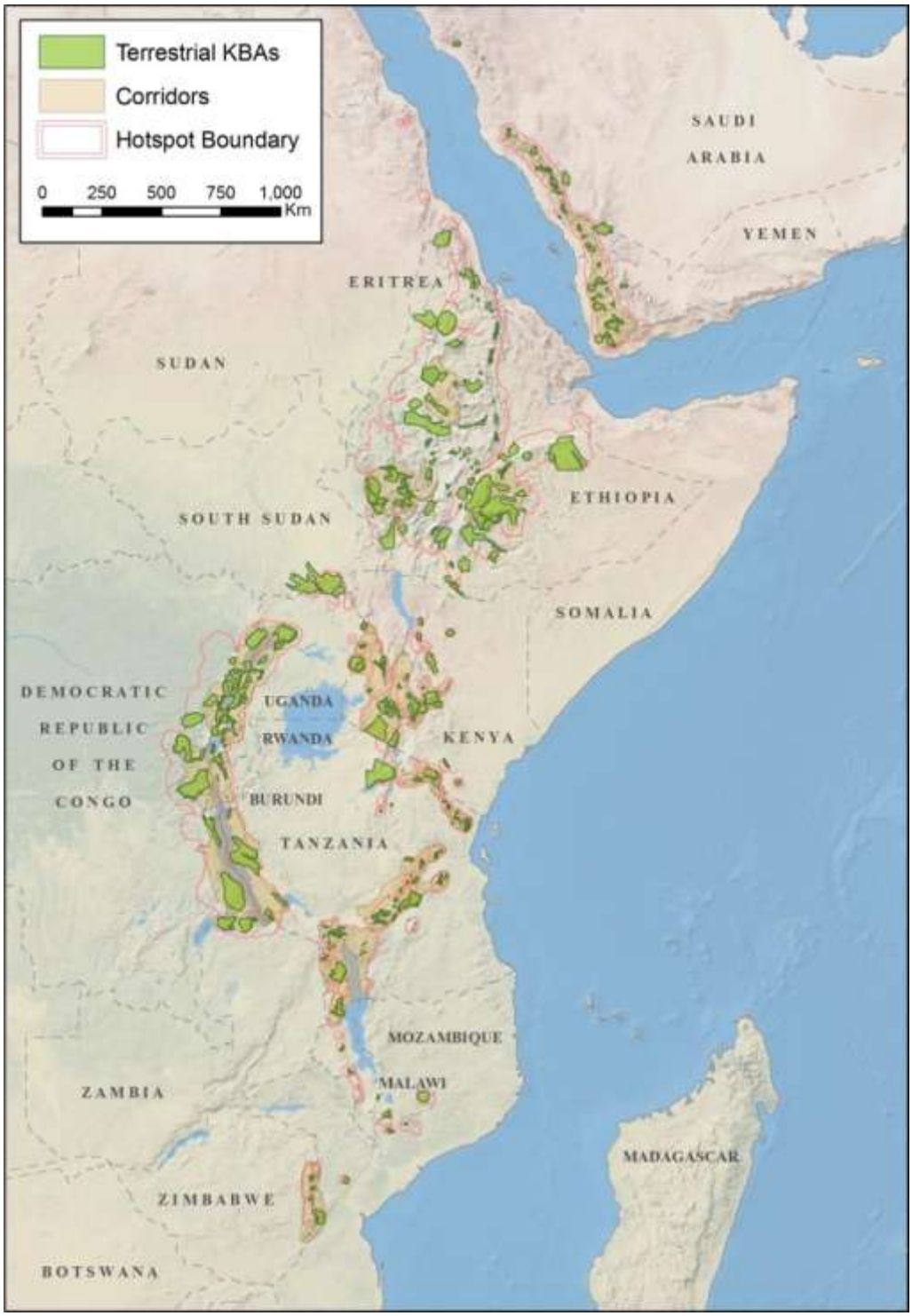
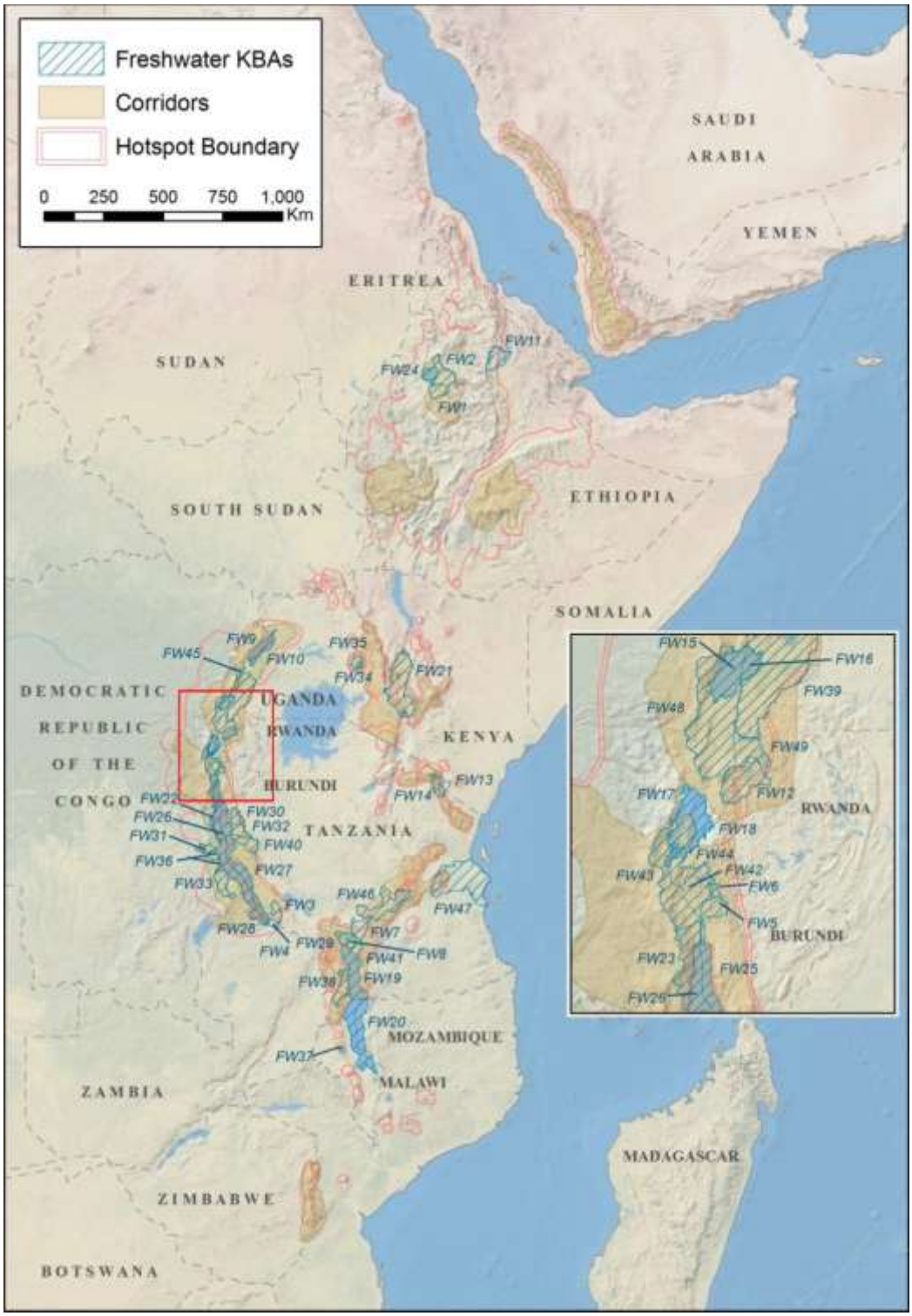


Figure 4.2. Map of Freshwater KBAs in the Eastern Afromontane Hotspot



Note: Freshwater KBA boundaries are based largely on sub-catchment boundaries and therefore may include urban areas or cross political boundaries.

Figure 4.3. Biological Priorities in the Eastern Afromontane Hotspot

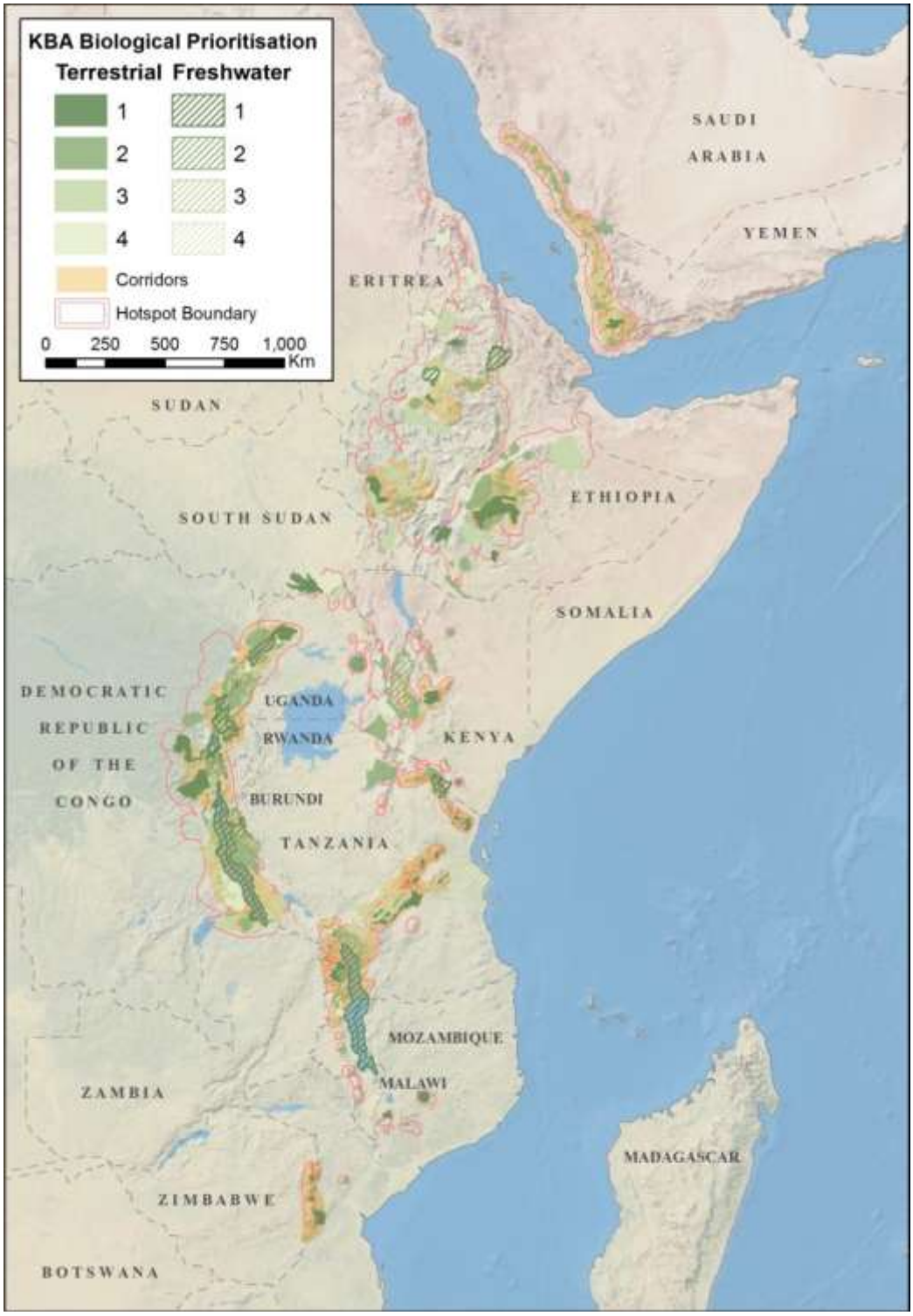


Table 4.2. Summary of KBAs Triggered by Threatened Species in the Eastern Afromontane Hotspot

Taxonomic Group	Number of KBAs
Amphibians	54
Birds	119
Freshwater (all species)	50
Mammals	99
Plants	97
Reptiles	4

Several KBAs have multiple trigger species, and some have remarkably high numbers of these threatened species. For example, more than 73 threatened species of mammals, birds and amphibians are known to occur in the Udzungwa Mountains of Tanzania. One example of a mammal restricted to the forests of these mountains is the Sanje mangabey (*Cercocebus sanjei*, Endangered), a primate whose total population is now believed to be less than 1,300 individuals (Ehardt *et al.* 2008). The Uzungwa Scarp viviparous toad (*Nectophrynoides wendyae*, Critical), which is an extremely narrow-ranged endemic, is also found in this KBA, but according to Menegon *et al.* (2007), it is common only within a specific location about 9 hectares—roughly equivalent to 13 soccer fields in size.

The Bale Mountains National Park in Ethiopia has 19 threatened species associated with it, including the Ethiopian wolf (*Canis simiensis*, Endangered) and its preferred prey in Bale, the giant mole-rat (*Tachyoryctes macrocephalus*, Endangered), which is wholly restricted to the KBA. An additional flagship species is the endangered mountain nyala (*Tragelaphus buxtoni*, Endangered). This national park, which was proposed as a UNESCO Natural World Heritage Site in 2008, covers approximately 2,200 hectares of the Bale Mountains ecosystem and, according to the government proposal to UNESCO, if Bale Mountains National Park were lost, there would be more global extinctions of mammal species than if any other equivalent-sized area in the world disappeared (UNESCO 2008).

The Itombwe Massif was identified by both Plumptre *et al.* (2007) and WWF (2004) as the highest priority for conservation action within the Albertine Rift, given the numbers of threatened and endemic species, and the lack of formal protection. Although funds were provided by WWF for its gazettement, the process is incomplete (Languy personal communication). The KBA analysis also highlights this site as incredibly important for biodiversity conservation in the Eastern Afromontane Hotspot as 24 species found in the KBA are threatened with extinction in the near future. The Kabobo Massif is entirely unprotected, but may receive higher protection in the future due to the recent discovery of six new vertebrate species—four mammals and two frogs (Plumptre, personal communication).

KBA Prioritization

All KBAs are globally significant priorities for conservation. However, CEPF will not be able to fund conservation in all 261 terrestrial KBAs and 49 freshwater KBAs. Therefore, a subset of top priorities was produced based on an analysis of irreplaceability and vulnerability. Whereas irreplaceability refers to the "where," vulnerability refers to the "when" and reflects the likelihood that a site's biodiversity value will be lost in the future. Biological site prioritization was based on Langhammer *et al.* (2007), which considers irreplaceability along with both species-based vulnerability and site-based vulnerability. In the present analysis, site-level vulnerability was not considered because data were not available for all areas of the hotspot. Both freshwater and terrestrial KBAs are included in the prioritization analysis, with equal weight to both.

Irreplaceability scores were assigned based on range restriction. A site is deemed wholly irreplaceable if it contains one or more species that occur nowhere else. Species restricted to two to 10 sites globally were considered the next highest priority, followed by species endemic to the hotspot or a single country, and then species that were more widespread. Given the need for more research on many species within the hotspot, determining which species were genuinely restricted to one or a few sites was challenging. As with KBA identification and delineation, the prioritization analysis should be updated when additional data become available.

Vulnerability was measured by the threat status of species according to the IUCN Red List. Thus, sites holding Critically Endangered species are more urgent conservation priorities than those holding Endangered species, which are in turn more urgent priorities than those holding only Vulnerable or Not Threatened species. This criterion allows investment to focus on the species at highest risk of extinction.

The combination of vulnerability and irreplaceability scores yielded four tiers of priorities. Priority 1 KBAs are Critically Endangered or Endangered species that are restricted to a single site worldwide. Priority 2 KBAs are all less-threatened single-site endemics, plus Critically Endangered/Endangered species restricted to two to -10 sites globally. Priority 3 KBAs contain all less-threatened species restricted to two to 10 sites, plus all remaining Critically Endangered/Endangered species. Priority 4 includes all remaining sites. The number of species associated with each site does not play a part in this approach to prioritization, since there are certainly more priority species in each site than available data suggest. Tables 4.3.a and 4.3.b provide a summary of the number of respective terrestrial and freshwater KBAs in each priority level for the hotspot overall and for each country, while a full list is provided in Appendix 2.

Table 4.3.a. Terrestrial KBAs by Country and Priority Level in the Eastern Afromontane Hotspot

Priority Level	Burundi	DRC	Eritrea	Ethiopia	Kenya	Malawi	Mozambique	Rwanda	Saudi Arabia	South Sudan	Tanzania	Uganda	Yemen	Zambia	Zimbabwe	Total KBAs by priority level in the EAM Hotspot
1	1	2		9	3	2	3	1		1	8	4	1	1	3	39
2	1	7		22	13	3	2	2	18		13	9	5	2	2	99
3	2	1	1	33	3	1		3	2		3	9	14	1		73
4	1	1	8	15	4	4	1			1	7	3	4		1	50
Total by Country	**5**	**11**	**9**	**79**	**23**	**10**	**6**	**6**	**20**	**2**	**31**	**25**	**24**	**4**	**6**	**261**
AZE sites	0	2	0	6	3	1	2	1	0	0	6	2	0	0	2	25

Table 4.3.b. Freshwater KBAs by Country and Priority Level in the Eastern Afromontane Hotspot

Priority Level	Burundi	DRC	Eritrea	Ethiopia	Kenya	Malawi	Mozambique	Rwanda	Saudi Arabia	South Sudan	Tanzania	Uganda	Yemen	Zambia	Zimbabwe	Total KBAs by priority level in the EAM Hotspot
1	1	4		2	1	1	1	2			3	2		1		18
2	2	2		1	2	2		2			5	3				19
3		5		1							4	1		1		12
Total by Country	**3**	**11**		**4**	**3**	**3**	**1**	**4**			**12**	**6**		**2**		**49**

A subset of Priority 1 KBAs for the hotspot was identified prior to this analysis. The Alliance for Zero Extinction (AZE), a group of more than 60 national and international conservation organizations working to halt imminent species extinctions, has identified a set of 587 sites around the world that each hold the last remaining population of one or more Critically Endangered or Endangered species (AZE 2010; Ricketts *et al.* 2005). At the global level, AZE sites are identified only for those taxonomic groups that have been assessed globally through the Red List: mammals, birds, some reptiles (crocodilians, iguanas, turtles and tortoises), amphibians, conifers and reef-building corals. Other taxa will be added as data become available. In the Eastern Afromontane Hotspot there are 25 KBAs that qualify for AZE status based on their extreme threat and irreplaceability (see Table 4.3.a). Through this analysis, we supplement these sites with an additional 32 equally important sites based primarily on additional data for freshwater species and plants. The lack of Priority 1 sites in the Arabian Peninsula is due in large

part to the lack of IUCN Red List assessments for plants; there is thus an urgent need to complete of such assessments.

The Bale Mountains KBA, mentioned earlier, is an AZE site based on the presence of five Critically Endangered and Endangered species that are found nowhere else. Another site in Ethiopia, Simien Mountains National Park, is home to a spectacular flagship AZE species, the Walia ibex (*Capra walie*, Endangered). According to Gebremedhin and Grubb (2008) its global population, which is restricted to the Simien Mountains, numbers around 500 (up from an estimated 250 in 1996).

In the freshwater realm, Lake Nyasa (also known as Lake Malawi) deserves special mention, given the presence of approximately 15 percent of the world's freshwater fish species. A total of 104 species are considered threatened on the IUCN Red List, essentially triggering AZE status many times over. The habitat affinity of many of these species is such that they make their homes in rocky areas, which are akin to separate underwater islands, thus allowing for relatively quick evolution of new species (Mittermeier *et al.* 2004). Soil erosion and overharvesting are major threats in and around the lake. Nets sometimes block entire rivers during spawning runs, and deforestation and agricultural expansion have increased sedimentation. Overharvesting for the aquarium trade is another major threat to this site (Holland and Darwall 2011). Lake Tanganyika also has very high levels of diversity and endemism, and faces similar threats.

These Priority 1 sites cover approximately 16 percent of the area of the Eastern Afromontane Hotspot (167,028 square kilometers out of 1,015,780 square kilometers). They represent the tip of the iceberg in terms of conserving biodiversity: if one of these sites is lost, at least one currently threatened species will become extinct in the wild (as happened to the Kihansi spray toad).

Table 4.4. Priority 1 KBAs in the Eastern Afromontane Hotspot

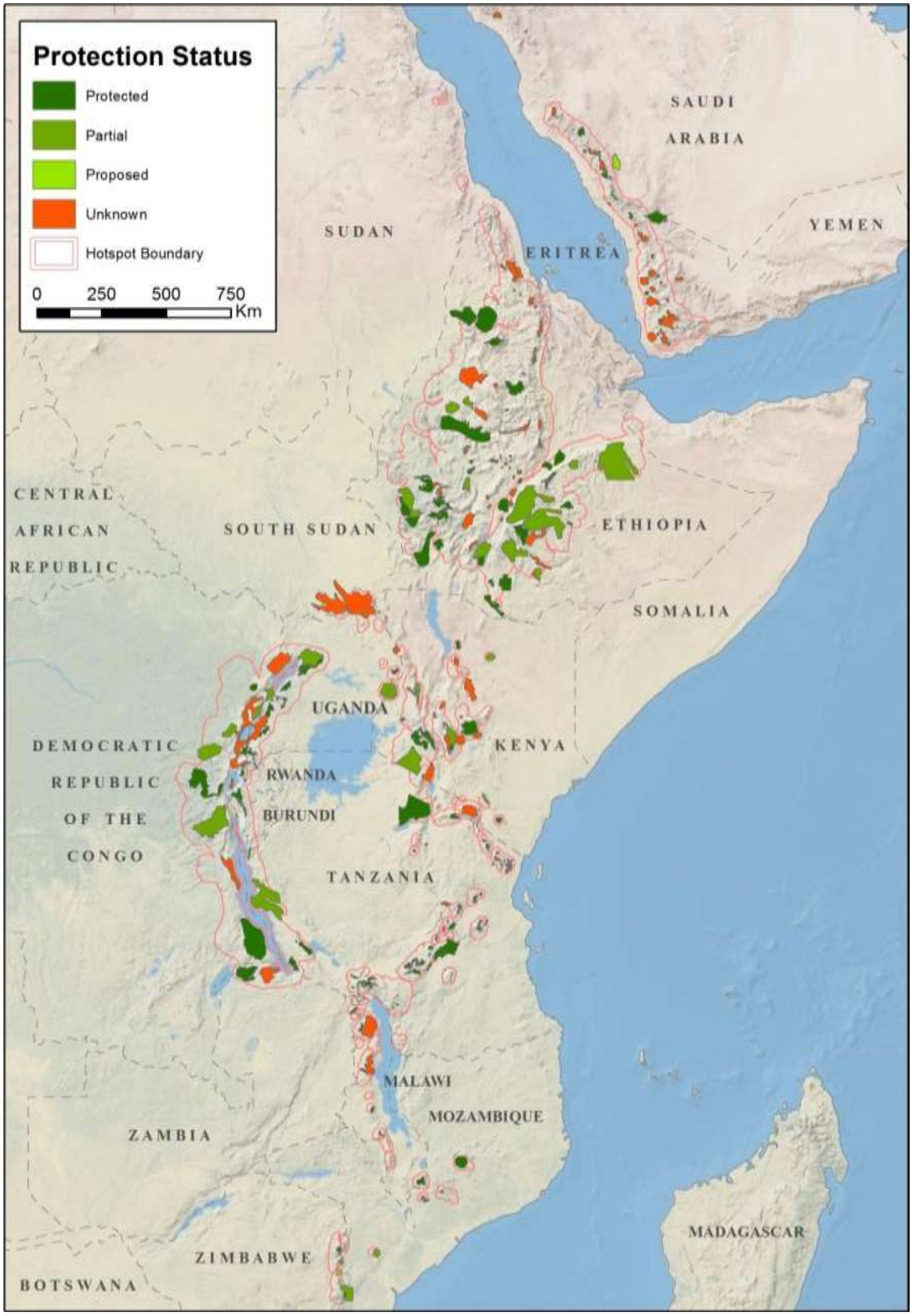
Key Biodiversity Area	Country	AZE Site
Kibira National Park	Burundi	
Lake Tanganyika Burundi	Burundi	
Itombwe Mountains	DRC	Y
Kahuzi-Biega National Park	DRC	Y
Lake Albert	DRC	
Lake Kivu	DRC	
Lake Tanganyika	DRC	
Virunga National Park and Rutshuru	DRC	
Bale Mountains National Park	Ethiopia	Y
Gughe Mountains	Ethiopia	Y
Harena-Kokosa	Ethiopia	
Koka Dam and Lake Gelila	Ethiopia	
Lake Ashenge Catchment	Ethiopia	
Lake Tana	Ethiopia	
Liben Plains and Negele Woodlands	Ethiopia	Y

Little Abbai River	Ethiopia	Y
Metu-Gore-Tepi Forests	Ethiopia	Y
Nechisar National Park	Ethiopia	
Simien Mountains National Park	Ethiopia	Y
Lake Chala and Lake Jipe Catchment	Kenya	
Mount Elgon	Kenya	Y
Mount Kenya	Kenya	Y
Taita Hills Forests	Kenya	Y
Lake Malawi	Malawi	
Mount Mulanje Forest Reserve	Malawi	Y
Nyika National Park	Malawi	
Lake Nyasa	Mozambique	
Mount Mabu	Mozambique	
Mount Namuli	Mozambique	Y
Lake Bulera and Luhundo	Rwanda	
Lake Kivu	Rwanda	
Nyungwe National Park	Rwanda	Y
Imatong Mountains	South Sudan	
East Usambara Mountains	Tanzania	Y
Lake Chala and Lake Jipe Catchment	Tanzania	
Lake Tanganyika	Tanzania	
Malagarasi River System	Tanzania	
Mount Rungwe	Tanzania	
Nguru Mountains	Tanzania	
Rubeho Mountains	Tanzania	Y
Udzungwa Mountains	Tanzania	Y
Ukaguru Mountains	Tanzania	Y
Uluguru Mountains	Tanzania	Y
West Usambara Mountains	Tanzania	Y
Bwindi Impenetrable National Park	Uganda	
Lake Albert	Uganda	
Mount Elgon National Park	Uganda	Y
Murchison Falls National Park	Uganda	
Rwenzori Mountains National Park	Uganda	Y
Virunga National Park and Rutshuru	Uganda	
High Mountains of Ibb	Yemen	
Lake Tanganyika	Zambia	
Nyika National Park	Zambia	
Chimanimani Mountains	Zimbabwe	Y
Nyanga Mountains	Zimbabwe	Y
Vumba Highlands	Zimbabwe	

Formal Protection of KBAs

As mentioned previously, most surveys carried out by field biologists have tended to focus on national parks and reserves, and in many parts of the hotspot, these areas represent the majority of the remaining natural habitat. Therefore, it is not surprising that many of the KBAs identified in the hotspot are covered by protected areas. Out of 261 terrestrial KBAs, 108 are known to be fully protected and 43 are known to be at least partially covered by protected areas – so it could be considered that about 58 percent of the KBAs are under some sort of legal protection (Figure 4.3 and Appendix 2). Formal protection does not guarantee the conservation of the species for which these KBAs were identified, as various threats such as poaching, climate change, the absence of active management for species conservation, and a lack of connectivity between sites may lead to local extinction (see Chapter 8). Relevant conservation action may focus on improved management of these protected areas, or on the development and implementation of management action plans for specific species.

Figure 4.3. Map of Protection Status for Terrestrial KBAs in the Eastern Afromontane Hotspot



Data Gaps, Research Priorities and Candidate KBAs

The KBA analysis and consultations with partners have shown that much remains to be understood regarding biodiversity in the Eastern Afromontane. Locality data are entirely unavailable for some species, and many others lack locality data over part of their range. Plant and reptile species represent particularly significant gaps and therefore represent high priorities for further field research.

Quite a few potentially important sites lack data on priority species and therefore could not be identified as KBAs during this analysis; still other KBAs require further survey work to confirm the presence of additional species targets. One notable example is Assimba Natural Forest in Eastern Tigray, Ethiopia. Assimba Natural Forest was established as a protected area by the regional government in 2010 and represents a rare example of a dry mountain ecosystem in this region. This inadequately surveyed site is thought to hold rich and highly endemic biodiversity (Tigray Bureau of Agriculture and Rural Development 2010). Its peak at Mount Assimba is 3,229 meters above sea level, and the escarpment drops dramatically toward the Red Sea to an elevation of 100 meters above sea level, through more or less intact ecotones (transition areas of vegetation between plant communities). Another example is the Serra Choa-Catandica area in central Mozambique, which has rarely been surveyed but could very well be confirmed as a KBA once additional information is gathered, such as what has been obtained from a recent expedition to survey trees (J. Burrows, personal communication). Such sites that seem likely to qualify for KBA status but lack adequate surveys can be considered candidate KBAs.

In addition, this analysis highlighted the need for IUCN Red List assessments for many species found in the hotspot. Again, plant and reptile species represented major gaps. Ethiopia and Saudi Arabia represent two important geographic gaps for both plant and reptile assessments.

4.3 Corridor Outcomes: Broadscale Planning Units for Conservation Investment

The CEPF framework uses the term "conservation corridors" to define broadscale planning units. In this context, the term **does not** adhere strictly to the biological definition of corridors (i.e. strips or patches of habitat designed to reduce habitat fragmentation or enable species movement by connecting protected areas or other priority sites). CEPF "conservation corridors" refer to far larger areas through which to direct conservation investment at a landscape scale. These planning units include major clusters of KBAs and as much biophysical homogeneity as possible. However, CEPF also places very strong emphasis on addressing improvements in ecosystem services, biodiversity conservation and human well-being through investment at the landscape scale. In the rest of the profile, the term "corridor" will be used to mean the same thing as "landscape planning units" unless it is qualified by the term "biological."

The patchy nature of the Eastern Afromontane Hotspot boundary itself suggested a basis for identifying these broad planning units. The boundary generally aligns with the ecoregional framework developed by WWF (Burgess *et al.* 2004a). As such, ecoregions within the hotspot subregions (Arabian Peninsula, Eastern Arc and Southern Highlands, Albertine Rift and

Ethiopian Highlands) can be used both to define outer boundaries of the landscape planning units, and to guide landscape-level investment within individual planning units. The use of the ecoregions framework has the advantage of being an already accepted biogeographical framework for the region. In the majority of the different mountain regions, the hotspot boundary follows the ecoregional boundary exactly. Only in the Albertine Rift is there significant deviation between the two frameworks, as the hotspot boundary follows the earlier outline for the Endemic Bird Areas in that region (Stattersfield *et al.* 1998).

Freshwater KBAs often necessarily target sub-catchment areas beyond more restricted sites where target species occur. Where possible, these large areas also informed boundary delineation for the landscape planning units. Directing conservation investment toward improved management of watersheds supports the conservation of numerous freshwater species. Such investment can also provide significant benefits for terrestrial biodiversity and human communities through improved water quality and quantity and reduced siltation. A range of ecosystem services can be addressed through sustainable watershed management. For instance, habitat conservation and restoration in upper catchment areas can greatly reduce dam siltation and thereby increase long-term energy provision. Sustainable fisheries management can result in species recovery, leading to increased food security for local residents. The provision of additional ecosystem services such as those related to climate change mitigation can also be addressed directly through many of the planning units.

Furthermore, planning unit boundaries were extended to include AZE sites where appropriate, since habitat fragmentation is the main threat to the persistence of most AZE species. In these areas, and wherever there are small or highly fragmented KBAs, a focus on habitat restoration or compatible land uses within production landscapes around the priority sites will be critical.

Planning unit boundaries are necessarily coarse given the multitude of conservation goals at this scale. Coarse boundaries also allow for further refinement during the CEPF implementation phase. Specific conservation goals at this scale will vary between and within planning units, but may support restoring or maintaining habitat integrity and migration routes, addressing human-wildlife conflict, and maintaining ecosystem services and their resulting benefits to people. Specific actions could include watershed management, reforestation, creating buffer areas around protected areas through agroforestry, and addressing climate change impacts; these are discussed later in the ecosystem profile.

In all, the Eastern Afromontane Ecosystem Profile includes 14 Conservation Corridors (or landscape planning units) in nine countries (Ethiopia, Kenya, Tanzania, Uganda, Rwanda, Burundi, DRC, Mozambique and Zimbabwe; Table 4.5 and Figure 4.4). This version of the planning includes inputs from subregional workshop participants and other experts. When such input was focused on fine-scale biological corridors or areas at the site scale, we tried to include these through modifications to the overall planning unit boundaries; however, some of these edits are not visible at the resolution of the entire region, or were in the middle of planning units and so could not be reflected.

Finally, detailed conservation plans or strategies already exist for some areas within the Eastern Afromontane Hotspot. These areas include the Albertine Rift (Plumptre *et al.* 2003a; Languy and

Burgess 2003; 2005; ARCOS 2004), the Eastern Arc (Kilahama and Burgess 2005; Kilahama *et al.* 2009; FBD 2009), Lake Malawi/Niassa/Nyassa (Chafota *et al.* 2003), and various mountains such as Mulanje, Mahale (Doody 2008), Kilimanjaro (Newmark 1993), Udzungwa (Sumbi *et al.* 2005), and Bwindi (AWF/IGCP 2005). There is thus a considerable body of strategic planning to build from through CEPF investment. Furthermore, a large number of plans are already in place for the development of biological corridors to improve the connectivity between remaining areas of natural habitat and to make isolated mountain areas more resilient to the potential impacts of climate change. These should be taken into account in targeting CEPF investment at the landscape scale.

Table 4.5: List of Landscape-Scale Planning Units or "Conservation Corridors" Identified as Part of the Afromontane Ecosystem Profile, Including the Numbers of KBAs and AZE Sites Contained within Each

Hotspot Subregion	Planning Unit Conservation Corridor	WWF Ecoregions	Countries	Freshwater KBAs	Terrestrial KBAs	AZE Sites
Arabian Peninsula	Arabian Peninsula Highlands	Southwestern Arabian Montane Woodlands, Southwestern Arabian Foothills Savanna	Saudi Arabia, Yemen	0	37	0
Ethiopian/Eritrean highlands	Bale Mountains	Ethiopian Montane Moorlands, Ethiopian Montane Grasslands and Woodlands, Ethiopian Montane Forests	Ethiopia	0	7	1
Ethiopian/Eritrean highlands	Kaffa–Yayu Coffee Biosphere Reserve	Ethiopian Montane Grasslands and Woodlands, Ethiopian Montane Forests	Ethiopia	0	9	1
Ethiopian/Eritrean highlands	Lake Tana Catchment	Ethiopian Montane Grasslands and Woodlands, Ethiopian Montane Forests, Lake Tana Freshwater Ecoregion (Thieme *et al.* 2005).	Ethiopia	2	7	1
Albertine Rift	Greater Virunga-Murchison Landscape	Victoria Basin Forest-Savanna Mosaic, Albertine Rift Montane Forests, Northeastern Congolian Lowland Forests, Rwenzori-Virunga Montane Moorlands, East Sudanian Savanna, Lake Tanganyika Freshwater Ecoregion (Thieme *et al.* 2005)	Ethiopia	9	30	1
Albertine Rift	Mount Kabobo-Margungu Highlands	Albertine Rift Montane Forests, Central Zambezian Miombo Woodlands, Itigi-Sumbu Thicket, Lake Tanganyika Freshwater Ecoregion (Thieme *et al.,* 2005)	DRC, Tanzania, Zambia	6	4	0

Albertine Rift	Greater Mahale Landscape	Albertine Rift Montane Forests, Central Zambezian Miombo Woodlands, Lake Tanganyika Freshwater Ecoregion (Thieme *et al.* 2005)	DRC, Rwanda, Uganda	5	5	0
Albertine Rift	Itombwe-Nyungwe Landscape	Northeastern Congolian Lowland Forests, Albertine Rift Montane Forests, Lake Tanganyika Freshwater Ecoregion (Thieme *et al.* 2005)	Uganda	9	10	3
Northern Volcanic	Mount Kenya-Aberdare Mountains	East African Montane Forests	Kenya	1	10	1
Eastern Arc/Northern Volcanics	Kilimanjaro–Meru-North Pare Mountains	East African Montane Forests, Eastern Arc Forests, East African Montane Moorlands, Southern Acacia-Commiphora Bushlands and Thickets	Tanzania	1	4	0
Eastern Arc	Usambara-South Pare Mountains	Eastern Arc Forests, Southern Acacia-Commiphora Bushlands and Thickets, Northern Zanzibar-Inhambane Coastal Forest Mosaic	Tanzania	0	3	2
Eastern Arc	Udzungwa-Uluguru Mountains	Eastern Arc Forests, Southern Acacia-Commiphora Bushlands and Thickets, Eastern Miombo Woodlands	Malawi, Tanzania	3	7	4
Southern Mountains	Northern Lake Nyassa Catchments	Southern Rift Montane Forest-Grassland Mosaic, Central Zambezian Miombo Woodlands, Lakes Chilwa and Chiuta and Lake Malawi Freshwater Ecoregions (Thieme *et al.* 2005)	Mozambique, Zimbabwe	6	15	0
Southern Mountains	Chimanimani-Nyanga Mountains	Eastern Zimbabwe Montane Forest-Grassland Mosaic, Southern Miombo Woodlands	Mozambique, Zimbabwe	0	7	2

1. Arabian Highlands

The Arabian Highlands in Western Yemen and Southwestern Saudi Arabia are rich in plant endemism, and this endemism served as the basis for the identification of 37 KBAs in this profile. This narrow strip of Arabian Highlands near the Red Sea coast is relatively homogenous and follows a clear terrain gradient. This corridor is also one of the most densely inhabited and cultivated areas in the Arabian Peninsula. Biodiversity in this corridor is highly reliant on traditional agricultural practices, such as shade coffee plantation, that create micro-biomes of high biodiversity value for plants, reptiles and birds.

2. Bale Highlands

Water flowing from the Bale Highlands mostly drains south to the Dawa-Genale Basin and feeds the Melka Wakena hydroelectric dam. Four major rivers arise from the Bale Massif—the Wabe Shebelle, Web, Wemel and Dumal. These are the only sources of perennial water for the arid lowlands of east and southeast Ethiopia, including the Ogaden and Somali agricultural belt. Additionally, the endemic Ethiopian wolf (*Canis simiensis*) and mountain nyala (*Tragelaphus buxtoni*) would both greatly benefit from habitat restoration within and outside identified KBAs.

3. Kaffa-Yayu Coffee Biosphere Reserve

Known as the lungs of Ethiopia for its role in carbon sequestration, this remnant area of tropical rain forest is also the origin of the wild *Coffea arabica*. The Kaffa (Sheka) and Yayu forests within this corridor were designated UNESCO Biosphere Reserves in 2010. Human resettlement and expansion of commercial agriculture in the area has resulted in forest fragmentation. Similar species composition in remnant forest blocks suggests increasing connectivity through biological corridors. Parts of these southern Ethiopian highlands also form the water catchment for Lake Turkana via the Omo River. The western part of this corridor (from Sheka Forest westward) is less known and is presumed to host sites of high biodiversity value. This part of the corridor is a catchment area for the wetlands of Gambella and the Boma area (in South Sudan), home of the second largest annual antelope migration in Africa, as well as the Endangered Nile lechwe (*Kobus megaceros*), a species of antelope.

4. Lake Tana Catchment

Lake Tana is the main source of the Blue Nile, which in turn contributes about two-thirds of the water volume of the Nile. The significance of this corridor and the neighboring Ethiopian Highlands as a source of fresh water to Nile Basin countries is immense.

Dense human population has resulted in serious habitat fragmentation. This population density coupled with extremely rugged topography results in huge quantities of silt being fed into Lake Tana by rivers from the north and northeast, which threatens the long-term health of the lake and the survival of its endemic species. Catchment restoration and management are a high priority, but each catchment may need to be treated separately due to the extent of fragmentation and the rugged terrain.

A new project, the Grand Millennium Hydroelectric Dam, is being planned in Ethiopia. To protect the upcoming dam from siltation, the government of Ethiopia has already begun major catchment rehabilitation activities in the southwest highlands and the Blue Nile Basin.

Lake Tana and the surrounding Fogera Plains catchment are home to endemic, threatened freshwater species such as *Unio abyssinicus*, a type of mussel, and *Labeobarbus macrophtalmus*, a species of fish. (IUCN Freshwater 2011).

5. Greater Virunga-Murchison Landscape

This area includes the catchments of Lakes Albert and Edward, as well as the smaller Lakes Bulera and Luhundo. It extends from Murchison Falls National Park in the north to Mukura Reserve in the south. This area is important for its populations of chimpanzee as well as a number of Albertine Rift endemics. In the Murchison-Semliki area, a project involving approximately seven NGOs aims to conserve the remaining forest and savanna corridors through

linking protected areas. The conservation values of this planning unit include the entire world population of mountain gorilla, the region of highest importance for Albertine Rift endemic species, and the large Virunga Park. Lake Tanganyika contains some of the highest densities of endemic fish in the world.

6. Mount Kabobo-Margungu Highlands

This area includes Mount Kabobo and the Marungu Massif in DRC, and extends into northernmost Zambia on the southwestern margins of Lake Tangyanika. The area is poorly known biologically, but gorillas are believed to be present. As noted above, Lake Tanganyika contains some of the highest densities of endemic fish in the world.

7. Greater Mahale Landscape

This area covers the region of the rift from Gombe to Mbizi in Tanzania, including the Gombe Stream and Mahale Mountains national parks, Ugalla River Game Reserve and Mbizi Forest Reserve. The forests of this planning unit support the easternmost populations of chimpanzee in Africa and important concentrations of Albertine Rift endemic species. Chimpanzee populations are found in Mahale Mountains National Park, Ntakata Mountains, Kakungu Hills, Kalobwe Hills, Wansisi Hills, the proposed Kashagulu Village Forest Reserve, Mkuyu Forest, Kungwe Bay Forest Reserve, Tongwe East Forest Reserve, Masito forest/woodland and Ugalla forests/woodland. Mammal movement corridors connect Katavi and Mahale national parks and possibly also link to the Ugalla area.

8. Itombwe-Nyungwe Landscape

This corridor covers the area from Itombwe Massif in the south to Maiko Reserve in the north and links Kahuzi Biega with community reserves in Tayna. The landscape covers the majority of the global population of Grauer's gorilla in the Itombwe Massif. The Itombwe Massif is one of the highest priority sites along the rift—and an area that currently has no formal protection.

This area also covers the contiguous protected forest between Rwanda and Burundi, on the watershed divide between the Nile and Congo rivers. The mountain forests of this planning unit support healthy populations of Albertine Rift endemic species and chimpanzees, but lack gorillas.

9. Mount Kenya-Aberdare Range

This corridor comprises a cluster of terrestrial, montane KBAs, including the Mount Kenya AZE site. Boundaries were defined based mainly on the hotspot boundary, and in particular on the extent of the East African Montane Forest Ecoregion, as defined by WWF.

10. Kilimanjaro-Meru-North Pare Mountains

Mount Kilimanjaro, the highest peak in Africa, and the nearby Mount Meru are two recent volcanoes that contain habitat transitions from surrounding lowland savanna woodlands, through lowland and riverine forests, and on to submontane, montane and upper montane forests. Above the tree line, the habitat is afromontane heathland and afro-alpine habitats, leading up to a small snowcap. Hydrological processes are critical within this planning unit, supplying the Lake Chala and Lake Jipe watershed and the Pangani River system.

11. Usambara-South Pare Mountains

This planning unit contains the West and East Usambaras, as well as the South Pare Mountains, with their biologically related series of fragmented lowland, submontane and montane forests. In East Usambara, the restoration of ecological connectivity is under way. In part through CEPF funding, connectivity has been largely restored between Amani Nature Reserve and lowland forests, and to the Nilo Nature Reserve farther north.

12. Udzungwa-Uluguru Mountains

This planning unit includes four AZE sites in the Udzungwa and Uluguru mountains, and is probably most the important of the Eastern Arc Mountains blocks. Biological connectivity between the Udzungwa Mountains National Park/Kilombero Nature Reserve and the Uzungwa Scarp proposed nature reserve is being planned using CEPF consolidation funding; the movement of elephants between Udzunwga Park and the Selous Game Reserve to the south and to Ruaha farther northwest has been studied, and planning to maintain this connectivity is in place. Connection between the northern and southern elements of the Uluguru Nature Reserve is being secured through the protection of Bunduki Gap—a strip of land between the north and south portions of the reserve—brought about in part by CEPF funding. Biological connections of Uluguru Nature Reserve also exist to lowland forests on the eastern side of the mountain, and to some of the isolated forests on surrounding hills.

13. Northern Lake Nyassa Catchments

This planning unit comprises the mountain areas of the Southern Highlands of Tanzania and mountains of Zambia, Malawi and Mozambique that drain into Lake Nyassa, and it supports important concentrations of endemic and threatened species. The area includes botanically rich upland grasslands in the Kitulo Plateau and the Nyika Plateau. Lake Nyassa/Malawi is incredibly rich in freshwater species diversity, with hundreds of endemic species, particularly fish.

14. Chimanimani-Nyanga Mountains

The Chimanimani-Nyanga Mountains are biologically unique and contain key habitats for conservation investment, including two AZE sites. Boundaries here largely followed terrain and the ecoregional boundaries. The very small Chirinda Forest AZE site is the southernmost KBA in the hotspot and is home to the endemic, Endangered Chirinda toad (*Mertensophryne anotis*).

Figure 4.4. Map of Conservation Corridors in the Eastern Afromontane

5. SOCIOECONOMIC PROFILE OF THE HOTSPOT

5.1 Introduction and Historical Context

Africa is widely accepted as the birthplace of humankind, and some of the earliest fossilized hominin remains are found in East Africa. Early humans probably used the forested mountains as sources of food, water and shelter during periods of drought. Humans' ability to alter the environment has grown through the successive discoveries of fire, agriculture, technology and fossil fuels. The use of fire in East Africa dates back at least 60,000 years and the ability to smelt iron at least 2,000 years. There is also evidence of human alteration of the environment in the Arabian Peninsula dating back thousands of years.[4] This long association between human settlement and use of natural resources is arguably the longest of all the world's hotspots.

5.2 Demographic and Social Trends

Regional and National Demographics

(*For full data and sources, unless otherwise specified, see Appendix 5 and references therein.*)

Human population in the hotspot countries was an estimated 475 million in 2011, around 6.8 percent of the global total. The most populous countries (in millions) were Ethiopia (87.1), Democratic Republic of the Congo (DRC) (67.8), Tanzania (46.2) and Kenya (41.6). Rwanda is the most densely populated country in mainland Africa (an estimated 394 people per square kilometer), and Burundi has an average of 314 people per square kilometer. Local population densities can be even higher, especially in parts of the Albertine Rift (Plumptre *et al*. 2004).

Figures for human populations and densities within the hotspot's boundaries are not available but are significant in some places. For instance, the majority of the population of Ethiopia lives in the Ethiopian Highlands. There are major urban centers within the hotspot, including the capital cities of Yemen (population of Sana'a: 1.71 million in 2004), Eritrea (Asmara: 675,500 in 2005), Ethiopia (Addis Ababa: 2.98 million in 2011) and Burundi (Bujumbura: 478,000 in 2008).[5] High population densities put enormous pressure on surrounding natural resources, but in general, densities decline in the forbidding mountain climates and topographies of the highest parts of the hotspot.

Populations are increasing rapidly in hotspot countries, with annual growth rates typically between 2 and 3 percent (well above the world average of 1.2 percent). Zimbabwe is somewhat lower, mainly due to emigration. The combined population for all hotspot countries is predicted to rise to 677 million by 2025 and 1,109 million by 2050. This will increase the already high pressure on the hotspot's reduced and degraded natural resources unless adequate conservation policies and measures are implemented. Most governments are struggling to address poverty and human development issues, and increased populations are also likely to lead to increased numbers of people in poverty in the hotspot.

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[4] Southwest Arabia has been heavily cultivated for 3,000 to 4,000 years; see http://oi.uchicago.edu/research/pubs/ar/00-01/yemen.html.

[5] Figures from http://www.citypopulation.de/Africa.html.

Migration, Urbanization and Trends

(*For full data and sources, unless otherwise specified, see Appendix 6 and references therein.*)

Migration and movement of people has occurred across the countries of the hotspot over millennia, due to population expansion, colonization, the search for more fertile land, economic development, trade, wars and civil conflict. Some countries are currently experiencing significant influxes of migrants, notably Burundi, while others in the hotspot are losing population through migration (Zimbabwe, Saudi Arabia and Somalia).

Within the hotspot boundary, the pattern of movements of people is poorly known and variable between localities. People are known to move to areas of better agricultural potential in unpopulated highlands, but in other areas people are leaving the mountains and moving to cities or areas with more available farmland. The major social trend is urbanization, with all countries except Zambia reporting significant, and continuing, movements of rural people to urban areas over the last 20 years. Between 1990 and 2010, the percentage of the population living in urban areas in Burundi almost doubled from 6.3 percent to 11 percent, and the percentage in Rwanda grew by almost three and a half times (5.4 percent to 18.9 percent). Much of the urban migration from the mountains can be explained by population increase and the movement of adults of working age (mostly men) to cities in search of paid work. This leads to significant social changes in rural areas where populations are becoming increasingly comprised of older people. This is likely to have negative impacts on local agriculture and forestry, as fewer young people are available to work. It is also weakening traditional customs and obligations, including those associated with the extended family. City life also leads to later marriages and less traditional lifestyles among the young.

A very significant migration to Yemen occurred at the time of the first Gulf War (1990-1991) when Saudi Arabia and Kuwait expelled an estimated 1 million to 1.2 million Yemeni workers by revoking their work privileges. This raised the resident population of Yemen by some 9 percent, greatly increasing pressures on natural resources (Van Hear 1993).

Ethnicity, Languages and Religions

There are probably several hundred ethnic groups across the hotspot countries, each generally having its own language (or dialect) and culture. As a result, the hotspot hosts many languages—some 70 spoken languages in Ethiopia alone. The most common official languages are Swahili, English (Kenya, Tanzania, Uganda, Malawi, Zambia, Zimbabwe), Arabic (Saudi Arabia, Yemen), French (Burundi, Rwanda, DRC) and Portuguese (Mozambique). Other major languages include Amharic (Ethiopia, Eritrea) and Kikuyu (Kenya), reflecting the tribal and colonial histories of the region. English is becoming the default international language in the hotspot.

Religion, dominated by Christianity and Islam, is extremely important in the lives of people in and around the hotspot and a potentially important vehicle for conservation (Hall *et al.* 2009). The hotspot includes the holy Islamic city of Harar and many Coptic Christian stone churches in Ethiopia, while Mecca—another sacred Islamic city—is only a few miles away from the hotspot boundary. Indigenous animist religions are also still an important part of daily life; most are characterized by an awareness of nature and ancestral spirits and a personal spiritual connection

with the environment (Harvey 2005). Many small village forests across the Eastern Arc Mountains, the Southern Mountain Islands and the Albertine Rift still exist because of their importance for burials and ceremonies. Similarly, Christian church-controlled lands in Ethiopia support valuable biodiversity, especially forest species, preserved due to the spiritual values attached to churches, monasteries and sacred lands (see Box 5.1).

Box 5.1: Conservation of Biodiversity in the Ancient Church and Monastery Yards in Ethiopia

Ethiopia has suffered enormous deforestation; only about 11 percent of the country's land is now forested. Church and monastery lands of the Ethiopian Orthodox churches have for many centuries served as refuges for forest biodiversity in areas of the highlands. Ethiopia contains a total of around 35,000 churches and monasteries, some of which are 1,660 years old. People are not allowed to cut trees in these churchyards or monasteries, resulting in islands of biodiversity in the surrounding landscape, degraded by the pressure for timber and wood for fuel. Some 50 ancient churchyards and monastery grounds (older than 200 years), all within the Central and Northern Highland regions of Ethiopia, contain natural, biodiverse forest vegetation and a variety of rare vertebrate species. However, some of these forests are being degraded or lost as a result of continued deforestation of the surrounding areas for fuel wood and timber, the displacement of the church and monastery communities due to drought and famine, and the introduction of exotic species.

Source: FAO 2010

Economic and Human Development, Poverty and Gender Issues

(*For full data and sources, unless otherwise specified, see Appendix 7 and references therein.*)

Poverty and economic development challenges can be significant constraints on conservation. Indeed, the success of conservation initiatives is largely dependent on the local and national socioeconomic conditions, especially in developing countries.

Economic and Human Development Indicators and Poverty

(See Box 52 and Appendix 7.)

There are significant disparities in economic and human development measures, such as income, life expectancy, literacy and education, across the hotspot, which includes some of the richest (e.g. Saudi Arabia) and poorest (e.g. Mozambique) countries in the world. Almost all the hotspot countries are classified as low- or middle-income countries (except Saudi Arabia, which is high), and only three of the 16 countries are not categorized as Least Developed Countries (Saudi Arabia, Kenya and Zimbabwe).[6] The proportion of people living below the poverty line is also very high for most of these countries; more than 75 percent of the populations of Burundi, Rwanda and Tanzania live on less than $1.25 per day. Many survive through the exploitation of "free" local natural resources and are highly dependent on ecosystem services, the resources and

[6] According to the United Nations, a Least Developed Country (LDC) exhibits the lowest indicators of socioeconomic development, classified according to three criteria: low-income (three-year average gross national income, or GNI**,** per capita of less than $905 and must exceed $1,086 to leave the list); human resource weakness (based on indicators of nutrition, health, education and adult literacy); and economic vulnerability (instability of agricultural production and of exports of goods and services, economic importance of nontraditional activities, merchandise export concentration, handicap of economic smallness, and the percentage of population displaced by natural disasters). Zimbabwe also qualifies, but its government has rejected a recommendation by the relevant UN committee that it be classified as a LDC. The recommendation can only be implemented if the decision is acceptable to the country concerned.

processes provided by ecosystems[7]. Only three countries (Eritrea, Saudi Arabia and Yemen) have a life expectancy of more than 60 years, and in several it is below 50 (DRC, Mozambique, Zambia and Zimbabwe), compared with a developed world average of 69.3. Mortality rates for children younger than 5 are generally high (12 of the 16 countries have rates above 100 per 1,000 children); and literacy rates are typically 55 to 75 percent for adults (15 and older).

UNDP Human Development Index (HDI) scores are some of the lowest in the world, with 10 countries (Tanzania, Zambia, Sudan[8], Ethiopia, Malawi, Rwanda, Mozambique, Burundi, DRC and Zimbabwe) in the bottom 25 (out of 169) countries, although some (Burundi, Rwanda and Sudan[8]) have improved their scores significantly in the last 30 years). Relevant data are not available to calculate the HDI for Eritrea or Somalia, although they are also likely to be very low[9].

Box 5.2: Progress on Millennium Development Goals (MDGs) in Hotspot Countries

Achievement of the UN Millennium Development Goals (MDGs) is a policy priority for all governments in the hotspot, reflected in poverty reduction strategy papers, poverty eradication action plans and other policy documents and implementing mechanisms).[10] These generally have a weak emphasis on biodiversity conservation and management as tools to reduce poverty and as essential components of sustainable development. Progress on achievement of the MDGs is mixed across sub-Saharan Africa. Global hunger scores indicate that hunger has decreased in most hotspot countries between 1990 and 2010, but scores in some (Burundi, Zimbabwe and DRC) have increased, and food remains seriously scarce in DRC. Security of food supplies is a major concern across East Africa and the Arabian Highlands due to global food and economic crises.[11] High levels of unemployment remain in many countries, such as Tanzania. Rates of poverty remain high in hotspot countries other than Saudi Arabia, particularly in DRC (71.3 percent below the national poverty line); Malawi, Mozambique and Rwanda all have rates of more than 50 percent. Despite some progress, it is likely that most of the hotspot countries will not meet the MDG target of halving the proportion of people living in extreme poverty by 2015.[12] Progress on MDG 7 (ensuring environmental sustainability) is discussed in Chapter 6.

(*Sources*: Sandbrook and Roe 2010; ECA/AUC/AfDB/UNDP 2010; UN 2009, 2010; Overseas Development Institute 2010; Grebmer *et al.* 2010)

7 Human beings benefit from processes or structures within ecosystems that give rise to a range of goods and services called ecosystem services. These range from the relatively simple, such as crop pollination, to the highly complex, such as maintaining soil fertility, sinks for waste or regulation of the climate. Ultimately all human life depends on ecosystem services through providing clean air, clean water, food production, etc. Ecosystem services can be grouped into four categories: supporting; provisioning; regulating; and cultural.

8 No HDI data was available for South Sudan at the time of Profiling, as this country became independant in July 2011.

9 A composite measure combining information on life expectancy, education and per capita income (as a measure of the standard of living. (UNDP 2010).

10 See United Nations, "Millennium Development Goals," http://www.un.org/millenniumgoals

11 In Yemen, the agricultural sector has grown at an average of only 2.4 percent per year, compared with the population growth rate of 3.7 percent, which has resulted in a significant gap between local food production and needs. The agriculture sector currently meets the country's demand for vegetables and fruits, but only 40 percent of the domestic demand for grains. See UN Food and Agriculture Organization, *Country Report on the State of Plant Genetic Resources for Food and Agriculture, Yemen, Second National Report*, (Rome: FAO, February 2009), www.fao.org/docrep/013/i1500e/Yemen.pdf.

12 Several of the hotspot countries have been identified as among the top MDG achievers. For example, Ethiopia and Mozambique are among the top 20 countries for progress in meeting targets related to eradicating extreme poverty and hunger (Goal 1), and similarly Ethiopia and Malawi are in the top 20 in reducing child mortality rates (Goal 4) (ODI 2010).

Within the Hotspot Boundary

There are limited statistics on poverty and human development for the hotspot area specifically; most information comes from national statistics and some national and subnational poverty mapping initiatives, e.g. in Kenya (Kristjanson *et al.* 2005; World Resources Institute 2007); Uganda (Rodgers *et al.* 2006); Tanzania (Research and Analysis Working Group 2009); Ethiopia, Malawi, Rwanda and Mozambique (Woldemariam and Mohammed 2003). In general, incomes, life expectancy and education in rural areas are lower and mortality rates higher than national averages, and improvements in these areas are slower. Given that the hotspot comprises predominantly rural areas, with low levels of electrification and underdeveloped health and education services, it is expected that the same patterns apply for most people living in the hotspot. More positively, the reliable rainfall and relatively better soils in the mountains of the hotspot make these areas far less prone to food shortages than the more seasonal lowlands. This is one of the reasons for the large, permanent and long-established population living in African mountains (Fjeldså and Burgess 2008).

An analysis of differences in economic and broader measures of poverty between hotspots worldwide ranked the Eastern Afromontane Hotspot fourth out of 34 hotspots according to the total hotspot area affected by poor socioeconomic conditions (Fisher and Christopher 2007).[13]

Gender Issues in Relation to Management and Use of Natural Resources in the Hotspot

In the hotspot, political and economic decision-making and access to and rights over natural resources are generally dominated by men, although women's rights vary significantly across countries. In most countries, there is active discrimination against women in terms of education, health care and financial possibilities. The gap in education and decision-making is particularly obvious in the natural resource management sector (in which the majority of both government agency and NGO staff across the region are male) (FAO 2010). Women tend to have less access to education, lower incomes and reduced ability to own land and other assets. They are also typically the homemakers and ones who raise children, they play the major roles in collecting water and firewood, and also often in farming (Patt *et al.* 2009; CARE International 2010). Therefore, women usually have more direct contact with natural resources and a better understanding of the critical value of biodiversity and ecosystem services.

Men tend to have higher levels of education and are typically involved in exploitation (e.g. logging and charcoal production, commercial and illegal hunting, commercial collection of medicinal herbs and wild products). This gives men greater mobility and higher income levels in general. Agreements between governments and village committees for sharing natural resources and ecosystem services are generally dominated by men on both sides, and they focus on issues of strategic and financial interest to male society. Women are given access to areas under participatory forest management arrangements to collect items of use to the household, but not generally to profit economically.

[13] The metrics measured were: national debt service, percentage of people living below the national poverty line, undernourishment, access to clean water and potential population pressure termed by the authors "ecological poverty indicators." However, the authors note that population density and growth figures are only proxies for human impact on ecological systems (Cincotta *et al.*, 2000). For example, low-density slash and burn populations can have large ecological effects.

5.3 Economic Trends

Key Recent Economic Trends

Most hotspot countries have undergone significant economic development in the past 15 to 20 years, with growth in gross national income (GNI)/gross domestic product (GDP) an increase in employment, particularly in the service sector, and expansion of the private sector. This development occurred despite a number of major challenges, such as high foreign debt burdens in some countries, including DRC and Mozambique.[14] Two key economic trends have particularly impacted the hotspot region in the last 20 years: globalization and inward investment, and the global economic crisis of 2008/2009.[15]

Globalization and Inward Investment

After poor or mixed economic growth in 1980s and 1990s (partly due to civil conflicts in some countries), growth in East Africa improved in the 2000s, with some countries experiencing double-digit growth, e.g. Ethiopia from 2003 to 2008 (African Economic Outlook 2010). Many East African countries are now growing by more than 5 percent per annum. Growth has been facilitated by macroeconomic reforms (trade liberalization and privatization, and liberalization of land laws, albeit with no assessment of the impacts on sustainable development). High external demand for primary commodities (oil, minerals and agricultural products) has also driven growth, although some countries have lagged behind in this development, such as Eritrea. Trade has been boosted by steady growth in industrialized countries (explosive growth in emerging Asian economies) and a decline in armed conflicts, making parts of the region more attractive to foreign investment.

Many of the African hotspot countries have received substantial foreign investments, particularly in agriculture, tourism and mining sectors. The People's Republic of China has invested heavily in East and Southern Africa, such as in diamond mines in Zimbabwe and copper mines in Zambia.[16] There is significant current investment in agricultural production, especially the leasing or purchase of large areas of land by foreign investors to grow food crops for export. This practice (described as "neo-colonial") followed the food crisis of 2007-2008, when global prices of wheat, rice and cereal skyrocketed. Major, capital-rich food importers, such as China, India, the Republic of Korea, Qatar, Saudi Arabia and the United Arab Emirates (UAE), have together taken control of millions of hectares of land in the hotspot. According to various sources quoted in UNEP 2010a, the following countries have leased or invested in hotspot countries' lands: Abu Dhabi has leased 28,000 hectares in South Sudan to produce maize, beans and potatoes for the UAE; China is producing palm oil for biofuel on 2.8 million hectares in the DRC; and India has invested $4 billion in Ethiopian cropland to grow sugarcane and flowers. The civil society participatory website www.farmlandgrab.org keeps an updated list of agricultural deals involving

[14] These have been partly offset in some countries by debt relief—cancelling or rescheduling—under the IMF's Heavily Indebted Poor Countries (HIPC) and Enhanced HIPC initiatives in recent years.

[11] Globalization describes the process by which regional economies, societies and cultures have become integrated through a global network of political ideas through communication, transportation, and trade. The term is most closely associated with the term economic globalization: the integration of national economies into the international economy through trade, foreign direct investment, capital flows, migration, the spread of technology and military presence. Joshi, Rakesh Mohan, (2009) International Business, Oxford University Press, New Delhi and New York.

[16] In 2007 Chinese companies invested $1 billion in Africa. See http://www.migrationinformation.org/Feature/display.cfm?id=690.

foreign companies or governments in Africa. The International Food Policy Research Institute estimates the value of these transactions at $20 billion to $30 billion. Both state-owned (including sovereign wealth funds) and private sector businesses are involved in these so-called "land grabs," which are potentially transformational. They are often on the most fertile lands, may involve clearing areas of high biodiversity or the displacement of local farmers, and concerns have been expressed about growing crops for export in countries where millions of people are undernourished.

The Arabian Peninsula has also experienced considerable development in the last 50 to 70 years due to its oil deposits. Saudi Arabia has used much of the revenue from the sale of petroleum to invest heavily in its economy and infrastructure, and has attempted to promote growth in the private sector by privatizing industries such as power and telecommunication. In Yemen, economic development has also been driven by remittance payments sent home by expatriate workers (estimated at around $3 billion a year in the 1980s). The value of these payments dropped significantly following the expulsion of more than 1 million Yemenis from Gulf Cooperation Council states at the time of the first Gulf War.

Impact of the Global Economic Crisis

The global economic crisis of 2008-2009 and the subsequent global recession affected Africa through a contraction in global trade and a related collapse in primary commodity exports, on which many of the hotspot countries depend. Falling levels of foreign investment and remittances from overseas workers, as well as possible cuts in overseas development aid (Nanto 2009, Arieff *et al.* 2010) also contributed to increases in food prices and inflation. Real GDP growth was reduced in all the African countries of the hotspot in 2009—except Zambia—typically by between 1 percent and 4 percent, although there were some much larger drops, such as those experienced by Kenya and Rwanda (African Economic Outlook 2010). These national economies have begun to grow again, albeit at lower levels than before the crisis. In general, hotspot countries have weathered the crisis better than many developed countries, but it is estimated to have added 7 million people in Africa to the ranks of those living on less than $1.25 a day in 2009 and 3 million more in 2010 (IMF 2009). The human costs of the economic crisis will be dire: one prediction is for 30,000 to 50,000 excess infant deaths in sub-Saharan Africa, and most of these are likely to be poorer children, overwhelmingly girls (Friedman and Schady 2009).

Main Economic Sectors

Key economic sectors in the hotspot are agriculture, forestry, tourism, fisheries, mining and power generation. Historically, and up to the present day, agriculture has been the prime economic activity in most hotspot countries (except Saudi Arabia, where oil production is the most important; see Appendix 8). Other sectors have become important in recent decades, such as tourism in Kenya and mining in Zambia, DRC and Tanzania. Most of these sectors have a substantial impact, or are dependent, on the environment.

Agriculture

(See Appendix 8 for data and sources.)

Agriculture plays a very important livelihood and social role in the hotspot. In nine of the 16 hotspot countries (Burundi, Eritrea, Ethiopia, Kenya, Malawi, Mozambique, Rwanda, Tanzania and Uganda) more than 70 percent of the populations are engaged in agriculture (estimated at 120 million people in 2007). The vast majority are involved in subsistence agriculture. Usually more than half the land in rural areas is given over to agricultural production, and agriculture accounts for a significant proportion of foreign earnings (76 percent, 48 percent and 47 percent of exports from Burundi, Rwanda and Uganda respectively in 2006).

There are two main types of agriculture in the hotspot: (i) small-scale (typically farms of 0.5 to 3 hectares), rain-fed agriculture and pastoralism that dominates subsistence farming, with staple crops such as maize or wheat; and (ii) large-scale industrial agriculture frequently funded by foreign investment, with large estate farms growing export crops such as tea, coffee, cotton, tobacco, beans, peanuts, fruits, flowers and biofuel plants, which are dependent on irrigation, fertilizers and pesticides to maintain production.

Major cash crops grown in the African region of the hotspot include coffee, tea, cotton, tobacco, wheat, barley, maize, sisal, in some places pyrethrum and sorghum, and horticultural produce, as well as a wide range of fruits, nuts, spices and vegetables. Coffee and tea are particularly significant foreign exchange earners and employers in the hotspot. For instance, more than 15 million people (25 percent of the population) derive their livelihood from the coffee sector in Ethiopia. Crops for local consumption (staples) in the East Africa region include maize, wheat, Irish potatoes, sweet potatoes, bananas, pulses, plantains, bananas, groundnuts, vegetables and drought-resistant crops (millet and cassava). In Yemen's highlands, irrigated cash crops include grains, fruits, vegetables, and small amounts of coffee (on Jabal Milhan), but by far the most important is the leafy shrub qāt (or khat)[17]. It is used throughout Yemen and is grown on more than 50 percent of cash-crop agricultural land; production was estimated to equate up to a quarter of GDP and 16 percent of employment in 2001 (Ward 2000).[18] Subsistence crops include sorghum, maize, wheat, barley, pulses, vegetables and fruits. The region also supports cattle, sheep, goats and camels. Other crops grown in the Ethiopian Highlands include teff and oilseeds (including sesame).

There is a small, but growing, development of organic and fair-trade agriculture. Organic agriculture is generally well suited to the hotspot because farmers do not have the financial resources to purchase pesticides or chemical fertilizers.[19] Some development agencies are also promoting changes to conventional intensive agriculture. The Food and Agriculture Organization of the United Nations (FAO) is championing "ecological agriculture" as a way to mitigate climate change and improve food security and self-reliance among small-scale farmers (FAO

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[17] Qāt (*Catha edulis*) has been grown for use as a stimulant for centuries in the Horn of Africa and the Arabian Peninsula, where chewing it predates the use of coffee. Ethiopia also produces significant amounts of the plant, much of which is for export to Yemen.

[18] Also, Nadir Mohammed and Mohammed Al-Sabbry, *Yemen Economic Update*,(San'a, Yemen: World Bank, September 2001).

[19] This has been facilitated in East Africa by a uniform set of procedures for growing and marketing organic produce that was established for the region with the development of the East African Organic Products Standard (EAOS). http://www.unctad.org/templates/webflyer.asp?docid=8421&intItemID=4431&lang=1 and http://www.organic-world.net/263.html (For review and case studies from East Africa, see UNEP, 2010b)

2010). A successful example in the hotspot is the Tigray Project in the Ethiopian Highlands (Box 5.3).

Box 5.3. Addressing Land Degradation Using Ecological Agriculture: The Tigray Project

The Sustainable Development and Ecological Land Management with Farming Communities in Tigray Project was initiated by the Institute for Sustainable Development, the Bureau of Agriculture and Rural Development, and Mekelle University in four villages of Tigray Province in northern Ethiopia in 1996. The project works with families in one of the most degraded regions of the highlands) to introduce more sustainable, less damaging farming practices, and it has helped almost double crop yields of major cereals and pulses using ecological agricultural practices (composting, water and soil conservation activities, agroforestry, crop diversification). At the same time the use of chemical fertilizers has steadily decreased. The project is led by farmers and builds on the local technologies and knowledge of the farming communities. It is so successful that by 2008 it had been expanded throughout the country and is now a government model for combating land degradation and eradicating poverty in Ethiopia.

Sources: www.ifoam.org, Edwards *et al* 2010, FAO 2010.

Agricultural productivity is often very low within the hotspot, making it difficult to build and maintain efficient food systems in the face of growing population pressures. This is particularly true in the drier countries of Ethiopia, Eritrea, Yemen and Saudi Arabia. Agricultural development is high on the agenda in most countries in the region as political leaders see small-scale farmers and large-scale agricultural development—including biofuels, tree and food estates and plantations—as key ways to lift their countries and people out of poverty (see Chapter 6).[20] The area of arable land under permanent crops has increased in the period from 1995 to 2007 for most hotspot countries from a total 81.7 million hectares to 92.2 million hectares (FAO 2009). The hotspot region is particularly important for food production in many countries as mountainous areas offer wetter climates and generally more fertile soils than the surrounding lowland areas. This is probably the principal reason why there are very high population densities in these mountains, and pressure for agricultural land leads to conflicts involving people, biodiversity and protected areas in the hotspot (Balmford *et al.* 2001; Burgess *et al.* 2007).

Pastoralism is not a significant agricultural activity over much of the hotspot, except in Ethiopia, Saudi Arabia and Yemen, where it forms a large part of traditional agricultural practices. Ethiopia has the seventh largest cattle stock in the world and the largest national livestock herd in Africa (FAO 2007). In Yemen, rangelands (together with forest and woodland) comprise almost 40 percent of the land area, grazed by about 8.5 million sheep, 8.4 million goats and 1.4 million cattle in 2007 (Yemen CBD report 2009). In other areas of the hotspot, such as the Albertine Rift, Eastern Arc and Southern Mountain Islands, keeping livestock is a small-scale business and involves limited numbers of cattle and goats kept by farmers for their subsistence (see Plumptre *et al.* 2004 for Albertine Rift).

[20] Research has suggested that economic growth from agriculture generates at least twice as much poverty reduction as growth from any other sector (IFAD 2011).

Tourism

Tourism is a major foreign exchange earner for several hotspot countries, notably Kenya, where in 2006 it generated $803 million. Large numbers of people visit hotspot countries each year. For example, 817,000 tourists traveled to Uganda, 699,000 to Rwanda, 714,000 to Tanzania, 952,000 to Kenya, and more than 10.9 million to Saudi Arabia in 2009 (for Saudi Arabia, these were mostly pilgrims on the hajj to Mecca, which lies just outside the hotspot). The sector also employs significant numbers of people. An estimated 7.1 percent of total employment in Kenya and Tanzania is due to tourism (sub-Saharan African average is 4.6 percent, and the global average 7.6 percent). Employment in the industry (direct and indirect) has grown in many countries over the past 10 years, and the tourism sector is being actively promoted in most of hotspot countries.

However, tourism development in East Africa is mostly associated with the coast and large lowland national parks and game reserves. Within the hotspot boundaries, it is largely low-volume, high-fee, specialized nature-based adventure and wildlife tourism (hunting tourism is rare in the mountains, and most big game species occur in the lowland savannas). Nature tourism destinations within the hotspot include Mount Kilimanjaro and Mount. Meru (hiking to summit) in Tanzania; the Virungas region of Rwanda, Uganda and DRC (trekking to see gorillas); the Ngorongoro Conservation Area (mountain forest fringe on crater rim used by endangered species); Arusha National Park (especially birdlife), and the Simien and Bale mountains in Ethiopia (spectacular volcanic scenery and hiking).

The majority of the most visited sites are protected areas, which highlights their importance as a source of tourism revenue (Hatfield 2005; Hatfield and Malleret-King 2007), but there are huge revenue-earning differentials between protected areas and countries. Of the 14 parks documented in the 2006/2007 annual financial statement of the Tanzania National Parks Authority, two raised more than 75 percent of all revenue (Kilimanjaro 42 percent and Serengeti 33 percent) (Harrison *et al.* 2010), and the national park system in Ethiopia produced only $19,000 in official revenues in 2009. In less well-known mountain areas the number of tourists is quite small. For instance, only around 10,000 stayed at least one night in a hotel in the Eastern Arc Mountain blocks in 2007 (Ministry of Natural Resources and Tourism 2011). While the markets are relatively small and specialized, this kind of tourism can provide very important income and jobs to local communities in rural areas and crucial support to conservation of threatened biodiversity (e.g. protection of important montane forest areas for mountain gorillas). However, many scenically beautiful and biodiversity rich montane protected areas in the hotspot need further investment in facilities and better promotion to attract additional tourists.

Security concerns have had a negative impact on tourism (such as the killing of park rangers by armed gangs in the Virungas and kidnapping foreign tourists in the highlands of Yemen). Fear of terror attacks has also kept potential visitors away from parts of the hotspot. Tourism revenues in the region are also susceptible to economic downturns and were adversely affected by the global financial crisis of 2008-2009, as a result of a decline in foreign tourist arrivals to national parks and reserves.

Forestry

Natural and plantation forests in the hotspot provide a commercially important source of wood for timber and fuel, and numerous nontimber forest products that are exploited to support local livelihoods, such as building poles, fruit, honey, tannins, gums, medicinal plants and materials for rope.

Timber extraction in the hotspot varies from major commercial enterprises operating under large government concessions that typically feed the export market to small-scale logging that supplies timber to the local market. For instance, the forests of DRC have been subject to industrial logging since the 1920s, which gradually developed until the majority of the country's forests were under large-scale logging concessions, including parts of the east (Debroux *et al.* 2007). Due in part to disruption caused by the war in the 1990s, most logging within the hotspot region of DRC is now carried out by artisanal companies that supply local and regional markets, and industrial timber exports are modest (Debroux *et al.* 2007, Seyler *et al.* 2010). In the Eastern Arc Mountains and the majority of other mountain regions of the hotspot, most timber extraction is carried out by small pitsawing teams, and a considerable proportion of this harvesting is illegal, as has been seen in Tanzanian lowland forests (Milledge *et al.* 2007).[21]

Fuel wood is the principal source of energy for cooking and heating in the mountains, due to the lack of affordable alternatives, and harvesting it is widespread throughout the hotspot (probably the single largest use of forests and woodlands). In the areas around Uganda's Bwindi Forest, fuel wood consumption is estimated at 140,000 cubic meters/year (Plumptre *et al.* 2004); in DRC wood accounts for 85 percent of domestic energy use (Seyler *et al.* 2010), and in Ethiopia, demand has far exceeded the sustainable supply, leading to a total fuel wood deficit of 47 million cubic meters by the year 2000 (EPA 2004). Charcoal from wood from the forests is also produced as a convenient, largely smokeless cooking fuel, but production is more frequent in lower and drier areas with good access to facilitate the transport of charcoal sacks for sale in towns (Plumptre *et al.* 2004).

Large areas of plantation forests have been established in the last 20 years to meet increased demand for timber and fuel wood in most hotspot countries (FAO 2010). Montane plantations have species of pine, cypress and eucalyptus. The plantations include large state and privately controlled enterprises supplying timber to towns as well as smaller community-managed plantations for fuel wood, building poles and timber.

There are no known timber certification schemes in the mountains of the hotspot countries, although there are schemes in some lowland areas, such as certified natural forest timber coming from the *mpingo* or African blackwood *Dalbergia melanoxylon* tree in Kilwa, Tanzania (www.mpingoconservation.org/tanzania). There are initiatives to introduce more sustainable, "eco-friendly" use and management of nontimber forest products (NTFPs) within the hotspot (see Box 5.4).

[21] Pitsawing typically involves small groups of professional sawyers who cut trees into planks on site, which can then be carried out of the forest. This method is less damaging than mechanized logging but enables more forest areas to be accessed.

Box 5.4. Ethiopian Forests, Biodiversity and Ecologically Friendly Coffee

Coffee (*Coffea arabica*) is native to the Afromontane forests of Ethiopia and is a major commodity in national and local trade. Forest stands with a high frequency of wild populations of the plant are commonly known as "coffee forests," which are important for the conservation of the genetic diversity of wild Arabica coffee. Many are managed in traditional ways for coffee production, and some have been certified as "ecologically friendly" under various schemes. Unfortunately, large areas of these unique forests have been converted to other land uses and, in the remaining forest, wild coffee is managed and harvested with increasing intensity because of rising global coffee prices. In southwestern Ethiopia, coffee is harvested from natural forests and farms, where it is grown in small patches under isolated shade trees. Coffee cultivation in open farmlands promotes bird species diversity through the retention of forest trees, while cultivation in forests (managed semi-forest coffee) reduces bird diversity and species richness and abundance of typical forest vegetation due to removal of canopy trees and undergrowth in order to stimulate wild coffee growth and yields. Wild coffee management in natural forests therefore needs to be controlled to ensure conservation, but it can be effective in ensuring that forest remnants are not converted to other forms of more open agriculture. Certification standards for ecologically friendly coffee in Ethiopia need to take this complexity into account.

Sources: Gove *et al.* 2008; Schmitt *et al.* 2010; and www.coffeehabitat.com/2009/02/research-coffee-certification-and-bird-conservation-in-ethiopia/.

Forests in the hotspot play vital economic and social roles in the lives of many people living in and around the hotspot, and community forests can be a very important source of timber, fuel wood and nontimber forest products (e.g. in the Udzungwa Mountains, Harrison 2006a, b). The official contribution of legal forestry to national economies is less than 5 percent GDP, which is small by comparison with other sectors, such as agriculture. Few people are directly employed full time in forestry, but forests provide materials for part-time activities undertaken by many, such as charcoal production, firewood and building-pole collection, wood-carving, furniture-making, boat building and handicrafts.[22] The illegal exploitation of high-value timber provides considerable income for a few people, often powerfully placed within government systems. Artisanal logging, much of it illegal, is one of the most lucrative activities in eastern DRC, particularly for high-value species such as African teak, due to proximity to markets in Uganda, Kenya and Rwanda, and weak governance and insufficient capacity to enforce regulations (Debroux *et al.* 2007; IUCN 2008, quoted in Seyler *et al.* 2010). Similar situations occur in other countries in the hotspot, but due to the illegal and politically protected nature of this trade, there are few data available.

Overall figures on the value of the market for nontimber forest products across the hotspot are not available (much of this activity is also illegal), but household collection of such products is significant and its economic value believed to be huge. For example, calculations from the Eastern Arc Mountains suggest that these products are worth more than $40 million per annum for people living there (M. Schaafsma *et al.* unpublished), and in DRC fuel wood, bush meat, other forest foods and medicines currently rank top in terms of annual economic value in the forests, with timber far behind (Debroux *et al.* 2007).

[22] In the public forestry sector, numbers in 2008 range from only a few hundred or less (most countries) to a few thousand (5,350 in Kenya, where only 20 percent were women, and 6,650 in Malawi, where 15 percent were women). Figures for the private sector are not available. (FAO 2010, data not available for DRC, Uganda and Somalia).

Fisheries

Lake Tanganyika in the Rift Valley supports the hotspot's largest fisheries and the lake's fish are exported throughout East Africa. The lake supports a prodigious pelagic clupeid (sardine) fishery with about 200,000 tons per year harvested, translating to earnings of $80 million to $100 million. It is estimated that the fishery employs approximately 1 million people with up to 10 million people living in the basin benefiting directly or indirectly from it.[23] Many other smaller inland fisheries throughout the region provide important sources of food and livelihoods to local people and to some national economies. For example, in Lake Malawi, commercial fisheries producing an estimated 2,000 tons per year, combined with an artisanal fishery producing around 30,000 tons per year, are critical to both the national economy and to local livelihoods. Inland fisheries play a disproportionately large role in providing employment throughout Africa, especially for women. This is important as women generally spend more of their total income on family needs, such as food and medicine (Weeratunge and Snyder 2010).

Quantification of the benefits people derive from fisheries in the wider hotspot is difficult due to the challenge of collecting fisheries statistics from small-scale enterprise or individual activity, which is known to be greatly underreported (FAO 2009). The nutritional importance of fisheries is clear: 25 to 40 percent of the protein in the diet of people in Africa comes from freshwater fish, along with many important micronutrients, especially vitamin A, iron and zinc (Dugan *et al.* 2010). In more isolated rural communities fisheries serves as a "bank in the water" where fish are sold or bartered to pay for medicine, education, seeds or fertilizer (Béné *et al.* 2009).

Hunting and Harvesting of Medicinal Plants

Hunting within the hotspot is essentially for bush meat (trophy hunting by foreigners occurs in the game reserves in the lowlands). Bush meat hunting is widespread in the hotspot (although not in the Ethiopian Highlands and the Arabian Peninsula due to cultural reasons). It is carried out mainly for subsistence but can be economically important for some families and communities (Nielsen 2006; Topp-Jørgensen *et al.* 2009). In the Rwenzori, for instance, bush meat contributes 58 percent of nontimber forest product value, possibly because of proximity to DRC where bush meat, including primate meat, is popular as food (Bush 2009; Plumptre *et al.* 2004). But in most areas it is a less important source of protein than domestic livestock and fish. Poverty and cultural attachment are the principal reasons for exploitation, and bush meat-eating households also regard it as more tasty and medicinal than livestock meat and fish.

Bush meat is generally cheap in East Africa; a portion of giraffe meat or a dik-dik in Kenya, for instance, goes for as little as 50 Kenyan shillings ($0.62). In 2009, bush meat in Tanzania cost less than goat, beef, chicken or any other domestic meat (Caro and Andimile 2009), and there are a number of well-established bush meat links within Tanzania facilitating trade. However, as the hunting of most species sold for bush meat is illegal, there are few reliable data on its economic impact in the hotspot or its overall contribution to local and national economies. Bush meat is

[23] C. Magnet, J.E. Reynolds and H. Bru, *Fishcode Management: Lake Tanganyika Regional Fisheries Programme (TREFIP)* (Rome: FAO, July 2000) ftp://ftp.fao.org/docrep/fao/006/x8507e/X8507e00.pdf.

also exported across borders—from Tanzania across Lake Tanganyika to DRC and Burundi and internationally to the Middle East and to supply expatriate Africans in Europe—but the value of this trade is unknown. Many people in rural communities within the hotspot (especially women and children) also collect insects including locusts, grasshoppers and termites as food (they are rich in protein and a good source of iron and B-vitamins) (Van Huis 2003).

Medicinal plants are widely collected (Ndangaslasi *et al.* 2007) and form an essential component of primary health care for rural communities in much of the hotspot, where there are few medical facilities and far more traditional healers than medical doctors. In Malawi, for instance, there is one traditional medicine practitioner for every 138 people, compared with one university-trained doctor for every 50,000 people (Msuya and Kideghesho 2009). Even when modern medical services are available, use of medicinal plants is an attractive option due to their affordability, local availability, public trust in their efficacy and the emergence of "new" or incurable diseases such as HIV/AIDS, cancer and diabetes. Locally, this can lead to overharvesting and threats to native plant populations (Box 5.5).

Box 5.5 – Reducing Illegal Harvesting of Wild Aloes in Yemen

Aloe species are harvested illegally from the wild in Yemen, with the raw resin product exported for processing. One option to mitigate some of this unsustainable harvesting is the development of alternative, cultivated, sources, such as growing *Aloe vera* (presumed native to Yemen) as a dryland crop. Aloe plants are easy to grow and can survive without watering after transplanting in arid and semi-arid regions. Demand for the products (for cosmetics and medicinal use) is substantial, which suggests a significant economic market. Estimates of the size of the legitimate international trade are in the region of $110 billion; the trade in processed resin appears to be considerably lower, between $65 million and $80 million. As a cash crop that requires no watering, it represents a striking alternative to the thirsty qāt (*Catha edulis*) crop, which accounts for nearly half the volume of Yemen's agricultural water use.

Source: Hall and Miller 2011.

Energy, Power Production, Industry/Manufacturing, Mining and Transport

Many countries in the hotspot experience chronic shortages in energy supply, and the need to improve energy availability and security is a national priority. The main energy sources in the hotspot region are oil and gas, hydroelectricity and wood or charcoal. Rural populations generally lack electrification, and most rural people rely on candles and oil lamps for light and fuel wood for cooking and heating; in towns charcoal is the preferred cooking fuel (Ahrends *et al.* 2010). Liquid petroleum gas has been tried as an alternative to fuel wood in places like the highlands of Yemen, but this has met with mixed success due to cost and problems of transport.

Saudi Arabia (with 25 percent of the world's proven petroleum reserves) is the only country with a well-developed petroleum sector, accounting for more than 90 percent of the country's exports and nearly 75 percent of government revenues. Yemen is a small oil and gas producer, but since these reserves are failing, the World Bank predicts that its oil and gas revenues will fall to zero by 2017. There are also known or suspected oil reserves in South Sudan, Somalia, western Uganda and much of the Albertine Rift, which may be developed in the future. Other hotspot

countries have no domestic petroleum production and depend on imports, encouraging a push toward the development of biofuel plantations.

Some countries rely heavily on hydroelectric power generation; for example, Ethiopia derives about 90 percent of its electricity needs from it. The water that generates this kind of power throughout the hotspot comes from upland catchment areas in the mountains (such as in Tanzania, where around 50 percent of the country's hydroelectric power comes from the Eastern Arc Mountains and Southern Mountain Islands). It is critical to maintain the ecological condition of watersheds feeding the reservoirs in the hotspot in order to maintain this power supply.

Industry is relatively poorly developed within the hotspot, and none of the countries is considered "industrialized." Manufacturing is mostly small-scale and directed at food processing (including grain milling, beer production and sugar cane crushing) or the processing of export crops. In Kenya, the most industrially developed country in East Africa, manufacturing accounts for only 14 percent of GDP. Growth of the sector in many hotspot countries is hampered by shortages in electricity, high energy costs, poor transport infrastructure, the dumping of cheap imports and, in some cases, civil conflicts.

Many countries in the hotspot have significant mineral reserves of gold (Eritrea, Rwanda, Tanzania, Yemen, Zimbabwe), copper (Zambia, DRC, Zimbabwe), cobalt (DRC), platinum (Zimbabwe), zinc (Yemen), cassiterite (Rwanda), iron ore (Zimbabwe), coltan (Rwanda, DRC), bauxite (Mozambique), uranium (Somalia, Malawi) and gemstones including diamonds (DRC, Zimbabwe, Mozambique, Tanzania). Within the hotspot there is little large-scale mining (although some sites are very close, e.g. the new Kayelekera uranium mine in Malawi), but small-scale mining, especially for gold, occurs (for example, in Eritrea and the Eastern Arc). Mining is likely to expand considerably in the future due to increasing demand for these minerals. A World Bank study found that mineral exploitation in Malawi could provide up to 25 percent of export earnings and account for 5 to 6 percent of projected GDP within a decade, and gold mining in Yemen could provide 3 to 7 percent of total GDP.[24] Concerns have been expressed over the environmental and social impacts of many of these mining, oil and gas investments.

Transport links are poor in most parts of the hotspot, although some improvements are being made through upgrading major road and rail arteries. One example is the 1,400-kilometer "Northern Corridor" project to provide an investment and economic development corridor linking Central and East Africa and the Indian Ocean. Within the hotspot boundary and away from major cities such as San'a and Addis Ababa, roads are mainly unpaved and prone to wash away during heavy rains. In the generally mountainous, remote terrain, this makes land transport within the hotspot difficult and time-consuming. This situation has often been beneficial to natural areas, limiting poaching or agricultural encroachment—and dramatic changes in land use are often witnessed whenever transport infrastructures are created or improved without proper mitigation measures.

[24] International Finance Corp., "IFC Middle East & North Africa,"
http://www.ifc.org/ifcext/mena.nsf/AttachmentsByTitle/Miningpolicyreformyemen/$FILE/Yemen+Mining+Reform+English.pdf.

Land Cover, Use and Change

Most of the land within the hotspot is used for agriculture or lies within protected areas. The principal land cover and use trends are deforestation and land degradation.

Deforestation

(*See Appendix 9 and Boxes 5.6, 5.7 and 5.8.*)
Deforestation (conversion of forested area to nonforested land for use as arable land, pasture, urban development, logged area or wasteland) has occurred throughout the hotspot, and almost all hotspot countries experienced a reduction in forest cover between 1990 and 2010. In the Albertine Rift, for example, more than 1,500 square kilometers was lost to agricultural production in the forested areas of the region over a 15-year period up to the early 2000s (Plumptre *et al.* 2003a). Loss of forest was particularly pronounced in Burundi and Uganda (respectively, almost 40.5 percent and 36.8 percent loss of forested area from 1990-2010).

Box 5.6: Deforestation in the Eastern Arc and Southern Mountain Islands Forests

The Eastern Arc Mountains have suffered an estimated 80 percent total loss in historical forest area (25 percent of forest area since 1955); the forest is now estimated to cover 3,546 square kilometers (in 2000). Forest loss varies across elevations: the upper montane zone (above 1,800 meters) lost 52 percent of its paleoecological forest area, including 6 percent since 1955; the submontane habitat (800 to 1,200 meters) lost close to 93 percent of its paleoecological extent, 57 percent since 1955. Most of this forest now remains in 13 main mountain blocks. The Udzungwa Mountains contain the largest area of natural forest (just more than 1,800 square kilometers). A number of mountains have lost at least 80 percent of their original forest cover, including Ukaguru, Mahenge and West Usambara. The indigenous cloud forests in the Kenya's Taita Hills are the worst affected with only 1 percent of the original forested area remaining. The Southern Mountain Islands forests originally covered around 37,465 square kilometers, but at least 70 percent has been converted to agriculture (or urban areas). Deforestation is also pronounced in Malawi, as rural population densities are very high. The once extensive mid-altitude montane forests are now restricted to small relict groves used as graveyards. Further south, Mulanje Mountain is mainly protected as forest reserves (to safeguard water catchments and to control the extraction of the endemic Mulanje cedar—Malawi's national tree), and some forest remains in tea estates on the mountain.

Sources: Hall *et al.* 2009; Maeda *et al.* 2010; www.easternarc.or.tz

The Eastern Arc Mountains, the Southern Mountain Islands and Kenyan Highlands have also experienced massive deforestation (see Box 5.6), but the greatest loss of native forest in the hotspot has probably occurred in the Ethiopian Highlands. Forest cover is now estimated at less than 4 percent of the original forest extent of Ethiopia (CBD 2005), and in Eritrea it is at only 15 percent of land area (a reduction of at least 50 percent) (FAO 2001; UN 2010). In the coffee forest areas of southwest Ethiopia 67 percent of the forest cover was lost between 1973 and 2005. Despite this huge impact, 55.4 square kilometers of forest were allocated for private coffee production and 20 square kilometers for rubber plantations between 2001 and 2005 (Tadesse 2007). In an upland rain forest area in the Awasa watershed of the south-central Great Rift Valley, 80 percent (400 square kilometers) of forest was lost between 1972 and 2000, and within the formerly closed forest, clearings create a pattern of small disconnected and degraded forest patches (Dessie 2007). Rwanda is the only country in the hotspot that has shown an increase (up by 36.8 percent) in forest cover over the period 1990 to 2010, largely due to an increase in

plantations, which comprise 86 percent of the forest area. Little information exists on forest extent within the hotspot boundaries in Yemen and Saudi Arabia, and there are no data on trends, but available evidence suggests that it has declined recently (Box 5.7).

Box 5.7. Loss and Degradation of Forest in Yemen

Valley forest patches previously regarded as possessing "good vegetation" in Yemen were found to be heavily degraded due to over-exploitation for wood and grazing. Degradation of wadi (valley) vegetation over a 20-year period has also been recorded in Wadi Rima. Considerable pressure was placed on shrubs, sub-shrubs and tree cover in the 1980s and following the mass migration of returning Yemenis from Saudi Arabia and Kuwait in the 1990s. In addition, after the reunification of North and South Yemen during the 1990s, *Juniperus* woodlands in areas that were previously protected because of where they were on the border (e.g. Jabal Iraf) were clear-felled in accessible areas. Juniper is now found only in very inaccessible areas.

Sources: Hall *et al.* 2008; Hall *et al.* 2009; Scholte 2010; M. Hall and T.Miller *in litt.* 2011-06-09.

Most of the remaining blocks of forest, forest mosaics and timber resources of the hotspot now exist within national parks and reserves, mainly protected for watershed, conservation and recreational purposes (see Appendix 10) or as small, locally protected forest patches used as burial grounds and for traditional ceremonies. In some regions, especially in the Albertine Rift, the only forest remaining is in protected areas (e.g. around Makura Forest Reserve in Rwanda, Kibira National Park in Burundi (see Box 5.8), Kibale Forest National Park in Uganda and the Virunga National Park in DRC (where 60 percent of the park's boundary is densely populated) (UNEP-WCMC 2008; Plumptre *et al.* 2004).

Box 5.8. Kibira Forest, Burundi and Gishwati Forest, Rwanda: Islands of Biodiversity in a Sea of Agriculture

The 40,000-hectare Kibira Forest, Burundi's only montane rain forest, is home to 644 plant species including the threatened African mahogany, *Entandrophragma excelsum*, and the source of 75 percent of the water driving the country's largest hydroelectric dam. Due to pressure for agricultural land, Kibira Forest is an island of green in a largely deforested landscape with agriculture closing in on the boundaries. The forest is officially protected as a national park but faces continued pressure from illegal logging, bamboo cutting, fire, poaching, grazing and agriculture. Limited legal forestry is allowed in the park, but inadequate enforcement allows considerable illegal logging and clearing for farms. Gishwati Forest Reserve is one of the most severely deforested areas in Rwanda as a result of exploitation of the forests for commercial products such as timber, fuel wood, charcoal, medicine and food. Only a fraction of the forest that was intact in 1978 remains, and what is left is in degraded condition. Research and reforestation efforts are under way in several provinces, using agroforestry techniques such as radical terracing, progressive terracing and live mulches. Seedlings of *Calliandra calothyrsus*, *Leucaena diversifolia* and other species are being planted in collaboration with stakeholders and the local community. If efforts continue and are successful, the Gishwati Forest Reserve may experience considerable regeneration within the next five to 10 years.

Sources: UNEP 2008, FAO 2010.

Apart from direct loss of species through clearing of forest habitat, deforestation also leads to fragmentation and increasing genetic isolation of populations. In the cloud forests of the Taita Hills in southern Kenya, forest fragmentation and degradation decrease the long-term viability of the bird community across landscapes by reducing dispersal opportunities between populations and within fragments.

Land Degradation

Demand for agricultural land and increased intensity of agricultural use within the hotspot have resulted in cultivation on erosion-prone marginal lands and adoption of unsuitable agricultural practices, such as overgrazing and cultivation on steep slopes. These issues, combined with deforestation and forest degradation, are leading to broader land degradation across the region.[25] Land degradation is a particular issue in the Arabian Peninsula, Ethiopian Highlands and parts of the Albertine Rift. For instance, Eritrea is at extremely high risk of desertification due to its arid climate and heavy reliance on agriculture despite limited availability of arable land. Only 6.3 percent of land is suitable for cultivation, and most of this potential has already been exploited (UNEP 2006); 63 percent of the country is considered severely degraded (FAO AGL 2003). Ethiopia faces similar problems (see Box 5.9).

Box 5.9: Agriculture, Livestock Farming, Deforestation and Degradation in the Ethiopian Highlands

Soil erosion and land degradation are widespread in Ethiopia, particularly in the highlands. Deforestation, overgrazing and other poor farming practices and a heavy dependence on dung for fuel (because most wood sources have been removed) are the main drivers of land degradation in Ethiopia. In some areas, land is tilled for barley production on steep slopes, sometimes in excess of 45 degrees. Livestock is increasingly using the most extreme marginal areas to graze. In 2002, the livestock in a discrete area of the Bale Mountains reached an unprecedented density of 314 animals per square kilometer. Overgrazing has also led to an increasing abundance of unpalatable or poisonous species and heightened competition between livestock and wildlife. In the late 19th century, about 30 percent of Ethiopia was covered with forest, but today forest areas have dwindled to less than 11 percent of the total area; the northern parts of the highlands are almost devoid of trees. Overall, 85 percent of the land is classified as moderately to very severely degraded and 70 percent is affected by desertification.

Sources: FAO 2007 and 2010, FAO AGL 2003, EPA 2004, UNCCD 2002, Williams *et al.* (2005), www.fao.org/ag/agl/agll/wrb/soilres.stm.

In contrast to Ethiopia, Rwanda is a country with rich, fertile volcanic soils and plentiful rain, but population pressure has resulted in a similar expansion onto marginal lands and steep slopes. An estimated 71 percent of land is considered severely degraded (FAO AGL 2003), and approximately 500 metric tons of soil are lost to erosion each year, an amount that could supports crops to feed 40,000 people. In the Eastern Arc and Southern Mountain Islands, farming practices that degrade land are also common (including slash and burn, shifting cultivation with short fallows and cultivation on steep slopes).

[25] According to the definition given by the United Nations Convention to Combat Desertification (UNCCD), land degradation is the reduction or loss the biological or economic productivity and complexity of land in arid, semi-arid and dry sub-humid areas. UNCCD considers desertification as land degradation.

The economic costs of land degradation and associated loss in yields are enormous and long-lasting (natural soil formation can take centuries). Ethiopia suffers yearly losses of $106 million due to nutrient removal from agricultural areas, $23 million from forest losses, and $10 million from the loss of livestock capacity, amounting to about 3 percent of agricultural GDP.[26] Land degradation also causes increased siltation of rivers, which reduces the efficiency and effectiveness of hydroelectric schemes and water quality to lowland urban centers, such as along the Shire River in Malawi. (There are also major impacts on biodiversity due to loss of area and quality of wildlife habitats. Excessive siltation resulting from erosion is a major threat to many of Rwanda's lakes and wetlands.)

5.4 Ecosystem Services and Relationship between Environment and Development

Ecosystem Services and Their Importance to People

Ecosystems within the hotspot provide ecosystem services that are critical in supporting human well-being (Ash and Jenkins 2007, TEEB 2010). The key ecosystem services in the region and key references are outlined in Table 5.1. Many support livelihoods both within and beyond the hotspot boundary, such as timber, fuel wood, building poles, wild food and medicinal plants. Mountain forests in the hotspot play essential roles in carbon storage and sequestration, the regulation of flooding and the maintenance of fertile soils. Nonuse services include providing attractive scenery and rare and endemic wildlife that attract tourists and providing natural pollination services by wild bees.

Table 5.1. Example Ecosystem Services in the Eastern Afromontane Hotspot

Service	Importance and role	References
Carbon storage and sequestration in forests and woodlands	• Stabilization of global and regional climate • Reduced forest loss and degradation now part of REDD+ readiness funding across region	Baccini *et al.* 2009 Burgess *et al.* 2010 (Tanzania) www.valuingthearc.org
Reliable provision of clean water to downstream users	• Water supply from mountains to lowlands is major source of hydropower, irrigation, dry season water supply to many large towns across the region. • Essential to sustain adaptation strategies for food security in the face of climate change	www.easternarc.or.tz www.valuingthearc.org Fisher *et al.* 2010, 2011 Gross-Camp *et al.* In press (Rwanda) Hecht, 2006 (Mount Mulanje)
Preventing flooding and landslides	• Catchment forests and reserves on mountaintops regulate water flows and prevent flooding, landslides, erosion of topsoil into streams • Anecdotal evidence suggests that upper catchment deforestation is increasing the intensity of floods in the Arabian Peninsula	Lopa *et al.* In press (Tanzania, Eastern Arc) (M. Hall and T. Miller, *in litt.*)

[26] "Ethiopia loses $139 mil due to Desertrification – WB," *Jemma* (Ethiopia) *Times*, June 21, 2009, http://www.jimmatimes.com/article/Latest_News/Latest_News/Ethiopia_loses_139_mil_due_to_Desertification_WB/32409.

Timber and nontimber forest products	• Forest and woodland habitats are sources of quality timber (furniture, doors, window frames) • Nontimber forest products include firewood, building poles, medicinal plants, wild food (bush meat, plants)	Ndangalasi *et al.* 2007, Nielsen 2006 www.easternarc.or.tz www.valuingthearc.org Ghazanfar 1994 (Arabian Peninsula)
Fisheries	• Mountain streams and lakes of minor importance for fisheries, but the water flows into lakes such as Victoria and Tangyanika • Major rivers draining east and west provide major fishing resource for millions of people in the region	
Tourism	• Forest and surrounding habitats contain rare, endemic species that attract bird- and mammal-watching tourists (mountain gorilla) • Montane scenery, views, walking, cultural programs attract tourists	www.valuingthearc.org Sandbrook and Roe 2010 GTZ & GTDA 2006, (Haraz Mountains, Yemen)
Pollination	• Some wild pollinators from forest and woodland habitats provide important crop pollination service, such as pollination for coffee production and sustaining wild coffee varieties as genetic resource	Ricketts 2004
Genetic resources	• Biological diversity, including wild crop relatives	Country Report on the State of Plant Genetic Resources for Food and Agriculture: Yemen, Second National Report, 2009
Cultural Values	• Majority of villages have (or had) small area of sacred, cultural forest (often also burial grounds) • Wider cultural values apply to some areas, such as mountains with sacred/cultural values for groups of people • Traditional land management, or *hima,* system (Arabian Peninsula) involves setting aside areas that cannot be used for specified time period[27]	Mwihomeke *et al.* 1998 (clan forests Eastern Arc*)* Al Abbasi *et al.* 2010 (Arabian Peninsula)

Of particular importance is the hotspot's ability to supply water year-round from its mountain forests. Countries in the hotspot, including Eritrea, Ethiopia, Kenya, Yemen and Malawi, suffer from water stress and are below the international water scarcity threshold of 1,000 cubic meters per person per year (UNEP 2002). Kenya, for example, has only 935 cubic meters available per person per year (FAO 2007), and population growth is forecast to reduce this figure to 359 cubic meters by 2020 (UN-Water 2006). Water supply is critical for agricultural productivity (and hence food supply and poverty reduction) and for maintaining population centers in the hotspot (see Box 5.10) (Sayer *et al.* 2006; CESPA 2008; TEEB 2010; Lopa *et al.* in press).[28]. The main water supply for Dar es Salaam comes from the forest reserves of the Uluguru Mountains, which

[27] In Saudi Arabia there were an estimated 3,000 himas functioning in the mid-20th century. Yet for a variety of political and socioeconomic reasons, the hima/ hamiyah system is currently in rapid decline across much of the Arabian Peninsula. The functioning sites that still exist are important localities for promotion and restoration of local traditional management practices, and are a conservation priority in the Arabian Peninsula. (Eben-Saleh, 1998; Draz, 1969; Gari, 2006 and Lewellyn, 1998).

[28] Agriculture is a major user of water in most of the hotspot,, accounting for more than 50 percent of all water use in all but two of the countries (DRC and Uganda). It is particularly high in the drier countries, such as Eritrea, Ethiopia, Somalia, Sudan and Yemen, all of which use more than 90 percent of their water simply for agriculture (Appendix 8).

provide water for market crops grown intensively (often for export) at lower elevations around Naivasha (Aberdares catchment), Moshi (Mount Kilimanjaro slopes) and Arusha (Mount Meru slopes).

Box 5.10: The Water Towers of Kenya

The five main catchment areas in Kenya—the Mau complex, Mount Kenya, the Aberdares Range, Mount Elgon and the Cherengani Hills—are together known as the "Water Towers of Kenya." They form the upper catchments of all but one of the principal rivers west of the Rift Valley and feed the major lakes, three of which are cross-boundary. The Mau complex (the largest forest of Kenya, which covers some 400,000 hectares) also generates more than $270 million annually from tourism, energy and tea.

Sources: UNEP Annual Report 2009, Kenya Wildlife Service Annual Report 2008).

The mountains of the hotspot are also critical as suppliers of water for the region's hydroelectric power generation. The Eastern Arc Mountains provide the water for many of the large dams of Tanzania, and the Southern Highlands contribute to four of the country's 12 main drainage basins. The same dependence on hydroelectric power is also found in other countries, including Malawi, Mozambique, Kenya and Ethiopia. The water supplied by the mountains of the hotspot can also be extremely important for neighboring countries, which have a vested interest in maintaining these key ecosystem services. For example, the Blue Nile supplies about two-thirds of the water of the Nile during the rainy season (even though shorter than the White Nile) and is vital to the livelihood of Egypt. Of the water reaching Egypt, 59 percent originates from the Blue Nile branch. Combined with the Atbara River, which also has its source in the Ethiopian Highlands, the figure rises to 90 percent of the water and 96 percent of transported sediment. The river is also an important resource for Sudan, where the Roseires and Sennar dams produce 80 percent of the country's power and help irrigate the Gezira Plain, where cotton, wheat and animal feed crops are grown: this would be impossible without the regular water supply from the Eastern Afromontane Hotspot.

The Economic Value of Ecosystem Services

It is widely recognized that ecosystems produce a broad range of environmental services (MEA 2005), but the valuation of the services and the capture of those values within market- and nonmarket-based mechanisms is still in its infancy (TEEB 2010).[29]

There has been little valuation of natural resources, ecosystem services or biodiversity in the Eastern Afromontane Hotspot, in part because this is highly complex and time-consuming to do. One of the few studies undertaken estimated the annual total economic value of the catchment forests in the Eastern Arc Mountains at $621.4 million in 2001, taking account of timber, water, power generation, biodiversity and carbon sequestration) (www.easternarc.or.tz). A more recent "replacement cost approach" calculated that the water supply from the Eastern Arc Mountains was worth $17.5 million per annum in electricity generated from hydroelectric power stations and almost $8 million per annum in water supplied to towns (Pfliegner and Burgess 2005; Fisher *et al.* 2010). Additional experimental valuation work has been done for Mount Mulanje in

[29] The failure of society to compensate landowners/managers and users for the provision of ecosystem services (Daily, 1997; Balmford *et al.*, 2002) may be a key contributory factor to the rapid loss of biodiversity witnessed globally (Butchart *et al.* 2010).

Malawi (Hecht 2006), in the Virungas (www.arcosnetwork.org) and in parts of Rwanda, with funding from the MacArthur Foundation.

Payments for Ecosystem Services

Payments for ecosystem services (PES) have been proposed as mechanisms to deliver better conservation by linking beneficiaries of an ecosystem service with providers via a mechanism to pay the people who manage the natural habitats that provide the service.[30]. In the developing world these have included payments for ecological tourism (Clements *et al.* 2010), water provision (Pagiola 2008, Asquith *et al.* 2008, Muñoz-Piña *et al.* 2008, Wunder and Albán 2008), forest carbon (Reducing Emissions from Deforestation and Forest Degradation plus carbon enhancement, REDD +, e.g. Burgess *et al.* 2010a, Clements 2010), pollination of crops (Ricketts 2004) and delivery of biodiversity outcomes (Sommerville *et al.* 2010, Clements *et al.* 2010, Gross-Camp *et al.* in press). Some major PES schemes in the Eastern Afromontane Hotspot are summarized in Table 5.2.

Table 5.2: Major PES Schemes in the Eastern Afromontane Hotspot

Ecosystem Service	PES Scheme	Status and key references
Forest carbon/climate change mitigation	Voluntary carbon market projects	Voluntary carbon projects established in Uganda (ECOTRUST).
	Clean development mechanism (CDM)	Few CDM projects in the hotspot. Tree plantation companies (e.g. Green Resources) have applied and largely failed to achieve the standards required.
	Reduced emissions from deforestation and forest degradation (REDD)	REDD+ projects not yet operational (no agreed final mechanism through the UNFCCC), but REDD-readiness and piloting projects exist in almost all countries. Greatest investment in Tanzania (Burgess *et al.* 2010) and DRC (www.un-redd.org/).
Reliable provision of clean water	Regular water flows	Watershed PES project operating in the Uluguru and East Usambara Mountains of the Eastern Arc (Lopa *et al.* submitted).
	Clean, high quality water	Watershed management under way on Mount Kenya/ Mau supplying Lake Naivasha (CARE/BirdLife).
Biodiversity/tourism	Conservation Trust/endowment funds	Eastern Arc Mountains Conservation Endowment Fund (www.easternarc.or.tz) (Tanzania) Mulanje Mountain Conservation Trust (MMCT) (www.mountmulanje.org.mw) (Malawi) Mgahinga and Bwindi Impenetrable Forest Conservation Trust Fund (MBIFCT) (Uganda) International Gorilla Conservation Programme (IGCP) (www.igcp.org/) (Uganda, Rwanda, DRC)

[30] PES schemes are defined as (1) voluntary transactions when (2) a well-defined ecosystem service (or corresponding land use) is (3) being "bought" by a (minimum one) ecosystem service buyer (4) from a (minimum one) provider (5) if and only if ecosystem service provision is secured (conditionality) (Wunder 2005).

Forest Carbon Schemes

Human destruction of tropical forests is estimated to contribute 10 to 20 percent of the total carbon dioxide emissions in the world, resulting in accelerated global warming (IPCC 2007). A proposed mechanism for mitigating these emissions is REDD+: reducing emissions from deforestation and forest degradation "plus" conservation, the sustainable management of forests and enhancement of forest carbon stocks. There is growing interest in this as a tool to secure forest conservation and reduce poverty in the Eastern Afromontane Hotspot (see Box 5.11 and Chapter 9).

Box 5.11: REDD+ in the Eastern Afromontane Hotspot

The REDD mechanism is a major part of environmental and development work in the Eastern Afromontane region. DRC and Tanzania are focal countries for UN REDD, the World Bank's Forest Carbon Partnership and Norwegian bilateral REDD funds. Around $100 million is being invested in each country to prepare for REDD+. Activities range from assessing carbon stocks to implementing pilot projects to test delivery mechanisms on the ground, and DRC has a suite of donors supporting REDD-readiness efforts. In Tanzania, mechanisms proposed for implementing REDD+ will work either through protected areas (targeting reductions in deforestation and, especially, degradation), or through community forestry approaches. Tanzania has a strong Participatory Forest Management (PFM) program, which allows communities to manage and benefit from forests under their control; the first REDD pilot projects using PFM experience are now starting to achieve results. Other countries in the hotspot are also getting ready for REDD+ with World Bank and other donor support, establishing national carbon baselines and pilot projects for REDD+. In some countries, such as Uganda, there are also forest carbon projects operating through the voluntary carbon market at the pilot scale. Similarly, various tree-planting projects are also under way, funded by carbon money from outside the region.

Compensation for avoided deforestation in Tanzania may fail to mitigate climate change unless energy efficiency and agricultural productivity are simultaneously addressed, because carbon gains at REDD sites may be lost though carbon leakage in other areas (trees cut for charcoal or fuel wood or removed to make way for more farmland, within the same country or across borders). When the extra investments to improve energy efficiency and agricultural productivity are factored in, the effective implementation costs of REDD+ are substantially increased but remain competitive in carbon markets. REDD strategies that include this additional investment have been called "Smart REDD" (Fisher *et al.* 2011).

Sources: www.un-redd.org/; Blomley *et al.*, 2008; Burgess *et al.*, 2010; Tanzania Natural Resources Forum [www.tnrf.org/]; Fisher *et al*., 2011.

Watershed Management Schemes

Water PES projects are still at the experimental or research stage in the hotspot. The mountains sustain regular flows of water that is enormously important to downstream stakeholders in seasonally dry areas. PES schemes could link urban water users to ecosystem services providers to supply money and help reduce poverty (Wunder 2008; Box 5.12).

Box 5.12. Poverty Reduction Impacts of a Water PES Scheme in Tanzania

Sustaining the regular flow of water from mountain forests provides obvious economic benefits to downstream stakeholders in seasonally dry, tropical countries. A water PES scheme has operated since 2005 in the Uluguru Mountains in eastern Tanzania under a memoranda of understanding signed by the Dar es Salaam Water Co., the Coca Cola Co. in Dar es Salaam (the downstream water users) and farmers living on the mountains. Farmers are receiving tangible cash benefits under the scheme: payments to 650 farmers totaled around $5,000 in 2010 (anticipated to increase to $11,000 in 2011). These have resulted in improved agriculture and the growth of higher value crops (cabbages), which multiplies the benefits of the cash payments and helps reduce rural poverty. Another pilot project established in the East Usambara Mountains, with donor and NGO funding, is negotiating deals with the Tanga town water company and a large cement factory. Similar pilot projects are found in Kenya and Rwanda.

Sources: Lopa *et al.* [in press]; Fisher *et al.* 2010; Gross-Camp *et al.* submitted.

5.5 Contribution of Conservation Interventions to Poverty Reduction in the Hotspot

Direct and Indirect Benefits in the Fight Against Poverty

There is much debate in the literature about the links between conservation interventions and poverty reduction. Ten specific types of conservation interventions to address poverty have been identified: community timber enterprises, nontimber forest products, PESs, nature-based tourism, fish spillover from protected areas, mangrove restoration, protected-area jobs, agroforestry, grasslands management and agro-biodiversity conservation (Secretariat of the CBD 2009). Biodiversity conservation and poverty are multifaceted concepts, and the links between them are complex and variable (e.g. Walpole and Wilder 2008, Secretariat of the CBD 2009, 2010). A recent symposium on poverty and conservation concluded that it is often the relatively low-value goods and services from biodiversity that are most significant to the poor while resources of higher commercial value attract the attention of the more affluent groups, often crowding out the poor (see Pearce 2011, Leisher, 2010). This applies to bush meat, forest fruits, timber and even nature tourism.

Few quantitative studies have examined how biodiversity conservation projects have reduced poverty within the Eastern Afromontane Hotspot (Sandbrook and Roe 2010).[31] Natural resource conservation might help reduce poverty in the hotspot by protecting and maintaining ecosystem services vital to the poor and by providing specific material and nonmaterial benefits. For instance, some communities are very dependent on forests within the hotspot for their income. In the Dendi District of Ethiopia, forest income contributed as much of the average household income as agriculture (both around 40 percent) and was more important than all other income sources combined for the poorest 40 percent of households (Mamo *et al.* 2007). Along the margins of tropical forests in Malawi, the local forests act as a particularly important safety net

[31] In part this is because very few initiatives seem to measure and/or publish the impacts of their work for either conservation or poverty reduction, and most exceptions to this are because of research carried out independently of the project in question.

against food insecurity for the rural poor (Fisher and Shively 2003: quoted in Secretariat of the CBD 2009).

Low-volume, high-fee, nature-based tourism focused on unique attractions may be a means to provide economic benefit to poor communities around protected areas. In the hotspot, the best example is the development of gorilla tracking in the Virungas (see Box 5.13).

Hotspot habitats and ecosystem services also provide significant benefits, which may help reduce poverty for people living outside the immediate hotspot area. Millions of people, much of the industry, irrigated agriculture and hydroelectricity in the East African region of the hotspot rely on water flowing from the mountains of the hotspot (see examples and discussion of economic benefits in Section 5.4 Ecosystem Services and Relationship between Environment and Development, and Tables 5.1 and 5.2). REDD+ and other PES schemes may offer some of the best future mechanisms for linking poverty reduction and natural resource conservation and management in the hotspot.

Box 5.13: Mountain Gorilla Tourism Benefits to Local Communities and Impacts on Poverty

The International Gorilla Conservation Programme (IGCP) estimates that revenue earned directly from gorilla tourism is around $3 million per year. With the additional income received by hotels, restaurants and transport providers, the total figure may exceed $20 million, shared between Rwanda, Uganda and DRC. At present, Rwanda and Uganda are the only two countries where mountain gorillas can be visited safely (DRC is considered unsafe). In 2008, about 17,000 people visited the Volcanoes National Park (VNP) in Rwanda to see gorillas, a large increase from only 417 tourists in 1999, following the reopening of the park. Tourists will pay high fees (around $500) for a limited number of permits, which are usually sold out. Revenue-sharing mechanisms ensure that local communities around the protected areas where gorillas are found benefit directly from tourism.

Parishes adjacent to Bwindi Impenetrable National Park in Uganda, for instance, received $50,000 to $75,000 per year between from 2005 to 2007, and spent the money on projects (mostly infrastructure--roads and health facilities) as well as funding other income generation activities. Direct employment opportunities are offered in these protected areas, as well as opportunities to sell goods and services. These were estimated to equate to $360,000 in retained revenue for a single parish at the Bwindi tourism hub in 2004--about four times the value of all other sources of revenue to the area combined. The VNP employs at least 180 people, working as guides, gorilla trackers (for both tourism and research groups) and in anti-poaching teams. Around 800 community members near VNP are involved in daily management activities and benefit from temporary employment and revenue-sharing support. In addition, the park management has helped groups form two umbrella associations: one for park protection activities (*Amizero*, or Hope) and another for community development activities (*Iby'Iwacu*). It has also been recognized that people in the area have relied too heavily on the gorillas to attract and retain tourists, so tourism in the region is being diversified. In Rwanda, for example, new trails have been built to Mount Visoke's summit and crater lake, to Dian Fossey's grave, and to Lake Ngezi, to encourage visitors to linger in the VNP area. Three groups of golden monkeys (*Cercopithecus mitis kandtii)*, a beautiful blue monkey subspecies found only in the Virungas, have also been habituated and can be visited daily. Some of the private tour operators also offer other community-based tourism activities, such as stays with a local family, village walks, banana beer production or volunteering opportunities in local communities.

Sources: www.igcp.org/gorillas/tourism/; Nielsen and Spenceley 2010; Uwingeli 2009, Tusabe and Habyalimana 2010; SNV and ODI, 2008; AWF 2005; Hatfield and Malleret-King 2007; Hatfield 2005; Sandbrook and Roe 2010, Blomley *et al.* 2010, Sandbrook 2009.

In Yemen, the Ministry of Environment (assisted by RBGE) has proposed cultivating aloe as a drylands crop for global export (Box 5.5). This not only has the potential for reducing water use in a country that is predicted to be the first country in the world to run out of water, but it could also provide sustainable incomes for farmers and significant foreign currency income if marketed properly in the multibillion dollar aloe market.

Limitations to the Use of Conservation Interventions to Address Poverty

Not all of the above mechanisms may benefit the poorest sections of society. For example, most of the remaining forests in the hotspot are found within protected areas or catchment forest reserves. Logging and harvesting of nontimber forest products are typically banned or illegal in these areas, and the only poverty reduction benefits are from people undertaking illegal activities, which do not offer an effective and sustainable mechanism for lifting people out of poverty. In addition, there is concern that the populations around some of the remaining forests in these mountains may be too high to be supported through sustainable use of local natural resources. Attempts to increase use of natural resources to the level that would provide tangible economic benefits to locals could lead to serious depletion of the resource base.

A review of the impact of great ape tourism in the hotspot (Sandbrook and Roe 2010) found that this type of tourism can generate very large amounts of money, but the proportion shared by local communities is often too low to have any meaningful impact on poverty. High-cost tourism may therefore be no more effective than other forms of tourism as a tool for generating local benefits from conservation (Sandbrook 2010). Other mechanisms that can benefit the rural poor, but for which there is a lack of hard evidence of conservation benefits, include bush meat harvesting, medicinal plant collection, woodcarving and bio-prospecting (Secretariat of the CBD 2009), all of which occur in the hotspot.

Local people require real incentives and opportunities (such as alternative fuels, employment from conservation management and tourism, medicinal plant cultivation projects) from conservation areas in order for conservation to be effective in the future. Despite a lack of specific research and concrete data, the conclusion from the existing reviews and available empirical research is that, overall, empowerment, security and social network development are among the most significant short-term poverty reduction outcomes and benefits of conservation interventions rather than income generation, although this very much depends on the specific situation (Blomley *et al.* 2008, 2010). Community-run forests may be an exception: Leisher (2010) found "considerable evidence" that community forestry, when it works well, both protects biodiversity and reduces poverty.

6. POLICY CONTEXT OF THE HOTSPOT

6.1 Introduction

This chapter presents an analysis of policies related to the environment with special emphasis on poverty and natural resources management in the hotspot. It includes the following: an overview of the regional and national political situation; an illustration of how general development strategies in selected countries affect the prospects for conserving biodiversity and could influence CEPF activities; an overview of specific environmental policies and legislation; and a brief consideration of the science-policy interface for safeguarding key biodiversity areas and its relevance to the CEPF investment.

6.2 Overview of Regional and National Political Situation

General Overview of the Political Situation in the Hotspot

Many aspects of the current political situation in the African portion of the hotspot have their roots in the colonization of East Africa led by European powers. Colonization began with the 17th-century exploration of East Africa by the Portuguese, but their control was largely restricted to coastal areas. Between 1881 and 1914, Africa became the scene of intense competition between the major imperialistic European nations of the time, a period known as the "Scramble for Africa" (Packenham 1997). This led to the colonization of Sudan, Eritrea, Kenya, Uganda, Tanzania, Malawi, Zambia and Zimbabwe by the British (with a short period of German rule in Tanzania and Italian rule in Eritrea). DRC was colonized by the Belgians, who also governed Burundi and Rwanda (again after a short period of German rule). The Portuguese colonized Mozambique, and in 1975 it became the last of the countries in the hotspot to escape direct rule from Europe.

This colonial history has greatly impacted the use of the region's land and natural resources. Organized, intensive systems of agriculture and forestry were introduced along with legal, institutional and management systems to maintain them. Decolonization began after World War II and was more or less complete by the end of the 1970s (Table 6.1), but these systems were largely retained. Boundaries of protected areas, gazettement notices and structures of government remain similar to those developed by previous colonial , and it is only in very recent years that central government authorities have begun to take more community-based and private sector (e.g. forest agencies) approaches.

Yemen, Saudi Arabia and Ethiopia are the three countries in the hotspot that escaped colonization, except for five years of Italian occupation (1936-1941) in the case of Ethiopia. Part of Ethiopia's political organization is still influenced by the Ethiopian Empire era and the modernization of the state initiated by Haile Selassie as well as by the subsequent communist era. Yemen and Saudi Arabia were parts of the Ottoman Empire until the beginning of the 14th century and inherited part of their political organization from this common history (in particular

when Yemen was ruled under a theocratic regime in the 19th century), but they diverged after their independence.

In the African post-independence period from the early 1960s, many countries suffered difficult political situations, often marked by authoritarian regimes or dictatorships that retained the instruments of state control and security that had been put in place by the colonial governments. Several countries also faced civil unrest and regional conflicts. Although difficulties remain, there have been significant improvements in the last decade. Poor governance is, however, still considered a problem in some countries and is recognized in several official documents, as in DRC's and Burundi's poverty reduction plans.[32]

Table 6.1 summarizes some of the history and the situation in 2010 for all the hotspot countries except Somalia, which has been without a central government for the last 20 years.

Table 6.1. Political Regimes, Democracy Index Rate and Global Peace Index Rate for Hotspot Countries

Note: Shading indicates relative scores in 2010 for democracy and peace from green (good), blue (moderate), to beige (poor).

Country	Independence Date	Type of Political Regime	2010 Democracy Index (a)	2010 Global Peace Index (b)
Democratic Republic of Congo	1960 from Belgium	Semi-presidential republic	2.15	2.295
Federal Democratic republic of Ethiopia	na	Parliamentary, federal republic	3.68	2.444
Kingdom of Saudi Arabia	1926 from Ottoman Empire	Islamic absolute monarchy	1.84	2.216
Republic of Burundi	1962 from Belgium	Republic	4.01	2.577
Republic of Kenya	1963 from Great Britain	Republic, presidential system	4.71	2.369
Republic of Malawi	1964 from Great Britain	Republic	5.84	1.813
Republic of Mozambique	1975 from Portugal	Republic, presidential system	4.90	1.779
Republic of Rwanda	1962 from Belgium	Republic	3.15	2.012
Republic of South Sudan	1956 from Great Britain; 2011 from Sudan	Republic, presidential and federal system	2.43(d)	3.13(d)
Republic of Uganda	1962 from Great Britain	Republic, presidential system	5.05	2.165
Republic of Yemen	1917 from Ottoman Empire	Republic	2.64	2.573
Republic of Zambia	1964 from Great Britain	Republic	5.68	1.813
Republic of Zimbabwe	1980 from Great Britain(c)	Republic, semi-presidential regime	2.64	2.678
Somali Republic	1960 from Great Britain, Italy	Republic under a civil war, no formal government	Not rated	3.390
State of Eritrea	1993 from Ethiopia (after	Semi-presidential republic	2.31	Not rated

[32] *Document Stratégique pour le Croissance et la Réduction de Pauvreté (DSCRP)* Democratic Republic of the Congo, July 2006; *Cadre Stratégique de Croissance et de Lutte contre la Pauvreté*, Burundi, Feb. 1, 2007.

	Italy, Great Britain)			
United Republic of Tanzania	1963 from Great Britain	Republic	5.64	1.832

Notes to table:
(a) The Economist Intelligence Unit's Democracy Index is based on 60 indicators grouped in five different categories: electoral process and pluralism, civil liberties, functioning of government, political participation and political culture. The methodology used to produce this index could be questionable and does not necessarily reflect the government's efforts to promote democracy. This index is presented here for information purposes and does not reflect any opinion from the writers. The Democracy Index range is from zero to 10 (high values for more democracy).
(b) The Global Peace Index (GPI) is an attempt to measure the relative position of nations' and regions' peacefulness. It is the product of the Institute for Economics and Peace, based on collation of official data related to peace and security, including number of casualties from external and internal wars and unrest, criminality, number of heavy weapons, etc. The methodology used to produce this index could be questionable and does not necessarily reflect the government efforts to promote peace and security. This index is presented here for information purposes and does not reflect any opinion from the writers. The GPI ranges from 0 to 5 (high values for less peace).
(c) Zimbabwe suffered civil war from 1965 to 1979.
(d) Figures for Republic of Sudan (2010) before South Sudan independence.

The current political situation, with respect to its impact on conservation, was subjectively assessed for 11 countries in the hotspot during the national consultations. Participants were asked to grade governance structures, levels of decentralization, political conflicts and security as being difficult, satisfactory or good (Table 6.2). They judged these issues to be most favorable in Uganda and Rwanda, followed by Kenya, Mozambique and Ethiopia, and most difficult in Yemen, where all four issues rated as difficult. Most problems were reported for political conflicts and security, especially for Yemen, DRC and Zimbabwe. These conclusions are broadly concurrent with the data in Table 6.1.

Table 6.2. View of the Situation on Four General Issues and Impacts on Biodiversity Conservation by Participants in National Consultations (shading as in Table 6.1)

Country	Governance Structures	Levels of Decentralization	Political Conflicts	Security
Burundi	Satisfactory	Satisfactory	Satisfactory	Satisfactory
DRC	Satisfactory	Satisfactory	Difficult	Difficult
Ethiopia	Satisfactory	Satisfactory	Good	Good
Kenya	Good	Good	Satisfactory	Satisfactory
Malawi	Satisfactory	Satisfactory	Satisfactory	Good
Mozambique	Satisfactory	Good	Satisfactory	Good
Rwanda	Good	Good	Good	Good
Tanzania	Difficult	Good	Satisfactory	Good
Uganda	Good	Good	Good	Good
Yemen	Difficult	Difficult	Difficult	Difficult
Zimbabwe	Good	Satisfactory	Difficult	Difficult

Present Conflicts and Security Issues

The conflict and security issues reported in Table 6.2 and reflected in the peace and democracy indices in Table 6.1 impact heavily on the support from the international community in some countries, while threatening activities for local civil society in terms of environmental management.

Eritrea ranks 14th in the democracy index and has ongoing border conflicts with Ethiopia, which led to an open war between 1998 and 2000, in addition to conflicts with Yemen in 1996 over the sovereignty of the Hanish Islands in the Red Sea (although these have since been resolved). Relations between Eritrea and a number of other countries have been strained for some time. In 2005, the Eritrean government instructed USAID to cease its operations in the country, and in 2009 the United States accused Eritrea of supporting Muslim terrorist groups.

Somalia, which comprises a very small portion of the hotspot, is marked by 20 years of civil war and has not had an effective government since the start of the war. Security issues are high in this country, which ranks last in the Global Peace Index. Any international intervention in this country is very difficult if not impossible, even for United Nations bodies or internationally recognized NGOs such as Red Cross/Red Crescent. Due to the situation, the profiling team was not in a position to gather biological data or other information on the country during the profiling exercise.

The current political situation and unrest in Yemen (unforeseen at the beginning of the profiling exercise) have already precluded some of the planned consultations in this profiling process and make conservation investments in this country problematic. The situation in the country at the time of completion of the profile draft (October 2011) was still difficult, with most of the international organizations still not able to resume their activities in the country, while insecurity and unrest hamper the activities of the already scarce environmental civil society.

Sudan has been involved in the longest running civil war in Africa, lasting four decades, including recurring clashes in Darfur starting in 2003 that led to genocide charges at the International Criminal Court. At times it has had hostile relations with neighbors Chad and Eritrea. Sudan has also been classified by the U.S. Department of State as a state sponsor of terrorism since 1993. The recent referendum on South Sudanese secession (following an internal peace agreement in 2005), while overwhelmingly in favor of the creation of the new state of South Sudan in July 2011 (with 98.93 percent voting in support), has yet to play out to a peaceful conclusion, and conflicts continue in the disputed oil-rich central region of Abyei. There is, however, much donor goodwill toward South Sudan, and it may stand to benefit from post-conflict aid, as has been the case in Rwanda.

In DRC, more than 5 million people are reported to have died in long-running conflicts, with the resource-rich eastern part of the country (which falls within the hotspot) being particularly affected. Genocidal activities spilled over from Rwanda in the 1990s and restrictions on U.S. funding for DRC investments remain in place as a result. [33] The conflicts have had a severe impact on biodiversity and natural areas, both directly (through poaching and hunting,

[33] Special clearance was required to fund DRC delegates to attend the consultation workshops for this profile.

occupation of natural areas) and indirectly (through breakdown of law and order, population displacement and refugee camps). The conflict situation has also drastically reduced the development of tourism in protected areas, some of which have enormous potential, such as Virunga National Park and the Okapi Wildlife Reserve. The security of such protected areas is among concerns for the future of conservation. Attacks on protected area staff by militia have occurred, such as the killing of three rangers and five Congolese soldiers in Virunga National Park in early 2011.[34]

Zimbabwe has been largely peaceful since the end of its civil war in 1979, but Zimbabwean troops intervened in DRC between 1998 and 2002, and civil unrest is a constant threat. In 2010, only Sudan had a worse GPI ranking, and only four countries ranked lower in the Democracy Index ranking (Table 6.1). The political space for civil society operations is severely constrained (Chapter 7), while hyperinflation between 2003 and 2009 has contributed to a wrecked economy. Recovery is under way following the adoption of the U.S. dollar and South African rand as the official currencies, but it is still slow. Should the political situation change in the near future, the economy may improve more rapidly and there may be openings for civil society and for international interventions supporting it.

Finally there have been security issues in Uganda, where the Lord's Resistance Army (LRA) has fought since 1987 with the Ugandan government in the country's northern region, causing thousands of civilian casualties and displacing more than a million people. More recently, peace has returned to the north since talks began in 2006, allowing the government and development partners to begin the process of reconstruction, rehabilitation and development. The LRA also led incursions in eastern DRC and South Sudan, where this movement has been fought by government armies with the support of the United Nations Organization Mission in the Democratic Republic of the Congo (MONUC) forces. LRA activities are, however, unlikely to impact potential CEPF investments in Uganda.

As a result from these conflicts and civil wars, several countries have major refugee populations: Burundi, 281,600; Rwanda, 72,500; Eritrea, 186,000; and DRC, 368,000. Such refugee populations sometimes have a huge impact on the natural resources of a country (UNHCR 2008, UNDP 2010).

Though there are currently no major civil conflicts active within the hotspot, there is potential for these to develop. Further environmental degradation (exacerbated by climate change) could precipitate or worsen conflict and has been identified as a likely trigger for future conflicts globally (Shambaugh *et al.* 2001; Hanson *et al.* 2009). There are particular concerns over this risk in northeast Africa and the southern Arabian Peninsula, where droughts and water shortages could precipitate conflict between groups or nations, especially as the effects of climate change intensify (Parthemore and Rogers 2010). Recent sharp rises in food and fuel costs led to protests in African countries including Uganda and South Sudan in 2011 and hold the potential for further unrest in the hotspot. Relationships between some former protagonists, such as the governments of Ethiopia and Eritrea, remain difficult, and there are potential flashpoints over the use of natural resources such as water and fisheries among countries bordering Lake Tanganyika, and between DRC and Uganda over recently discovered oil and gas reserves.

[34] See http://greatervirunga.org/?p=263.

6.3 Global and Regional Agreements

Hotspot Parties to Global Agreements

The overall government commitment to global environment agreements among the hotspot countries is, at face value, both impressive and onerous. As of 2010, all the hotspot countries were parties to most global international agreements (Table 6.3). The only two conventions that are not yet signed by several countries are the Convention on Migratory Species and the Ramsar Convention on Wetlands, to which the absence of Ethiopia is surprising in view of the large number of important wetlands in this country (at least 31 sites fulfill the Ramsar criteria, Abebe 2004). The status of the parties (as signatories, ratified members, etc.) varies across the agreements, and being a party in theory does not always mean being one in practice, particularly in the face of the weak regulatory and law enforcement environments that often exist in the hotspot countries.

Table 6.3. Hotspot Parties to Global Environmental Agreements

Countries	Environmental Agreements									Number of Agreements
	CBD	CITES	KP	CPB	UNFF	UNCCD	WHC	CMS	Ramsar	
Burundi	Y	Y	Y	Y	Y	Y	Y	N	Y	8
DRC	Y	Y	Y	Y	Y	Y	Y	Y	Y	9
Eritrea	Y	Y	Y	Y	Y	Y	Y	Y	N	8
Ethiopia	Y	Y	Y	Y	Y	Y	Y	Y	N	8
Kenya	Y	Y	Y	Y	Y	Y	Y	Y	Y	9
Malawi	Y	Y	Y	Y	Y	Y	Y	N	Y	8
Mozambique	Y	Y	Y	Y	Y	Y	Y	Y	Y	9
Rwanda	Y	Y	Y	Y	Y	Y	Y	Y	Y	9
Saudi Arabia	Y	Y	Y	Y	Y	Y	Y	Y	N	8
Somalia	Y	Y	Y	Y	Y	Y	N	Y	N	7
Sudan*	Y	Y	Y	Y	Y	Y	Y	Y	Y	9
Tanzania	Y	Y	Y	Y	Y	Y	Y	Y	Y	9
Uganda	Y	Y	Y	Y	Y	Y	Y	Y	Y	9
Yemen	Y	Y	Y	Y	Y	Y	Y	Y	Y	9
Zambia	Y	Y	Y	Y	Y	Y	Y	N	Y	8
Zimbabwe	Y	Y	Y	Y	Y	Y	Y	N	N	7

Notes: Y = party to agreement; N = not a party; CBD = Convention on Biological Diversity; CITES = Convention on International Trade in Endangered Species; KP = Kyoto Protocol on Climate Change; CPB = Cartagena Protocol on Biosafety; UNFF = United Nations Forum on Forests (all UN member states); UNCCD = UN Convention to Combat Desertification; WHC = World Heritage Convention; CMS = Convention on Migratory Species; Ramsar = Convention on Wetlands of International Importance. * at the time of Profiling (2011), South Sudan's participation to the agreements was pending due to the recent independence of this country.

Hotspot Countries and Regional Agreements

The African countries of the hotspot are all members of one or more of the regional economic communities (RECs) listed in Table 6.4. The principal focus of these communities is to facilitate trade and economic cooperation between their member states, and in many cases they started their activities with trade and custom agreements. They also often represent an important arena to deal with security issues and peace-building. But some of the RECs have also developed initiatives in the field of environment, providing a framework for developing common positions regarding international agreements and for holding high-level meetings and conferences (on climate, forest, see COMESA, ECCAS), as well as developing protocols or regional regulations on sustainable management of natural resources that have to be enforced by their member states.

Table 6.4 below provides some examples of such initiatives that demonstrate the development of regional frameworks and cooperation agreements relevant in the context of this profile.

Table 6.4. Brief Descriptions of Seven Regional Agreements in the Hotspot

COMESA	The Common Market for Eastern and Southern Africa has been developing a climate change initiative since 2007, encompassing various transnational activities and in particular the establishment of an African bio-carbon facility that combines market-based offsets and public and private funds. COMESA also develops agricultural programs.	Eritrea, Ethiopia, Sudan, South Sudan, Uganda, Kenya, Rwanda, DRC, Burundi, Malawi, Zimbabwe, Zambia
IGAD	Created in 1986 after several severe droughts, the Inter-Government Authority on Development initially focused on developing regional cooperation on agriculture and environment before widening its activity to infrastructure and economic integration. IGAD supports various regional initiatives on water, land management, agriculture and environment. It organizes regular high-level meetings, such as the biennial Directors of Conservation and Economic Planning Conference.	Eritrea, Ethiopia, Sudan, Somalia, Uganda, Kenya,
SADC	The Southern African Development Community has a natural resources management program dealing with regional issues on fisheries, forestry, wildlife management and trans-frontier protected areas. The SADC Protocol on Wildlife Conservation and Law Enforcement (1999 and ratified 2003) commits its member states to "promote the conservation of the shared wildlife resources through the establishment of transfrontier conservation areas."[35]	DRC, Tanzania, Malawi, Mozambique, Zimbabwe, Zambia
EAC	The East African Community works primarily on common market and custom issues. It produced a draft protocol on environment and natural resources that has not yet been ratified.[36]	Uganda, Kenya, Rwanda, Burundi, Tanzania
CEEAC	Communauté Économique des Etats d'Afrique Centrale has developed interventions on natural resources through the creation of a specialized organ, COMIFAC, to enhance regional cooperation on forest issues. The CEEAC also supported CEFDHAC—a regular technical conference gathering major stakeholders on forest issues, as well as a network of protected areas of the Congo Basin.	Rwanda, DRC, Burundi

[35] See http://www.sadc.int/fanr/naturalresources/transfrontier/index.php.
[36] See http://www.eac.int/environment/index.php?option=com_content&view=article&id=122:eac-gender-a-community-development-framework&catid=3:key-documents.

ECGLC	The Economic Community of Great Lakes Countries hosts different bodies on energy and finance, but has no specific interventions on environment. Its support to large energy infrastructures could potentially have important environmental repercussions.	Rwanda, DRC, Burundi
CEN-SAD	The Community of Sahel-Saharan States, recognized as a regional economic organization, gathers 28 African states from North Africa to the southern part of Saharan desert, as well as some island states. The organization promotes several initiatives related to food security and agriculture, and launched in 2005 the Great Green Wall Initiative.	Eritrea, Sudan

For the Arabian Peninsula, the main regional forum is the Arab League, to which Somalia and the former unified state of Sudan also belong (note that South Sudan has been invited to join but had not accepted at the time of profiling (Nov 2011)). The Arab League has few activities in the environmental field, apart from environmental councils that tend to define common positions of the member states prior to some international conferences (such as United Nations Framework Convention on Climate Change, or UNFCCC).

More importantly, there are several regional initiatives that aim to foster regional cooperation with regard to the environment; some of them have been initiated by the RECs, or the African Union (see Table 6.5).

Table 6.5 Hotspot Parties to Regional Environmental Agreements

Countries	**LA**	**Algiers**	**NBI**	**CLVFO**	**AMCEN**	**COMIFAC**
Burundi	N	N	Y	N	Y	Y
DRC	N	Y	Y	N	Y	Y
Eritrea	N	N	N*	N	Y	N
Ethiopia	Y	N	Y	N	Y	N
Kenya	Y	Y	Y	Y	Y	N
Malawi	N	N	N	N	Y	N
Mozambique	N	Y	N	N	Y	N
Rwanda	N	Y	Y	N	Y	N
Somalia	N	N	N	N	Y	N
Sudan*	N	Y	Y	N	Y	N
Tanzania	Y	Y	Y	Y	Y	N
Uganda	Y	Y	Y	Y	Y	N
Zambia	Y	Y	N	N	Y	N
Zimbabwe	N	Y	N	N	Y	N
Number of Parties (in the Hotspot)	**5**	**9**	**8**	**3**	**14**	**2**

Notes: Y = party to agreement; N = not a party; *Observer; LA = Lusaka Agreement on Co-operative Enforcement Operations Directed at Illegal Trade in Wild Fauna and Flora; Algiers = African Convention on the Conservation of Nature and Natural Resources (1968); NBI = Nile Basin Initiative; AMCEN = African Ministerial Conference on the Environment; COMIFAC = Central Africa Forest Commission; CLVFO: Convention on Lake Victoria Fisheries Organization. * at the time of Profiling (2011), South Sudan's participation to the agreements was pending due to the recent independence of this country.

One of the most important agreements in Table 6.5 is the Nile Basin Initiative (NBI) that was established in 1999 and involved nine countries that share the Nile River and its sources. The initiative's vision is to "achieve sustainable socioeconomic development through the equitable utilization of, and benefit from, the common Nile Basin water resources." This is an ambitious agenda, in view of current and projected water shortages in the region and the colonial inheritance of a situation in which Egypt has had a privileged position with respect to use of the Nile. These difficulties led to a split between the partner states in 2010, with five of the upstream countries (Ethiopia, Kenya, Uganda, Rwanda and Tanzania) signing a cooperative framework agreement (CFA) to improve their access to the river for irrigation and development. Burundi and DRC may also join the CFA, but Egypt and Sudan are strongly against it.

The Algiers Convention, signed in 1968, introduced innovative approaches for the conservation of nature. It acknowledged early on the principle of common responsibility for environmental management by African states. This convention, initiated under the auspices of the Organization of African Unity (now the African Union), focuses on living resources, calling for the creation of protected areas and for specific conservation measures for species that are listed in its annex. It also provides for the conservation of other natural resources such as soil and water, the consideration of environmental concerns in development plans, and research and education. It was revised in 2003 (known as the Maputo Convention), but that version has not yet reached the necessary number of ratifications to put it into force.

The Convention on Lake Victoria Fisheries Organization (CLVFO) aims to foster cooperation among the contracting parties, harmonize national measures for sustainable utilization of living resources of the lake, and to develop and adopt conservation and management measures.

The Lusaka Agreement (LA) supports the member states and collaborating partners in reducing and ultimately eliminating illegal trade in wild fauna and flora through facilitation of cooperative activities in undertaking law enforcement operations, investigations on violations of national wildlife laws, dissemination and exchange of information on illegal trade activities, and ultimately, capacity building. Its task force signed a memorandum of understanding with Central Africa Forest Commission (COMIFAC) in 2010 to enhance collaboration. The main objective of COMIFAC is to enhance regional cooperation on forest issues, working for a better convergence of forest management regulations, developing transnational protected areas and other regional programs on issues such as capacity building for REDD.

Among the regional initiatives, the African Ministerial Conference on the Environment (AMCEN) is the most influential. All the African states in the hotspot are members of this permanent forum, where African ministers of the environment discuss matters of relevance to the environment of the continent. AMCEN was established in 1985 and convenes every second year for regular sessions. It prepares statements and positions for the international conferences, issues specific reports such as the African Environment Outlook, and provides heads of state with recommendations regarding the environment.

6.4 Main Development Strategies and Potential Interactions with Natural Resources

National development strategies are heavily contingent upon natural resources and greatly influence the ways in which environmental issues are managed, posing one of the major challenges facing the countries in the hotspot. Despite much debate on poverty reduction in relation to biodiversity conservation, and their potential synergies, the reconciliation of the two remains problematic. This section reviews development strategies as they affect natural resources in the hotspot from the perspective of civil society, and presents a thematic analysis of key country documents to show how they may affect the CEPF investment.

Analysis of Development Strategy Documents and Potential Environmental Impacts

This section reviews development and poverty reduction strategy documents in selected hotspot countries. The review is restricted to a thematic analysis of the more recent strategy papers available at the time of the profiling exercise (seven out of 16 countries, Table 6.6). However, the issues that are highlighted are believed to be common to most of the other hotspot countries.

Table 6.6. Recent Development Strategy Documents for Seven Countries in the Hotspot

Country	Strategy Paper		Period Covered
Burundi	CSCLP	Cadre Stratégique de Croissance et de Lutte contre la Pauvreté (CSCLP)	2005-2010(+)
RD Congo	DSCRP	Document de Stratégie pour la Croissance et la Réduction de la Pauvreté	2007-2012(+)
Ethiopia	PASDEP	Plan for Accelerated and Sustained Development to End Poverty	2005-2010
	GTP	Growth and Transformation Plan	2011-2015
Kenya	IP-ERS	Implementation Programme for the Economic Recovery Strategy for Wealth and Employment	2003-2008
	Kenya Vision 2030		2008-2012 (first five years implementation plan)
Tanzania	MKUKUTA II	*Mkakati wa Kukuza Uchumi na Kupunguza Umaskini Tanzania* (National Strategy for Growth and Reduction of Poverty)	2011-2015
Uganda	PEAP III	Poverty Eradication Action Plan	2004-2010
	NDP	National Development Plan	2010-2015

These documents present a many similarities that relate first to shared geographical and historical situations, and second to the fact that they reflect current global development paradigms driven by the largest donor agencies. For example, all the recent strategies emphasize the role of the public sector in agriculture and the importance of subsistence farmers, unlike those developed in the 1990s. This mirrors the rather recent recognition (particularly by the

World Bank) of the difficulties in shifting directly from a dominant primary sector to industrial or tertiary sectors.[37].

Most of the documents attempt to assess and prioritize the many reasons for underdevelopment. These reasons include environmental degradation, which is recognized as one of the most important drivers of poverty, especially in Burundi, Rwanda and Ethiopia. But it is only in Rwanda and Ethiopia that this degradation is directly linked to demographic trends, with a reduction in population growth identified as an important development objective. Countries with lower densities, such as Tanzania, tend to see the growth in population as a positive trend. All documents, however, recognize the need for better governance, law enforcement and security, especially for those countries such as Uganda, Burundi and DRC, which have had recent conflict situations. Most countries also recognize the urgent need to improve capacities in both public and private sectors.

The remainder of this section examines five specific themes in the development strategies in the region that are most important with respect to their environmental impacts: agriculture, mining, energy, tourism and the role of civil society.

Increasing Production in the Agricultural Sector

All the documents present the same set of objectives regarding agriculture, and this economic sector is given top priority, except in Kenya and Uganda. The prominent objective is to increase production to improve food security and develop cash crops to increase export revenues. All documents focus first on subsistence agriculture. Plans include activities to improve access to (and in some cases to provide subsidies for) pesticides and fertilizers. Improved access to markets is also a frequent objective with an emphasis on upgrading rural roads and transport facilities. In most countries, plans also include ambitious programs for dams (often linked to hydropower projects), together with canals and pipelines for irrigation. These programs could have a devastating effect on some natural areas. More environmentally benign options for improving the productivity of subsistence farmers include agroforestry and soil conservation, which are mentioned in the plans of Uganda, Rwanda and, to a lesser extent, Tanzania.

The promotion of cash crops is not always comprehensively addressed. For example, the rehabilitation of large estates (tea and coffee in Uganda, Rwanda, Burundi and DRC; fruits in Tanzania) is sometimes mentioned without assessing the requisite management structures. In the Ethiopian PASDEP (drafted 2003-2004), the development of new large-scale commercial farming is explicitly mentioned, and the document also states that "a wide range of programs (rural development, resettlement, development of commercial farming) have been implemented which did not sufficiently protect environmental resources." But despite this recognition of environmental concerns, the policy of large, foreign-owned commercial plantations recently led to degazettement of several protected areas.

Production can also be increased through the conversion of lands to agriculture. With the percentage of land under agriculture (including pasture) in 2007 ranging from less than 10

[37] World Bank, *World Bank Assistance to Agriculture in Sub-Saharan Africa: An IEG Review* (Washington, DC: World Bank, 2007a), http://www.oecd.org/dataoecd/16/28/39681400.pdf.

percent in DRC to almost 90 percent in Burundi (Appendix 8), expansion of agricultural landscapes might not be an option for all hotspot countries. Rwanda, which had78 percent of its land devoted to agriculture in 2007, aims to increase the area of reclaimed marshlands from about 10,000 to 30,000 hectares, while Kenya aims at "utilization of a million hectares of currently uncultivated land and new cultivation of up to 1.2 million hectares of newly-opened lands" (Kenya Vision 2030). Such objectives could conflict with the rehabilitation of critically degraded ecosystems that are also presented in the development papers.

Generally speaking, there is little recognition of the importance of forests and other natural areas in maintaining the long-term ecological conditions necessary for agricultural productivity. The role of ecosystem services, for agriculture as well as for other sectors, is not taken into consideration—except to a certain extent by the Rwandan document.

Development of Mining and Other Extractive Industries

Nearly all the documents include the development of the mining industry in their top priorities. The two exceptions are Kenya (no mention in the Vision 2030) and DRC. In the latter case mining is already in the hands of a very dynamic private sector, and the DSCRP emphasis is on the rule of law and the fight against corruption in this industry.

In contrast, Uganda intends to exploit its oil resources from the Albertine Graben, Tanzania plans to increase the growth in mining from 2 percent in 2009 to 12.7 percent in 2015, and Rwanda proposes to increase mineral exports by 250 percent between 2005 and 2012. Ethiopia makes mining its third development priority, with a focus on exploration, as most resources are not yet proven. Burundi includes mining among its six priority sectors (but without defining its precise objectives) and intends to revise its mining regulations to attract new investors.

The development of mining industries, if associated with weakness of environmental impact assessments, the absence of mitigation measures, and poor law enforcement could have a devastating impact on natural areas (see Chapter 8). The rapidly increasing Chinese investment in the region, which is often not tempered by environmental safeguards, makes this an issue of special concern. The role of civil society in advocacy, impact monitoring and the development of partnerships with the industry to improve mining practices will be highly important in the coming years in the hotspot.

Developing and Diversifying Energy Production and Distribution

All countries in the hotspot, with the exception of Saudi Arabia, already experience difficult energy situations (see Chapter 5). It is therefore no surprise to see the energy sector as an important issue in the development strategy papers. The energy sector is seen in two different ways: some countries only consider huge, ambitious programs of electricity production plants (Ethiopia, Burundi, Uganda), while other countries consider the issue more from the demand side and also plan local, small-scale solutions (Tanzania, DRC and especially Rwanda). Kenya's plans are among the most ambitious, with a target of 16,000 megawatts by 2030 against a current capacity of 1,300 megawatts. Among the other countries, Ethiopia plans to increase its power generation from 791 to 2,218 megawatts, and Rwanda from 45 to 130 megawatts.

In both approaches, all documents recognize the importance of rural electricity coverage. This issue sometimes includes the goal of reducing the use of firewood (Rwanda, Burundi, Ethiopia). Two strategies are proposed: expansion of the grids and (more rarely) development of renewable energy (solar, wind, mini-hydro and biogas) for off-grid areas. Improving access to electricity in remote areas could have beneficial side effects for environmental NGOs (improving communication, reducing operational costs) and also for ecotourism and the development of other economic activities.

The issue of firewood and charcoal production is sometimes mentioned in a specific forestry chapter rather than in the energy one, but is almost always described as a key issue to be addressed. Several countries set targets for reduction of fuel wood and charcoal in the energy share (for example, Rwanda seeks to move from 94 percent to 50 percent), often mentioning improved stoves and natural gas (Ethiopia and Tanzania). DRC is the notable exception, with an aim of developing charcoal production.

With respect to electricity production, most countries put hydropower as the first or among the first priorities. While some countries aim at rehabilitating existing hydroelectricity plants (DRC, Burundi) with a low impact on natural resources, others intend to develop mega-projects: Ethiopia and Rwanda both intend to triple their capacities, while Uganda plans to develop four large plants, in Karuma, Ayago, Isimba and Arianga.

Most of the proposed new large dams will be situated within the mountainous areas of the hotspot and are therefore considerable threats to biodiversity. A further concern is that, with the exception of Rwanda, the development policy documents do not adequately consider the management of the catchments and the siltation issues that could result from deforestation. As in the case of agriculture, the concept of ecosystem services that maintain the production capacity in the long term is not yet recognized. Civil society will have an important role to play in minimizing the adverse impacts of these energy strategy policies in the coming years and also making the most of opportunities for promoting environmentally friendly practices in this sector.

Developing and Diversifying Tourism

All countries in the region put tourism as a key economic sector, with the exception of DRC where it is only mentioned once and incidentally. The targets are sometimes very ambitious, especially in light of the recent global economic slump and regional competition for a market that may have already peaked. Tanzania and Kenya—where tourism is already important—as well as Rwanda and Burundi present very ambitious goals for multiplying the number of tourists. The fact that all the countries in the region offer similar products and niches makes these objectives seem all the more overly ambitious.

For this reason, tourism diversification appears necessary, and the development of small-scale nature and cultural tourism involving local populations has assumed a greater importance. Even in Kenya, where most of the efforts are going to mass tourism and coastal resorts, the government intends to launch the “under-utilized parks initiative” by upgrading the standards of attractive but seldom visited parks such as Ruma and Marsabit and promote ecotourism.

Similarly, Uganda identifies its main attractions as "gorilla tracking; viewing chimpanzee, golden monkeys and Patas monkeys; nature guided walks, community walks, butterfly viewing, and bird watching." If Ethiopia's main asset remains cultural tourism, based on the many historical sites and ethnic diversity of the country, the strategy also notes that "the wildlife conservation policy is to create a conducive environment whereby the country's wildlife and their habitats are protected and developed in a sustainable manner."

Most countries in the hotspot thus consider their nature, wildlife and protected areas as key for the development of a major economic sector, even though they don't recognize the additional value of the ecosystem services they provide to the other sectors such as agriculture and energy.

Civil Society

The role of civil society in promoting development is mentioned, often under different sections, in all the documents. Uganda, for instance, indicates that "it is essential for the development of civil society that its actions are not planned or dictated by Government. However, Government enjoys productive partnerships with civil society organizations and supports the role they play in the process of economic growth and development."

The role of civil society is particularly highlighted in relation to rural development, with several countries aiming to support and develop farmers' associations. These are seen as good channels for distributing improved seeds, pesticides or fertilizers, enhancing value chains, facilitating access to markets, and popularizing sound agricultural techniques. Examples include "developing farmers' cooperatives" (Ethiopia, PASDEP), "creation and strengthening of farmers' cooperatives" (Rwanda), and "increasing the number and functioning of farmers' organizations … for collective marketing" (Uganda).

The emphasis on local organization is greatest in DRC, where the strategy intends to "support the involvement of local people, so-called 'dynamiques communautaires,' and in particular the emergence of Neighborhood Development Associations (ADQs) or Village Development Associations (ADVs) as genuine focal points for local initiatives."

Importantly, some countries mention the role of civil society for environmental activities. Uganda declares explicitly under its section 8.4.3, "Restore degraded ecosystems," that "civil society organizations and the private sector will be mobilized to support this initiative." Tanzania insists on "Enhancing community based natural resource management arrangements," and "Improving legislation on ownership/access to environmental and natural resources," and strongly emphasizes community-based forest management (see also Chapter 5).

The recognition of the role of civil society in development is already a major improvement over strategies prepared in the former decades. Empowering and building the capacity of grassroots organizations, especially for rural development, community forest and natural areas management, is recognized by all the countries as an important development issue. This gives a special responsibility to civil society agencies that are able to support the emergence and consolidation of community-based organizations.

6.5 Environmental Policies and Legislation

Environmental policies and legislation in the hotspot have undergone major reforms over the last two decades. To a large extent these reforms have been donor-driven and have taken place alongside the development of the National Biodiversity Strategic Action Plans (NBSAPs) and National Environment Action Plans (NEAPs) in line with the deliberations of the Convention on Biological Diversity.

NBSAPs in the Hotspot Countries

The NBSAPs in the region describe the strategic axis for biodiversity conservation. Table 6.7 below displays the major themes of the NBSAP for the hotspot countries (although most are currently under revision). The three most important themes are: i) sustainable use of natural resources with an emphasis on productive landscapes; ii) improvement of the management of protected areas (including the extension of the network to cover adequately the diversity of ecosystems for five of the countries); and iii) the revision of laws and regulations regarding biodiversity, and their enforcement. While defining their priorities, governments were also conscious of the lack of scientific data and data management systems, and nine countries included this as a major concern. In addition, about half of the country strategies mentioned specifically the need to support, facilitate (and manage) international cooperation.

Table 6.7 Key Themes of the NBSAPs for 14 Countries in the Hotspot

	Yemen	Eritrea	Uganda	Rwanda	Kenya	Tanzania	Ethiopia	Saudi Arabia	DRC	Burundi	Zambia	Zimbabwe	Malawi	Mozambique	
Date of last NBSAP submitted to CBD	2005	2000	2002	2003	2000	2001	2005	2005	2002	2000	2003	2000	2006	2003	
Sustainable use of biological resources outside Pas	x	x	x	x	x	x	x	x	x	x		x	x	x	13
Develop and enforce legislation on biodiversity	x		x	x		x		x	x	x	x	x	x		10
Improve PA management		x		x	x		x	x	x	x	x			x	9
Science and research, databases		x	x			x		x	x	x	x	x		x	9
Access and Benefit Sharing			x	x	x		x	x	x	x	x		x		9
Education and Awareness	x	x	x			x		x	x	x		x	x		9
capacity building for structures in charge of biodiversity		x	x			x			x		x		x		6
Ex-situ conservation		x					x	x	x				x	x	6
Conservation of Agro-biodiversity	x						x			x	x		x	x	6
Enhance international Cooperation					x	x		x	x	x			x		6
Establishment/Development of PA network	x						x	x			x			x	5
Alien invasive species		x											x	x	3
Pollution management		x													1

Policies and Legislation on Involvement of Local Communities in Sustainable Use of Natural Resources

The greater involvement of local communities in the management of natural resources (especially in the forest sector) is mentioned in almost all biodiversity conservation strategies, but has not yet been fully addressed by legislators. Many barriers still exist.

Tanzania is the most advanced country in the hotspot with respect to community-based forest management (CBFM) and community-based natural resource management (CBNRM). This reflects the country's historical emphasis on rural development and local empowerment, and was greatly facilitated by the 1995 National Land Policy. The policy recommended that village councils administer their lands with the aim of protecting their land rights and promoting better and sustainable use of their natural resources. Under the subsequent Land and Village Land Acts (1999), villages were empowered to draft and enforce bylaws, with the creation of village guards authorized to monitor compliance. CBFM guidelines (2001) were also developed. These distinguish between joint forest management (JFM) for government-owned reserves, and CBFM for village forest reserves (VFRs).

Similar regulations exist in Kenya, where the 2005 Forest Act empowers local communities to participate in the management of state or local government forests as community forest associations (CFAs). CFAs can enjoy forest-user rights such as collecting medicinal plants, honey harvesting, the domestic use of timber, pole and fuel wood, water, grazing and grass harvesting, and access for ecotourism and recreation, as well as other rights that are negotiated under each particular agreement. Extractive activities, particularly for wood products, are based on participatory assessments of the resources available to ensure sustainability. Hunting for bush meat, however, remains illegal, though widely practiced.

In Uganda, local community participation in natural resource management is provided for under the National Forestry and Tree Planting Act and the Wildlife Statute (1996). The former has facilitated collaborative forest management (CFM) arrangements within reserves and CBFM in forestlands outside reserves. CFM has been difficult to implement; reasons given are lack of awareness, lack of short-term tangible benefits to the target communities and implementers' bias. By 2006, only six communities had signed CFM agreements.

In DRC, community rights to manage their traditional forests are recognized under the protected forests category, one of the three forest types introduced by the 2002 Forest Code. These forests are available for exploitation by local people, including small-scale farming and logging concessions up to 25 years, with 40 percent of logging fees supposed to be used for developing local infrastructure. The proposed zoning under the Forest Code has, however, been ignored, and there are no records of logging fees being allocated in the manner proposed—a situation that relates to the many governance issues faced by DRC.

In Yemen, the 2008 National Strategy for Environmental Sustainability (NSES) promotes decentralization to district levels and the empowerment of local communities (especially women) in natural resource management, with particular reference to making decisions about land and resource use. Despite all these efforts, however, the Environmental Protection Agency remains largely ineffective and is in need of further reform.

Community-based natural resource management policies are still weak to nonexistent in most of the other countries of the hotspot.

Legislation and Policies on Protected Areas Management

Protected areas management systems within the hotspot vary, from centralized and well-funded authorities managing the entirety of the protected area system (such as in Saudi Arabia), to complex, multilayered systems with a variety of institutions in charge of different protected area types, such as in Uganda.

All countries have regulatory frameworks to declare protected areas and to define a set of human activities compatible with conservation. Some of these frameworks were directly inherited from the colonial era, some developed more recently as is the case in Burundi. But in several countries, the issue of gazettement of protected areas is still problematic. In Ethiopia, DRC and Burundi for instance, several important national parks have not been properly gazetted with clearly defined boundaries and land surveys, thus impeding long-term management. Even when this is not the case, protected areas can be degazetted. In DRC, even iconic parks such as the Virunga National Park (a World Heritage Site and home to mountain gorillas) have been threatened by the issuing of oil exploration permits, although the government rescinded these in March 2011. Civil society organizations have already played an important role in preventing some degazettement, but often face a lack of means, capacities and coordination to effectively play this watchdog role (Chapter 7, Box 7.2).

While some existing protected areas are not yet effectively gazetted, there are still many areas in the hotspot that are not protected at all in spite of their importance for biodiversity and ecosystem services. Despite the recognition that many countries made in their NBSAPs of the need to expand their protected areas network (Table 6.7), progress to date has been slow. Table 6.8 shows that only 43 percent of terrestrial KBAs are currently fully protected, and the situation is even worse for freshwater KBAs (only 8 percent fully protected). The partial protection category in the table refers to sites that have only part of their area under protected status. This unfortunate situation reflects both knowledge gaps relating to the geographical distribution of threatened species and a lack of political will to implement global environmental commitments.

Table 6.8. Protection Status for Terrestrial and Freshwater KBAs in the Hotspot

Type of KBA	Protection Status	Count of Protection Status	Percent	Area (ha)	Percent
Terrestrial	Partial	43	16.5 %	10,019,620	33.6 %
	Proposed	3	1.1 %	70,749	0.2 %
	Protected	108	41.4 %	11,446,099	38.4 %
	Unprotected or Unknown	107	41.0%	8,289,604	27.8 %
Total		**261**		**29,826,071**	
Freshwater	Partial	30	61.2 %	16,780,279	74.2 %
	Protected	4	8.2 %	2,534,472	11.2 %
	Unprotected or Unknown	15	30.6 %	3,303,685	14.6%
Total		**49**		**22,618,436**	

A further bottleneck for biodiversity conservation is the lack of human capacity and resources to ensure law enforcement in the protected areas themselves. The "paper park" syndrome is widespread in the hotspot with the notable exceptions of Kenya, Tanzania, Uganda and Saudi Arabia. Enforcement is generally best when protected areas bring in ecotourism revenues. After years of weak law enforcement, even national parks show signs of heavy human disturbance. In Ethiopia's Bale National Park, the population adjacent to the park jumped from 2,500 to more than 40,000 between 1986 and 2003 (Frankfurt Zoological Society 2007), and similar trends were experienced in Parc des Virunga-Parc des Volcans at the Rwanda-DRC border.

In this context of scarce resources and sometimes difficult governance issues, several countries have delegated, at least in part, the management of some of their protected areas to nongovernment stakeholders—while conserving a regulatory and law enforcement role. Several large protected areas in the hotspot are heavily supported by projects implemented by international NGOs. Acknowledging this situation, DRC and Zambia have developed regulatory frameworks to cater to long-term private-public partnerships.

Environmental Impact Assessments

Although there are legislative provisions in all countries to make environmental impact assessments mandatory for development projects, implementation is extremely poor. This reflects a lack of capacity and resources, particularly in the environmental management authorities that have the responsibility for such assessments. As a result, assessments are often contracted out to parties with a vested interest. Even when an assessment recommends terminating a project or ameliorating its adverse impacts, these recommendations are sometimes ignored in favor of powerful interests. Nonetheless, the fact that the legislation exists gives a legal foothold for environmental protection that may sometimes be used effectively by civil society.

6.6 Policy Implications for the Environment and Biodiversity

The Science-Policy Interface

The wide gap between the scientific and political arenas was recognized as an important barrier by many during the profile consultation process. Naturally, this is related, in part, to the weakness of many scientific institutions of the region—both in terms of funding and human resources. The relatively low number of experts does not allow for the scientific data collection and analysis required to ensure effective conservation of biodiversity. But even when the data exist, they are seldom used effectively as tools for decisions by politicians and administrators.

An obvious example of the lack of scientific feedback into the political decision-making process is the mismatch between the protected areas network and the high biodiversity value sites, as shown in Table 6.8. Beresford *et al*. (2011) conclude that protected areas cover only 14 percent of suitable habitats for threatened bird species on the African continent. Only in areas that mobilize the international scientific community (such as the Bale Mountains and Virunga National Park) is a sound scientific basis brought to bear on protected area management.

The gap between the scientific community and decision makers is also illustrated by the lack of integration of biodiversity into development, whether for territorial planning at various scales or for the adoption of regulations and laws on agriculture, mining or the energy sector. Issues of deforestation, erosion and siltation are not mentioned in development papers when dealing with hydropower plans. Similarly, payments for ecosystem services or the importance of natural assets appear only on rare occasions in official documents.

Many countries do however include strategic interventions for scientific research, development of databases, etc. in their NBSAPs. The development of standard data protocols (such as the IUCN Red Listing) is an essential step to reinforce the science-policy interface. Many stakeholders consulted during the profile development regretted the absence of national or regional fora to facilitate the exchange of data and improve the role of the scientific and conservation community in advocacy.

Conservation and National Development

Widespread poverty within the hotspot countries (except in Saudi Arabia), combined with rapid population growth, makes accelerated economic growth at the national level the single most important element in their development policies. While conservation policies also highlight poverty reduction as a priority, they demand due consideration for environmental safeguards both for biodiversity and for ecosystem services. These safeguards are often sacrificed, especially when major infrastructure developments are planned and executed, and large sums of money are involved. Political pressures, poor governance at multiple levels, and inadequate resources in national environmental agencies exacerbate this situation, so that it becomes a constant struggle to ensure that biodiversity is adequately protected even when the requisite policies and legislation are in place. In this context, civil society has a vital role to play in defending biodiversity in the hotspot, so that progressive environmental policies are not sidelined in the justified push for rapid economic growth. In addition, the importance of ecosystem services is insufficiently recognized at the national policy level, especially when it comes to land-use issues and landscape planning. This urgently needs to be addressed, and the emerging opportunity for sustainable financing to support these services needs to be brought to the fore in policy discussions in the hotspot—particularly by civil society.

Conservation and Rural Development

At the level of rural development, and in the local context of communities living in the vicinity of protected areas and KBAs, development and conservation policies are more in harmony. The role of civil society in supporting participatory management initiatives and microeconomic interventions that can support biodiversity conservation is well recognized and provided for in much policy and legislation within the hotspot. It is also reflected strongly in the various global and regional agreements to which most of the countries are signatories. This represents an open door for the CEPF investment and is an area in which civil society has been active for decades.

7. CIVIL SOCIETY CONTEXT OF THE HOTSPOT

This chapter provides an overview of the civil society organizations that are engaged in natural resources management and biodiversity conservation in the hotspot. It describes the operating environment for civil society in the region (legal framework, political space, funding availability) and gives an analysis of the state of civil society using a tracking tool developed by CEPF. Existing formal and informal networks in the hotspot are also presented. Much of the chapter draws on the results of the questionnaire administered to more than 150 participants from more than 140 institutions in 11 of the hotspot countries from December 2010 to February 2011.

7.1 General Overview of Civil Society

Operating Environment for NGOs

Workshop participants and other respondents were asked to assess the operating environment for civil society in terms of legal frameworks, political space and funding availability in their respective countries (Table 7.1). Overall the operating environment was judged to be best in Kenya (though a need for harmonizing legislation and institutional activities was noted) and in Rwanda, where both the legal framework and political space were rated as enabling. It was rated worst in Zimbabwe, where the legal framework was in place but political space and funding were both highly constrained. In Ethiopia, the assessment was mixed, with political space being rated as enabling but the legal framework labeled constrained. In Tanzania, all three factors were rated as variable, with some constraints emerging from legislation not directly related to civil society, such as land laws that potentially restrict community-level capacity to engage in forest carbon projects. In other comments, Ugandan delegates reported that good laws and policies exist for biodiversity conservation, and civil society faces few direct hindrances in seeking their execution, but some institutions are weak in implementation of laws. In DRC, delegates noted that civil society legislation needs to be revised to make it more effective and that awareness of such legislation must be raised. Similarly, despite the existence of several consultation frameworks in DRC on policy formulation, these are voluntary and have no legal force.

Despite the prevailing level of satisfaction (seven out of 11 countries) reported with respect to legal frameworks, NGO laws in the hotspot have been criticized by independent and partisan analysts. Several of these laws came into force in the 1990s and early 2000s (such as in Kenya, 1990; Tanzania, 2002; and Uganda, 1989, amended 2006) following liberalization in some countries.

In Ethiopia, the 2009 Promulgation to Provide for the Registration and Regulation of Charities and Societies was severely criticized by the Ethiopian Human Rights Council (EHRCO) in its draft form; it has since been described as one of the most controversial NGO laws in the world by the International Centre for Not-for-Profit Law (ICNL 2011). When the draft was first introduced, it was explicitly defended by a senior adviser to the prime minister as being designed to prevent foreign interference in Ethiopia's internal affairs. Under the law, any CSO in Ethiopia that receives more than 10 percent of its income from foreign sources is classified as a foreign NGO and barred from engaging in civil rights or advocacy activities. A further provision of the promulgation is that it would be a criminal offense for any civil society organization to use more

than 30 percent of its budget for its own administrative costs. Although this legislation is highly restrictive, detailed guidelines have not yet been produced, and there is some expectation that it may be revised.

In general throughout the hotspot, there has been increasing democratization in more recent years, and a consequent partial reversal of donor aid flows back to government agencies, so that cooperation between government and the civil society has improved.

Table 7.1. Operating Environments for Civil Society in 11 Hotspot Countries (Assessed through Consultations)

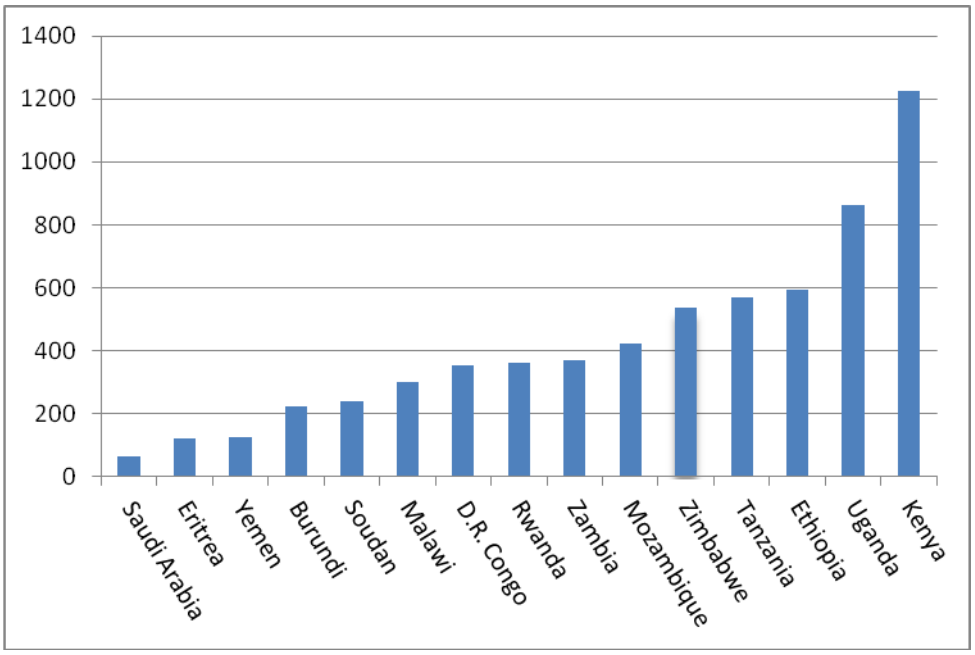
Country	Legal Framework	Political Space	Funding Availability
Burundi	Neutral	Neutral	Constrained
DRC	Constrained	Enabling	Constrained
Ethiopia	Constrained	Enabling	Constrained
Kenya	Enabling	Enabling	Constrained
Malawi	Enabling	Neutral	Constrained
Mozambique	Enabling	Neutral	Constrained
Rwanda	Enabling	Enabling	Constrained
Tanzania	Variable	Variable	Variable
Uganda	Enabling	Neutral	Neutral
Yemen	Enabling	Enabling	Constrained
Zimbabwe	Enabling	Constrained	Constrained

Importance of Civil Society in the Development Sector

Most of the countries within the hotspot are among the poorest in the world and receive substantial financial support from a wide range of multilateral and bilateral donors, charities and foundations, much of it going to civil society organizations. This situation has promoted the creation of a considerable number of national offices or branches of international organizations and an even greater number of national civil society organizations, especially among development and/or relief NGOs.

Their establishment has been somewhat uneven across the hotspot. Figure 7.1 shows the number of entries in the Directory of Development Organizations, which includes national and international organizations, donors and some government agencies, and provides a rough idea of the development community in each country. Numbers range from 1,226 organizations registered in Kenya (including many regional ones), to around 120 or fewer in Yemen, Eritrea and Saudi Arabia. Rwanda and Burundi both have a high number of active development organizations for the size of their population.

Figure 7.1. Number of Entries in the Directory of Development Organizations, by Country, as an Indirect Indicator of the Importance of Civil Society (Based on Wesselink 2010)



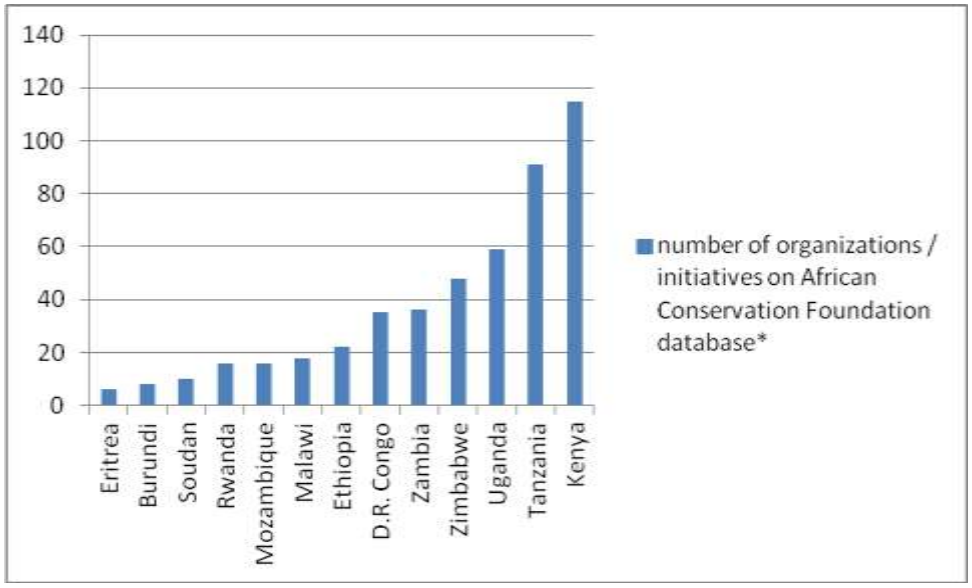
Note: data for Sudan are for the unified Republic of Sudan before South Sudan independence (2011). No data was available on Sudan on South Sudan at the time of the Profile.

Many of the organizations active in the region focus on sustainable agriculture and therefore present good opportunities for collaboration with conservation NGOs. For example, the World Agroforestry Centre, based in Kenya, is dedicated to generating and applying the best available knowledge to stimulate agricultural growth, raise farmers' incomes and protect the environment. The International Livestock Research Institute helps farmers sustain their livestock and increase farm productivity. Both are research centers in the Consultative Group on International Agricultural Research (CGIAR) network, and work extensively throughout eastern and southern Africa. These and many other organizations focused on agriculture and the rural poor have partnerships with other civil society groups.

7.2 National Civil Society Organizations in the Environment and Conservation Sector

A similar picture of the development of civil society organizations in the environment sector is provided by the number of initiatives and organizations registered in the African Conservation Foundation database (Figure 7.2). Again this is approximate: the data were contributed on a voluntary basis and cover a wide range from grassroots organizations to international NGOs and projects, with non-English-speaking organizations underrepresented and Saudi Arabia and Yemen excluded. It nevertheless provides an insight into the general CSO environmental activity in each country.

Figure 7.2. Number of Organizations/Initiatives in the African Conservation Foundation Database



Note: data for Sudan are for the unified Republic of Sudan before South Sudan independence (2011). No data was available on Sudan on South Sudan at the time of the Profile.

Three main groups of countries can be identified:

1. Countries with many civil society organizations and initiatives. These include Tanzania, Kenya and Uganda, and (on the basis of its relative population size and area) Rwanda.
2. Countries with moderate numbers (relative to their size and biological importance) that are insufficient to tackle the challenges at stake: Burundi, DRC, Ethiopia and Malawi.
3. Countries with very few civil society organizations and ongoing initiatives. These are countries that have faced civil unrest in the recent past or are currently experiencing unrest: Eritrea, South Sudan and Yemen.

National consultations led to the identification of more than 100 national civil society environmental organizations that are active in the hotspot, including both international organizations that have offices or are working in the region and purely national and local NGOs. Among these, 76 national civil society organizations (70 percent) working specifically on biodiversity issues were identified. More than half of them also implement activities on poverty reduction (including projects focusing on ecotourism, natural resources management). Around 30 percent of the NGOs also reported working on climate change issues, a situation that might be linked to perceptions of what could be key donor interests and does not necessarily reflect their relative competencies.

Main Activities of Civil Society Organizations in the Region

Management of Protected Areas

Although management of protected areas is the responsibility of national authorities, there has been significant support for protected area management from civil society, especially from the larger international NGOs. This sometimes reflects a historical lack of capacity (now being increasingly addressed) on the part of mandated authorities, especially in technical areas such as

biodiversity monitoring and assessment, climate change, remote sensing and ecosystem services. National capacities have also been weak in relation to the more social aspects of protected areas management, such as poverty reduction and participatory management, which have emerged as donor interests over the last few decades.

Capacity has been particularly lacking in the forestry sector, which has traditionally focused on meeting national requirements for timber and wood products, and to a lesser extent on maintaining watersheds. Governance issues have also limited donor funding for the official agencies in charge of protected areas. The most extreme cases are reported from DRC, where long-term "devolution" management agreements have been made with international NGOs for the Virunga and Garamba national parks. In other countries of the hotspot, the main contribution to protected area management has been technical and has come from international NGOs. Only in Kenya, Uganda and Tanzania have national civil society organizations played notable roles in the management of important protected areas, mainly with respect to social issues.

Livelihood and Local Development

More than 50 percent of the national NGOs consulted during this profile implement livelihood and local development activities (Table 7.2), and the same applies for most international NGOs. This is an area in which national civil society organizations have had demonstrable success in the hotspot and where they have a comparative advantage because of their relative closeness to local communities. Three examples are given in Box 7.1.

Sensitization and Media Outreach

Civil society organizations in the hotspot have been successful in a wide variety of awareness-raising activities and publications. Some outstanding publications include *Swara* (a popular wildlife magazine published by the East Africa Wildlife Society), *the Arc Journal* (published by Tanzania Forest Conservation Group) and *the Journal of East Africa Natural History* (one of Africa's oldest scientific journals, published without a break since 1911 by the East Africa Natural History Society, now Nature Kenya and Nature Uganda). Publications in other countries do not reach the quality and outreach of these three. Major projects implemented with international support do have publications, sometimes of great quality, but these tend not to be sustainable.

Internet communication varies greatly among countries in the hotspot, with Kenya in the lead, followed by Tanzania and Uganda, and then Rwanda together with Zambia. The quality of the websites for civil society organizations in the hotspot appears significantly lower in Burundi, DRC and Ethiopia. This reflects a difference in capacity among civil society organizations, but is also related to poorer Internet infrastructure.

Awareness activities are too numerous to mention but include all the standard activities (World Environment Day, etc.), with regular coverage of events in electronic and print media. The civil society organizations are often the only providers of environmental information at the local scale. Interesting initiatives have been reported using locally adapted information channels, such as participatory radio or movie projects in remote places.

In terms of international communication and media outreach, countries such as Tanzania and Kenya enjoy considerable coverage in support of their flourishing tourism industry. Similar international public outreach exists in the rift thanks to the numerous NGOs working on conservation of mountain gorillas. By contrast, NGOs in Ethiopia, Yemen and DRC (except for gorillas) are far less visible in the international communication arena.

Box 7.1. Examples of Civil Society Local Development Activities in the Hotspot

1. **Berga Floodplain (EWNHS 2001-present)**
   - Establishment of the Berga Bird Lovers Site Support Group and effective protection of the breeding areas for the white-winged flufftail.
   - Local community conservation and livelihood improvement activities.
   - Development of a participatory wetlands management plan.
   - Mobilization of resources for primary education, maternal and reproductive health, birth control and nutrition.

2. **Kikuyu Escarpment (KENVO 1995-present; Equator Prize Winner 2008)**
   - Connects local entrepreneurs with micro-credit loans.
   - Provides training in apiculture and ecotourism guiding.
   - Promotes environmental education through conservation clubs and networks in and among local schools.
   - Runs a tree-planting initiative that focuses on indigenous tree species.
   - Promotes responsible consumer behaviors in all of its training.
   - Ensures the sustainability and maximum impact of its work by facilitating community knowledge exchanges.

3. **Echuya Forest (Nature Uganda (2004-present)**
   - Facilitated access to forest products for more than 600 Batwa and 1,020 households.
   - Involved 15 primary schools and 3,000 households in environmental activities.
   - Implemented income-generating activities for more than 1,200 households.
   - Capacity to advocate for local rights, benefits and participation in natural resources management improved.
   - Some 438 soil and water conservation trenches constructed over 2 square kilometers.
   - About 700 households have planted 240,000 trees and 5,000 bamboo plants.

Advocacy and Lobbying

Recent case studies of CSO advocacy in the region provide telling illustrations of how NGO alliances can support beleaguered government agencies to maintain and perform their legal mandates to protect biodiversity and ensure that environmental safeguards are applied.[38] Although the results are often mixed, they point to an emerging role for hotspot civil society agencies in ensuring that good policies and environmental laws are implemented. Such help is most effective when coalitions are formed that address threats to and from specific sectors such as forest and energy (hydropower), as the examples from Kenya and Uganda show (Boxes 7.2, 7.3 and 7.4). The Serengeti case is also instructive as it took advantage of the legal jurisdiction of the recently established East African Community.

[38] See http://www2.eli.org/africa/advocacytools.htm.

Civil society organizations in other countries do not have as much freedom of action or capacity to mobilize quickly in the face of emergent threats. In such cases, and those in which governments are particularly committed to environmentally damaging projects (Box 7.4), international organizations have a vital role to play. This especially applies to large agricultural developments involving land leases to foreign governments.

Box 7.2 Forest Degazettement in Kenya

In February 2001, Kenya's environment minister published legal notices of the government's intention to degazette more than 167,000 acres of forest in 13 reserves (ostensibly for distribution to the landless), threatening a reduction of 10 percent of the country's total remaining forest cover. This notice was in direct conflict with the Environmental Management and Coordination Act of 1999 (EMCA), which requires an environmental impact assessment before any such major change in land use could be sanctioned. The Greenbelt Movement, led by Wangari Maathai, and a coalition of environmentally concerned citizens, residents and NGOs under the Kenya Forests Working Group (KFWG, led by Michael Gachanga of the East African Wildlife Society), exercised its right to petition against the degazettement notice within 28 days of its publication. Despite this petition being ignored and subsequent intimidation of the individuals behind it, the use of all available advocacy tools and strategies led to an injunction against the excisions. Most of the losses due to settlement were in fact a fait accompli by the time of the excision notice, particularly in the Mau Forest, which is a part of the hotspot although efforts to recover the land for forest are ongoing. While the advocacy efforts of civil society have not yet reversed these losses, they were extremely successful in halting the momentum of certain forces in government that were driving forest degazettement in Kenya.

Box 7.3. The Bujagali Hydroelectric Power Project in Uganda

The Bujagali project is a 250-megawatt power-generating facility proposed by Bujagali Energy Ltd., a company now jointly owned by affiliates of Global Power LLC and the Aga Khan Fund for Economic Development. Initially there had been an implementation agreement with AES Nile Power Ltd. (a local Ugandan company fronting for AES Energy in the United States), the Uganda Electricity Board and the Ministry of Energy. This was rejected by the attorney general, as it had a clause requiring the government to guarantee the developer's loan. At that stage, there had been neither a public tender nor any environmental impact assessment process prior to the agreement. A coalition of concerned environmentalists subsequently became involved. This included Greenwatch, the National Association of Professional Environmentalists, Uganda Wildlife Society, Advocates Coalition for Development and Environment, and the Save Bujagali Crusade, which included people who were to be displaced by the project. Their objective was not to halt the dam but to ensure that due process and the law were followed to the full extent. Their advocacy led to a World Bank inspection panel report in 2002, which highlighted various flaws in the handling of the project, including a lack of transparency and participation, and inadequate access to information on alternative sources of energy and the demand for power. The original project was then abandoned in 2003, but subsequently revived under Bujagali Energy Ltd., which has a website that includes documentation of its public consultation process.

Biodiversity Monitoring and Science

Several of the civil society organizations in the hotspot already have track records of significant achievements in the area of biodiversity monitoring and science. Most notably, from the

perspective of identifying the conservation outcomes, the BirdLife partners have assisted in identifying and publishing a series of important bird area (IBA) books for their respective countries, and have contributed to information in the comprehensive "Important Bird Areas in Africa and Associated Islands" (Fishpool and Evans 2001) published by BirdLife International. This took eight years to complete, and it was the first attempt to list all the sites in the region that are internationally recognized as the most critically important places for bird and biodiversity conservation. Within the hotspot, the Ethiopian Wildlife and Natural History Society, Nature Kenya, Nature Uganda, Wildlife Conservation Society Tanzania, Association Burundaise pour la Protection des Oiseaux and Zambian Ornithological Society have published books on the IBAs in Ethiopia, Uganda, Kenya, Tanzania, Burundi and Zambia.

Very often, nevertheless, biodiversity monitoring and conservation science activities remain in the hands of the international NGOs and associated labs and research centers from the Western Hemisphere. With the notable exception of the IBA data, most of the information during the profiling exercise has been produced in the context of internationally funded projects. Many reasons explain this situation, such as the weakness of countries' authorities and research centers, the absence or obsolescence of database and exchange platforms, and even the lack of communication tools accessible to some members of the scientific community.

Box 7.4. Highway Development in Serengeti National Park, Tanzania

Although the Serengeti is not in the hotspot, this example is relevant as it demonstrates the role that international organizations can play. In June 2010, President Jakaya Kikwete announced a plan for construction of a road through Serengeti National Park. The plan threatened one of the last great migration spectacles on the planet, involving hundreds of thousands of wildebeest, as well as the integrity of the Serengeti wilderness. It would also have established a damaging precedent for other conservation areas throughout Africa. Although a Tanzanian environmental and social impact assessment drew attention to the numerous adverse effects of this road, the Tanzanian government appeared determined to implement the project.

A coalition of international and national NGOs quickly mobilized in opposition and organized concerted pressure on the government using all possible means and arguing for a realistic alternative to the proposed route through the park. Because of the strong determination of the government to push the road through—which made the situation difficult for national civil society organizations—and in view of the trans--boundary impacts and implications for Tanzania's global image, international organizations took the lead. The plan has since been declared illegal by the East African Court of Justice (Chapter 6), following an action brought by the Africa Network for Animal Welfare (ANAW).

ANAW moved to the regional court in December 2010 to seek an interim order to stop the project on the grounds the road would harm the park's ecology. ANAW also asked the court to declare that the action was unlawful and infringed on various articles in the provisions of the East African Community Treaty. ANAW also challenged the Tanzanian government's official impact assessment. In August 2011, the judge agreed with the suit, effectively sabotaging the road plans. In a parallel development the German government has agreed to fund an alternative route.

Source: http://www.anaw.org/index.php?option=com_k2&view=item&id=13:east-africa-regional-court-approves-anaw%E2%80%99s-serengeti-road-legal-action&Itemid=1.

Civil Society Capacities

An assessment of the capacity of conservation NGOs in the entire hotspot was not possible under the present profile, but 16 NGOs completed a capacity self-assessment tool produced by CEPF.

The small size of the sample does not allow for statistical analysis, but some main gaps were clearly identified:

- Inadequate human resources, with insufficient staff to perform the tasks, insufficient experience and skills (in particular in specialties such as GIS, as well as more general aspects such as administration and accounting).
- Inadequate funding, often due to the difficulty of accessing donor funds even when they are available.
- Governance issues (transparency and insufficient oversight by, for example, a board), especially in countries that have been subject to civil strife. Several small and mid-sized NGOs are highly professional and performing, but they depend on a few individuals and are not necessarily sustainable.

The exercise also showed, as expected, a considerable difference between organizations, from a score close to 50 out of 100 for an organization in Yemen to very high scores in Kenya and Uganda. The unevenness in capacity is very real, and it arises from historical factors, major differences in available resources, different national contexts in which the civil society organizations are operating, and from selective long-term capacity building. Nature Uganda and Nature Kenya, for instance, have been supported for many years by the Royal Society for the Protection of Birds, with very positive results. Capacity building could be even more effective if carried out by organizations in the region that have a greater understanding of the local context. Meanwhile, the usefulness of the results in Table 7.3, (like those produced by applying the Management Effectiveness Tracking Tool for Protected Areas), lies in their value as baselines for monitoring civil society capacity over time.

Interactions between Civil Society and Governments

The history of relationships between civil society organizations and governments within the hotspot has been mixed, but is marked by increasing levels of co-operation and the recognition of mutual benefits, in keeping with the gradual democratization of society and its institutions. Even when relationships take on an adversarial aspect, as when conservation NGOs oppose government development plans that threaten biodiversity sites (Boxes 7.2-7.4), CSO actions are often quietly welcomed within the government agencies charged with the protection of the environment. In other cases, co-operation has been established as an explicit objective of a donor funded project: an early example (1998-2002) within the hotspot that has had a lasting legacy is described in Box 7.5.

Even when donor efforts to facilitate Government–CSO collaboration are less explicit, the involvement of government agencies in Project Steering Committees (PSCs) that oversee civil society projects has become routine. In the case of CEPF funding for the Eastern Arc and Coastal Forest Hotspot (2004-2009), a PSC was set up that involved the Vice President's Office in

Tanzania and the wildlife and forest authorities in Tanzania and Kenya. Regular meetings of the PSC brought the relevant government institutions in the two countries together in a common forum. It led to exchanges between the Forestry Society of Kenya and the Tanzania Association of Foresters, both organizations being dedicated to improving the professional capacity of foresters. The PSC also helped to resolve thorny issues in the establishment of the Derema Corridor linking important KBAs in the East Usamabaras in Tanzania. Other examples of transboundary collaboration are included in section 7.4.

Box 7.5 GEF African NGO-Government Partnerships for Sustainable Biodiversity Action

This project (1998-2002) was a collaborative effort by African BirdLife Partners working with government institutions in ten countries to conserve and manage Important Bird Areas (IBAs). Four countries within the hotspot (Ethiopia, Kenya, Uganda and Tanzania) were involved. The project set up National Liaison Committees (NLCs) comprising representatives from national governments, NGOs, UNDP and community groups in all participating countries. The NLCs functioned as channels of communication between the highest levels of national policy-making and site conservation action.

The project led to the publication of National IBA directories for Ethiopia, Kenya and four countries in southern Africa (covering six countries). At community level it led to the establishment of 42 active Site Support Groups comprising local people that actively promote the conservation and management of 'their' IBAs. Methodologies and innovative tools were developed and guidelines documented for prioritizing IBAs, monitoring IBAs, preparing National IBA Conservation Strategies and implementing site actions. Regional training workshops were organized to address Partner and project skill needs. Nationally, BirdLife Partners trained volunteers, site support groups and government personnel in ornithology, bird tour guiding, biodiversity monitoring and organizational development. Partners' capacities to raise funding and implement conservation projects were built with over $4.1 million already leveraged for site action at priority IBAs.

Source: www.birdlife.org/action/capacity/african_psba/index.html

Three countries (Tanzania, Kenya, and Uganda) have established open fora (Forest Working Groups) for CSOs, private individuals and government officers to discuss forest issues.These have proved to be invaluable in airing and resolving controversial issues and charting means of communication and collaboration.

In short, increasing recognition of the value of a collaborative approach in which civil society works in an integrated manner with government, has led to a range of examples involving diverse stakeholders. Increased collaboration would be advantageous throughout the region, as this would lead to projects and policies that support rather than impede eachother.

7.3 International Conservation NGOs in the Hotspot

Several international NGOs are active in the hotspot on conservation activities. They work most of the time with local partner NGOs or have local branches managed primarily by nationals in the countries where they are represented. An indicative list of the most important ones is provided in Table 7.2.

Table 7.2. Programs and Presence of Selected International Conservation Organizations in the Hotspot

Organizations and Programs	Presence in Hotspot Countries
The World Wildlife Fund (WWF) has offices and active programs in eight of the hotspot countries. WWF also collaborates with various national and regional partners (e.g. the International Gorilla Conservation Program IGCP in the Virungas) in the Eastern Arc Mountains, the Albertine Rift and the Congo Basin on a variety of issues including ecosystem services, REDD initiatives and landscape programs.	Uganda, Kenya, Tanzania, Zambia, Rwanda, Burundi, DRC, Malawi, Mozambique*
BirdLife International is based in Cambridge, England. It has an African Partnership Secretariat in Nairobi and national partners in 11 of the 16 Hotspot countries (all but DRC, Somalia, South Sudan, Eritrea and Mozambique). BirdLife works for birds and people, and has active programs in those 10 countries as well as in DRC, South Sudan and Eritrea (the last two through a Soaring Birds project that extends throughout the hotspot).	Saudi Arabia, Ethiopia, Uganda, Kenya, Tanzania, Rwanda, Burundi, Zambia, Malawi, Zimbabwe, Sudan.
The Wildlife Conservation Society (WCS) has major programs in collaboration with various civil society and government partners in the whole Albertine Rift, particularly the Greater Virunga Landscape; Nyungwe Park in Rwanda; Kibira Park in Burundi; Kahuzi Biega Park, Itombwe Massif and Kabobo Massif (in collaboration with several partners) in DRC, the Kidepo in Uganda, and in South Sudan.	South Sudan, Uganda, Kenya, Tanzania, DRC, Rwanda, Burundi, Zambia
The African Wildlife Foundation (AWF) works through its African Heartlands approach in the Albertine Rift, particularly in the Virungas with the IGCP and the Greater Virunga Transboundary Secretariat and across the Kenya/Tanzania border in the Kilimanjaro heartland.	Uganda, Kenya, Tanzania, DRC, Rwanda, Zambia*, Zimbabwe*, Malawi*, Mozambique*
The International Union for Conservation of Nature (IUCN) is present within the hotspot through the Program for Central and West Africa (PACO) and the Eastern and Southern Africa Regional Office (ESARO). IUCN supports networking activities and capacity building for NGOs and managers of protected areas. It develops a range of programs and research activities on interrelations between biodiversity and economics or climate change, as well as activities on specific issues such as freshwater species, wetlands or drylands management or invasive species.	South Sudan, Ethiopia, Eritrea, Uganda, Kenya, Tanzania, DRC, Rwanda, Burundi, Zambia, Malawi, Mozambique, Zimbabwe
The Frankfurt Zoological Society (FZS) works in the Bale Mountains and in the Virungas in partnership with the Ethiopian and Congolese Wildlife Authorities, and in Ngorongoro in Tanzania.	Ethiopia, Tanzania, DRC, Kenya*, Zambia*, Malawi*, Zimbabwe*
Conservation International works with regional and national partners in the Albertine Rift (on biodiversity and ecosystem monitoring) and in DRC through the U.S. AID-CARPE (Central African Regional Program for the Environment, focusing on the Congo River Basin rainforest and threatened flora and fauna), where it leads the coordination of activities in the MaikoTayna Kahuzi-Biega landscape within the hotspot.	DRC
The African Parks Network (APN) assists national wildlife authorities in the Garamba National Park in DRC and was formerly active in the Omo National Park in Ethiopia.	DRC, Rwanda*, Zambia*, Malawi*
The Royal Society for the Protection of Birds (RSPB) provides financial and capacity support to the BirdLife partners in the region.	Uganda, Tanzania, Kenya, Zimbabwe

Fauna and Flora International (FFI) works with the IGCP in the Albertine Rift, Garamba and the Kahuzi-Biega and Maiko National Parks in DRC.	Uganda, Kenya, Tanzania, DRC, Rwanda, Mozambique*
The Centre for Middle Eastern Plants, part of the **Royal Botanic Garden Edinburgh**, has worked on biodiversity research and conservation in the southwest Arabian region for more than 35 years with the Saudi Wildlife Commission, Environment Protection Authority Yemen, Agricultural Research and Extension Authority Yemen, and with various university partners.	Yemen, Saudi Arabia

* countries in which organizations currently have projects, but in areas outside of the hotspot boundaries.

7.4 Alliances and Networking Initiatives in the Hotspot

National Networks and Alliances

Thirty-eight national networks and alliances were identified during the consultations (see Table 7.3). Most of the countries have created associations or forums that include the most influential conservation NGOs, often also associating national authorities in charge of protected areas. In DRC it is interesting to note that la Coalition pour la Conservation au Congo (CoCoCongo) has no national NGOs as members—but instead has projects and donors. Also common are the community forestry networks that have been instituted in most countries where this management practice exists (Kenya, DRC, Tanzania and Uganda); these organizations support communities, share information and have an advocacy role.

The countries that demonstrate the highest degree of institutional organization and professionalism in terms of networking and building alliances are without any doubt Tanzania and Kenya (and to a lesser extent Uganda). In these countries, impressive networks gather a high number of members; they also demonstrate a high level of governance and transparency. Several have been or still are supported by the international community.

In most countries forums and networks have also been created on climate change, a phenomenon that is certainly partly donor-driven. These forums appear to be among the only networks gathering together both developmental and environmental organizations—even if sometimes subdivision into specific working groups reduces the interactions between these two groups. Only in Yemen has a network on sustainable agriculture been mentioned in which environmental NGOs appear to participate. Certainly other development networks—open to environmental organizations—do exist, but the fact that they were not identified during the consultations (although the question of networks gathering different types of organizations was explicit in the questionnaires) is an interesting demonstration of the lack of coordination and dialogue between environmental and developmental organizations in the hotspot.

Also noteworthy is that in many cases international NGOs or projects appear to be part of the national networks and alliances, at least on specific technical issues, if not for advocacy reasons.

Table 7.3. National Networks and Alliances

		# of members (if avail.)	general environment	conservation	science	community forestry	wetlands	species specif.	climate change	agriculture and dev.	others
Yemen	Yemen Society for the Protection of Wildlife			x							
	Yemen Biological Society				x						
	Environmental Protection Society		x								
	Yemen Society for Sustainable Agriculture									x	
Burundi	Forum pour le Renforcement de la Société Civile (FORSC)										x
	Plan d'action pour la gestion intégrée des ressources en eau		x							x	x
Eritrea	None										
Malawi	Wildlife and Environmental Society of Malawi		x	x							
D.R. Congo	Alliance Congolaise des Organisations de Conservation des oiseaux (ACOCO)	3						x			
	COCOCONGO (Coalition pour la Conservation au Congo)			x							
	GTCR (Groupe de Travail Climat REDD)	500							x		
	Dynamique des Groupes des Peuples Autochtones (DGPA)										x
	Union of Associations for Gorilla Conservation and Community Development in eastern DRC (UGADEC)	8						x			
	Reseau Ressources Naturelles (RRN)	300									
	RESEAU CREF	30									
	Conseil national des ONG (CNONG)										x
Rwanda	Rwanda Environmental NGOs Forum (RENGOF)		x								
Tanzania	MJUMITA	72				x					
	Tanzania Natural Resources Forum (TNRF)	150	x	x		x					
	Forum CC								x	x	
	Wildlife Management Areas Consortium			x							
Ethiopia	Ethiopian Civil Society Network on Climate Change (ECSNCC)	21							x		
	Green Forum	5	x								
	Ethiopian Wildlife Association			x							
	Biological Society of Ethiopia	700			x						
Uganda	Uganda Forest Working Group (UFWG)					x					
	Wetlands Advisory Group (WAG)			x			x				
	Uganda Network on Collaborative Forest Management Associations (UNETCOFA)					x					
	Civil Society Coalition on Oil and Gas Uganda (CSCO)										x
	Uganda Forest Governance Group (UFGG)					x					
	Uganda Nile Discourse Forum (UNDF)										x
Kenya	IBA National Liaison Committee	20		x	x			x			
	Kenya Wetlands Forum						x				
	Wildlife Conservation Working Group			x							
	Kenya Climate Change Working Group								x		
	National Alliance of Community Forest Associations					x					
Sudan*	Environmental Forum	86	x								
Mozambique	Link		x								
	Rede Environmental Mozambique (REM)		x								
	Grupo de Conservacao (Conservation Working Group)			x	x						

* Sudan: before separation of South Sudan.

Regional Networks and Other Regional Initiatives

For practical purposes, regional civil society initiatives in the region can be divided into three main groups (even if this an oversimplification and the borders among these groups are not necessarily impenetrable).

The first type consists of networks instituted under large international organizations. They work on a specific subject and provide their members with support (mostly technical, but sometimes financial), back regional or local projects implemented in collaboration with their members, ensure the use of similar methodologies for site identification or monitoring, and/or develop systems for data and sharing experience. Among these we could cite as very active in the region are BirdLife International, IUCN, TRAFFIC and the Great Ape Survival Project (GRASP).

A second type of regional network can be identified as ad hoc networks built to implement a range of activities and develop collaboration on a specific subject or a specific area (trans-boundary issues/areas in particular). The U.S. AID-funded initiative Central African Regional Program for the Environment (CARPE) provides funds to multiple stakeholders for the preservation and sustainable management of the Congo Basin forest, and its secretariat plays a vital role in the coordination of national and international organizations. In the hotspot, CARPE is active in DRC, Rwanda and Burundi. The International Gorilla Conservation Program (IGCP) is a partnership of three international NGOs working with national authorities in the trans-boundary habitat of mountain gorillas (Uganda, Rwanda and DRC). The ever-closer links among core members of IGCP and the governmental bodies and local partners make this initiative transitional with the following category of long-term, sustainable initiatives (see Box 7.5).

Box 7.5. The International Gorilla Conservation Program (IGCP)

IGCP is a joint program of the African Wildlife Foundation (AWF), Fauna & Flora International (FFI), and WWF, working with the wildlife divisions of Rwanda, Uganda and DRC through the Rwanda Development Board (RDB), the Uganda Wildlife Authority (UWA) and the Institut Congolais pour la Conservation de la Nature (ICCN). The goal of the IGCP is to ensure the conservation of mountain gorillas and their regional Afromontane forest habitat in Rwanda, Uganda and DRC. It aims to reduce the threats to mountain gorillas and their forest habitat by creating widespread support for conservation among local communities, interest groups and the general public; and to improve the protection of gorillas and their habitat by encouraging the relevant authorities to adopt a consistent, collaborative approach to conservation policy and legislation throughout the region.

A tripartite declaration was signed by ministers from the three countries, coordinating joint activities such as patrols and training, and enforcing laws against animal trafficking. This declaration has provided the political support to strengthen existing activities and has opened a door for future conservation efforts.

The third type of regional network is a long-term, sustainable initiative mainly driven by national organizations. These initiatives can take various legal forms. Their main characteristic is to be less donor-driven, even if they often get initial support from a donor and may still rely heavily on international funding. Interestingly, these initiatives coming from the Congo Basin or the Horn of Africa tend to have tighter links with governmental authorities—this could be considered as a

reflection of a weaker civil society as well as a more prominent role of the nation state in these countries. The most important of such regional initiatives or networks are described below:

The Albertine Rift Conservation Society (ARCOS)
ARCOS was established to champion collaborative conservation and sustainable development in the Albertine Rift region through biodiversity monitoring, information exchange, networking, capacity building, conservation action and policy work. It started at a workshop in 2001 organized by WCS with funding from the MacArthur Foundation. A core group was formed, with ARCOS as the lead and most of the key players in the Albertine Rift involved. This led to several meetings, culminating in a workshop in 2004 that established a strategic framework for the conservation of the region. This meeting was attended by the protected area authorities and government representatives from the five countries in the Albertine Rift (Burundi, Rwanda, DRC, Tanzania and Uganda). The final framework document covers 26 years (2004-2030).

The ARCOS experience provides a model for regional networking, involving almost all the key players in the Albertine Rift and covering in its entirety one of the four subregions recognized by CEPF. The MacArthur Foundation now plans to follow a similar model to develop a conservation and sustainable development strategy (CSD) for the Great Lakes Region, which has considerable overlap with the Eastern Afromontane Hotspot.

East African Wildlife Society (EAWLS)
EAWLS came into being in 1961 through a merger of the Kenyan and Tanzanian wildlife societies (both formed in 1956) and wildlife enthusiasts from Uganda. EAWLS was established as a membership organization. It has been at the forefront of efforts to protect endangered, rare or threatened species and habitats in East Africa. The society realizes the need for stakeholders in tourism and conservation to come together, providing a forum for the regional community to understand and review how to achieve sustainable environmental management and community benefits through tourism. The vision of such a forum would be to come up with policy and best practice recommendations that would support both these sectors. EAWLS is a regional NGO whose members may be individuals, organizations or businesses. Mostly active in Kenya, Uganda and Tanzania, EAWLS also edits *Swara* magazine.

Eastern Africa Environmental Network (EAEN)
EAEN was founded in September 1990 during a regional workshop in Nairobi, Kenya, held by the Eastern Africa Regional Committee of the IUCN Commission on Education and Communication. The decision was taken to form EAEN as a regional network mechanism that would promote collaboration and dialogue among individuals and their organizations; enhance sharing of information; and facilitate exchange of experiences, best practice and tools relevant in promoting sound environmental management of natural resources and sustainable development in eastern Africa.

Horn of Africa Regional Environment Network (HoA-REN)
HoA-REN is a network of members and partners consisting of environmental community-based organizations, NGOs and higher learning institutes from six countries in the Horn of Africa. Partners in the network consist mainly of nonindigenous international organizations working on environmental issues in the region. The network promotes intensive cooperation among its

members and facilitates experience exchange among the various countries in the Horn. In addition HoA-REN also partners with government bodies, businesses and international organizations to achieve an optimal impact on the ground. The network has three environmental management themes: lakes and wetlands; parks and buffer zones; and highlands and dry lowlands.

Réseau des Aires Protégées d'Afrique Centrale (RAPAC)
RAPAC is a nonprofit organization whose members are governmental and nongovernmental actors working for the preservation of protected areas in Central Africa. Its aim is to harmonize conservation approaches, facilitate exchange of experience, improve coordination and support its members (technically and, to some extent, financially, playing the role of a hub for some international funding). In the hotspot, currently only protected areas in DRC are involved in this network.

Congo Basin Forest Partnership (CBFP)
CBFP consists of governments of the Congo Basin countries, representatives of the donor community, conservation NGOs, forest research centers and private sector associations. Launched in Johannesburg in 2002, CBFP is the regional body in charge of forest and environmental policy, coordination and harmonization, with the objective to promote the conservation and sustainable management of the Congo Basin's forest ecosystems. In the hotspot, Rwanda, Burundi and DRC are members of this initiative.

7.5 Conclusions

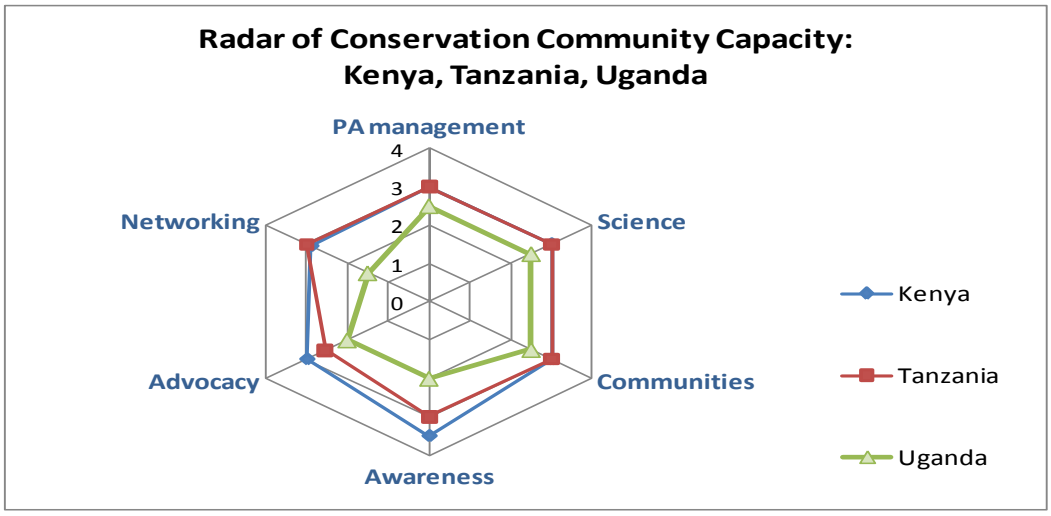
A Region Where Civil Society Plays a Prominent Role

The Eastern Afromontane Hotspot hosts an incredibly active civil society, which can be considered a reflection of the development aid engagement in favor of nonstate actors, the long-time presence of international NGOs in Africa (which has also led to development of local civil society), and a wide range of indigenous factors including political will and recognition of the role civil society can play. The largest area of activity for NGOs is by far poverty reduction and rural development, but there is also considerable involvement of civil society in environmental and conservation issues. The hotspot presents many civil society organizations of all sizes and capacities that are massively supported by external development aid: environmental civil society organizations, including the international ones, have received more than $187 million for work in the hotspot since 2007 (Chapter 10).

A Varying Situation from One Country to Another for Conservation Communities

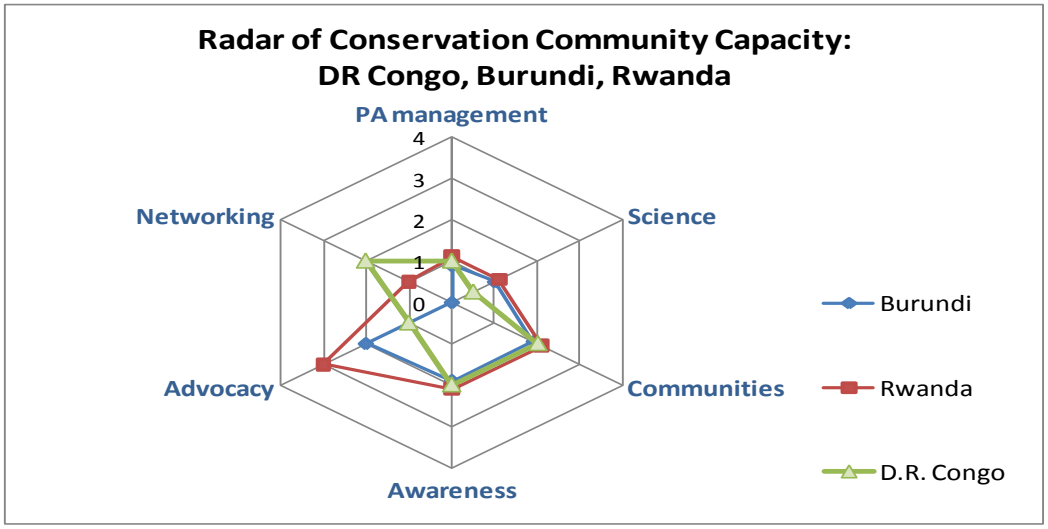
On top of the list, Tanzania and Kenya present strong local civil societies backed up by international NGOs. Civil society in both countries is very active and has relatively strong capacities in critical themes such as science, monitoring, management, advocacy and raising awareness. It works frequently with government bodies and agencies, for example for protected areas management. Yet civil society also maintains its watchdog role in the face of major threats. It benefits from regional networks and collaborations that expand into Uganda and, less often, into other countries.

Figure 7.3. Evaluation of Civil Society Activity in Kenya, Tanzania and Uganda



Uganda appears in a transitional situation that tends to be closer and closer to its two East African neighbors; it is possible that the delay in developing its civil society relates to the difficult political situation in the 1990s and early 2000s. The number of NGOs and initiatives is lower, as well as their capacities, but they are actively working in most of the conservation areas.

Figure 7.4. Evaluation of Civil Society Activity in DRC, Burundi and Rwanda



It benefits from the collaboration with Tanzania and Kenya, but also from the Albertine Rift neighbors, in particular in the mountain gorilla habitat, where there is a high presence of international partners.

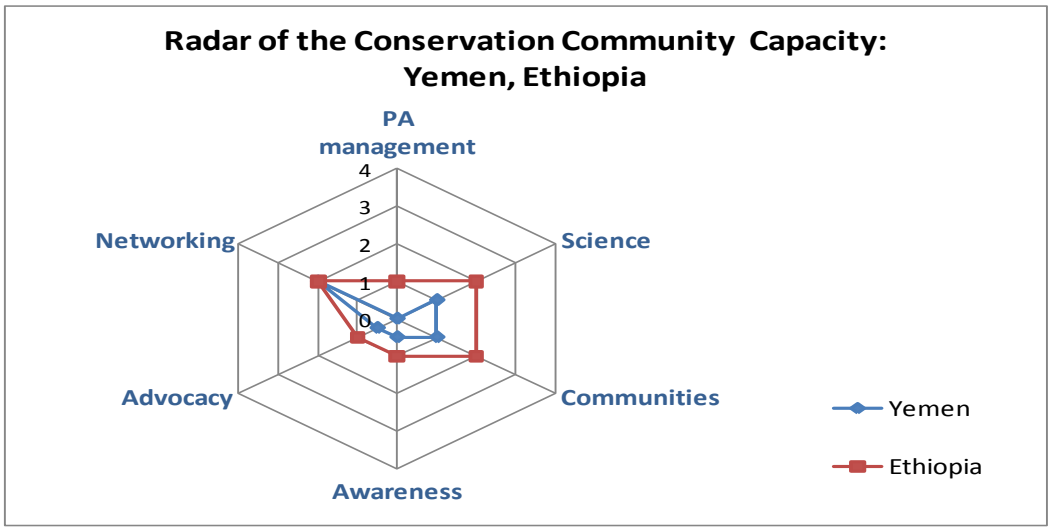
Rwanda also benefits from the presence of international NGOs for the conservation of its remaining natural habitats. Local civil society is less strong in terms of conservation, which is

more related to the limited areas where strict conservation activities can take place in a country in full agricultural development. It is therefore not a surprise to see that Rwanda has a very active civil society in rural development that supports reforestation or soil conservation activities that are of high environmental value.

The conservation community in DRC and Burundi are also relatively weak. They are less active in terms of science and data production, as well as in terms of advocacy and raising awareness. Most of the NGOs are implementing community-based actions, sometimes with great local success. However, most of the conservation activities still remain with a few international NGOs, whose activities focus on a limited number of key protected areas, particularly in DRC. The political situation, and for DRC the remoteness of these local NGOs from the capital city, implies a difficult role in advocacy and participation in making decisions. A similar situation is also found in Yemen, with many "sleeping" local NGOs whose capacity (including financial) prevents them from having a real impact locally and from playing an efficient advocacy role (all the more so in a difficult political situation).

Ethiopia is in a different situation, because the legal framework for civil society appears to be constraining. There, as in DRC, international donors predominantly support most of the conservation activities, with international NGOs being the main channel. However, there is high capacity for conservation in Ethiopia, as exemplified by the publications from the Ethiopian Wildlife and Natural History Society and by activities in the Bale Mountain area and other sites.

Figure 7.5. Evaluation of Civil Society in Yemen and Ethiopia



The link with rural development organizations, which are powerful in Ethiopia, has not yet been entirely built. The advocacy role of national NGOs exists but is hard to implement given the difficult governance context of the country.

Finally, civil society in Eritrea and South Sudan appears to be at a very low level of development, on all criteria.

The Important Role of International NGOs

The region is characterized by the importance of conservation activities implemented by international NGOs, and their contribution to biodiversity conservation in the hotspot is outstanding. Where such NGOs are absent, such as in Eritrea, Yemen and some other parts of the hotspot, conservation activities tend to be low, if not absent, with the exception of Saudi Arabia, where governmental bodies are efficient. International NGOs also play a crucial role in organizing and professionalizing national NGOs—as exemplified by the actions of the BirdLife network or WCS activities.

Regional Cooperation as an Asset in the Region

Regional cooperation is well developed in the hotspot, but limited to a few strong cooperation axes (such as Kenya-Tanzania-Uganda and Rwanda-DRC-Uganda). The great gap in terms of civil society development in this context could be considered as an opportunity to develop even more regional cooperation and to strengthen support from highly capacitated civil society to less developed organizations across borders. Mentoring and local-to-local capacity-building initiatives hold a high potential for developing the conservation community within the hotspot.

Collaboration with Development Community Still Weak

An obvious conclusion of the consultation process was the low level of collaboration between development and conservation NGOs in the hotspot. If examples exist on a local scale, these are more the exception than the rule, and generally most of the national—but also international—conservation civil society organizations appear not to have developed many relationships with development NGOs, which is surprising as most NGOs are implementing livelihood activities locally. This provides opportunities for strengthening conservation civil society on the ground locally as well as nationally considering the widespread presence of development actors in the region and the political impetus of poverty reduction in national strategies.

8. THREATS TO BIODIVERSITY WITHIN THE EASTERN AFROMONTANE HOTSPOT

This chapter presents an overview of the main threats to biodiversity and natural habitats in the hotspot and is closely linked to Chapter 5 (socioeconomic profile). Humans have influenced terrestrial biodiversity over much of the Eastern Afromontane Hotspot for millennia. The impact of ancient humans is poorly understood, but significant negative impacts on the environment followed European colonization in eastern and southern Africa in the 18th and 19th centuries (Packenham 1991), and those impacts have escalated in the last 50 years due to the rapidly increasing populations and economic development.

Current information on threats to biodiversity and their causes in the hotspot is scattered, and there are no overviews for the region. Some subregional reviews exist. Albertine Rift and Eastern Arc Forests, and threats have been analyzed as part of specific projects or programs. For example, threats have been examined in the Eastern Arc strategy development process (2004-2009), the WWF Strategic Framework (2004-2014) for the Albertine Rift Montane Forests Ecoregion, and the MacArthur Foundation Strategy for the Albertine Rift.[39] There are also programs and documents from ARCOS and from GEF project development in the hotspot.[40] In addition, there are national overviews of threats in National Biodiversity Strategies and Action Plans, and some countries have environmental profiles compiled by development agencies or international institutions (such as EU and World Bank environmental profiles), but these vary considerably in the quality of information and analysis; many are more than five years old and outdated.

All documents were reviewed as part of the hotspot profiling process, and key threats and their root causes, as well as barriers to effective conservation within the hotspot boundary were identified through the various workshops held as part of the process. Classification of threats followed the IUCN standardized threat categories that are used for the Red List to maintain consistency among countries and allow regional analysis.[41] These threats were ranked by national workshop participants according to their importance in each country and within the hotspot boundary, and additionally reviewed by the two regional workshops. The main biodiversity threats identified were: habitat destruction and fragmentation due to agricultural development; overexploitation of biological resources (particularly logging and nontimber forest products); and various forms of human intrusion and disturbance and other modifications to natural systems (such as fire and construction of dams and roads). Invasive species and climate change are viewed as increasingly significant threats, and so are urban spread, mining and other industrial and transport developments (Table 8.1).

[39] See www.macfound.org

[40] See www.arcosnetwork.org.

[41] See http://www.iucnredlist.org/technical-documents/classification-schemes/threats-classification-scheme-ver3.

Table 8.1. Prioritized Threats in the Eastern Afromontane Hotspot

IUCN Threat Category	Country and Threat Ranking by Workshop Participants												Rank Totals	Hotspot Ranking
	BDI	DRC	ETH	KEN	MAL	MOZ	RWA	SAU	TAN	UGA	YEM	ZIM		
Agriculture and Aquaculture	3	3	3	3	3	3	3	2	3	3	3	3	35	**1**
Biological Resource Use	3	2	3	2	1	3	3	3	3	3	3	3	32	**2**
Human Intrusions and Disturbance	2	3	3	3	3	2	2	3	3	1	3	2	30	**3**
Natural System Modifications (e.g., Dams, Fires)	3	3	3	3	3	3	1	1	3	3	1	2	29	**4**
Invasive and Other Problematic Species and Genes	2	2	3	3	2	2	1	2	2	2	2	3	26	**5**
Climate Change and Severe Weather	2	1	3	2	1	2	2	2	3	2	3	2	25	**6**
Energy Production and Mining	2	3	2	2	2	1	2	1	3	2	3	1	24	**7**
Residential and Commercial Development	1	2	2	2	2	1	2	3	1	2	3	2	23	**8**
Transportation and Service Corridors	2	2	2	1	2	2	2	3	1	1	3	1	22	**9**
Pollution	1	1	1	2	1	1	2	1	1	2	1	1	15	**10**
Geological Events	1	2	1	1	1	1	1	1	1	1	1	1	13	**11**

Coding: 3 (red) = severe; 2 (orange) = moderate; 1 (green) = minor.

8.1 Key Threats

Expansion and Intensification of Agriculture and Forestry; Development of Aquaculture

Expansion of agriculture has been the major driver of habitat loss, fragmentation and degradation in the hotspot, which is a reflection of the importance of this activity as an economic sector and source of food and livelihoods. Much of the original forest and grassland areas within the hotspot, especially at lower elevations, have been converted to agricultural land for food production to feed the large and increasing number of people.

Clearance for Subsistence Agriculture

Most land clearance for agriculture has been for small-scale subsistence farming. Cleared forest usually has good growing potential, but after a few years the soils become exhausted and yields drop to those of other nearby nonforest agricultural lands; farmers may then search for new forests to clear. Land shortages mean that the traditional shifting cultivation cycle cannot be maintained and many areas in the hotspot are now under permanent agriculture, with the only unfarmed land remaining in protected areas.

The Ethiopian Highlands have experienced considerable conversion of natural habitat to agriculture. During the last 70 years, the population of Ethiopia has increased more than tenfold (from 7 million in 1940 to 85 million in 2010), and around 80 percent live in the highlands, putting land at a premium for both agriculture and livestock husbandry. Much of the original Afromontane forest vegetation now exists only as small remnants, largely restricted to churchyards and other sacred groves in a matrix of cropland and semiarid degraded savanna, and to the steep escarpments of the Rift Valley, river gorges and the cold Afro-alpine plateaus (areas that are extreme and defy human use).

Clearance for subsistence agriculture has been exacerbated by influxes of refugees desperate for food and shelter following conflicts in the region. For example, in May and June 2004, there was a large coordinated influx of nonlocal people into the Virunga Park region on the border between Rwanda and DRC, and an estimated 15 square kilometers of land at the western edge of the park was deforested (UNEP 2008).[42] Similar situations have occurred in other hotspot regions, such as in Yemen with the influx of Yemenis after the first Gulf War and, more recently, the influx of Somali refugees. Both have greatly increased land-use pressures in an already intensively used country.

Areas of natural montane grassland habitat are also increasingly being converted to farmland for temperate crops (such as potatoes in the Udzungwa Mountains and farther south in the Kitulo Plateau, Burgess *et al.* 2004b). Almost all forest and montane grassland areas around Mount Kenya National Park have been converted to agricultural or other human use (Gathaara 1999). In Mozambique, there is significant loss of forest to subsistence agriculture on Mount Gorongosa, clearance of forest for potato cultivation on Mount Namuli, and increasing potato and wheat cultivation in the broader Chimanimani (Tsetserra) area (Beilfuss *et al.* 2005; Mozambique Workshop Report 2011).

Threats from Commercial, Large-Scale Agriculture

Large-scale, commercial agriculture in the hotspot developed during the colonial period with a focus on tea and coffee plantations and caused the clearance of large areas of natural habitat. Despite the lack of available land, large commercial ventures continue to be planned and threaten the remaining patches of natural habitats in areas such as the large farms along the Awash Valley, Ethiopia. In the Yemeni highlands, agricultural production has changed greatly due to the expansion of commercial khat plantations that have often replaced other crops such as coffee.

[42] This includes the Mgahinga National Park in Uganda, Volcans National Park in Rwanda and the Mikeno (gorilla) sector of Virunga National Park in DRC.

This has had a significant impact on biodiversity and agro-biodiversity due to the loss of shade trees and associated species.

A recent development is the purchase or lease of large areas of land within the hotspot countries for production of agricultural commodities by foreign-owned companies, often on the most fertile land or on land with high biodiversity or social and cultural value that is then cleared. There are several high-profile examples just outside the hotspot area, such as in the Gambella and Awassa regions of Ethiopia, and there are concerns that such schemes could spread.[43] A special target of these investments has been the development of large biofuel plantations.[44] Growing demand for biofuels is driven by high global oil prices, energy security concerns, global climate change and a rationale that biofuels can offer a new stream of revenue for rural communities, particularly on unproductive, marginal lands. Investments have already occurred in Uganda, Kenya, Tanzania, Mozambique and Ethiopia, and there are proposals for development in Rwanda. Common biofuel crops being promoted in the region are *Jatropha curcas*, sugar cane, oil palm and maize (Sulle and Nelson 2009; Vermeulen *et al.* 2009; Nhantumbo and Salomão 2010). While most biofuel plantations have been established in lowland and coastal areas in East Africa, like other lowland agriculture, these rely on a regular water supply from mountain catchments and are thus dependent on the conservation of the hotspot areas. Interest is increasing, and companies are proposing biofuel projects involving investments over the next 10 to 20 years.

There is also concern that the UN's carbon offset Clean Development Mechanism (CDM) could lead to a land grab for industrial biofuels in Africa (Africa Biodiversity Network 2011).[45]

There are some places where human agricultural activity helps maintain the habitat for plant species in mountainous areas of the hotspot. For example, in southwest Arabia (cultivated for at least 3,000 to 4,000 years, much of the natural remaining vegetation in upland areas has been affected by human agricultural activities.[46] But some activities help maintain habitat for montane plant species and even increase diversity of some plant taxa, such as succulent stapeliads. Terracing, for instance, provides a rich habitat (terrace walls and field shade trees), but if this system is not maintained, the field surface becomes impermeable and rainfall runs off rapidly, leading to erosion and sedimentation down slopes. Consequently, maintaining terrace systems can be important for conservation of biodiversity in the highlands of the Arabian Peninsula.

Intensification of Pastoralism

Overgrazing can lead to decreased soil cover, increased erosion, decreased quality and productivity of range resources, reduction or elimination of the natural regeneration of woody

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43 See www.solidaritymovement.org/110216EnvironmentalImpactWarningsIgnored.php and www.guardian.co.uk/environment/2010/mar/07/food-water-africa-land-grab.

44 Biofuels are broadly defined as liquid, solid or gaseous fuels that are predominantly or exclusively produced from biomass. The main types of biofuels include biodiesel ethanol, or purified biogas derived from crops, plant residues or wastes. All of these can be used as a substitute or supplement for the traditional fossil fuels used for transportation, domestic and industrial uses.

45 See www.gaiafoundation.org/content/africa percentE2 percent80 percent99s-pollution-and-land-grab-threat-un-carbon-market and http://onthecommons.org/neo-colonial-land-grab-africa.

46 See http://oi.uchicago.edu/research/pubs/ar/00-01/yemen.html.

and preferred forage species, encroachment of bush and loss of biodiversity. Overgrazing by livestock is a significant local problem in the Ethiopian Highlands, where both forests and grasslands within the hotspot boundary have been degraded through overstocking. This includes the higher Ethiopian Montane Grasslands Ecoregion (above 3,000 meters). Even protected areas have been subject to serious overgrazing (often associated with settlements in parks), such as Abijata-Shalla, Awash, Bale Mountains, Mago, Nechisar, Omo, Senkelle, Siemen Mountains and Yangudi-Rassa (Government of the Federal Republic of Ethiopia 2005). Overgrazing in Ethiopia has often resulted from the breakdown of traditional pastoral/range management systems, unclear land tenure and de facto open access to rangelands in some places. Livestock grazing is also a problem in some other areas of the hotspot, including the North Pare Mountains and the highlands of Kenya (Aberdares and Kinangop), but not to the same extent as in the Ethiopian Highlands.

Overgrazing also occurs in parts of the Arabian Peninsula. In the Saudi Arabian Millennium Ecosystem Assessment for Asir National Park (2010), overgrazing is listed as one of the principal threats, because the traditional grazing system has been replaced by an "open" grazing system. Overgrazing of rangelands and the loss of sound rangeland management practices has also occurred in Yemen and is considered a key biodiversity problem. However, grazing has played a large role in the development of upland Yemeni ecosystems; properly managed grazing has helped maintain species richness and is associated with endemism in certain plant taxa such as stapeliads, aloes, *Caralluma* spp. and *Cichorium bottae* (M. Hall and T. Miller *in litt.*). The maintenance (and adaptation) of traditional agricultural and grazing practices should represent a major focus for biodiversity conservation in Yemen (Yemen CBD 2009).

Threat from Fire

Another threat in the hotspot, particularly associated with agriculture, is fire.[47] Farmers use fire to clear fields prior to planting and, given that most of the land outside protected areas is under agricultural use, fires pose a significant threat.[48] Where population densities are high, vegetation from the fields to be farmed that season is cleared into piles and burned on the site. These fires generally do not spread into forest margins or montane grasslands, although slow-growing species at the edge of the forests are thought to be disappearing and gradually replaced by pioneer species due to fire (UNEP 2006). In areas of lower population density, the incidence of fires is greater and they more commonly get out of hand, as there are fewer available people to monitor and control them (Burgess *et al.* 2005). Fires are also started within forest and woodland habitat to clear areas for cultivation (slash and burn) and to promote new growth; these often get out of control and burn large areas. Regeneration of some slow-growing tree species, with high value for timber, might be impaired by human-enhanced fire regimes (UNEP 2004), and forests may gradually be replaced by savanna. Wild honey harvesters may also start forest fires when they smoke bees to collect the honey.[49] At higher altitudes, increased rates of human-caused fire in the heathland/moorland zones are believed to have depressed the upper limit of forest and replaced it with a fire-maintained border.

[47] Human activities, particularly slash-and-burn agriculture, are suspected to be responsible for 90 percent of all the fires (Saket 2001).

[48] It is also used as a hunting technique in some regions; poachers will burn bush to track animals more easily

[49] There have also been reports of fires started deliberately for political reasons, e.g. in Udzungwa Mountains National Park in 2000 during the election (Burgess *et al.* 2005).

Expansion of Forestry

(For data and references, see Appendix 9.)

Large areas of commercial softwood plantations (such as *Pinus*, *Cupressus* and *Eucalyptus*) have been established in areas of natural habitat in the hotspot since colonial times; most are now operated by the private sector for timber. For example, grassland areas have been lost to exotic plantations on the slopes of Mount Kenya, within the Eastern Arc (Burgess *et al.* 2005) and in the montane grasslands of Malawi (Dowsett-Lemaire 1989). The proportion of forest area that is planted is small in most countries, apart from Burundi and Rwanda (plantations 40 percent and 86 percent respectively of the forest area). It increased or remained stable in all countries (except Kenya) between 1990 and 2010, but large-scale commercial forestry is not currently a major activity within most of the hotspot.

A number of reforestation developments propose extensive plantations under the UN's CDM in Kenya, Uganda, Tanzania, DRC and Mozambique.[50] Regenerating woodland is being replaced by plantations of exotics in the area around Mount Gorongosa and Mount Namuli (Mozambique Workshop Report 2011), and montane grasslands in Zimbabwe are being planted with exotic trees (Zimbabwe Workshop Report 2011). These schemes could dramatically increase the attractiveness of plantation forestry, as governments and companies look to gain tradable carbon credits. But industrial monoculture tree plantations do not resemble natural, biodiverse forests and can have significant adverse social side effects (Africa Biodiversity Network 2011). There are also concerns in Yemen about indiscriminate attempts at "greening" through use of plantations, which poses a substantial risk to semi-deciduous and deciduous montane woodlands in the botanically important Udayn area (Taiz Province). For instance, interplanting with *Eucalyptus* species to improve forest cover can reduce water availability, increase fire frequency and have negative impacts on regeneration of native flora (M. Hall and T. Miller *in litt.*).

Small-scale plantations are less problematic and can be important sources of timber and fuel wood for local people. They can reduce pressure on natural forests and help in efforts at reforestation (such as in the Albertine Rift and combating land degradation).[51]

Threats from Fisheries and Aquaculture

There are important fisheries in the Rift Valley lakes, including Lakes Tanganyika, Malawi, Kivu, Edward and Albert. Overfishing is believed to pose a threat to fish stocks at all these lakes, and there are problems with pollution from raw sewage. In Lake Tanganyika, commercial fishing began in the mid-1950s and has had an extremely heavy impact on the pelagic fish species; in 1995 the total catch was around 180,000 tons. Former industrial fisheries, which boomed in the

[50] For example, Green Resources (one of Africa's leading forestation companies, with plantation, carbon offset, forest products and renewable energy interests) has 20,000 hectares of forest under management with 300,000 hectares of more land for future planting and conservation. In November 2008 the company applied to register a carbon offset "reforestation" (tree plantation) project at Idete in southern Tanzania under the CDM, aiming to obtain carbon credits to sell to the government of Norway. The project involves replacing nearly 7,000 hectares of natural grassland with alien pine and eucalyptus tree monocultures. See www.greenresources.no/.

[51] In 1990, there were fewer than 1,000 hectares of planted forest in Burundi; now it is around 69,000 hectares. Rwanda increased its area of plantations from 248,000 hectares to 373,000 hectares over the same time, a 50.4 percent increase in 20 years (FAO 2010; Plumptre *et al* 2004).

1980s, have subsequently collapsed.[52] Part of this may be due to warming of the lake's waters over the past 90 years, which has made it less productive and poses a serious threat to fisheries (Tierney *et al.* 2010). Pollution (for example waste discharge from the city of Bujumbura), overfishing and deforestation in the region that has accelerated siltation, as well as the use of unauthorized fishing equipment, have all led to smaller catches and endangered local fish species. In addition, the introduction of non-native fish species (lake sardine or *Stolothrissa tanganyicae*) has led to the loss of the main plankton-grazing shrimp at Lake Kivu (Seyler *et al.* 2010). Overfishing has not only led to a decline in overall catches in many lakes, but has also contributed to changes in overall species composition with species such as chambo (*Oreochromis* spp.) in Lake Malawi and *Lates* species in Lake Tanganyika undergoing significant declines, while others, such as the lake sardine in Lake Tanganyika, increased in abundance . Overall this has led to less stable fisheries based on a lower diversity of species.

Alien invasive species pose a major threat to many freshwater species across Africa (Darwall *et al.* 2011). There are a variety of routes through which invasive species have entered freshwater habitats in the region, of which intentional introductions for fishery enhancement and escapes from aquaculture are the most important. The Nile tilapia (*Oreochromis niloticus*) is one of the most commonly introduced fish for aquaculture, being highly productive and resilient. Once it escapes, or is introduced, into freshwater systems outside its native range, it is capable of causing serious damage to populations of essential aquatic plants, native fish species and a range of freshwater invertebrates. The best-known example of the impact of the Nile tilapia comes from Lake Victoria, where the two indigenous tilapia species, previously the basis of a major fishery, appear to have been outcompeted by the Nile tilapia following its introduction in the 1950s-1960s, and their fisheries subsequently collapsed. Another example of an introduced species of major concern is the freshwater crayfish, which has been introduced to East Africa over the past several decades and have since escaped from aquaculture facilities. They are capable of rapid overland dispersal, and once they invade freshwater systems they present a significant threat to other freshwater species including native fishes. Their predatory behavior and ability to devour local plant cover leads to significant ecological changes within lake systems with consequent impacts on local fisheries. For example, the Louisiana crayfish (*Procambarus clarkia*), introduced into Lake Naivasha in 1970, has contributed to major ecological changes in the lake including a decline in the native fishery (Clearwater *et al.* 2008). The development and implementation of a workable policy for the control of alien invasive species, in particular those escaping from aquaculture facilities, is a major priority for the region.

Overuse of Biological Resources

People living in and adjacent to the hotspot rely on many forest and grassland resources for subsistence and for commercial gain. Particularly important is the use of timber for construction, furniture and firewood, and charcoal for cooking and heating. Forest areas are also important for hunting, as a source of medicinal plants, rope, bean stakes, fruit, honey and other nontimber forest products, and as a place for traditional ceremonies and burials (Burgess *et al.* 2005). Logging and wood harvesting are considered major problems in all the hotspot countries except

[52] C. Magnet, J.E. Reynolds and H. Bru, *Fishcode Management: Lake Tanganyika Regional Fisheries Programme (TREFIP)* - UN Food and Agriculture Organization, July 2000, ftp://ftp.fao.org/docrep/fao/006/x8507e/X8507e00.pdf.

Burundi. Even in countries that had little forest originally such as Yemen and Saudi Arabia, surviving areas are being overharvested.

Timber Extraction

It is likely that all major natural forest areas of the hotspot have been logged for timber at some point. In some countries, such as DRC, there are still substantial timber resources, but much of the forest area within other hotspot countries has been lost (see Appendix 9).

Legal commercial timber extraction within forestry concessions occurs in some forest areas (mostly lowland), but much of the current logging within the hotspot is believed to be illegal; it is also unsustainable and poses a threat to forest biodiversity. Details of the illegal timber trade are not available as it is secretive, often controlled by powerful elites, and poorly studied. For instance, in DRC, 500,000 cubic meters of timber are officially harvested each year, but it is estimated that unofficial logging more than doubles that total and much is carried out under dubious licensing arrangements (see Box 8.1).

Logging in the hotspot tends to be extensive and selective, focused on a few high-value species. In DRC a dozen or so key species make up approximately 90 percent of the production (Debroux *et al.* 2007). Rates of extraction are poorly documented but high-value species known to have been considerably reduced in population as a result of logging include *Khaya anthotheca*, *Milicia*

Box 8.1. Timber Extraction in the DRC

DRC contains about 145 million hectares of natural forests: 10 percent of the world's tropical forests and about half of Africa's rain forests. The conflict that began in 1990 saw much of the timber industry disrupted, but the companies have since returned and illegal logging is a significant concern in the country, including in the east, within the hotspot boundary. FAO estimates that from 1990 to 2010, forest cover in DRC fell by nearly 4 percent. Many logging companies obtained contracts during the war or in the period of the subsequent interim government, which was plagued by corruption. By the time the war ended, more than 43 million hectares of land (twice the area of the UK) was under 285 logging contracts. A recent government working group has found that only 29 out of 156 of these deals are operating to minimum standards (few were awarded transparently or competitively, local and indigenous people were neither consulted about nor expected to receive benefits and there are allegations of tax evasion).

Around 500,000 cubic meters of timber are officially harvested each year; however, the FAO estimates that unofficial logging more than doubles that total. In some locations, logging permits, mining concessions, national parks, and farmland occupy the same forest space, which spurs conflict and mismanagement. Industrial timber exports from DRC are modest, less than 15 percent the exports of Gabon or Cameroon, which have only a fraction of DRC's forest resources. Because of high costs (transport and "externalities" such as bribes) nearly all of the concessions under Fédération des Industries du Bois (FIB) are only cutting high-value species at a rate of about 1 to 2 cubic meters per hectare, or less than one tree per hectare. The impact from industrial logging appears minimal but the same cannot be said for artisanal logging which supplies the majority of local and regional markets (many artisanal operations are in fact prefinanced by industrial concessions). The World Resources Institute found artisanal logging for local furniture-making and construction to consume three times more timber than industrial logging for export in 1998; this situation is not believed to have improved.

Sources: FAO, 2010; Seyler *et al.* 2010; Wolfire *et al.* 1998; www.illegal-logging.info/approach.php?a_id=70

excelsa, Podocarpus and *Ocotea usambarensis.* Other heavily logged species include *Beilschmedia kweo, Olea africana, Prunus africana, Newtonia, Albizia* and *Juniperus procera*. Most of these species (with the exception of *O. usambaraensis*) are widespread.

In the Southern Montane Forests in Malawi, the Endangered Mulanje cedar (*Widdringtonia whytei*) is threatened by logging on Mount Mulanje (Bayliss *et al.*2007). Many species have been logged for more than a century, and some timber trees are now commercially extinct in parts of the region. Reserves with unsustainable levels of logging include the Chome proposed nature reserve in the South Pare Mountains of the Eastern Arc. The threat from logging can be compounded by people using logging roads to access new land for shifting agriculture. But this is more of a problem in lowland areas; most mountain forests are within reserves and the slopes are too steep for agriculture (Seyler *et al.* 2010).

Extracting too much fuelwood from forests has led to loss and degradation of forest areas, particularly around urban areas, and is probably a threat to some endemic trees and shrubs within the hotspot, although examples are lacking. Collecting fuelwood is mostly illegal, poorly documented and difficult to regulate as local villagers mainly undertake it. Volumes of fuelwood extracted can be considerable and have increased in most hotspot countries in recent years (Table 8.2, Figure 8.1). This is due to the rising price of other energy sources (particularly imported oil), population growth and other cultural reasons. In Yemen, for example, a substantial driver of the demand for fuelwood is its use in traditional bread ovens. In the highlands, higher altitude *Acacia* species, such as *A. etbaica* and *A. origena,* provide the bulk of the fuelwood.

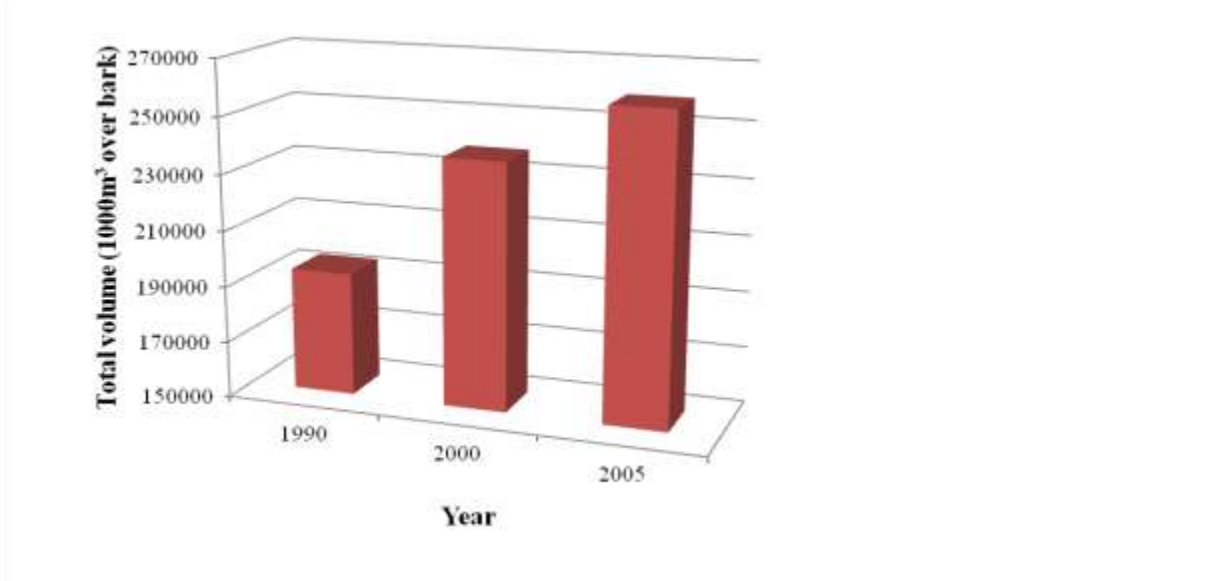
Charcoal production tends to have high environmental impacts, consuming huge areas of woody vegetation annually in some areas. For example, it is estimated that at least 3 million to 4 million cubic meters of wood is cut per annum to supply residents of the city of Dar es Salaam in Tanzania (Malimbwi *et al.* 2007), with at least some of this coming from lower parts of the hotspot (Kitulang'halo Reserve near Morogoro). In DRC, charcoal is now transported 300 kilometers to 400 kilometers to supply Kinshasa (Seyler *et al.* 2010). In a Ugandan forest in the Albertine Rift, charcoal producers had the most direct negative impact of five user groups extracting natural products from the forested landscape around Kibale National Park, whereas local firewood use for cooking was probably sustainable (Naughton-Treves *et al.* 2006).

Table 8.2 Trends in Removal of Fuelwood 1990-2005

Country	Fuelwood			
	Total volume (1,000 m^3 over bark)*			Percent obtained from forest (2005)
	1990	2000	2005	
Burundi	6,663	7,845	9,815	100
DRC	51,451	74,592	81,580	
Eritrea	-	2,549	1,475	100
Ethiopia	-	100,376	108,548	100
Kenya	19,381	22,631	27,359	100
Malawi	5,873	5,702	5,919	100
Mozambique	17,104	19,233	19,233	-
Rwanda	4,823	6,831	7,801	90
Saudi Arabia	-	-	8	-
Somalia	-	-	7,922	-
Sudan**	18,648	19,226	20,347	57
Uganda	33,865	39,316	42,310	-
Tanzania	21,552	23,984	24,970	100
Yemen	205	347	422	-
Zambia	7,309	9,106	10,002	100
Zimbabwe	7,199	9,278	9,473	100

* Five-year averages for 1988-1992, 1998-2002 and 2003-2007 respectively.

Figure 8.1. Removal of Fuelwood in the Eastern Afromontane Hotspot



Note: Five-year averages are given1988-1992;1998-2002; 2003-2007 for countries with data for all years (Burundi, DRC, Kenya, Malawi, Mozambique, Rwanda, Sudan**, Tanzania, Uganda, Yemen, Zambia and Zimbabwe).

*** data for unified state of Sudan before independence of South Sudan*

Table 8.3. Major Species Harvested for Timber and Fuelwood in the Forests of the Eastern Afromontane Hotspot

Region	Species and comments
Arabian Peninsula	• *Acacia etbaica*, *Acacia origena* (IUCN Red List) • *Ziziphus spina-christi* (particularly for building) • *Juniperus procera*
Eastern Arc Mountains	• *Khaya anthotheca* • *Milicia excelsa* • *Ocotea usambarensis* • *Olea africana* • *Prunus africana* • *Podocarpus* spp., *Netonia* spp., *Albizia* spp.
Southern Mountain Islands	Species of miombo or similar lower elevation woodlands: • *Pterocarpus angolensis* • *Pericopsis angolensis* • *Millettia stuhlmannii* • *Afzelia quanzensis* • *Dalbergia melanoxylon* (IUCN Red List) • *Swartzia madagascariensis* • *Spirostachys africana* Higher moist forest species: • *Khaya anthotheca* • *Milicia excelsa*
Albertine Rift	• *Entandrophragma utile, E. excelsa, E. cylindricum* • *Khaya anthotheca, K. Grandifoliola* • *Milicia excelsa* • *Maesopsis eminii* • *Fagaropsis angolensis* • *Podocarpus* spp. Secondary species taken include: • *Celtis* spp., *Funtumia, Cordia*

Illegal forest use in Kenya and Tanzania is compounded by official bans on tree harvesting, which create high prices and encourage illegal harvesting/poaching by local communities to generate income (often driven by buyers and political influence from outside the area).[53] Tanzania's timber export market increased in value by almost 1,400 percent between 1997 and 2005, with China identified as the major recipient, according to TRAFFIC International (Milledge *et al.* 2007).[54] Many other countries supply timber to the Asian market, including DRC and Mozambique. Very little of the value of the timber extracted usually goes back to the illegal loggers, who are at the bottom end of an exploitative network of village leaders, foresters, middlemen and contractors.

As urban populations in the hotspot have increased, market demand for wood products (legal and illegal) has also increased. It affects particularly the more accessible areas (woodlands on

[53] In Kenya this has also resulted in loss of jobs and considerable public opposition; 95,000 acres of overmature forest plantations (valued at more than 36 billion Kenyan shillings) has begun to deteriorate in value due to heart rot and windfall. See http://komaza.org/blog/?p=740.
[54] China accounted for all indigenous hardwood logs and three-quarters of sawn wood and raw material exported between July 2005 and January 2006, although much of this was believed to be illegal trade. See http://www.traffic.org/home/2007/5/25/tanzanias-disappearing-timber-revenue.html.

communal lands and close to main roads), but protected forests also come under increasing pressure once unprotected areas are depleted (Burgess *et al.* 2005). Once the most valuable (e.g. high-value timber) species have been extracted there is often a second wave of exploitation of resources such as wood for charcoal (Ahrends *et al.* 2010).

Hunting and Bush Meat

Hunting for bush meat in eastern and southern Africa was viewed in the past as a subsistence activity undertaken by traditional hunter/gatherer societies. However, increasing human populations, acute poverty and widespread unemployment in the region, as well as demand for improved living standards (more protein in the diet), have encouraged widespread illegal hunting of wildlife for both commercial and subsistence purposes (Barrett 2000, 2002; Fa *et al.* 2006; Caro and Scholte 2007; Caro and Andimile 2009; Wilfred 2010). As a consequence, households find it increasingly difficult to secure their own bush meat supplies, and a commercial trade has emerged to meet this shortfall. Poachers have no problem selling the "free meat" to village butcheries and truckers who ferry containers across the continent, especially as bush meat is usually cheap (often cheaper than chicken, goat or beef). Bush meat hunting and demand are also associated with some refugee groups in the hotspot, and the influx of refugees from the Rwandan genocide in the early 1990s is believed to be at least partly responsible for herbivore declines in some regions (Jambiya *et al.* 2007, 2008; Caro 2008). Documented increases in the trade of bush meat have been linked to deforestation, and especially the development of roads and railroads, which has increased settlements and provided access to previously inaccessible forests. In Africa, the main prey species are duikers, bushpigs and other forest herbivores (as well as primates in DRC).

The bush meat trade in the hotspot is smaller than it is in West and Central Africa, but local consumption can still empty a forest of large- and mid-sized mammals and threaten rare species (Willcox and Nambu 2006; Nielsen 2006; Rovero *et al.* 2010). Past hunting is believed to be responsible for the absence of several large mammals (such as elephant, leopard and bushbuck) from large areas in the hotspot where they used to roam, and it is considered the most immediate threat to wildlife populations in some areas such as the Udzungwa Mountains in Tanzania. Most relevant wildlife densities in this mountain range are severely depleted by comparison with an area subject to low hunting pressure (including *Cephalophus monticola*, *C.harveyi*, *C.spadix* and *Potamochoerus larvatus*), and most large (mammalian) species (weighing less than 40 kilograms) are absent from selected forest reserves where hunting occurs (Nielsen 2006; Topp-Jørgensen *et al.* 2009). In the Southern Montane Islands, poaching of wild antelope herds (especially roan and eland) from Nyika National Park is a problem (Malawi Workshop Report).

Levels of bush meat trade in the Albertine Rift are of particular concern (A. Plumptre pers. obs., in Cordeiro *et al.* 2007). There are large numbers of guns in circulation after the various civil wars in the region, and there is some evidence that soldiers have returned from Congo to Rwanda and Uganda with a taste for bush meat, which is fueling the trade. The situation is perhaps most severe in DRC, where armed conflict, poverty and illegal mining all contribute to the problem of poaching in forest and savanna areas. For instance, the pre-war population of about 800 elephants in the upland forest of Kahuzi Biega National Park has essentially been eliminated, and in the Virunga National Park, hippopotami have been poached almost to local extirpation from a

population estimated at 30,000 only three decades ago (Blanc *et al.* 2007; Owen 2006).[55] Most hunting in Uganda, Rwanda and Burundi is through the use of snares or by driving prey into nets with dogs; in DRC there is more reliance on the use of guns. Total numbers of animals killed for bush meat each year in the hotspot are unknown, but locally they are significant. For instance, 3,000 wild animals per year are killed to supply two Tanzanian refugee camps near the Rwandan border (out of 22 such camps) (Caro and Andimile 2009).

Hunting for food is not as common in the Ethiopian Highlands or Arabian Peninsula, where there is less tradition of eating the meat of wild animals. However, in the Arabian Peninsula, a number of species have been locally extirpated and hunted to the brink of extinction, such as the Arabian leopard, ibex and gazelle (Hall *et al*. 2008). Another significant issue in this region is the trapping of raptors for sale in Gulf countries, although this is believed to occur mostly outside the hotspot. In Saudi Arabia, there is little left to hunt, and the hunting that occurs is "trophy hunting" for sport.

Collateral impacts of hunting can also be significant. In Budongo and Kibale forests in Uganda, chimpanzees have lost feet or hands in snares set for smaller animals; around 25 to 35 percent of habituated animals are affected (Wrangham 2001; Plumptre *et al.* 2003c).

Commercial Trade in Wild Plants and Animals

Commercial trade in wild animals and plants occurs in the hotspot. Much of it is unsustainable, but there are no accurate figures on numbers traded. There is concern over the harvesting and trade in plants for traditional medicines, on which many hotspot inhabitants depend (Chapter 5). These plants are vulnerable to overexploitation, for both national and international trade, triggering increased scarcity and even loss of species. For instance, nine medicinal plant species in Tanzania were found to be endangered and in need of conservation and research as a result of overexploitation (TRAFFIC: Msuya and Kideghesho 2009).[56] Africa's largest remaining natural stands of *Prunus africana* (the bark of which is used to treat pre-prostate cancer) are at risk in eastern DRC due to uncontrolled harvesting (Seyler *et al.* 2010). Excessive collection of plants in the Arabian Peninsula is also an identified threat; two examples of these are an aloe species that is harvested for resin and *Salvadora persica*, which is used as a toothbrush.

A number of species are also collected and sold as ornamental and horticultural plants, like orchid tubers in the Southern Mountain Islands (largely for ornamental purposes, but some are also eaten as food; see Box 8.2). This has extended recently across the southern highlands of Tanzania, (Ufipa, the Kipengere Range and the Kitulo Plateau). The center of exploitation is northern Zambia, where trade threatens as many as 85 species of terrestrial orchids (Davenport and Ndangalasi 2003).

Collection of horticultural plants for export to Europe and the Middle East has also been identified as a potential issue in Kenya and some other countries. In general, there are few data for the hotspot, and the scale and impact of the trade is unknown. The trade and collection of

[55] Also see www.african-elephant.org/aed/aesr2007.html.

[56] *Dioscorea dumetorum*, *Cadaba farinosa*, *Milicia excelsa*, *Acalypha fructicosa*, *Harrisonia abyssinica*, *Steganotaenia araliacea*, *Acacia melifera*, *Ehretia amoena* and *Wedelia mossambicensis* (Marshall 1998).

African violet (*Saintpaulia)* species from Tanzania has been heavily regulated for many years, but occasionally rare species are collected from the wild.

Box 8.2. Orchid Trade in the Southern Rift Mountains

More than 90 percent of orchids collected in southern Tanzania were destined for Zambia (GEF 2010), and there has been an enormous increase in harvesting over the last five years (while domestic Tanzanian consumption may be declining). Some 85 species of terrestrial orchid may be at risk from the trade, many of them national and regional endemics. The volumes collected across the Southern Highlands indicate unsustainable levels of harvest. In Malawi, orchid tubers are often processed into a popular meat substitute called chakanda. It is conservatively estimated that more than 2.2 million plants (40 metric tons) are lost through orchid trade to Zambia each year. The monetary value is also significant, although it does not compare with the potential (more sustainable) revenue from tourism. In Malawi, it is recognized that wild edible orchids, which used to be widely distributed, have been overharvested.

Sources: Davenport and Ndangalasi 2002, 2003; Environmental Affairs Department 2006; T. Davenport *in litt.* 2011.

There is also a trade in animals, particularly chameleons, some amphibians and some birds (as well as millipedes and dead specimens of butterflies and beetles). Specialist collectors are active in many of the Tanzanian Eastern Arc Mountain forests, collecting live animals for export. Although the trade is regulated by CITES and export quotas, identifying species of chameleon and amphibian is not easy, and rare endemic Eastern Arc species are probably being exported at levels above the quotas, by mistake or deliberately. Nineteen chameleon species (most of them endemic to Tanzania) are exported (in numbers of hundreds to thousands annually for the most popular species). The three most popular (*Bradypodion fischeri*, *Chamaeleo deremensis* and *C. werneri*) are all Eastern Arc endemics known from only a few sites. The only bird that is traded significantly from the Eastern Arc is Livingstone's turaco, found across the area. There are also occasional records of export of hornbills and red-faced crimson wings.

Civil Unrest, War and Refugees

Many parts of the hotspot have suffered political conflicts and wars over recent decades, which have destroyed many millions of lives and livelihoods, and generated enormous numbers of refugees seeking safe haven and sources of food and shelter. The UNHCR estimates that there were 2.4 million refugees in Africa at the end of 2006 (UNHCR 2006a). These conflicts have enormous adverse impacts, with the direct destruction of farmlands, forests and other resources, damage to protected areas, and increased pressure on already threatened ecosystems and species. Civil strife in the Great Lakes region has led to the degradation and loss of protected areas in Rwanda, Uganda and DRC, as militia groups have used them as bases to launch attacks on nearby communities.[57] Several protected areas have been lost or reduced in size as a result of war, and significant numbers of the region's unique, charismatic gorillas have been killed (Box 8.3).

[57] On the other hand, forests have often been places to which the local people could flee during conflict, so attitudes toward protected areas vary across the region depending on how they were used.

Conflict also deters international conservation organizations, aid agencies and governments from investing in biodiversity conservation and management in affected areas, particularly where transboundary cooperation is needed. Instead, staff members have been withdrawn, antipoaching efforts reduced and projects closed (Vanasselt 2003). In the Virungas region, for instance, protecting gorillas has proved extremely difficult and hazardous, with destruction of protected area infrastructure and, tragically, significant mortality of protected-area staff (more than 100 people have been killed in protected areas in eastern DRC in recent years and a third of the staff working with gorillas in Rwanda 1990 and 1999). Pressure on forests, especially in Uganda, has continued even after the war due to demand for timber for reconstruction. Other areas of the hotspot have also been similarly seriously affected by human conflicts over the past 30 years, such as protected areas in the Ethiopian Highlands (Williams *et al.* 2005; Yalden *et al.* 1996).Yemen has approximately 100,000 Somali refugees, many of them implicated in significant land management problems, particularly the overexploitation of natural resources (M. Hall and T. Miller *in litt.*). There is also concern in Yemen that the current conflict in the country could have a severe impact on existing conservation programs due to funding being diverted and the flight of international researchers.[58]

Box 8.3. Armed Conflict and Impacts on Protected Areas in the Virungas Region

Fighting in Rwanda in the 1990s led to enormous numbers of refugees crossing international borders in the Virungas region. By April 1994, around 860,000 refugees were concentrated around the Virunga National Park and a further 332,000 fled to nearby Kahuzi-Biega National Park, both in DRC. Subsequent wars between the armed forces of DRC and a rebel movement backed by other African nations resulted in the death of 5.4 million people, mostly from disease and starvation, by 2008. The streams of refugees displaced during these conflicts led to increased poaching in the Virguna National Park, uncontrolled firewood harvesting, and disruption of natural animal migration patterns. Three of the four refugee camps in North Kivu were located in or near the park, and at least 500,000 hectares of the park were affected by poaching or wood harvesting (an estimated 36 million trees lost from the park). Hippopotamuses in the park (once the world's largest population) declined by almost 97 percent in just over 30 years (from 29,000 in 1974 to 887 in 2005). Concern for the protection of the site led to the park being placed on the World Heritage in Danger List in 1994.

Hunting for meat in Kahuzi-Biega National Park also increased greatly as a result of war and displacement. The lowland areas of the park remain largely inaccessible but surveys in 2000 showed that the highland sector of the park had lost more than 95 percent of its elephant population and an estimated 50 percent of its gorilla population in over just four years. In addition to hunting by rebel groups and deforestation by refugees, much of the decline in biodiversity in the park has been due to illegal mining for gold, diamonds and coltan. The situation remains unstable, militia groups are still active in the region and conflict remains a threat to the mountain and eastern lowland gorillas within the hotspot.

Sources: Owens 2006 ; UNEP-WCMC 2003b ; Plumptre *et al.* 2003b; Redmond 2001; Kalpers *et al.* 2003; and WWF Website (www.panda.org)

[58] See www.nature.com/nmiddleeast/2011/110322/full/nmiddleeast.2011.36.html.

Mining, Mineral Extraction and Energy Production

Mining and Mineral Extraction

Mining forms an important part of the economy in some hotspot countries, such as DRC and Zambia, and both demand for and price of many metals (especially copper and gold) have risen significantly in the last few years. There is considerable public concern about environmental impacts of mineral extraction and the distribution of economic benefits.

Although mining has been identified as a threat to biodiversity in many of the countries of the hotspot (Table 8.1), most mining activities operate at a low level and are believed to have relatively little, usually local impact. Examples of problems include ruby mining in many parts of the Eastern Arc Mountains/Coastal Forest transition forests (such as Ruvu Forest Reserve in the Ulugurus); diamond mining in Zimbabwe (such as in Chimanimani National Reserve); and bauxite mining on Mount Mulanje in Malawi. Gold mining is considered particularly damaging as mercury is often used in the extraction process, and it can cause serious pollution of neighboring aquatic systems. Gold mining in the Chimanimani Mountains in Mozambique, for instance, is destroying riparian systems that provide habitat for endemic species and is increasing the risk of invasive plants becoming established.[59] There are similar issues in the Albertine Rift, where extraction of gold along rivers occurs in areas of Kibira National Park in Burundi (REMA 2009).

Mining in forest areas also frequently increases human activity in the area, leading to increased exploitation of forest resources such as bush meat and timber, and substantial degradation to surrounding ecosystems. In the hotspot, mining is a significant problem in a number of reserves across the Eastern Arc Mountains, especially in the East and West Usambara, Nguu, Nguru and Uluguru ranges and in the Albertine Rift, where it is known to have precipitated declines of key species in several protected areas (Box 8.4).

Box 8.4. Impacts of Mining in the Albertine Rift

Mining of minerals is not common in the Albertine Rift but has affected sites in Rwanda, Uganda and DRC. Many miners settled in the Kahuzi Biega National Park, in the east of DRC, in the 1990s and 2000s to mine for coltan (columbo-tantalite), diamonds and gold. Habitats have been degraded through the mining activity, wildlife hunting and harvest of wood for fuel. In some parts of Kahuzi Biega, rats were for sale in local bushmeat markets, which suggests that larger mammals have been completely hunted out. Coltan mining in Kahuzi Biega has been implicated in the precipitous decline of the eastern lowland gorilla (*Gorilla beringei graueri)* population, which now numbers less than 200. Illegal mining has also impacted the forests of the Itombwe Massif, the Okapi Forest Reserve, the Maiko National Park, and, to a lesser extent, the Virunga National Park. These sites have attracted hundreds of settlers, whose camps slowly evolve into permanent settlements, making restoration of the protected area's integrity very difficult. Many of these illegal mining sites have been controlled by militias, who have also participated heavily in the bushmeat trade and illegal trafficking of animals in the region.

Sources: Plumptre *et al.* 2003b; Robbins and Williamson 2008; Debroux *et al* 2007.

[59] See http://www.swradioafrica.com/Documents/ChimanimaniArticle.pdf.

Quarrying rock is considered a local problem in parts of the Ethiopian Highlands and has created some local heavy metal pollution around the Queen Elizabeth National Park, Uganda (Plumptre *et al.* 2003b).

Energy Production

Energy supply is a major issue in the hotspot. Most rural communities depend on increasingly scarce fuelwood and/or charcoal, and urban areas are mostly supplied with electricity generated from costly imported oil or hydroelectric power. Renewable energy sources (especially biofuels) are being heavily promoted in the hotspot, due to government interest in reducing foreign expenditure on the import of fossil fuels and commercial interests of foreign companies. Pressure to develop alternative energy production is likely to increase as it offers hotspot countries an attractive opportunity to achieve greater energy independence and potentially boost export earnings.

At present, most alternative energy initiatives have been limited to lowland areas, such as a wind farm in southern Yemen close to the hotspot area, developed under a climate adaption program partly funded by the World Bank.[60] If such developments expand into higher elevations, they could threaten biodiversity: for example, soaring birds are particular vulnerable to mortality from striking wind turbines, and the Rift Valley and Red Sea are a globally important migration route for such birds (GEF 2005).

Many hotspot countries already have a significant number of hydroelectric dams, and many more are planned.[61] In the Kenyan highlands, dams have been built in the Kiamususu, Kiringani and Marsabit forests, Cherengani, South Nandi and along the Omo River, affecting the affecting Turkana District and the Matthews range. A new dam is proposed for the Yala River, threatening destruction of an additional 1,185 hectares of indigenous forest in South Nandi (a key biodiversity area).[62] In the Albertine Rift, dams are proposed for the Upper Ulindi in the Itombwe Massif and along the Ruzizi River on the border of Rwanda and DRC. Hydroelectric dam construction and distribution threaten Murchison Falls National Park and Karuma Wildlife Reserve, with associated power line construction in Semliki National Park, Mabira Forest Reserve and Queen Elizabeth National Park in Uganda.

Locally, hydroelectric dam development can represent a significant threat to biodiversity with the loss of important habitat and changes in water flow downstream (impacting riverine forests, for instance, that rely on seasonal flooding). Dams in the hotspot have often been constructed without adequate environmental and social impact assessment and mitigation. There is at least one example of a dam leading to the extinction of a species in the hotspot: the construction of the Kihansi hydroelectric dam on the Kihansi River in the southern Udzungwa Mountains, Tanzania, was directly responsible for the extinction of the Kihansi spray toad *(Nectophrynoides asperginis)* in the wild.

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[60] See web.worldbank.org/WBSITE/EXTERNAL/COUNTRIES/MENAEXT/0,,contentMDK:21797345~pagePK:146736~piPK:146830~theSitePK:256299,00.html.

[61] Dams are also built to help provide irrigation for food production, for example, for pastureland during the dry season in Burundi. There is a perceived need for dams to control or reduce the impact of extreme weather events and ameliorate potential climate change impacts.

[62] See www.nairobistar.com/local/rift-valley/22968-dam-rift-mps-opposed-to-wb-forest-plan and Kenya Forests Working Group *in litt.*, 2011; www.kenyaforests.org

Invasive and Other Problematic Species
(see also Threats from Fisheries and Aquaculture)

Both plant and animal invasive alien species (IAS) threaten biodiversity across all regions in Africa and the Middle East, and they can have considerable economic costs (Chenje and Mohamed-Katerere 2006; Wise *et al.* 2007).[63] In many African countries, where nearly half of crops are lost to invasive species, the parasitic plant *Striga hermonthica* causes annual losses of maize totaling $7 billion, adversely affecting 300 million Africans (Burgiel and Muir 2010). Total IAS recorded for several African countries included 22 in Ethiopia, 26 in Zimbabwe and 35 in Kenya, but these species may be underreported (IUCN 2004).

Several IAS in the hotspot pose a threat to native biodiversity and are considered an increasing problem affecting many protected areas (Table 8.4).[64] At least 20 common IAS have been recorded in the Eastern Arc Mountain forests, and 49 alien species (of which 17 have become invasive) have been recorded from the East Usambaras (Burgess *et al.* 2010b). Disturbed ecosystems are particularly vulnerable to invasion by alien species. In Tanzania, for example, the umbrella tree (*Maesopsis eminii*) has become dominant in logged forests and has invaded the Usambara Mountains, where it is also capable of regenerating in natural forests (Bingelli *et al.* 1998).[65] Invasive pines (*Pinus* spp.) are considered a problem in the Southern Montane Islands (T. Davenport *in litt.* 2011).

Table 8.4. Selected Invasive Alien Species Impacting Hotspot

Species	Examples of Occurrence/Comment
Spectacular cassia, *Senna spectabilis*	Budongo Forest Reserve, northwest Uganda
Lantana, *Lantana camara*	Invasive shrub from tropical America; said to be present in virtually every protected area in East Africa and Ethiopian Highlands (Kavilu 2010).
Feverfew, *Parthenium hysterophorus*	Queen Elizabeth National Park, Uganda
Chromolaena odorata	Native to North America; found in many protected areas in Tanzania, Uganda and some parts of western Kenya.
***Parthenium* spp.**	Ethiopian Highlands
Opuntia ficus-india	Ethiopian Highlands, Yemen and Saudi Arabia at altitudes above 1,000 meters In Yemen and Saudi Arabia, species is abundant in upland areas and heavily invades patches of natural vegetation, threatening biodiversity.
Opuntia dillenii	Yemen and Saudi Arabia at altitudes lower than 1,000 meters In Yemen and Saudi Arabia, species is abundant at lower altitudes and heavily invades patches of natural vegetation. Spread by hamadryas baboons, for which the fruit comprises a significant part of the diet.

[63] IAS are species, native to one area or region, that have been introduced into an area outside their normal distribution, either by accident or on purpose, and have colonized or invaded their new home, threatening biological diversity, ecosystems and habitats, and human well-being. See http://www.cbd.int/invasive/.

[64] See "Invasive Species and Protected Areas: Managing the increasing threat of Invasive Species in Protected Areas in Africa." *www.gisp.org/whatsnew/docs/AfricaIASProtectedAreas.pdf*.

[65] See http://www.tropical-biology.org/research/dip/species.htm for list of species that have invaded the Usambara Mountains.

Umbrella tree, *Maesopsis eminii*	Dominant in logged forests in East Usambaras, Tanzania.
Himalayan raspberry, *Rubus ellipticus*	Mount Mulanje and Mount Zomba, Malawi Similar *Rubus* spp. "blackberries" are invading the Eastern Arc Mountain forests, for example in Uluguru.
Pines, *Pinus*, and wattles, *Acacia*	Zimbabwe, Tanzania Species invade natural, nutrient-deficient grasslands (more competitive than native species, especially in face of disturbance or frequent burning).
Water hyacinth, *Eichhornia crassipes*	Present in the African Great Lakes since the late 1980s. Native to the tropical and subtropical regions of South America.

Despite good intentions, international assistance programs have been known to be a pathway for the introduction of invasive species into the hotspot. For example, *Parthenium* spp. is thought to have been introduced to Ethiopia during the 1980s, when drought-induced famine triggered a massive multinational relief effort. The weed was first seen growing near food-aid distribution centers, and it is likely that imported wheat grain was contaminated with its seeds. It spread rapidly and soon came to dominate pastures and crop fields due to its allelopathic properties (it releases chemicals that suppress the growth and germination of neighboring plants). It devastates crop production and leads to grazing shortages since it is unpalatable to livestock.

There is also the potential for some introduced biofuel species (see above) to become problem IAS. *Jatropha* is one of the most widely touted but controversial species proposed for use as a biofuel in East Africa. It has a record of invasiveness in many areas of the world such as Brazil, Australia, the United States and the Pacific (Low and Booth 2007; Brittaine and Lutaladio 2010). A review of 40 crops being considered for use as biofuels found that approximately 75 percent of them had some record of being invasive, although guidelines for the use of nonnative species as biofuels are being developed to address the problem (GISP 2008; IUCN 2009). Overall, biofuels are considered an emerging threat for the hotspot. However, the risks and impacts associated with these crops have not been well assessed, and awareness of the potential threat is low among decision makers.

Wildlife-Human Conflicts

Direct wildlife-human conflicts occur (such as damage to crops by forest elephants and crop raiding by gorillas, bushpigs, baboons and monkeys around protected areas in the Albertine Rift), but they are not widespread in the hotspot. They can have significant negative impacts on poor adjacent households and are a major reason why neighboring local communities are often not fully supportive of protected areas (Blomley *et al.* 2010).

Infrastructure Developments

Urban expansion, driven by local population growth and immigration from rural areas, is a feature of most hotspot countries. Many of its cities are expanding at a rapid rate and have sizeable slum areas without proper waste disposal, which creates local pollution effects, such as in Addis Ababa. Tourism and recreational developments in the hotspot are not generally seen as a major a threat, although there are examples of unplanned tourism development on the

escarpment of the Albertine Rift and concentrations of hotels at major tourist sites, such as along the walls of the Ngorongoro Crater, which may create local pollution and habitat degradation. Locally, tourism activities can also pollute if not properly managed, such as through dumping of rubbish or cutting of trees for fuelwood close to camps, as has happened on Mount Kilimanjaro.

Increasing areas of land in the hotspot are given over to commercial and industrial development, driven by economic growth and inward investment. Associated with these developments are increases in road—and to a lesser extent rail—networks, especially in East Africa. There are concerns that these developments will encourage additional, frequently unplanned construction along the routes, putting natural habitats at increased risk of fragmentation and opening up areas to fuelwood and charcoal merchants and bush meat hunters. In Yemen and Saudi Arabia, road construction and housing developments at higher altitudes in mountainous areas threaten the remaining patches of upland vegetation, both directly and through debris spillage and erosion from poor construction methods. For instance, the largest remaining patch of valley forest on Jabal Bura in Yemen (approximately 80 hectares) suffered extensive damage in 2005-2006 due to the construction of a road, which destroyed 10 to 15 percent of the valley forest vegetation and killed a significant number of individuals of 18 regionally rare tree species. The area was also an important faunal refuge for species such as striped hyena, hamadryas baboon, Yemen monitor lizard and imperial eagle *(Aquila heliacal)*. Other valley forest sites on Jabal Raymah have been similarly impacted (Hall et al. 2008).

Pollution

Pollution within the hotspot originates largely from domestic and urban wastewater, garbage and solid waste (all workshop reports list these at the tops of their pollution lists). Due to poor regulations and inadequate enforcement, industrial waste can cause significant levels of pollution locally, and agricultural and forestry effluents can also be a problem, such as in rivers and streams adjacent to tea plantations (van Biervliet *et al.* 2009). The impact of agricultural pesticides and fertilizers on neighboring habitats and biodiversity has been poorly studied within the hotspot, and the degree of their impact is not known.

Some of the major bodies of water bodies within the hotspot boundary suffer from pollution, which damages aquatic ecosystems and threatens the water supplies of communities. Lake Tanganyika is affected by agricultural, industrial, mining and domestic pollution, and it is estimated that three-quarters of Malawi's rivers are significantly polluted by human waste (SoE 2002). Overall, however, pollution is not considered as a major threat to biodiversity within the hotspot.

Disease

Disease is potentially a major threat to some groups of wild animals and plants in the hotspot, but has been poorly studied. In the Ethiopian Highlands, domestic dogs often accompany livestock, and this can present a risk of disease transmission to wildlife species. There have been several rabies epidemics in recent years among Ethiopian wolves *(Canis simensis)* by transmission from domestic dogs (Williams *et al.* 2005).

A well-known potential threat to gorillas and chimpanzees, particularly those in habituated groups, is exposure to human diseases (Plumptre *et al.* 2003d; Homsy 1999; Sandbrook and Semple 2006). Gorilla and chimpanzee trekking potentially exposes the animals to human diseases, some of which they may never have encountered before (Butynski 2001). There are known cases of such transfers causing deaths of gorillas in the Volcanoes National Park, despite strict rules about tourist behavior (Wallis and Lee 1999). Unfortunately, the frequency of encounters between great apes and humans/human waste is increasing as human populations expand, leading to higher risks of disease transmission between them (Oates *et al.* 2010).

Many recent amphibian declines around the world have been associated with the emergence of a pathogenic fungus, *Batrachochytrium dendrobatidis*, which causes the disease chytridiomycosis in amphibians (Berger *et al.* 1998; Skerratt *et al.* 2007), and there is concern that it could threaten this group in the hotspot. The presence of *B. dendrobatidis* has been shown in a variety of genera in at least 13 countries in sub-Saharan Africa (including DRC, Kenya, Malawi, Tanzania, Uganda and Zambia), with most occurrences in southern and eastern Africa (Blackburn *et al.* 2010). However, only one decline (of the toad *Nectophrynoides asperginis* in the Udzungwa Mountains in Tanzania) was probably due to the fungus, and it is not yet considered a major threat to amphibians in the hotspot (Weldon and du Preez, 2004; Channing *et al.* 2006).

Climate Change and Severe Weather

Climate change is expected to become a major driver of environmental change in the hotspot but is not currently considered as great a threat as others listed. Climate change and its impacts are treated more fully in Chapter 9.

8.2 Root Causes and Barriers

A number of root causes and barriers act together across the hotspot to generate the proximal threats listed above. A summary of the main root causes is presented below.

Table 8.5. Root Causes Underlying Threats to the Hotspot

Root Cause	Explanation
Large and Growing Human Population	The hotspot has a large and increasing population, and rural populations in the mountains are growing in most areas despite urban migration. Higher numbers of people dependent on the same natural resources result in increased pressure on remaining habitats for timber, nontimber forest products, bush meat, etc.
High Human Population Densities	The hotspot has some of the highest rural population densities in Africa. They are highest in the Albertine Rift but also relatively high in Ethiopia, the Eastern Arc and in the Kenyan Highlands. In most areas the high population density extends right up to protected area boundaries, with a hard, distinct boundary between farmland and reserves. In some areas, farming continues within reserves, and a number have been degazetted over the past 30 years due to human pressure.

Economically Impoverished Populations	Economic poverty is a feature in many areas of the hotspot, partly due to shortage of agricultural land outside remaining protected areas. Land shortages mean that there is a lack of land for grazing or other forms of basic subsistence. People depend on free resources in their immediate surroundings and cannot afford to look beyond their immediate survival needs, making them more likely to engage in illegal activities.
Rapid Economic Growth Beyond the Hotspot	The montane regions are important sources of natural resources to rapidly expanding urban areas, and demand for these is fueled by rapid economic growth nationally. They include food crops that cannot be grown at lower altitudes, wood, nontimber forest products and essential ecosystem services (such as regular water supply). All of these are critical, but often undervalued, resources for national development. Increasing demand from outside the hotspot (especially for charcoal) is a key driver of deforestation and unsustainable use of natural resources within the hotspot.
Increased Global Demand and Prices	The demand for commodities—food, timber, minerals, coffee, tea, pyrethrum and to a lesser extent biofuels—has increased with the rise in regional and global human populations. This has led to shortages and price hikes in some cases. There is increasing international demand for many resources from the hotspot mountains, notably from China and Asian countries.
Previous Wars and Unresolved Ccivil Conflicts	In parts of the hotspot there is a legacy from previous wars and unrest, particularly in the countries around the Albertine Rift and in Ethiopia and Eritrea. In some of these areas, especially DRC, security remains a root cause of environmental degradation and a significant challenge to undertaking conservation. These conflicts have led to large numbers of refugees and displaced people taking over areas of land, particularly forest land, for agriculture and to build settlements. Large numbers of guns left in circulation have resulted in increased levels of hunting of large mammals (including mountain gorillas) and the near decimation of the hippopotami in Virungas National Park.
Natural Disasters	Natural disasters include flooding and droughts, which may be increasing in frequency and severity due to climate change. The environmental degradation caused by people trying to survive these disasters can be extremely serious and cause particular problems in areas already suffering from land degradation. Natural disasters can worsen other root causes leading to famine and increased poverty.
Negative Beliefs and Views on Value of Environment and Conservation	A number of commonly held views and beliefs in the hotspot work against environmental protection and conservation, including attitudes that environmental resources are “free” and conservation is “anti-people.” These undermine conservation efforts and lead to a lack of political will to address the severe environmental problems faced by the hotspot.
Poor Environmental Governance	Environmental management and conservation are often not treated as priorities by local and national governments, and the environment may be relegated to minor ministries or responsibilities spread across ministerial departments. This is especially true when economic and security circumstances are difficult and sectors such as health or national security take priority. Lack of political support and resources (funding and manpower) leads to weak enforcement of regulations and poor implementation and management of conservation funding and initiatives.

The first three root causes—population growth, population density and poverty—are considered to be the main drivers of habitat and biodiversity loss in the hotspot, through increased demand for land, water and other natural resources. These are common major causes behind the loss of biodiversity worldwide and especially in Africa (NEPAD 2003; Cordeiro *et al.* 2007), although macroeconomic processes and policies of the developed world are also considered as important

underlying drivers of ecosystem change in the developing world, including African countries (Shiva 1993; Geist and Lambin 2002; Martinez-Alier 2002).

The root causes are exacerbated by a number of barriers (most of which can be expressed as a lack of something—the right conditions or activities) that hamper efforts to address the threats and prevent effective biodiversity conservation (see Table 8.6).

Table 8.6. Barriers to Addressing Threats and Achieving Biodiversity Conservation in the Hotspot

Barrier	Explanation
Weak Legal Protection	There is weak legal protection of many high-biodiversity sites in the hotspot. This stems from the root cause of poor environmental governance and is one of the fundamental challenges to conservation. Failure to follow laws and regulations (from national to community levels) leads to resource extraction that can easily become damaging.
Government Policies and Incentives Incompatible with Sustainable Use	Government policies and incentives are often incompatible with sustainable use of natural resources, including perverse economic incentives/subsidies, grants and financial arrangements that lead to unsustainable natural resource extraction. For example, the promotion of biofuels leads to the clearance of high-carbon and high-biodiversity-value forest or the loss of agricultural land for food production. Both lead to loss of local livelihood-support mechanisms.
Lack of Awareness	Overall, the public and decision makers are not aware of the relationships among biodiversity, ecosystem services, livelihoods and poverty. This contributes to lack of effective policies, poor implementation and regulation.
Inadequate Knowledge/ Information about Key Biodiversity Problems and How to Solve Them	Efforts to tackle illegal logging are hampered because the status and trends of forestry resources in most hotspot countries are largely unknown and existing information is fragmented and outdated. In response, some countries are establishing new inventories of forest resources, like the NAFORMA project in Tanzania and integrated land use and forest resource assessments in Kenya and Zambia.[66]
Poor.Land Tenure Systems and Resource Access Rights	Land tenure systems are mainly communal and traditional in nature. Formal land rights and land registration systems are being implemented in many countries, but the process is far from complete. This results in the potential for land grabbing by powerful elites, politicians, wealthy business people, foreign companies or individuals. Weak tenure can also result in de facto open access regimes in forest/wild lands, leaving them susceptible to overuse (the “tragedy of the commons” scenario).
Lack of Institutional Capacity	There is a chronic lack of institutional capacity to carry out effective conservation and environmental management. Management of protected areas is primarily the responsibility of poorly resourced government departments; there is often little money for operations and frequently a lack of qualified personnel able to implement policy and enforce legislation and regulations to control illegal activities. This leaves many protected areas poorly managed. Large-scale development plans are being implemented in any areas, often with weak or no environmental impact assessments, even when legislation exists.

[66] See http://www.fao.org/forestry/17847/en/.

Inappropriate Land-use Practices and Lack of Alternatives	In the heavily farmed mountain areas of the hotspot, farming is often conducted on steep slopes using inappropriate techniques, resulting in low agricultural yields, declining soil fertility and land degradation. A lack of extension and training capacity are often regarded as two reasons for lack of progress in changing these traditional but environmentally damaging farming practices. Lack of options, experience and incentives to develop alternative (nondestructive) livelihoods is also a factor.
Inadequate Fora for Networking and Exchange of Experience	There is only weak ability to exchange information on lessons learned and successful techniques for natural resource management in the region. Projects and programs operate in isolation, and knowledge and information is scattered and not widely available, hampering progress toward better environmental management. The weak capacity, limited research and poor opportunities for training result in inadequate knowledge/information of key biodiversity problems and how to solve them, such as the likely impact of climate change on biodiversity within the hotspot.

Given the growing human population within the hotspot, scarcity of available fertile land, current global economic situation (high and increasing prices for food and minerals), and limited urban employment and livelihood opportunities, it seems likely that the threats to biodiversity and barriers to addressing them will continue to increase. On the positive side, many of these issues are widely recognized, and various initiatives (including institutional, policy and legislative reforms) have been launched to address them. These are generally targeted at the barriers, as they are amenable to action and can be altered.

9. CLIMATE CHANGE ASSESSMENT

Following the publication of the Intergovernmental Panel on Climate Change's (IPCC) Fourth Assessment Report in 2007, there is general agreement that human activities, particularly the combustion of fossil fuels and land-use change, are leading to changes in the Earth's climate beyond that which would naturally be expected (Denman *et al.* 2007). Furthermore, there is consensus that such anthropogenic climate change is already adversely affecting the world's ecosystems, biodiversity, human health and livelihoods (Boko *et al.* 2007). Since adverse effects are predicted to intensify over time, considerable attention and investment is being made in developing appropriate responses to climate change, such as the UN Framework Convention on Climate Change (UNFCCC) stated goal of $100 billion being made available annually by 2020.

There are two broad responses to climate change: mitigation and adaptation (IPCC 2001). Mitigation activities mainly focus on reducing human-generated greenhouse gas (GHG) emissions released through the combustion of fossil fuels, the production of cement, or through deforestation, ecosystem degradation and the turnover of soil organic matter. As dry biomass is approximately 50 percent carbon, changes in land use can result in the release of significant amounts of stored carbon into the atmosphere, principally as carbon dioxide. By comparison, adaptation activities focus on decreasing exposure to the potential detrimental effects of climate change. Due to the variety of ways that climate change may affect humans and the Earth's biota, the potential range of adaptation activities is considerable, from the adoption of drought-resistant crops in areas that are predicted to become drier, to the building of flood barriers, to the creation of corridors of suitable habitat that allow species to adapt to changes in climate.

This chapter provides a brief assessment of climate change within the hotspot and its potential impact on natural systems and livelihoods, and presents a general overview of policy responses.

9.1 Past and Present Climate of the Eastern Afromontane Hotspot

Past Climate

The climate of the Eastern Afromontane Hotspot has been relatively constant over recent geological history due to a stabilizing effect of the Indian Ocean. For instance, higher rainfall was maintained over the hotspot compared with other forested regions, where rainfall greatly decreased during the Pleistocene period (Lovett and Wasser 1993). Evidence from the Uluguru Mountains of Tanzania indicates that Eastern Arc forest composition has remained stable over the last 40,000 years, including through the last glacial period (Finch *et al.* 2011), although pollen records from East, Central and Southern Africa indicate a shift toward a drier climate between 5,000 to 3,000 years before present with a drop in the water level of many of the large lakes (Marchant and Hooghiemstra 2004). This relative stability of the climate is seen as one of the reasons for its high levels of biodiversity and endemism, coupled with the geographical isolation of each part of the mountain belt (Burgess *et al.* 2007). Marchant and Hooghiemstra (2004) provide a detailed review of the paleoclimate of the region and its effect on the observed distribution of forests and biodiversity more broadly.

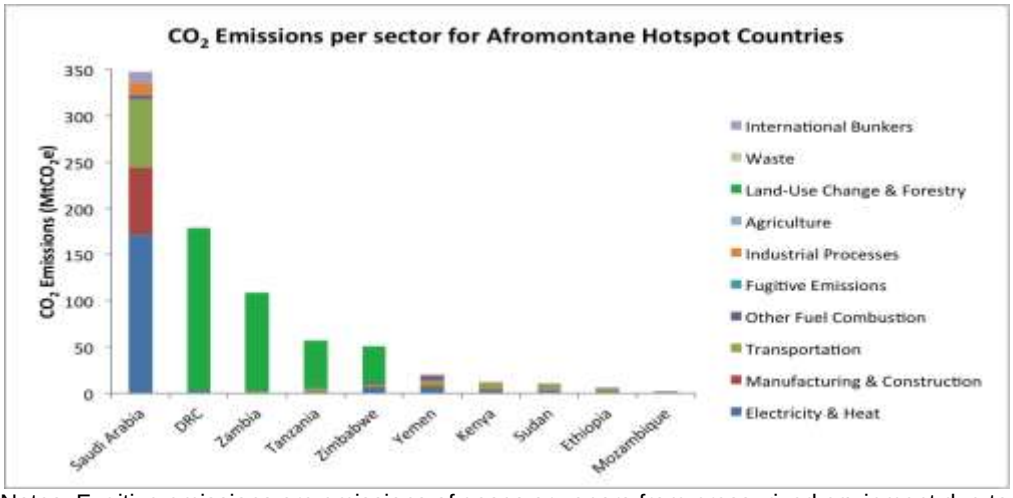
Present Climate in the Hotspot

The Eastern Afromontane Hotspot spans a range of latitudes (approximately 22°S to 22°N), approximately centered on the equator. Consequently different parts of the hotspot experience very different climates each season, with the northern reaches being in summer while the southern reaches experience winter (and vice versa). The El Niño Southern Oscillation (ENSO) and North Atlantic Oscillation (NAO) are the main drivers of the climate, with the Inter-Tropical Convergence Zone as a strong influence on the central region and the Indian monsoon driving rain in the Arabian Peninsula. Overall, the climate of the mountain belt is generally considerably wetter than the surrounding lowland areas.

9.2 Contribution of the Eastern Afromontane Hotspot Countries to Global Climate Change

Overall the 16 countries in the hotspot emit less than 3 percent of global GHG emissions, with Saudi Arabia contributing more than all the other countries combined excluding DRC (Figure 9.1). However, there are great differences in the magnitude of the hotspot countries' contribution to climate change. Saudi Arabia, being an oil-producing country, has the largest annual emissions of all the countries within the hotspot and is ranked the 24th highest GHG emitter in the world (20th on a per capita basis). DRC is rated 31st in terms of total annual national GHG emissions but 107th on a per capita basis.

Figure 9.1 Emissions per Sector for Eastern Afromontane Hotspot Countries for 2005[1]



Notes: Fugitive emissions are emissions of gases or vapors from pressurized equipment due to leaks and various other unintended or irregular releases of gases, mostly from industrial activities. International bunkers are emissions resulting from fuel use in ships or aircraft engaged in international transport. Source: Climate Analysis Indicators Tool (CAIT) Version 8.0 (World Resources Institute 2010).

The majority—47 percent—of hotspot emissions come from land-use changes, mainly deforestation and degradation. That figure is somewhat less than the overall proportion of 60 percent from this source estimated from the whole of sub-Saharan Africa, but greater than the

[1] There is no reported comparable data for Burundi, Eritrea, Malawi, Rwanda, Somalia and Uganda.

approximately 20 percent for such GHG emissions worldwide (Denman *et al.* 2007, CAIT 2010). The use of biomass for energy (theoretically a sustainable activity as far as GHG are concerned) contributes significantly to land degradation. Domestic and industrial energy demands are estimated to contribute 24 percent of emissions from hotspot countries.

9.3 Predicted Changes in the Future Climate of the Eastern Afromontane Hotspot

Climate Projections for the Eastern Afromontane Hotspot and Their Limitations

Predicted climate changes are largely based on complex computer models called general circulation models (GCMs), which represent interactions among the different components of the climate system such as the land surface, the atmosphere and the oceans, and scenarios that describe potential futures based on either changes in the climate system, socioeconomic circumstances or other potential future changes. While there may be slight relative variation in predicted changes according to the GCM or scenario used, general predictions for the period up to 2100 can be made.

However, GCMs typically work at a spatial scale of 200 to 300 kilometers, so the applicability of their projections at the local scale is limited. This is especially true for regions characterized by steep topography, heterogeneous landscapes or large bodies of water, such as most of the Eastern Afromontane Hotspot. They also have limited ability to predict changes in temperature at higher altitudes; so again, there is a degree of uncertainty over predictions for the mountain areas of the hotspot. Predictive climate change models for the hotspot suffer from having limited background data on existing climate variability and relationships to social and ecological vulnerability, and therefore are less confident as to where and who will be most affected. This is an important constraint to the development of appropriate adaptation strategies.

The limitations of GCM models are revealed by regional models, which suggest that climate change will be highly heterogeneous both in magnitude and direction of change. For example in the Eastern Arc (Phil Platts, personal communication) and in the West Usambaras to the north, predictions suggest that annual temperature range will decrease, annual rainfall will increase, and the water balance will be stable with more rain in drier months. In contrast, in the Udzungwas to the south, they suggest that annual temperature range will increase, annual rainfall will decrease, and the water balance will be lower with a harsher dry season. These models also suggest that the impact on endemic mountain plants will also be highly variable, both between taxa (some ranges will expand, others will contract, and others will hardly change) and across sites. All the GCMs used in this report are from the IPCC 4th assessment report (2007).[67]

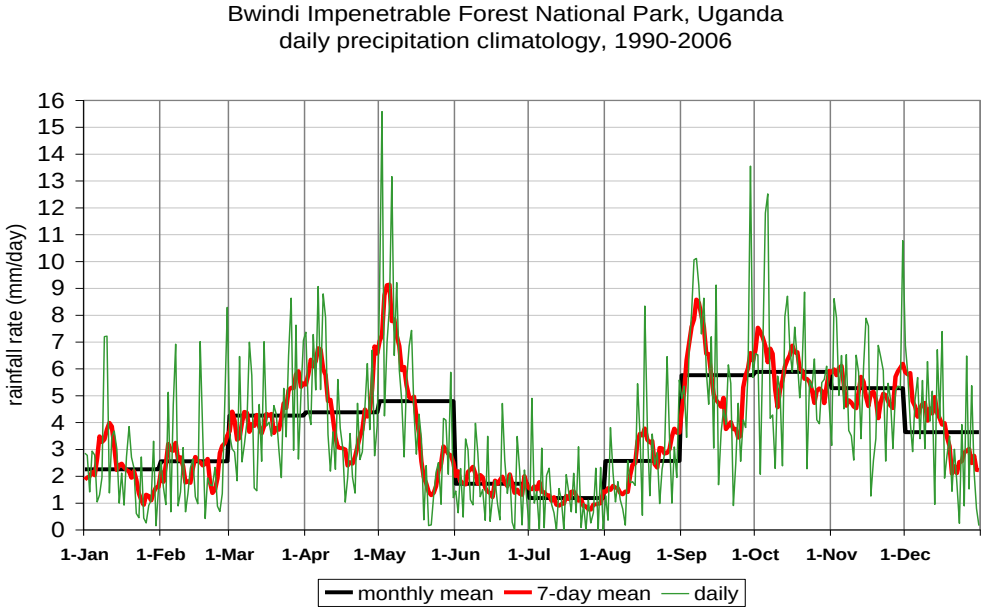
[67] We use GCMs forced with the Special Report on Emissions Scenarios (SRES) B1 (assumes society will reduce its use of fossil fuels and increase clean technology, as well as increase an emphasis on social and environmental stability) and A2 (assumes that society will continue to use fossil fuels at a moderate growth rate, there will be less economic integration, and populations will continue to expand) (IPCC 2000). It is notable that there are only subtle differences between the B1 and A2 scenarios, which suggests that for this mid-century period (2040-2060) the choice of assumed emissions scenarios makes little difference to the projected changes in rainfall.

Projections for Rainfall

The current models and scenarios suggest that there will be changes in rainfall and its distribution over the hotspot in the next 100 years, although the patterns vary according to the time of year. During the period December-January-February there is likely to be less rainfall over central southern Africa, with increased precipitation farther north over East Africa, particularly the central region. A similar trend is predicted for the period March-April-May, although increases in rainfall are restricted to a smaller central region. Farther north, consistent decreases in rainfall (though small in magnitude) are projected over Eritrea and the Arabian Peninsula.

A decrease in rainfall is predicted to occur during June-July-August over most of the southern region (and Tanzania), although these changes are small and this represents the dry season in most countries, so the impact of this change in rainfall alone is likely to be minimal. Farther north there is little consistency in predictions. However, during September-October-November there are likely to be decreases in rainfall across much of the southern region. This is the period incorporating the start of the rains and suggests a reduction in early season rainfall. Over the north central and northern regions the climate change models are consistent in suggesting an increase in rainfall. Empirical data from the site level suggest exceptionally large magnitudes in fluctuations in rainfall across some regions of the hotspot (Figure 9.2). Although poorly studied, these fluctuations (spikes) are likely to be of considerable significance to local fauna and flora, influencing the timing and duration of leaf-burst and flowering and a wide range of other phenological responses.

Figure 9.2. Pluviogram Showing Rainfall Climatology for Bwindi Impenetrable Forest (Uganda) at Monthly, Weekly and Daily Resolution, for the Period 1991-2006



Source: Seimon and Picton Phillipps, *Climatological assessment of the Albertine Rift for conservation applications.* New York: Wildlife Conservation Society, 2009.

Projections for Temperature

Current models predict an increase in temperature across the hotspot, with expected rises between 1 degree Celsius and 3 degrees Celsius over most land areas by approximately 2050. Increases are predicted to be greatest in the already arid regions toward the south and north of the continental landmass (and Arabia), which are also the regions most likely to receive the lowest increases (or decreases) in average rainfall in the future. This suggests that future climate patterns might have an important impact on water resource availability in these regions.

Overall, the climatic models give varying results but suggest a general increase in rainfall (approximately 0 to 10 millimeters a month) over the next 50 years. This conflicts with the recent drying trend in East Africa and must be regarded as a tentative conclusion. Trends in precipitation are less clear than for temperature, not least because of the high spatial and temporal variability across Africa. Predictions of rainfall in future climates vary widely among models, mainly because of their inability to reproduce the mechanisms of precipitation, the influence of topography and feedback mechanisms. Other limitations include lack of information on dust aerosol concentrations, sea surface temperature anomalies, deforestation and soil moisture. All of these influence rainfall and runoff to varying degrees depending on the location, but especially in arid and semiarid regions where slight changes in precipitation can result in dramatic changes in the runoff process (Fekete *et al.* 2004). Land-use changes and degradation, which are not simulated by some models, could also contribute to decreases in rainfall (for example, Huntingford *et al*. 2005). More certain is the prediction of rising temperatures in all seasons, with the highest increases in the north and south of the hotspot and impacts dependent on local topography and processes. The temperature may also force intensification and shifting south of Indian Ocean cyclones.

9.4 Potential Impact on Natural Systems, Associated Ecosystem Services, Human Health and Livelihoods

The predicted changes in climate outlined above are likely to affect biodiversity, natural ecosystems and associated ecosystem services, human livelihoods, health and economies in a multitude of complex, interlinked and often subtle ways. However, it should be noted that there have been no studies on the likely impact of climate change on the natural and human systems of the whole hotspot. There are a small number of studies, most currently in progress but some already published, that have examined the likely impact on certain species occurring within the hotspot, such as mountain gorilla (AWF/IGCP/EcoAdapt 2010). Most of the review below is based on broader studies covering the hotspot countries, including studies on Uganda (Hepworth and Goulden 2008); the Albertine Rift (IRA/PASS 2007, Picton Phillipps and Seimon 2010); East and Southern Africa (Eriksen *et al.* 2008); and Africa or the Middle East as a whole (Leemans and Eickhout 2004, Boko *et al*. 2007, Elasha 2011).

Workshop participants identified droughts (particularly Ethiopia, Uganda, Tanzania, Yemen and Eritrea) and storms and flooding with an increase in associated landslides in degraded/deforested areas (especially Burundi and Rwanda) as the key immediate problems of climate change. However, habitat shifts and alteration of ecosystem boundaries due to climate change are

considered a growing problem for this montane hotspot. The main predicted impacts are discussed in more detail below.

Impact on Biodiversity, Ecosystems and Ecosystem Services

According to the Millennium Ecosystem Assessment, climate change is likely to become the dominant direct driver of biodiversity loss globally by the end of the century (MA 2005) and is expected to significantly alter African and Arabian biodiversity as species struggle to adapt to changing conditions (e.g. see Lovett *et al.* 2005). There is already some worrying evidence of changes to natural systems in response to changing climate. These are particularly noticeable at higher altitudes. For instance, there has been a gradual yet dramatic disappearance of glaciers on the Ruwenzoris in Uganda and Mount Kenya. The ice cap on Mount Kenya has shrunk by 40 percent since 1963, and a number of seasonal rivers that used to flow from atop the mountain to the surrounding areas have since dried up (ECA 2005). The observed glacier retreat on Kilimanjaro is also thought to be due, in part, to climate change. At current rates, the ice cap on Mount Kilimanjaro could disappear by 2020 for the first time in 11,000 years (Thompson *et al*. 2002, Kaser *et al*. 2004, UNEP 2006).

Impact on Montane and Forest Systems

Predicted decreases in precipitation are likely to have a significant impact on some montane forests that are dependent on high moisture levels (UNEP-WCMC 2009). Indeed, there is already evidence that a drier and more seasonal climate reported in recent decades in East Africa may lower the likelihood of montane forests being enveloped in mist (Hamilton and Bensted-Smith 1989), which is thought to have reduced regeneration of some native tree species in the Usambara Mountains, such as *Octea usambaraensis*. Similar anecdotal reports of a decrease in the occurrence and extent of mist and a simultaneous decrease in the distribution of *Juniperus procera*, *Euphorbia grandis* and *Dracaena ombet* has been reported from Somaliland (Awale 2007), and highland juniper *Juniperus* forests have also decreased in extent in Saudi Arabia, partly, it is thought, due to climate change.[2]

Higher temperatures and greater periods of drought could also lead to increased frequency and intensity of fires, which could decrease the current distribution of forests and even convert forest areas to more fire-resilient savanna/shrubland, as most hotspot forest types are not fire-adapted. Fire rates in Tanzania are strongly correlated with annual rainfall, and drought years lead to many more fires in forests within the hotspot, as has happened in Chome Forest and Mtai Forest. In very dry years, fire can even invade the wetter higher forest areas (N.Burgess *in litt.*). Grass and shrub savannas have also been shown to be highly sensitive to short-term availability of water due to climate variability (Vanacker *et al*. 2005).

Even though a certain degree of "carbon dioxide fertilization" (Doherty *et al.* 2010) is expected for Eastern Afromontane forests, prolonged dry periods and droughts in some areas are expected to lead to a decrease in forest biomass.[3]

[2] See http://www.saudiarabia-chm.gov.sa/mountainbio.htm.

[3] There is also some evidence from recently observed climatic changes that carbon sequestration is possibly enhanced in tropical forests (Malhi

Changes in forest ecosystems themselves have a significant feedback effect on global and local climate processes and hence climate change and variability (Christensen *et al*. 2007). Globally, deforestation contributes an estimated 20 percent of GHG emissions, whereas an increase in vegetation density produces a cooling effect; so protecting existing forests and promoting forest growth should be considered as key mitigation and adaptation strategies.

Impact on Wetland Systems

The hotspot's freshwater ecosystems—both lakes and river systems—will also be impacted by climate change (particularly an increase in temperature or a decrease in precipitation). Evidence suggests that the biota of some of the region's lakes may be particularly sensitive to local climate fluctuations, including Lake Suguta and Nakuru-Elmenteita (Hume *et al*. 2001, Boko *et al.* 2007, Olaka *et al.* 2010). Rising temperatures of around 1.5 degrees Celsius to 2 degrees Celsius will adversely affect fisheries in the East African lakes (Christensen *et al*. 2007). Primary productivity in Lake Tanganyika has decreased due to an increase in surface water temperature, and climate change may further reduce lake productivity (see Box 9.1). Some lakes within the hotspot have experienced severe drying, such as Lake Haromaya in Ethiopia and Lake Naivasha in Kenya (which is just outside the hotspot, but part of its water catchment is within the boundary), although this is believed to be due to a complex set of factors of which climate change is one (others include overextraction and poor water management) (Dagnachew 2007, Wetland International 2009).

Box 9.1 Impacts of Climate Change on Ecosystem Productivity in Lake Tanganyika, East Africa

Lake Tanganyika has historically supported a highly productive pelagic fishery that provides 25 percent to 40 percent of the animal protein to populations in surrounding countries. Since the beginning of the 20th century, a rise in surface water temperatures has increased the stability of the water column. A regional decrease in wind velocity has further contributed to reduced mixing, decreasing deep-water nutrient upwelling and entrainment in surface waters, thus leading to reduced productivity. Carbon isotope records from sediment cores suggest that primary productivity may have decreased by about 20 percent, implying a roughly 30 percent decrease in fish yields.

Source: O'Reilly *et al.* 2003, Nyong 2005.

Impact on Individual Species

Changes in annual rainfall (particularly decreases) are likely to affect the distribution of a number of species, shift entire ecological zones and could lead to an overall reduction in ecological productivity (net ecosystem production/carbon sequestration) in Africa (Boko *et al.* 2007). Predicted rises in temperature may present a threat to species that have low tolerance to fluctuations in temperature or humidity, and many endemic and/or restricted-range species in the hotspot could be impacted (Laurence *et al.* 2011), with significant species extinctions a

and Phillips 2004), provided these are not offset by water limitations, deforestation or fire regimes.

possibility.[68] Reptiles and amphibians are considered to be at particular risk from warming and drying trends due to their low tolerance of thermal changes, and in the case of most amphibians, their need for moist environments (UNEP-WCMC 2009). There is particular concern for montane-zone specialist species, which generally have limited options in terms of shifting to new, suitable ranges, e.g., mountain gorillas (AWF/IGCP/EcoAdapt 2010), and many of the hotspot mountains contain isolated plant populations with no possibility of migration. Populations of many montane species are expected to fall as they shift upward in altitude due to temperature increases, and species may disappear completely if they are unable to shift any farther in elevation (UNEP-WCMC 2009, Laurence *et al.* 2011).

There is already anecdotal evidence of shifts in behavior of some species in response to climate change. In the Ethiopian Highlands, for instance, gelada baboons (*Theropithecus gelada*) are reported to spend more time at higher elevations in response to drying of their current upland grassland habitat in the Simien Mountains. Other research undertaken jointly between BirdLife International, the Royal Society for the Protection of Birds (UK), Durham University (UK) and other partners on endemic birds in the Albertine Rift indicates that all 14 of the species studied are at severe risk from climate change impacts, including species whose current and predicted future ranges are not likely to overlap (so habitat connectivity and dispersal are issues). In addition, the distributions of all 14 species are likely to shift altitudinally, on average, rising by 350 meters to 2,085 meters (BirdLife International *undated*).[69] Unfortunately, knowledge on which to develop accurate models to predict the potential speed and magnitude of shifts in climate conditions and their impacts on biodiversity over the hotspot area is still rudimentary, and more research is needed.

However, a recent study of species richness of breeding birds in Kenya under various climate-change scenarios (Kissling *et al.* 2010) showed different results according to the response time of woody plants to climate change. Forecasts that assumed a strongly lagged woody plant response to climate change showed reduced bird species richness. This suggests that, given the slow response time of woody plant distributions to climate change, current estimates of future biodiversity of many animal taxa may be both biased and too optimistic. Another recent modelling study, of plant species in the southern Ethiopian Highlands (Kreyling *et al.* 2010), found that altitudinal contractions and mountaintop extinctions will potentially become important when warming exceeds 3.5 degrees Celsius and that the mean area per species is likely to decline by 55 percent for the A2 emissions scenario (more than 4.2 degrees Celsius until 2100) because of the physical shape of the mountains. Novel problems facing conservation of the flora of the mountains identified by the study included attrition by lowland forms (the net loss of species richness because of upward range shifts in the absence of new species arriving) and range-shift gaps (the absence of an overlap between future and current altitudinal ranges already under mild warming scenarios).

Climate change also has the potential to alter migratory routes (and timings) of species that track

[68] Although there are no figures for the hotspot itself, some estimates have been made for other regions or the whole of Africa, which may be indicative. One study has predicted that 10 to 15 percent of species in Africa would fall within the IUCN Critically Endangered or Extinct categories by 2050, increasing to 25 to 40 percent by 2080, assuming no migration (Thuiller *et al.* 2006). If migration is assumed to take place, losses would be less extreme, with these proportions dropping to approximately 10 to 20 percent by 2080. Given that not all species will be able to migrate, the true figure is likely to be between these two extremes, although many of the hotspot's montane species have low migration abilities.

[69] "Climate Change in Africa: What is BirdLife International doing about it?" See www.africa-climate-exchange.org/.

seasonal changes in vegetation or fruiting (such as herbivores and frugivores) or use seasonal wetlands (such as migratory birds as habitats along their migration routes change or are lost, necessitating creation of new corridors of habitat to accommodate these shifts).[70] This may have the additional impact of increasing conflicts between people and wildlife, such as elephants, particularly in areas where rainfall is low (Thirgood *et al*. 2004).[71]

Impact on Invasive Species

Many invasive species have been shown to be highly adaptive to variable climatic conditions, and these could pose a significant threat to ecosystems and biodiversity as climate changes across the hotspot (Sala *et al*. 2000, Malcolm *et al.* 2002, Gaston *et al*. 2003). Due to its climate-sensitive native fauna, East Africa may be particularly vulnerable to exotic and invasive species colonization (WWF 2006).

Other possible impacts on African biodiversity have been identified (WWF 2006) and include:

- Changes in the intensity or duration of the rainy versus dry seasons that could change relative breeding rates of flora and fauna and, hence, genetic structures in local populations;[72]
- Large changes in ecosystem composition and function because of regional climate change would have cascading effects on species diversity;
- Species ranges that will probably not shift in a cohesive manner and are likely to become more fragmented as they shift in response to changing climate;
- Changes in plant composition will also have an impact on ecosystem resilience; less diverse systems can be more sensitive to precipitation fluctuations. For instance, savanna plant communities show higher sensitivity to precipitation fluctuations when compared with plant communities with a mix of herbaceous, shrub and tree species that support a higher diversity of species;
- A reduction in the range of a species is likely to lead to a rapid decline in population size, which could be exacerbated if climate change restricts the range of a species to just a few key sites and an extreme weather event occurs, thus driving up extinction rates even more.

Impact on Key Biodiversity Areas and Protected Areas

The impact of climate change on key biodiversity areas in Africa has been examined for Important Bird Areas (IBAs) (see Box 9.2).

[70] Typical mammal migrations involve regular movement between dry-season and wet-season grazing areas, and are therefore climate sensitive. The latest IPCC report notes the possibility of losses of 10 to 20 percent in African mammalian species by 2080 even under the scenario of unlimited migration (Boko *et al* 2007).

[71] Land-use patterns in Africa can also prevent animals from changing their migratory routes. For example, park boundary fences have been demonstrated to disrupt migratory journeys, leading to a population decline in wildebeests (Whyte and Joubert 1988).

[72] For example, in African elephants (*Loxodonta africana*) breeding is year-round, but dominant males mate in the wet season and subordinate males breed in the dry season. Subsequently, a change in the intensity or duration of the rainy versus drought seasons could change relative breeding rates and, hence, genetic structures in these populations (Poole 1989, Rubenstein 1992).

Networks of protected areas are a cornerstone of current conservation strategies across the hotspot but are fixed in space and time, and the continuing effectiveness of protected area networks under projected 21st- century climate change is uncertain. Shifts in species' distributions could mean that some of these areas will cease to afford protection to those species for which they were originally established (for birds, see Hole *et al.* 2011), and strategies for future designations of protected areas in the hotspot will need to include projections of future climate change and corresponding changes in the geographic range of plant and animal species to ensure adequate protection. Well-managed terrestrial protected areas can improve the state of biodiversity and increase its resilience to climate change and other disturbance and therefore need to be integral parts of any adaptation strategy (Day 2009).

Box 9.2. The Impact of Climate Change on the IBA Network

A continent-wide study on the impact of climate change on the network of IBAs found that between 88 and 92 percent of priority species (i.e. those species with small range extents, restricted to a particular biome, or that are globally threatened) retained suitable climate space within one or more IBA. However, although the African IBA network is extensive and covers a large variety of landscapes across the continent, many IBAs do not have any formal protected status (although most protected areas also qualify as IBAs) (Fishpool and Evans 2001). Species turnover across the continent's IBA network is likely to vary regionally and will be substantial at many sites (more than 50 percent turnover at 42 percent of IBAs by 2085 for priority species). Turnover of the Eastern Afromontane Hotspot species within IBAs is projected to vary widely, from 0 to 100 percent, depending on locality, reflecting the specific climatic tolerances of individual species and the wide variability in topographic complexity within individual IBAs. Hence, while the avian communities of some IBAs are projected to remain relatively stable, others will see potentially dramatic changes, with as yet largely unknown ramifications for ecosystem stability and sustained delivery of ecosystem services. Broadly speaking, species of the Afrotropical Highlands biome are on average projected to be lost from around 40 percent of IBAs in which they are currently projected to occur.

Source: Hole *et al.* 2009.

Many of the 310 key biodiversity areas identified for this hotspot are at risk due to climate change. Areas at high elevations, such as the peaks of the Virungas, are likely to be severely impacted by climate change, as it will be difficult or impossible for species living in these mountain areas to migrate upward in elevation. Similarly, species within key biodiversity areas surrounded by agricultural land also face a barrier to dispersal and migration. The creation of altitudinal corridors of suitable habitat is therefore of obvious importance. Corridors that link montane protected areas and key biodiversity areas across lowland regions are also considered a potentially important measure in facilitating adaptation to climate change, but they are problematic for much of the hotspot region, where human population densities are already high and demand for land intense (Chapter 12).[73]

[73] See Heller and Zavaleta (2009) for review of biodiversity management in the face of climate change.

Impact on Ecosystem Services and Their Importance in Relation to Climate Change

Ecosystem goods and services based on biodiversity are critical for the survival of human populations. Consequently, loss of natural habitats rich in biodiversity that provide key services for people can result in a reduced potential for human development and economic prosperity (IPCC 2001, 2007).

Given the heavy dependence of the hotspot's human populations, particularly poorer rural populations, on natural resources and ecosystem services, many communities are vulnerable to a loss of service provision due to the impacts of climate change. These losses have the potential to further reinforce poverty (IPCC 2001, 2007; Gitay *et al.* 2002; Reid *et al*. 2004).

One important ecosystem service that is likely to be particularly impacted by climate change is the provision of clean water for drinking, generation of electricity, and use in irrigation and industry. Climate change is predicted to change rainfall patterns across the hotspot, although the impact on water resources is not expected to be equal in all areas (see above). Many of the hotspot areas, particularly the Arabian Peninsula and Ethiopian Highlands, are likely to suffer from more frequent and severe droughts and increased desertification in the region, and are already facing a water shortage (see Chapter 5).[74]

Yemen is particularly vulnerable to impacts from climate change on its water resources and is perhaps the country most subject to shortages of water supplies among the hotspot countries (see Box 9.3). Decreased rainfall would further negatively impact agricultural production and create potentially widespread food shortages, as well as reduce the quality and quantity of water available for domestic and industrial use, and limit hydropower production. Farther south and close to the coast, the predictions are for elevated rainfall, which may improve water supply and electricity generation potential in some countries, unless these positive changes in rainfall are offset by land-use changes and increased evaporation.

Much of the hotspot includes important water catchments that provide water for both local communities and those well beyond the hotspot boundaries. For instance, access to water in the Nile Basin countries, particularly Egypt and Sudan, is largely dependent on runoff from the Ethiopian Highlands (source of the Blue Nile), which is sensitive to variations in rainfall. Historically, there have been tensions between upstream and downstream countries that share the Nile over the use of its waters, and competition and conflicts could increase if flows are reduced in future (Eriksen *et al.* 2008). In addition, a decrease in runoff could threaten globally important wetlands occurring downstream.

Floods are also likely to become more common in the hotspot, particularly at the lower elevations, in part because some regions will experience higher rainfalls, but even in drier regions there is likely to be a higher frequency of more intense downpours, which may create flooding. This will lead to increased direct human mortality from drowning and mudslides and

[74] With the present population trends and patterns of water use, many African countries will exceed the limits of their economically usable water resources before 2025, with an estimated 480 million people then facing either water scarcity or stress, even in the absence of climate change (Ashton 2002).

damage to crops and livestock and infrastructure (roads, dams, power generation), as well as demands on health and social systems (Conway 2009). Prolonged droughts and/or floods are often particularly severe during El Niño events (Mendelsohn *et al*. 2000).

Land cover changes reduce ecosystem services and may exacerbate vulnerability to climate change, although the link is not well studied. Some initial evidence suggests that cloud forests above 2,000 meters produce more water than they consume (due to fog and cloud), but noncloud forests may lose more that they contribute to downstream supplies through evapotranspiration. However, the hotspot's montane forests do regulate water flow, including, importantly, maintaining water supplies during the dry seasons (N. Burgess *pers. comm.*).

Box 9.3 Climate Change, Water Availability, Agriculture and Poverty in Yemen

Yemen is particularly vulnerable to impacts from climate change on its water resources, and already has a growing acute and chronic water shortage, with demand outstripping supply and ground water abstraction reaching up to four to six times the available supplies in some basins. Consequently it is not surprising that in some important cities, such as Taiz, running water is already available only a few hours every other week. In the capital, Sanaa, and other urban centers, aquifers may be fully exhausted in a few decades. Both irrigated and rain-fed areas, each covering 50 percent of the land area, are vulnerable to climate change. Irrigated agriculture is threatened by groundwater depletion and spreading of khat plantations, and rain-fed agriculture is dwindling due to flood and drought extremes. Excessive floods have resulted in soil erosion, damages to agricultural infrastructure and losses to the rural economy, while drought negatively affects agricultural production, lowers farmers' incomes and reduces groundwater recharge. This is coupled with low-quality seeds and primitive agricultural practices.

Irrigated agriculture uses about 90 percent of total water resources, and khat is consuming about 40 percent of this scarce, precious resource. If groundwater abstraction continues at the same rate (two and a half times the rate of natural recharge) people living in the highlands (65 percent of total population) will be forced to leave their homes, which could create an economic crisis and increasing social unrest in the country. In addition, more than 90 percent of the households are net food buyers, even in rural areas, and food price hikes will have a direct consequence on malnutrition. (Yemen already has the second highest child malnutrition rate in the world at 50 percent.) Under a pessimistic climatic change scenario, with no adaptation action, prices will continue to rise and food insecurity will push several million people below the poverty line, with direct consequences on health and malnutrition. The livestock sector, which plays a critical role in food security strategies, will also likely be adversely impacted by climate change as a consequence of changes in pasture productivity, nomadic livestock patterns and increased disease burdens.

Source: Adapted from World Bank 2007b, 2010, Elasha 2010.

Impacts on Human Health and Livelihoods

Climate change-driven impacts on biological systems, such as those mentioned above, will pose major threats to human livelihoods, health and economies in the hotspot countries, both directly and through complex interactions between drivers such as population growth, globalization, conflicts and disease, with small economies being especially vulnerable (Stern 2006, Boko *et al.* 2007, UNEP 2008, AWF 2009). People will be impacted directly by a growing number and frequency of extreme climatic events including floods, droughts and storms, as well as indirectly

by the negative impacts of biodiversity losses and degraded ecosystem services.[75] Climate change is expected to exacerbate existing risks such as water stress and the spread and prevalence of certain diseases, and increase livelihoods' vulnerability (especially for those dependent on agriculture) with increased food insecurity (for review, see Erikson *et al.* 2008). The loss of species and biodiversity will have dramatic impacts on key economic sectors including agriculture, fisheries and tourism.

Vulnerability to Climate Change

Human populations within parts of the hotspot are already vulnerable to climate change (see Box 9.4), although vulnerability is differential and context-specific, depending on country, geographic location, sector, social factors, current climate, and access to alternative livelihoods and support. For example, the drought-prone areas of Zimbabwe, Sudan, Eritrea and Ethiopia are likely to be more vulnerable to climate change than the more humid areas of Tanzania, Rwanda or Burundi.

Box 9.4 Vulnerability of Human Societies in Hotspot Countries to Climate Change

- Most hotspot countries are highly dependent on natural resources and their agricultural sector for food, employment, incomes, tax revenues and exports. Changes in weather conditions that damage the agricultural sector will thus have a major impact on incomes and livelihoods.
- Many farming units are based on low levels of development with little technological input to their production systems. Most at risk are the rural landless and small and marginal farmers. Also, there is relatively little irrigation in the hotspot countries, and most subsistence farmers rely on natural rainfall, making them highly vulnerable to even quite small changes in rainfall patterns.
- Most people operate at low levels of income with limited reserves and lack formal insurance coverage, and there is a high incidence of poverty, especially among rural populations. Poor countries and poor communities tend to have a higher share of their assets and wealth tied up in natural resources and environmental assets, so anything that damages the natural resource base will clearly damage these countries and communities more.
- Most vulnerable to climate change are the poorest groups, because they live in areas more prone to flooding and droughts, and because they have little capacity to adapt to such shocks.
- Much of the area of hotspot countries, particularly in the north, is classified as dryland, and climate change may bring less rainfall and a shorter growing season, extending such drylands over a larger area. Many parts of hotspot countries are already short of water and that shortage may increase in future.
- The countries are handicapped by poor governance and weak institutions and poorly resourced, with very limited national capacities (financial, institutional and human) to anticipate and respond to the direct and indirect impacts of climate change. So, many people will have to cope on their own, and the "brain drain" of well-qualified people from the region further limits the capacity to deal with climate change impacts. Meanwhile, populations are predicted to increase substantially in the next few decades in most hotspot countries, which will put additional stress on environmental resources.
- Many diseases (and their vectors) that affect humans are endemic in Africa and are strongly affected by fluctuations in temperature and humidity.

Sources: Conway 2009, UNEP 2008.

[75] For instance, floods in Mozambique in 1999-2000 displaced half a million people, and affected more than 12% of the population of the country (United Nations, 2000).

Impacts on Agriculture and Fisheries

Most of the hotspot relies on rain-fed agriculture, which is highly vulnerable to changes in climate variability, seasonal shifts and precipitation patterns, putting rural livelihoods and food security at risk. For instance, rain-fed agriculture in the highlands of Yemen represents more than half of the country's total cultivated area, and one study estimates that climate change could lead to a 50 percent reduction of crop yields for rain-based agricultural crops by 2020[76].

Agricultural production and food security in hotspot countries are likely to be severely compromised by climate change, in particular by damaging high temperatures and a greater incidence of drought (Conway 2009), exacerbated by other constraints such as poor soil fertility, pests, crop diseases, absent or poor irrigation systems and a lack of access to inputs and improved seeds.[77] As a result, there is likely to be a decrease in the area suitable for agriculture and reduced agricultural yields through a shortened growing season, drought, floods and increased erosion, which could adversely affect food security and exacerbate malnutrition in these regions (Easterling *et al.* 2007, Lobell *et al.* 2008, Thornton *et al*. 2006). Semiarid and arid areas, smaller farmers, people making a living in marginal areas and without access to irrigation technology, and those unable to develop alternative livelihoods are likely to be the most severely impacted (Eriksen *et al.* 2008, Christensen *et al.* 2007).

Many of the current crops in Africa are grown close to their limits of thermal tolerance, and yields from rain-fed agriculture could be reduced by up to 50 percent (Boko *et al*. 2007). Recent research suggests that a rise of just 1 degree Celsius would devastate yields from 75 percent of Africa's vital maize crops (the time crops are exposed to temperatures above 30 degrees Celsius being the most important variable) (Lobell *et al.* 2011). Other studies have found similar trends for maize (for example, Stige *et al*. 2006, Thornton *et al*. 2011), as well as for wheat production, which is predicted to disappear from Africa by the 2080s (Fischer *et al.* 2005), and coffee (for example, in Uganda, see Hepworth and Goulden 2008). Consequently, more prolonged high temperatures and periods of drought will force large regions of marginal agriculture out of production (Christensen *et al.* 2007).[78] Pastoralism will also be hard hit by climate change impacts (UN OCHA Pastoralist Communication Initiative 2007, Eriksen *et al.* 2008), particularly by desertification, prolonged droughts and increased competition for resources. However, in some parts of East Africa, such as Uganda, commercial ranching may marginally improve in some places as the result of increased rainfall in the short term, whereas communal ranching might be disadvantaged because of increased erosion and the incursion of woody weeds (Eriksen *et al*. 2008).

Given the above, the supply of water and nutrients provided by the rivers in the hotspot's forested mountain areas to lower, drier neighboring regions becomes particularly crucial, and the protection and maintenance of these hotspot areas and their ecological services needs to be a key

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76 According to the World Bank and GEF, In description of project *MENARID - Adaptation to Climate Change Using Agrobiodiversity Resources in the Rainfed Highlands of Yemen*, accessible on the Adaptation learning mechanism (www.adaptationlearning.net)

77 According to the UN Food and Agriculture Organization, the number of African food crises per year tripled from the 1980s to 2000s (FAO 2004). Drought-diminished water supplies reduce crop productivity and have resulted in widespread famine in East Africa.

77 However, the picture is not straightforward, and not all changes in climate and climate variability will necessarily have negative impacts. Thornton et al. (2006), for example, found that the growing seasons in certain areas (for example, parts of the Ethiopian Highlands and parts of southern Africa such as Mozambique) may lengthen under climate change, due to a combination of increased temperature and rainfall changes.

feature in any national adaptation plan. However, because the mountain regions of the hotspot will be less impacted by climate change (depending on the temperature rise) than many surrounding lowland areas, it is likely that farmers from drier lowland areas will seek to move into the wetter mountains and agricultural production will shift to higher altitude areas that are cooler and more suitable for crops (Turner *et al.* 2010, Maeda *et al.* 2011).[79] This will increase pressure on remaining forests and other natural habitats (and protected areas) within the hotspot.

Climate change may also negatively impact the region's fisheries. Any reductions in water level or changes in the ecology, species composition, temperature, chemical composition and productivity in lake ecosystems resulting from climate change are also likely to have significant negative effects on the shallow lake fisheries and fish yields of the African Great Lakes. Local livelihoods around Lake Tanganyika, for instance, depend heavily on fishing and the processing and trading of fish. Therefore, any negative impacts of climate change on the Lake Tanganyika fishery will also have an impact on local livelihoods and exacerbate poverty (see Box 9.6).

Box 9.5. Likely Impact of Climate Change on Regional Fisheries

An increase in mean temperature may affect the formation and maintenance of stratification in the African Great Lakes and the mixing between the layers, which can affect fish productivity (Fick *et al.* 2005). Moderate amounts of mixing allow nutrient influx into the layer of water above the thermocline and benefit fisheries' productivity without introducing high concentrations of toxic hydrogen sulfide from deeper waters (Fick *et al.* 2005). This is demonstrated at the stratified northern end of Lake Tanganyika, which supports a less productive fishery than the well-mixed southern arm and the main basins (Vuorinen *et al*. 1999). A comparative study of historical and current levels of primary production in the north end of Lake Tanganyika indicated that current levels are much lower as a result of strengthened stratification (Verburg *et al*. 2003). Recent changes in the limnology of Lake Victoria have also negatively affected its fishery. In the 1980s decreased turnover in the lake led to low levels of dissolved oxygen and, consequently, fish kills. Stratification in this lake now appears to be permanent (Kaufman *et al.* 1996).

Source: WWF 2006.

Furthermore, research has shown that other stresses on fisheries such as overfishing, pollution and reduction in biodiversity may reduce the resilience of lake ecosystems to climate change and increase the potential of a collapse in fisheries (Goulden 2006). However, the expansion of aquaculture has been suggested as an adaptation to potential negative impacts of climate change on fisheries (as well as to meeting the increasing demands for fish and the impact of overfishing).

Health Impacts

The expected health impacts of climate change across the hotspot are predominately negative and can be classified into two categories: direct effects mainly resulting from exposure to extreme weather (such as heat stress and risk of drowning during floods); and indirect effects through influences on the agricultural and freshwater systems that provide food and water (such

[79] Indeed this is already being experienced in the Horn of Africa, with many "climate change refugees" from Somalia crossing the Gulf of Aden to Yemen in recent years.

Box 9.6. Increase in Mosquitoes and Malaria with Climate Change in East Africa

The temperature in the East Africa highlands has risen by 0.5 degrees Celsius since 1980—much faster than the global average—and this has been accompanied by a sharp increase in mosquito populations. Increased rainfall from September to November combined with increased warmth may accelerate mosquito larval development. One mosquito species that carries malaria—*Anopheles arabiensis*—has been found for the first time in the central highlands of Kenya (Chen *et al*. 2006), and microclimate change due to land-use changes, such as swamp reclamation for agricultural use and deforestation in the highlands of western Kenya, suggest that suitable conditions for the survival of *Anopheles gambiae* larvae are being created and therefore the risk of malaria is increasing (Munga *et al*. 2006). Increased droughts may also favor the spread of malaria in some areas in the short term (IPPC 2007). In general, the range of malaria-carrying mosquitoes and malaria is expected to extend into higher elevations, particularly above 1,000 meters (Tanser *et al*. 2003). While some of this may be due to other factors such as poor drug treatment implementation and drug resistance, there is also a strong correlation with climate change. However, there is still much uncertainty about the potential impact of climate change on malaria at local and global scales, because of the paucity of concurrent detailed historical observations of climate and malaria, the complexity of malaria disease dynamics, and the importance of nonclimatic factors, including socioeconomic development, immunity and drug resistance, in determining infection and infection outcomes.

Sources: Conway 2009 and Matthews *et al.* 2007.

as malnutrition resulting from interruptions in agricultural production and food distribution), and on the vectors and pathogens that cause infectious diseases. In the latter case, reproduction and survival rates of infectious agents (such as protozoa, bacteria and viruses) and their associated vector organisms (such as mosquitoes, ticks and sand flies) are strongly affected by fluctuations in temperature and humidity.[80] For instance, Rift Valley fever outbreaks are positively correlated with El Niño events (Patz *et al*. 2005). Climate change is expected to exacerbate the occurrence and intensity of disease outbreaks and may increase the spread of diseases in some areas.

There is particular concern about the possible increased spread of malaria, dengue fever and water-borne diseases such as diarrhea and cholera in Africa, with the occurrence of disease where it has previously been absent (Boko *et al.* 2007). Indeed, there have been resurgences of malaria in the highlands of East Africa in recent years, and highland areas in Kenya, Burundi, Rwanda and Ethiopia that have previously been free of malaria are predicted to fall victim to the *Anopheles* mosquito by 2080 (see Box 9.7).[81]

Economic Impact of Climate Change

Almost all sectors of the economies of the hotspot countries are expected to be at risk from the negative impacts of climate change (Boko *et al*. 2007, Elasha 2010). A modeling study of the relationship between mean economic costs and mean temperature for Africa (Clements 2009) predicts economic costs will be equivalent to 1.7 percent of Africa's GDP, assuming a mean average global temperature rise of 1.5 degrees Celsius by 2040, which will then rise to the equivalent of 3.4 percent of Africa's GDP by 2060, as the mean temperature rises by 2.2 degrees

[80] Temperature affects the development rates of vectors and parasites, while rainfall affects the availability of mosquito breeding sites (Zhou *et al.* 2004, Craig *et al*, 2004, Patz *et al.* 2005).
[81] Few *et al.* (2004) provide a comprehensive review of the effects of extreme weather events on health, disease and hygiene as well as potential adaptation responses.

Celsius. By the end of the century, with a mean temperature rise of 4.1 degrees Celsius, the economic costs have been estimated as equivalent to just less than 10 percent of the continent's GDP. While detailed figures are not available for the economies of the hotspot countries, they are heavily tied to agriculture and (in some cases) tourism, and climate change is likely to have a significant economic impact on these sectors (UNEP 2008).

Tourism, for instance, is a major revenue earner for many hotspot countries and is predominantly based around the natural and cultural heritage that coexists in the region (Ngugi *et al*. 2003). Protected areas are particularly important as sources of revenue for the tourism sector in some parts of the hotspot, such as in the Virungas; so if climate change impacts these sites it may significantly impact tourism revenue. The maintenance of such key high-value biodiversity and protected areas therefore needs to be targeted as part of adaptation strategies and efforts to maintain and diversify local livelihoods.[82] Although no data exist for hotspot sites, the lost value for protected areas associated with the projected impacts of climate change in Africa, based on willingness to pay, has been estimated at $74.5 million by 2100 (Velarde *et al.* 2005).

The economic and social consequences of climate change on the hotspot, including loss of infrastructure, reduced tourism, increased flooding and storms, health risks and agricultural damage, underscore the importance of protecting biodiversity and maintaining ecosystem services in the region as part of adaptation strategies that hotspot countries need to develop in the face of climate change (UNEP 2008, Day 2009).

9.5 Developing a Climate Change Response Strategy for Biodiversity and Livelihoods

A stepwise process for developing an appropriate climate change adaptation response for managing biodiversity and protected areas is described below (based on Pressey *et al.* 2007, Mawdsley *et al*. 2009, Heller and Zavaleta 2008, and Hole *et al.* 2011).

Ecosystem-Based Adaptation

An ecosystem-based approach to adaptation may be appropriate.[83] The approach integrates the conservation of biodiversity into a strategy that simultaneously aims to assist people to adapt to the adverse impacts of climate change through the provision of a resilient supply of ecosystem services (Devisscher 2010). Furthermore, it can have numerous benefits, ranging from cost-efficient flood attenuation, long-term access to critical resources and climate change mitigation. As it often requires the additional maintenance (and restoration) of indigenous ecosystems, it often forms a REDD+ activity in its own right and may therefore be eligible for GHG emission reduction payments. Payments for REDD+ activities are explored further in the next section.

[82] For instance, in southern Africa, the tourism industry was been valued at $ 3.6 billion in 2000. However, 25 to 40 percent of animal species in national parks in sub-Saharan Africa are expected to become endangered as a result of climate change (Boko *et al.* 2007, Christensen *et al.* 2007). Therefore, the National Climate Change Response Strategy of the government of South Africa includes preventive interventions to protect plant, animal and marine biodiversity in order to preserve the biodiversity and maintain the tourism income (Department of Environmental Affairs and Tourism, 2004)

[83] Ecosystem-based adaptation seeks to maintain ecosystem functioning at the landscape level while at the same time allowing multifunctional land use and multifunction benefits (Devisscher 2010).

Ecosystem-based adaptation activities need not necessarily be constrained to protected areas or forest vegetation types. The approach is equally applicable to populated landscapes that are being farmed to a certain degree as well as grassland, savanna or wetland systems. An initial investigation into the avoided degradation of soil carbon stocks in the high-altitude, species-rich grasslands of the Drakensburg Mountains in South Africa indicated that there is good opportunity to reduce atmospheric GHG, maintain biodiversity, and regulate water flow and sedimentation through the application of an ecosystem-based adaptation approach (Knowles *et al.* 2008).

A variety of innovative conservation strategies would be required to implement an ecosystem-based adaptation approach, particularly in landscapes that are populated and converted to a certain degree. Such strategies have been pioneered elsewhere in the form of community-based natural resource management (CBNRM, Frost 1996, Kowero *et al.* 2003), biodiversity stewardship (www.stewardship.co.za), and participatory forest management and village forest reserves (Zahabu *et al.* 2007, Blomley *et al.* 2008, Burgess *et al.* 2010). Such programs focus on local management of indigenous landscapes that are being used by humans, but where land management priorities are realigned to include the long-term maintenance of biodiversity and ecosystem structure and function. The foreseen outcome of a successful program would be the creation and maintenance of intact indigenous areas at a landscape scale outside formal conservation. It may be wise to comprehensively review past community-based natural resource management and similar programs to capitalize on hard-earned experience and lessons.

Table 9.1. List of Potential Climate Change Impacts on Human Livelihoods and Potential Adaptation Responses

Climate Change Impact	Adaptation Response
Water - A decrease in surface runoff and subsurface water availability is predicted. - A reduction in stream flow - An increase in flooding and drought events leading to increased erosion and sedimentation	- Improved catchment management—REDD+ and rehabilitation - Improved water resource management - Prevention of upstream over-extraction and damming of water courses
Household Energy - Reduction of the availability of fuelwood, strengthened by decrease in water availability and erosion	- Improved forest and woodland management - Use of energy-efficient stoves and alternative sources of energy such as biogas generated from manure
Agriculture - Increased desertification - Decrease in staple cereal crop yields - Drought and decrease in water availability for subsistence and commercial farming - Land degradation due to increased drought and other extreme events such as floods	- Improved water harvesting for subsistence agriculture - Drought-resistant crop cultivars - Improved grazing-management systems - Livestock breeds that are adapted to degraded conditions - Improved irrigation methods such as drip irrigation - Restoration of catchments and riparian vegetation
Biodiversity and Conservation - Species range shift and reduction - Contraction of Afromontane habitat - Increased seasonality	- Evaluation of effectiveness of current reserve network - Identification of new key conservation areas and planning to secure these areas - Identification of rare and endangered species particularly vulnerable to climate change and development of species conservation plans

Health - Increased prevalence of diseases, in particular malaria, at higher elevation - Exacerbation of health problems related to sanitation, due to increase in flooding and heavy rain events	- Improvement of public health systems, including prevention

9.6 Policy Responses and the Role of Governments, NGOs and Civil Society Organizations

Due to the complex ways in which climate change affects natural systems and human societies, adaptation responses need to occur at a variety of scales. Following earlier, smaller project-scale initiatives, which were mainly led by development and conservation NGOs, there is growing realization that if land-use-based climate change adaptation and mitigation initiatives are to be sustainable over the long term, they need to be supported by national policy, legislation and land-use planning (Boko *et al.* 2007, Winkler *et al.* 2007). Such an approach could be piloted in the hotspot. A national-scale approach is therefore being taken to the implementation of climate change adaptation and to mitigation activities including the creation of supporting policy and institutional and human capacity. In terms of adaptation, the UNFCCC is supporting the development of national adaptation programs of action (NAPAs) that provide a means for some developing countries to identify and develop responses to immediate needs to adapt to climate change. A NAPA has already been compiled for the majority of countries within the hotspot (see Table 9.2), and a brief description of the key outcomes of each country's NAPA together with the contact details of each country's climate change focal point is included in Appendix 11.[84]

Table 9.2. Status of Hotspot Countries Regarding Kyoto Protocol, National Action Plans for Adaptation (NAPA), and UN REDD and the World Bank Forest Carbon Partnership Facility (FCPF)

Region	Country	Kyoto status	NAPA (year)	UN REDD	World Bank FCPF
Arabian	Saudi Arabia	Ratification	-	-	-
	Yemen	Ratification	2009	-	-
Northern	Sudan	Ratification	2007	Observer status	-
	Eritrea	Ratification	2007	-	-
	Ethiopia	Ratification	2008	-	-
	Somalia	Ratification	-	-	-
Central	Democratic Republic of the Congo	Ratification	2006	Pilot country	Partner
	Kenya	Ratification	-	Observer status	Partner
	Burundi	Ratification	2007	-	-
	Tanzania	Ratification	2007	Pilot country	Partner
	Uganda	Ratification	2007	-	Partner
	Rwanda	Ratification	2007	-	-
Southern Africa	Zimbabwe	Ratification	-	-	-
	Malawi	Ratification	2006	-	-
	Mozambique	Ratification	2008	-	Partner
	Zambia	Ratification	2007	Pilot country	-

Note: at the time of Profiling (2011), recently independent South Sudan was not party to the UNFCCC nor to any other related global climate change initiatives.

[84] See unfccc.int/national_reports/napa/items/2719.php.

The UNDP African Adaptation Program funded by the Japanese government (www.undp-adaptation.org/africaprogram) and the Southern African Regional Climate Change Program (www.rccp.org.za) are national-scale adaptation and mitigation programs, with project-scale initiatives that are mainly led by international NGOs. The UNDP African Adaptation Program is financing the development of planning, institutional, policy and knowledge capacity in Ethiopia, Kenya, Rwanda, Tanzania, Malawi, Mozambique and Zambia. This program has three broad aims: climate-proofing development, delivering adaptation solutions and financing adaptation. The program has a budget of $92.1 million over three years. It would be appropriate for CEPF to undertake a comprehensive assessment of existing and planned initiatives in particular areas of interest within the hotspot to see where additional climate change activities are required and where investment will be most effective.

In 2007 the European Commission initiated the Global Climate Change Alliance (GCCA, www.gcca.eu), which aims to increase dialogue, as well as the amount of cooperation and support on climate change issues that Europe provides to the developing countries most vulnerable to climate change. Among the main activities carried out by the GCCA are financial agreements with selected beneficiary countries, regional dialogue events to intensify cooperation on climate change, and technical assistance such as project development and capacity-building activities. In the hotspot, two countries benefit from GCCA: Tanzania (on eco-villages and natural resources management) and Rwanda (land use), while additional programs are being finalized in Mozambique and Ethiopia (support to government capacities, land use).
It should be noted that the list of project-scale initiatives is by no means exhaustive but is based on those readily available on the Internet. In addition, the Katoomba Group Web portal (www.katoombagroup.org) has a number of project- and national-scale ecosystem service projects listed.

Despite the crucial supporting role of government, there is still a clear need for NGOs and civil society to develop and implement project-scale activities. First, host-country governments may not have the capacity to implement adaptation and mitigation responses at the scale required throughout all sectors of the economy. Second, early project-scale activities provide valuable lessons and insights into how national policy and implementation structures should be appropriately structured. There is good reason for NGOs and civil society organizations to partner with governments on responding to climate change. The key, however, is to truly partner with and complement current initiatives in an efficient manner and not replicate efforts. In addition to climate change adaptation activities, the implementation of REDD+ at a national scale may play an important role in the adaptation of the hotspot to climate change, particularly with regard to the maintenance of indigenous (especially forest) landscapes that allow species to shift their geographical range and the sustainable supply of ecosystem services to surrounding and downstream human economies. The UN REDD program and the World Bank Forest Carbon Partnership Facility (FCPF) are aimed at creating the required capacity, policy and institutional structures for national-scale REDD implementation in countries with significant forest cover (Box 9.7).

Box 9.7. International REDD Programs and Funds in the Hotspot

UN-REDD: The United Nations Collaborative Initiative on REDD in developing countries. The program assists developing countries in preparing and implementing national REDD+ strategies, and builds on the expertise of the FAO, the UNDP and UNEP. There are currently 12 participants, and the program has strong ties with the GEF and FCPF. www.un-redd.org/

World Bank Forest Carbon Partnership Facility: The FCPF assists tropical and subtropical forest countries to develop the systems and policies for REDD+ and provides them with performance-based payments for emission reductions. The FCPF complements the UNFCCC negotiations on REDD+ by demonstrating how REDD+ can be applied at the country level. There are currently 37 participating countries. The FCPF became operational in 2008. www.forestcarbonpartnership.org/fcp/

Norwegian International Climate and Forest Initiative: The initiative was started in 2007 and is aimed at developing REDD programs in African countries. Most activities are coordinated by the UN and World Bank. Norway is prepared to make 3 billion krone (approximately $550 million) available to committed developing countries for REDD initiatives. www.regjeringen.no/en/dep/md/Selected-topics/climate/the-government-of-norways-international-/what-do-we-finance.html?id=557700

Global Environmental Facility Tropical Forest Account: The GEF will make approximately $1 billion available between 2010 and 2014 for the implementation of sustainable forest management and REDD+ projects. The initial pilot incentive focused on developing frameworks, capacity and strategies in Amazonia, the Congo Basin, Papua New Guinea and Borneo. Other focal areas have been the development of a market mechanism for voluntary emissions reductions in Colombia, and paying specific attention to building capacity for the generation of Verified Emission Reductions from REDD+ pilot projects. www.thegef.org/gef/sites/thegef.org/files/publication/REDD-english.pdf

Within the Eastern Afromontane Hotspot, DRC, Zambia and Tanzania are currently UN REDD program countries, with Kenya and South Sudan being observer countries to the program (www.un-redd.org). DRC, Kenya, Mozambique, Uganda, Tanzania and Ethiopia have been selected as country participants in the FCPF
(www.forestcarbonpartnership.org).

The Potential Cost of Climate Change Adaptation

Adaptation costs may be defined as the "cost of planning, preparing for, facilitating, and implementing adaptation measures, including transition costs" (IPCC 2001). Parry *et al.* (2009) and Devisscher (2010) provide good recent reviews on the nature and magnitude of climate change adaptation funding. Devisscher (2010) in particular focuses on the potential cost of ecosystem-based climate change adaptation measures that are currently being proposed, noting that existing African NAPAs include approximately $100 million for ecosystem-type initiatives. If this estimate is extrapolated to the rest of Africa on a per capita basis, it implies that more than $250 million is required. In terms of the cost of improving the network of protected areas in Africa, it is estimated that $4 billion to $5.5 billion per year is required to enhance the network to adapt to the adverse effects of climate change. Some estimates increase this estimate to $12 billion to $17 billion per year to include wider conservation measures and current, general vulnerability, not just the additional cost of adapting to climate change (Devissher 2010).

However, few direct cost-benefit analyses have been undertaken to date. Whereas the reviews cited above assess expenditure on climate change adaptation measures located in Africa, few assess the direct adaptation benefit including its monetary value versus the cost of implementing

the adaptation measure (the incremental cost compared with a business-as-usual scenario versus the incremental benefit compared with a baseline scenario). Further research is needed to understand the cost of ecosystem-based adaptation actions in the hotspot, for example, the cost of restoring and maintaining high-altitude Afromontane vegetation compared with the downstream adaptation benefits in terms of improved stream flow and sedimentation management and the monetary value thereof.

Given that some form of adaptation to climate change in hardest hit regions is inevitable, research is also urgently needed to assess the cost-effectiveness of ecosystem-based adaptation relative to other adaptation options (for example, hard-engineered options such as irrigation infrastructure). Transparent and robust assessments of each option's direct and indirect costs are required in order to determine the optimal role for ecosystem-based adaptation in any country's overall adaptation portfolio.

9.7 Conclusions and Recommendations

It is clear that climate change is already affecting the biodiversity of the hotspot, its impacts being exacerbated by other proximate threats such as land-use change, particularly deforestation and the increased degradation of indigenous ecosystems. These changes have the potential to profoundly impact the ecosystem services provided by the region's natural capital to human communities and downstream economies.

A certain amount of work has already been undertaken on the impacts of climate change on the biota of the hotspot, the development of land-use-based climate change mitigation and adaptation activities in the region, as well as related initiatives on the management of ecosystem services for adaptation. This has mostly been localized in particular areas such as the Eastern Arc Mountains in Tanzania. In terms of CEPF investing in appropriate responses to climate change in the hotspot, one needs to be cognizant of the number of present and planned project- and national-scale activities. In terms of efficiency and avoiding repetition, it would make good sense to review existing initiatives and complement them when possible.

In addition to investigating sources of funding aimed at climate change adaptation, it may be appropriate to assess payment for climate change mitigation, especially payment for REDD+ and forest rehabilitation as a long-term source of revenue for climate change adaptation and mitigation activities within the Eastern Afromontane Hotspot.

10. ASSESSMENT OF CURRENT CONSERVATION INVESTMENT

10.1 Introduction

This assessment describes the most important investments made during the last five years in biodiversity conservation in the Eastern Afromontane Hotspot. Investments are described that have direct or significant indirect benefits for biodiversity conservation, including those related to livelihoods, ecosystem services and climate change. More than 400 individual projects and bilateral sector support programs that have been or are being implemented in the Eastern Afromontane Hotspot since 2007 have been analyzed, including 222 projects active in 2011 or planned for in the near future. Data have been collected on a large number of donor agencies and recipients (implementers) in the hotspot, including funding streams, themes of investments, amounts of funding, and the species and sites (protected areas), and KBAs that are benefiting from donor-funded interventions. For projects that started before 2007, the total funding amounts have been recalculated to only include the investments that were made since 2007. For investments related to countrywide environmental sector support, protected area systems and climate change adaptation, the total funding amounts have been used, as it was impossible to allocate amounts to the hotspot area/KBAs specifically. For other investments we have tried to specify funding toward the individual Eastern Afromontane Hotspot KBAs, species and corridors as far as possible. To avoid "double counting," we only looked at direct donor contributions and not at cofinancing or leveraging amounts provided by governments and NGOs to specific projects.

Information for this chapter has been derived from various sources, including the national questionnaires for Burundi, DRC, Ethiopia, Kenya, Malawi, Mozambique, Rwanda, Saudi Arabia, Tanzania, Uganda, Yemen and Zimbabwe, as well as consultants' reports, individual requests to key resource people, desk and Web surveys, donors' databases and annual reports when available. Despite this extensive research, the information in this chapter remains incomplete and only serves as an indication of where (both geographically and thematically) conservation investments are currently being made within the Eastern Afromontane Hotspot—and where the funding gaps are.

10.2 Major Sources of Investment in the Hotspot

Even though they are incomplete, the collected data provide a picture of the financial investments made in the hotspot in the last five years. In total, more than $950 million has been tracked to its source and is described in the paragraphs below. This figure represents less than one percent of the global Official Development Aid for the 16 countries concerned[85].

National Government Expenditure

Annual budget information for key government sectors in the 16 countries analyzed, such as the departments of environment, national parks, forestry, natural resources, etc., is hard to come by,

[85] The overall net official development aid to the 16 hotspot countries between 2007 and 2009 (covering three years out of five) was $59.455 million (OECD/WorldBank, "Aid Statistics," www.oecd.org/infobycountry/0,3380,en_2649_34447_1_1_1_1_1,00.html Recipient Aid Charts, accessed June 2011).

let alone information about government investments in Eastern Afromontane Hotspot areas specifically. Additionally, many of these government departments receive significant budget support from external donors, as described in the section below on multilateral and bilateral donors, which may therefore lead to investments being counted twice—first as a funding stream from a bilateral donor to a government, and second as the actual expenditure from the government in the respective country/area. Some indication of government expenditures in the hotspot can be derived by looking at the cofinancing amounts donor agencies put up against external donor investments (most notably for GEF-funded projects); but again, the actual source of the cofinancing streams cannot be traced back, and in some cases the same financing may be used for various projects. Another way of looking at government expenditure at specific KBA sites is, for instance, by calculating income from national park fees; yet again this information has proved to be patchy and, if available, it does not show where these funds are being reinvested. It is highly recommended that more research into this area be carried out, but in the context of this profile (which will define an investment strategy for civil society organizations) national government expenditure is excluded from the analyses in this chapter.

Multilateral and Bilateral Donors

Multilateral Donors

The main multilateral source of investment in the hotspot is the GEF, with at least 41 medium- and full-sized projects implemented and $157.3 million invested in the region since 2007. UNDP is the GEF agency for the majority of these projects (21), followed by the World Bank/IBRD (13), UNEP (3) and IFAD (3). Each of these agencies funds a small number of non-GEF projects as well. Other multilateral donors active in the 16 hotspot countries include the EU and the Africa Development Bank, but information about investments by the first is scarce, while the latter is primarily active in infrastructure projects (Table 10.1).

Table 10.1. Overview of Multilateral Funding in the Eastern Afromontane Hotspot Since 2007

Multilateral Donor	Main Countries and Areas of Intervention in the Eastern Afromontane Hotspot	Total Amount since 2007 (Estimated/USD)
GEF-UNDP	GEF-UNDP supports 21 projects in the hotspot: 19 of them are local/national projects in Burundi, DRC (2), Eritrea, Ethiopia, Kenya (2), Mozambique, Rwanda (2), South Sudan, Tanzania (3), Uganda (4) and Zambia. It also supports two regional projects on Lake Tanganyika and on migratory soaring birds (Middle East and North Africa). GEF areas of intervention in the hotspot include biodiversity, climate change, international waters, land degradation and ecosystem services. Thirteen of the 21 projects have a specific focus on protected areas—in Burundi, DRC, Ethiopia, Kenya, Mozambique, Rwanda, South Sudan, Tanzania, Uganda and Zambia.	$87.5 million
GEF-World Bank/IBRD	GEF-World Bank supports nine projects: seven local/national projects in DRC (3), Ethiopia, Mozambique, Rwanda and Yemen, and two regional projects (one in the Congo Basin countries, including DRC, and one in Zimbabwe/Malawi). The main area of intervention is in biodiversity, including two projects with a focus on climate change (Yemen and DRC), two transboundary site projects (Chimanimani and Nyika), and one on protected area management (DRC). The IBRD supports four projects, all in Uganda, including two on protected area systems and one on primate conservation in Bwindi-Mgahinga.	$38.3 million (World Bank) $15.5 million (IBRD)

GEF-UNEP	GEF-UNEP supports two projects in Uganda that aim to enhance knowledge on payment for ecosystem services (PES) and taxonomy in the country, and one regional project in three countries including Ethiopia (Awash) and Uganda (Budongo), that focuses on combating invasive alien species.	$1.6 million
GEF-Other (AfDB, IFAD)	The Africa Development Bank (AfDB) supports a climate risk management project in Burundi; IFAD runs three GEF projects in Eritrea, Ethiopia (Tana) and Kenya (Mount Kenya) on land degradation and biodiversity loss.	$3.2 million (AfDB) $11.3 million (IFAD)
Other Projects through UNEP, UNDP, Including GEF Small Grants Program	UNEP funds two forest rehabilitation projects in Kenya and one poverty and environment project in Rwanda. The GEF Small Grants Program has provided at least 21 small grants for hotspot sites in Burundi, Ethiopia, Kenya, Malawi, Rwanda, Tanzania, Uganda and Zimbabwe since 2007, mainly involving community-based site conservation, species conservation, tourism development and raising awareness. A site support group in Kenya (KENVO at the Kikuyu Escarpment) won the prestigious UNDP Equator Award in 2008. Other larger projects are being implemented by UNDP national offices across the hotspot but were hard to track down; however five were reported from Kenya, Rwanda and Yemen.	$900,000 (UNEP) $4.8 million (UNDP, including $719,820 for GEF SGP)
Other Projects through African Develop-ment Bank (AfDB)	The Africa Development Bank administers a number of climate change funds including the Congo Basin Forest Fund (filled by the UK and Norwegian governments with $82.5 million each) that pay for projects in DRC. The AfDB also supports a regional integrated management project for Lake Tanganyika ($37 million). Otherwise, its focus is mainly roads, railways and dams.	Estimated project funding in hotspot: $40.8 million
EU	Funding streams consist of the European Development Fund (EDF 9 and 10), EuropeAid (including the Thematic Program for Environment and sustainable management of Natural Resources—ENTRP—such as energy), FP7/CORDIS for research programs, and general budget support to governments. For the analyses in this chapter, 21 national/regional projects have been included that have a direct impact on biodiversity conservation in the hotspot.	Estimated project funding in hotspot: $74 million
Others (CIFOR, WFP, AEWA, AU-IBAR, etc.)	The Centre for International Forestry Research (CIFOR) is involved in a climate change research project in DRC, together with the Canadian International Development Research Centre. The World Food Program (WFP) is implementing a $45 million agricultural/forestry project in Ethiopia that has a large environmental component. The African-Eurasian Waterfowl Agreement (AEWA) supports a small bird project in Ethiopia, and the African Union's Interafrica Bureau for Animal Resources (AU-IBAR) supports a wildlife project in northern Kenya.	Estimated project funding in hotspot: $6 million
Total		**$283.9 million**

Bilateral Agencies

There are many bilateral donors active in the Eastern Afromontane Hotspot, but again, information on the amounts dispersed is hard to come by. An internal evaluation by the Danish International Development Agency (Danida) concedes that: "Although Danish support to the environment began in the 1980s, calculating the level of this support is not straightforward

because of the variety of channels and the difficulties of defining what to include."[86] Nevertheless, donor annual reports (mostly available up to 2009) do make it clear that the main bilateral donors in the region since 2007 are the Scandinavian governments, most critically the governments of Denmark, Finland and Norway. Together these three countries have provided more than $493 million (more than 50 percent of all identified investments in the hotspot) in annual sector support and project grants to the environmental sector in their respective "partner countries," with Ethiopia, Kenya, Mozambique, Tanzania, Uganda and Zambia benefiting most.[87]. Other bilateral donors include the Austrian, Belgian, Canadian, Dutch, British, French, German, Irish, Japanese, Portuguese, Spanish, Swedish and U.S. governments, but none of them appear to be as committed to financing the environment /biodiversity conservation in the hotspot (countries) as the Norwegian, Danish and Finnish governments.[88] Table 10.2 shows the main bilateral donors, the hotspot countries where they have invested, the type of projects they have invested in, and how much they have invested in the region since 2007.

Table 10.2. Overview of Bilateral Funding in the Eastern Afromontane Hotspot Since 2007

Bilateral Donor	Main Countries and Areas of Intervention in the Eastern Afromontane Hotspot	Total Amount since 2007 (Estimated/USD)
Norway	Norway's partner countries are Burundi, DRC, Ethiopia, Malawi, Mozambique, Somalia, South Sudan, Tanzania, Uganda and Zambia. Focal areas include REDD (including a $75 million REDD project in Tanzania), as well as support to the Tanzanian Ministry of Natural Resources and Tourism ($60 million over the last 12 years).	$205.4 sector support $29.7 million project support
Denmark	Denmark's "program countries" include Kenya, Mozambique, Tanzania, Uganda and Zambia. The Danish government provides general government support in forestry management and game resource conservation, as well as various projects on environment and livelihoods (in Kenya, Tanzania and Uganda).	$149.5 million sector support + $2.7 million project support
Finland	Finland's "long-term partner countries" in the hotspot are Ethiopia, Kenya, Mozambique, Tanzania and Zambia. Core areas of support are sustainable forestry and industry, water and the environment; also there are projects on site management (Tanzania, Kenya), poverty reduction (Ethiopia) and climate change (Ethiopia, Kenya and Tanzania).	$71.7 million sector support + $34.3 million project support
Sweden	Sweden's focal countries are Burundi, DRC, Ethiopia, Kenya, Mozambique, Rwanda, Somalia, South Sudan, Tanzania, Uganda, Zambia and Zimbabwe. Focal areas are poverty and environment, but specific investment figures in the hotspot could not be found.	$800,000

[86] Ministry of Foreign Affairs, *Evaluation of Programmatic Approaches to Support for the Environment in Africa 1996-2009* (Copenhagen: Ministry of Foreign Affairs, November 2010).

[87] Of this amount, $426 million is support to government departments and/or the environmental/forestry sectors in general between 2007 and 2009. This includes "Environment and Energy sector support" from Norway, "Special Environmental Assistance" and support through the "Environmental Peace and Stability Fund" from Denmark, and general support to the forestry and environment sectors in selected countries by Finland. While not all of this support will have been spent in the hotspot (but in the hotspot countries), the total amounts of 54 national sectoral support budgets as provided on the respective donor agencies' websites/annual reports have been included for the three years for which data were available to indicate the magnitude of this funding. There may be some overlap with specific projects identified through other channels.

[88] Only a few bilateral donors provide accessible information about their investments on their websites. Much of the information presented in Table 10.2 (and elsewhere in this chapter) is therefore derived from the questionnaires and shows (anecdotal) information on selected projects instead of complete overviews of all bilateral investments in the hotspot. Considerable efforts have been made to verify and validate data, but this has not always been possible.

Austria	The Austrian Development Cooperation focuses on water supply and sanitation work but also runs an integrated rural development program in Ethiopia that includes an environmental component.	$1.2 million
Belgium	Mainly active in promoting peace and stability, democracy, human rights, regional cooperation and economic reconstruction. The Belgian government works in Central Africa (not on biodiversity), and it supports the wildlife management areas in Tanzania, but only in the lowlands.	No data found
Canada	The Canadian development agencies are active in the region (Ethiopia, Mozambique, South Sudan and Tanzania). However relevant conservation programs in the hotspot could not be found, although they are expected to be there. The only projects identified in the hotspot are through the Canadian Embassy in Nairobi, the Canadian World Youth Program, and the Manitoba and Saskatchewan Councils for International Cooperation.	$300,000
France	The French Agency for Development (AFD) and the French Global Environment Fund (FFEM) invest in DRC, Burundi, Kenya, Mozambique, and to a lesser extent, Ethiopia; in DRC, FFEM invests in natural resource management, while in Ethiopia the focus is on sustainable agriculture. FFEM also supports a small project at Rusizi in Burundi, co-funded by the French Region Pays de la Loire. In Kenya AFD funds a forestry project in the Aberdare Mountains.	$1.5 million (AFD) and $7.6 million (FFEM)
Germany	The German development cooperation agencies BMZ (Economic Cooperation and Development) and BMU (Environment and Nature Conservation) are active in 10 of the hotspot countries, mainly in forest conservation/climate change (including through the International Climate Initiative, or IKI). Most projects are being implemented in Ethiopia and Kenya (by/with the German International Development Agency, or GIZ).	$17.7 million
Ireland	Irish Aid supports sustainable management projects, including a joint project with the Dutch and the Norwegians in the Bale Mountains in Ethiopia. No other directly or indirectly Irish-funded projects could be identified, though they are likely to be there (e.g., through grants to civil society organizations).	$2.9 million
Japan	The Japanese government's environmental support goes partly through CEPF. In addition, the Japanese government funds conservation projects in Ethiopia, Kenya, DRC, Tanzania, Malawi and Mozambique. In 2012, new activities are expected to be launched in Uganda (national wetlands management) and in DRC (forest resources survey).	$10.8 million
Netherlands	The Netherlands supports a joint project with the Irish and the Norwegians in the Bale Mountains in Ethiopia and provides support to NGOs through the embassies. It also gives small grants to civil society organization partners and support to education sector through the Netherlands Organization for International Cooperation in Higher Education (Nuffic). More investments are likely to be there but could not be tracked down.	$7.8 million
Spain	The Spanish development agency AECID provides grants to local community-based organizations to improve livelihoods at selected KBAs in Ethiopia and Kenya.	$1 million
Portugal	Portugal supported the restoration of Gorongosa National Park in Mozambique. No additional projects could be found.	$300,000

United Kingdom	The Darwin Initiative supports the implementation of various international environmental agreements and has supported six national and regional hotspot-related projects since 2007 in Ethiopia, Kenya, Tanzania, Malawi, Mozambique, Uganda and Zambia. The UK's Department for International Development (DFID) priority is poverty reduction and provides both civil society and government funding. DFID's environmental support to governments in the hotspot seems solely focused on climate change.	$1.3 million (Darwin) + $2 million (DFID to civil society) + $31.5 million (of DFID to governments)
United States	The U.S. Fish and Wildlife Service (USFWS) website lists 35 projects in the hotspot, mostly focusing on species conservation (African elephants and great apes). Other programs that were mentioned in the questionnaires include the Central African Regional Program for the Environment (CARPE), the collaboration with the capacity-building program Pact, and funding through USAID; however, complete data for hotspot-specific investments for any of these programs could not be found. CARPE's second phase (2005-2010) came with a $15 million to $20 million price tag.)	$2.3 million (USFWS) + $19 million (other U.S. funding)
Total		**$598.1 million**

Trusts and Foundations

The three main trusts and foundations active in the hotspot are the John D. and Catherine T. MacArthur Foundation (Albertine Rift), CEPF (Eastern Arc Mountains) and the Carr Foundation (Gorongosa National Park in Mozambique). Additionally, there are quite a number of trusts and foundations active in primate conservation in the hotspot, both as donors and as recipients (implementers), with considerable amounts of money invested in them. Other species-focused funds such as the Mohamed bin Zayed Species Conservation Fund and the Disney Worldwide Conservation Fund provide much smaller grants (usually not more than $25,000) to a much wider array of species and agencies. Specific site-based funding agencies often take the form of trusts or endowment funds.

Table 10.3. Overview of Funding by the Main Trusts and Foundations in the Hotspot Since 2007

Trust/Foundation	Main Countries and Areas of Intervention in the Eastern Afromontane Hotspot	Total Amount since 2007 (Estimated/USD)
MacArthur Foundation	Has supported at least 27 grants for biodiversity conservation, ecosystem processes and climate change in Albertine Rift countries (DRC, Uganda, Rwanda, Burundi, Tanzania and Zambia)	$9.6 million
Critical Ecosystem Partnership Fund	CEPF invested $7 million in the Eastern Arc Mountains and Coastal Forests of Kenya and Tanzania for livelihoods, connectivity, research, small grants and fund-raising activities (2004-2008). A consolidation grant of $1.74 million is planned to take off shortly.	$4.5 million
Carr Foundation	The Carr Foundation has been working toward the restoration of Gorongosa National Park in Mozambique since 2006.	$2 million/year
Ford Foundation	Capacity-building projects in Kenya	$600,000

Bill and Melinda Gates Foundation/Rockefeller Foundation	The Bill and Melinda Gates Foundation (BMGF) and the Rockefeller Foundation are working together in a massive program across Africa called AGRA: Alliance for a Green Revolution for Africa. The program is aimed at improving agricultural productivity across the region. It is not clear where they work in the hotspot, but Conservation International (CI) is collaborating with them in various countries. BMGF is also planning to establish an $8 million Africa Network (and a similar global network) in collaboration with CI.	($400 million for the overall AGRA program until 2009 but no specific allocations available for the hotspot)
National Science Foundation, JRS Foundation, Servir Africa	These are scientific funding agencies; the JRS Foundation has been funding at least three research projects in Kenya, while the National Science Foundation has been focusing on the various rifts (including the lakes). Servir Africa is working on climate change vulnerability assessments in Kenya.	$300,000 (JRS) + $400,000 (NSF) + $37,500 (Servir)
Species-focused Donors: Dian Fossey Gorilla Fund, Jane Goodall Institute, Great Ape Trust, International Gorilla Conservation Fund, Mohamed bin Zayed Species Conservation Fund, Disney Worldwide Conservation Fund, etc.	These can be broadly divided into two groups: primate conservation donors and others. Primate donors include the Dian FosseyGorilla Fund (DFGF), the Jane Goodall Institute (JGI), the Great Ape Trust and the International Gorilla Conservation Fund; most of these agencies are both donors and recipients. They work mainly in DRC, Rwanda, Tanzania and Uganda. DFGF spent more than $4 million in 2009 alone on gorilla conservation in Maiko, Virunga and Volcanoes national parks. The Great Ape Trust, with Earthpark, has established a conservation corridor in Gishwati-Nyungwe (Rwanda) with tens of millions of dollars of support from the Clinton Global Fund (no specific total available for 2007-2011). JGI is implementing two projects (with $5 million from USAID, $3 million from Norway and $2 million of its own funding) in Gombe, Tanzania. The Mohamed Bin Zayed Species Conservation Fund supports projects anywhere in the world, including 12 in the hotspot in Burundi, Ethiopia, Kenya, Tanzania and Uganda. The Disney Worldwide Conservation Fund and the International Fund for the Welfare of Animals are both active in Kenya, in bird and elephant conservation respectively.	$8.8 million, of which 85 percent ($7.5 million) is from/through primate conservation trusts and foundations
Site-focused Donors: Peace Park Foundation, Nyika Vwaza Trust and Other Trust, Foundation and Endowment Funds	Benefiting from site-focused donors are Malawi (Nyika-Vwaza Trust, Mulanje Mountain Conservation Trust Fund), Uganda (Mgahinga Bwindi Impenetrable Forest Conservation Trust) and Tanzania (Eastern Arc Mountains Conservation Endowment Fund). These trusts, foundations and endowment funds are funded by other donor agencies such as the World Bank/GEF (to MMCT and EAMCEF), the Dutch Lottery (to Peace Park Foundation, which in turn supports the Nyika Transfrontier Conservation Area in Malawi/Zambia) and Norway (with a proposal pending to further enhance the EAMCEF).	Estimated value: $25 million
Others	The Audamers Piguet and Tides Foundations support small-scale ecotourism; the Christensen Fund supports rangeland management; Eco-Agriculture Partners support eco-agricultural projects; the Liz Claiborne and Art Ortenberg Foundation supports elephant conservation; and the Aage V. Jensen Charity Foundation and the World Land Trust provide funding for land purchases. All these projects are in Kenya and Tanzania.	$1 million
Total		**$60.2 million**

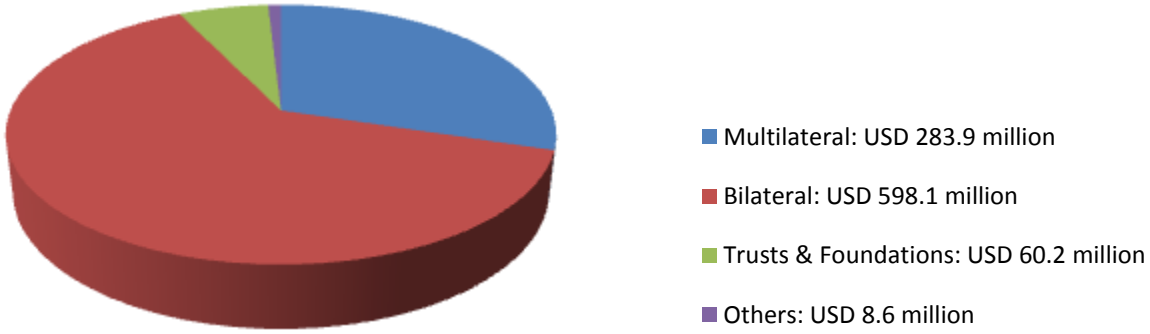
Other Sources Including NGOs and Corporate Funding

Some NGOs are not only recipients of funding but are also donors, sub-granting funds they have received from their own donors or members. These include (besides some of the primate trusts and foundations listed in Table 10.3) the Africa Conservation Center (operating through its fund-raising arm, the Africa Conservation Fund); the Frankfurt Zoological Society; the IUCN, mainly through the Netherlands Committee (Purchase Land for Nature Fund, Ecosystem Grants Program) and its Livelihoods and Landscapes Strategy (LLS); the WCS, which seems to be both donor and recipient of its longstanding Southern Highlands/Southern Tanganyika Conservation Program in Tanzania; and WWF, which receives income through its sister organizations in Belgium, Germany and the Netherlands. BirdLife International runs a Preventing Extinctions Program, which provides small grants to NGOs, community-based organizations and individuals ("species guardians") to try to save the most critically threatened bird species in the world, including those in the hotspot. BirdLife also sub-grants its national partner NGOs in regional projects such as the EU-funded protected area monitoring project (being implemented in Burundi, Kenya, Uganda, Zambia and Zimbabwe). The BirdLife partner in the United Kingdom, the Royal Society for the Protection of Birds, is investing in southern Ethiopia with money raised through the annual British Birdwatching Fair, while Nabu (the Naturschutzbund)—BirdLife's partner in Germany—also supports projects in Ethiopia.

Corporate/private-sector funding is largely focused on the carbon trading/forestry sector, such as in the Albertine Rift (through EcoTrust), Mozambique (Envirotrade) and in Malawi (Altria Group and Japan Tobacco Group). Some corporations are involved in site monitoring and conservation activities, including forest restoration and tree planting. In Kenya, money is raised by corporations/events regularly, including for fencing off national parks (such as through the Rhino Charge rally). However, these are all relatively small-scale initiatives (totaling about $2.3 million); no large-scale corporate funding or partnerships could be identified in the hotspot.

Other, small-scale funding comes from European city councils, university departments, and through appeals from Wildlife Direct, individual fund-raising and campaigns. The total amount of funding toward conservation in the Eastern Afromontane Hotspot from all these sources combined since 2007 is estimated to be about $8.6 million.

Figure 10.1. Overall Investment in the Eastern Afromontane Hotspot Since 2007, per Group of Donors/Funding Sources; Total Investments = $950.8 Million



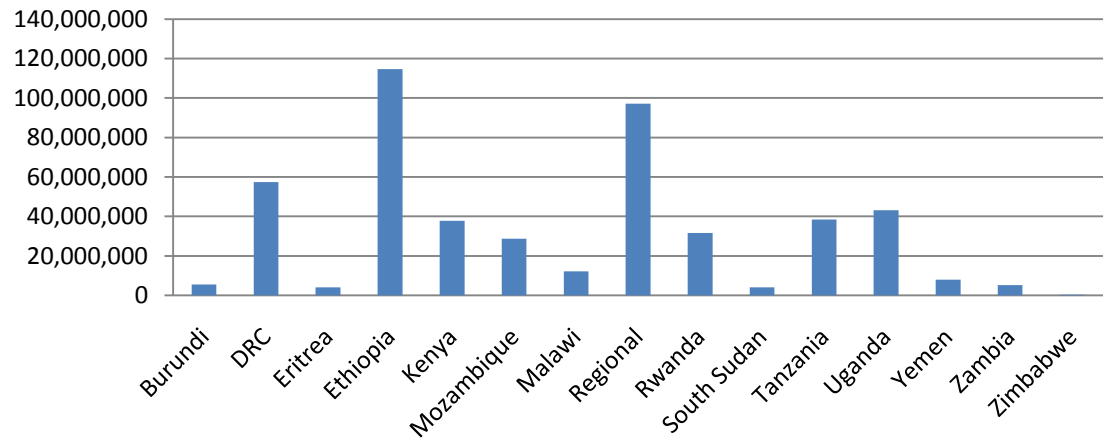
10.3 Focus of Current Investment in the Hotspot

Overview of Funding per Country

Figure 10.2 shows the levels of funding received, per country, for hotspot-related projects. This excludes the sectoral budget investments that were included in Section 10.2, as those describe the wider, national funding received by governments for sector-wide programs (rather than hotspot-specific investments). The next sections of this chapter are confined to the project investments made specifically in the Eastern Afromontane Hotspot (sites, species, habitats and people) through the 350 projects that could be analyzed in the context of this profile. The total amount of funding related to these 350 projects is $488 million.

Figure 10.2 shows that most investments (shown in U.S. dollars) in the hotspot are being made in Ethiopia; this is partly a reflection of the relative size of Ethiopia's hotspot area (including the number of hotspot KBAs), and partly of the quality of the investment data that were available for the country.[89] DRC, Uganda, Tanzania and Kenya follow at some distance, with Burundi, Eritrea, South Sudan, Zambia and particularly Zimbabwe at the bottom of the list.

Figure 10.2. Funding Levels per Country in the Eastern Afromontane Hotspot (in USD)[90]



Thematic Distribution of Investment

The overall analysis distinguishes four main themes of investment: biodiversity, poverty reduction (poverty), climate change and ecosystem services. Additional information has been gathered on investments in protected area systems, species conservation and corridor/landscape conservation. Table 10.4 shows the contribution made by the 350 projects in the hotspot to these seven themes, noting that most projects contribute to more than one theme.

[89] It was also noted during the subregional consultation meeting in Addis Ababa (April 2011) that this relatively high level of investment in Ethiopia may reflect a resurgence of funding following withdrawal during a previous period of political difficulties.
[90] No data were obtained for Saudi Arabia and Somalia, and very limited data was available for Yemen.

Table 10.4. Thematic Distribution of Projects in the Eastern Afromontane Hotspot

	Biodiversity	Poverty reduction	Climate Change	Ecosystem Services	Protected Areas	Species conservation	Corridor/ Landscape approach
Number of Projects that Include This Component	350	139	49	32	42	95	28
Percentage of Projects that Include This Component	100 %	40 %	14 %	9 %	12 %	27 %	8 %

All projects analyzed in the context of this chapter have a targeted "biodiversity" component. Some projects mainly focus on sustainable land/lake management, rural development, agriculture, livelihoods and climate change, but all projects contribute to a certain extent to conserving biodiversity. However, what is more interesting is that 40 percent of all projects in the hotspot have a component that deals with poverty reduction and livelihoods (including capacity building). Keeping in mind that the focus of this research was on investments in the hotspot's environmental sector, this shows that poverty considerations seem to be very well mainstreamed into this sector, and that conservation and development are not perceived as incompatible objectives.

Climate change features in 49 projects; this is less than 20 percent of the total number of projects, but these projects do have a considerable amount of funding for this issue ($115 million in total). In 25 of these projects, climate change is only part of the overall objective, but 24 projects are fully aimed at climate change risk management and adaptation frameworks, REDD+/reforestation and climate change impact monitoring. The main climate change donor is, as indicated before, the Norwegian government with about $15 million of related investment in the hotspot (including a contribution of $10 million from a $75 million REDD+ investment in Tanzania that is expected to be spent in the hotspot). GEF spends $9 million on specific climate change-focused projects, followed by the German government ($8 million), the Finnish government ($7 million) and the MacArthur Foundation ($2 million). In addition, the EU is implementing a $20 million climate change policy project in Ethiopia that aims to build the capacity of the Ethiopia Global Climate Change Alliance (GCCA-E) on climate change-resilient adaptation actions, while DFID is spending an additional $31.5 million across the hotspot on climate change-related national programs.

Valuing and managing ecosystem services is another emerging issue. It is increasingly being mainstreamed into wider sustainable management projects. However, even though 32 projects in the hotspot have an ecosystem services component, only six of them deal with payments for ecosystem services (PES). These include: a GEF-funded project in Uganda that is testing the effectiveness of PES in productive landscapes; a recently completed EU-funded project on sustainable forest management through promoting nontimber forest products and PES in Ethiopia; DGIS/Danida and DFID-funded projects on watershed payments in the Uluguru Mountains in Tanzania; a Darwin-funded project on paying local communities for ecosystem services in Uganda; and two projects in the Albertine Rift funded by the MacArthur Foundation (including one on valuing ecosystem services in the Greater Virungas Landscape).

National protected area systems are definitely "hot" in the hotspot—42 of the 350 projects deal with protected areas, totalling more than $121 million of protected area-related investments. This includes 18 GEF-funded projects on enhancing the effectiveness and sustainability of national protected area systems in Burundi, DRC, Ethiopia, Kenya, Mozambique, South Sudan, Tanzania, Rwanda and Zambia. One regional EU-funded project is instituting long-term monitoring systems at protected areas that are also Important Bird Areas (and therefore KBAs) in five of the hotspot countries (Burundi, Kenya, Uganda, Zambia and Zimbabwe).

Of the 95 projects that include a species conservation component, 35 focus on primates, 19 on birds and 17 on elephants (others include other mammals, reptiles and trees). Primate conservation received $26.7 million in four countries: DRC, Rwanda, Tanzania and Uganda. Primates often serve as flagship species for wider habitat conservation. In contrast, donors are currently spending $11.2 million on bird conservation projects, but this includes a $9.7 million regional soaring birds project (covering 11 countries in the Middle East and North Africa)—which leaves about $1.5 million for the remaining 18 projects. Elephant conservation—including human-elephant conflict resolution—has received $1.3 million between 2007 and 2011 in DRC, Ethiopia, Kenya, Malawi and South Sudan.

Only 28 investments are aimed at establishing or conserving landscapes and corridors— the main ones being the Gishwati-Nyungwe Corridor in Rwanda (Great Ape Trust/Clinton Global Initiative); the Chimpanzee Conservation Corridor between Budongo and Bugoma in Uganda (Darwin Initiative); the Ruipa Corridor between the Udzungwas and Selous Game Reserve in Tanzania (also funded by Darwin); and corridors in the Maiko-Tayna-Kahuzi-Biega and Mount Hoyo-Virunga-Volcanoes landscapes in the DRC and Rwanda (mainly funded by USAID-CARPE, USFWS and the MacArthur Foundation).[91] The investments in the latter four corridors total approximately $3 million, while the investments in the Gishwati-Nyungwe Corridor are expected to be several time this amount. Freshwater landscapes that have attracted considerable funding include Lake Tanganyika (more than $40 million from the Africa Development Bank and GEF-UNDP), and to a much lesser extent, Lake Tana ($11.6 million from the Finnish government and GEF-IFAD). Significant investments are also being made in the Bale Mountains and the coffee forests in Ethiopia, contributing to the Bale Mountain Massif Corridor and the Kafa-Yayu Corridor respectively.

Investments in Key Biodiversity Areas

Table 10.5 shows the distribution of current investments/interventions (funded by external donors) over the identified KBAs in the hotspot, with separate columns for protected and unprotected KBAs, per country.

[91] Note that these corridors include but are not limited to the conservation corridors listed in Chapter 4.

Table 10.5. Numbers of Protected and Unprotected KBAs in the Eastern Afromontane Hotspot where Project Interventions Take Place

	Number of Hotspot KBAs	Number of Protected KBAs (or partially protected, or proposed)	Number of Unprotected KBAs or KBAs whose status is unknown	Protected KBAs with Interventions	Unprotected KBAs with Interventions	Protected KBAs without interventions or no intervention found	Unprotected KBAs without Interventions or no intervention found
Burundi	8	6	2	4	0	2	2
DRC	22	15	7	7	1	8	6
Eritrea	9	1	8	0	0	1	8
Ethiopia	83	39	44	14	8	25	36
Kenya	26	17	9	13	6	4	3
Malawi	13	13	0	4	0	9	0
Mozambique	7	4	3	3	0	1	3
Rwanda	10	8	2	3	1	5	1
Saudi Arabia	20	7	13	1	0	6	13
Somalia	0	0	0	0	0	0	0
South Sudan	2	0	2	0	0	0	2
Tanzania	43	39	4	19	0	20	4
Uganda	31	25	6	16	3	9	3
Yemen	24	1	23	0	1	1	22
Zambia	6	6	0	3	0	3	0
Zimbabwe	6	6	0	5	0	1	0
Total	**310**	**187**	**123**	**92**	**20**	**95**	**103**

Including the countries for which no or incomplete data have been found (mainly Somalia), this table shows that roughly 60 percent of the 310 identified KBAs have some type of legal protection (cross-checked against the WDPA), and that at about 50 percent of those protected KBAs (92), externally funded interventions take place. These vary from annual IBA monitoring to full-fledged site interventions and conservation action (this does not include national governments' budgets for their protected area systems, which could be important in some countries, such as Saudi Arabia or Kenya). More critically, the table also shows that 123 KBAs are not protected (or at least not recognized as protected under the WDPA) and that 92 of these high-biodiversity sites (75 percent) do not receive any kind of external support. Most of these (36) are found in Ethiopia (which holds 28 percent of the total number of KBAs).

Main Recipients of Current Investments in the Hotspot

Of the 350 analyzed projects in the hotspot, 264 are implemented by civil society organizations, 67 by government agencies, and another 19 by government and civil society organizations together. However, even though the number of projects managed by civil society organizations is almost four times as high as those managed by their governments, the amount of money civil society organizations are administering is less: $187 million compared with $267 million by government agencies. This obviously means that the size of grants received by civil society is much smaller than those received by governments (on top of the budget support many government departments are receiving already).

Figure 10.3. Number of Projects Managed by Recipient Group (350)

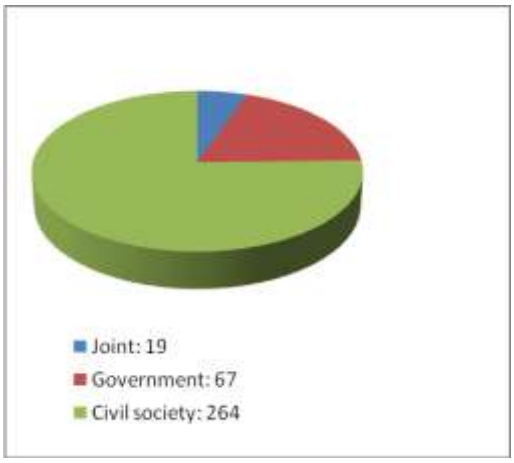
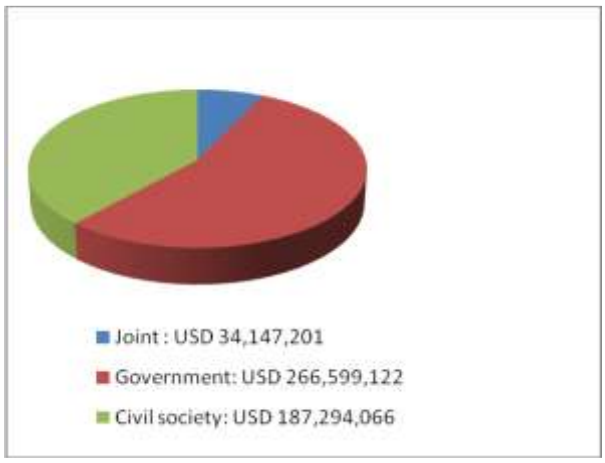


Figure 10.4. Amount of Funding to Recipient Group ($488 million)



Figures 10.3 and 10.4 provide graphical descriptions of the division of project numbers and amounts over the three groups of recipients (civil society, government, and joint civil society and government). (For detail of civil society organizations active in the hotspot, see Chapter 7.)

10.4 Trends and Gaps in Investment in the Hotspot

Overall Trends in Donor Funding

Little can be said about the future priorities of donor agencies, as they often change as a result of the global economic situation, national elections, new developments in science and knowledge, and fashion. Over the years, priorities have moved from agriculture and infrastructure to poverty and basic social services, from combating mother and child mortality to fighting HIV/AIDS, from promoting gender equality to promoting good governance and human/indigenous rights, and from environment to climate change, among many other things. Most donors subscribe to the Millennium Development Goals as a focus of their investment and to the Paris Declaration on Aid Effectiveness as guidance on how best to use their development assistance to deliver them. However, beyond that, each donor defines its own scope, niche and methodologies.

Two major trends in global funding streams can however be identified:

(1) Generally, the environment and biodiversity conservation do not seem to be high on the agenda of donors (with the exception of climate change—see below), as they demonstrate an ever-increasing focus on poverty reduction combined with the promotion of freedom, democracy and human rights, as well as support to fragile states in an attempt to make the world safer from terrorist attacks.

(2) Within the environmental agenda, climate change adaptation and mitigation (including REDD+) are taking the stage, to a certain extent at the cost of traditional concerns such as species and site conservation. This is partly being countered by a number of new initiatives such as the German-hosted LifeWeb brokering site, the GEF/World Bank/IUCN Save our Species Fund (SOS) and the Alliance for Zero Extinction; however, overall analysis shows that investments in climate change-related programs (including

clean energy) seem to be growing, while investments in other types of environmental projects seem to be decreasing.

In addition, two smaller trends seem to be occurring:

(1) There is a growing emphasis on the economic value of biodiversity and ecosystem services, building on The Economics of Ecosystems and Biodiversity (TEEB) and various valuing analyses that have been or are being carried out.
(2) There is a tendency among donors to move from project to program funding (especially with regard to bilateral support to recipient governments), to reduce the number of "partner countries," and to narrow investment sectors/subsectors.

The overall impact in the hotspot of these four combined trends could be that: (i) less funding will be available for biodiversity conservation; (ii) the funding that will be available will be largely spent in a small number of countries and key programmatic areas (per donor); and (iii) these areas are likely to include climate change adaptation and mitigation, and to a lesser extent ecosystem services. This means that there will be less funding available for both government and civil society recipients in "unpopular" countries, and that there will not be many opportunities to find support for addressing "unpopular" conservation needs.

Key Strategic Funding Initiatives

To reduce the dependency on project and program funding, various mechanisms are in place to provide strategic and sustainable financing for biodiversity conservation in the hotspot. These include, in summary:

Trust Funds

There are four main endowment trust funds active in the hotspot: the Mulanje Mountain Conservation Trust and the Malawi Environmental Endowment Fund in Malawi, the Eastern Arc Mountains Conservation Endowment Fund in Tanzania, and the Mahinga Bwindi Impenetrable Forest Conservation Trust in Uganda. In addition, there are two multimillion dollar GEF-UNDP projects currently being implemented focusing on the sustainable financing of protected areas in Mozambique and in DRC (Congo Basin), which include the potential development of trust funds, maximizing user fees, developing carbon payments and biodiversity offsets, and improving the cost effectiveness of the national protected area system (the latter is also a component of other protected area projects in the hotspot countries, including in Ethiopia). In Kenya, a Water Services Trust Fund has been established recently and a Forest Management and Conservation Fund is currently being set up under newly approved legislation. LifeWeb is advertising a request to contribute to the $100 million target of the Mozambican BIOFUND.

Environmental Taxes

In Burundi, DRC and Kenya, legislation and mechanisms exist for environmental taxes (including the imposition of tax or tax relief on activities that promote environmental health and endorse the "polluter-pays" principle), but it is not clear if they are being put into action yet. In Rwanda, legislation for environmental taxes is included in an environmental bill that seeks to establish a National Fund for the Environment in Rwanda (FONERWA), but this is not yet operational. A similar National Fund for Forestry was established in 1998, but does not seem to

have been very effective. There is a carbon tax on cars in Zimbabwe, but there is no accountability on the funds derived from this tax.

PES/REDD/REDD+

In Tanzania, legislation for PES is pending, but voluntary agreements on water management are already in place in the Uluguru and Usambara mountains. Economic valuations have been done for the Eastern Arc Mountains in Tanzania, Mulanje Mountain in Malawi, and are currently being done for the Virungas in the Albertine Rift.

National REDD+ strategies/REDD readiness plans are being developed in DRC, Ethiopia, Kenya (readiness plan produced in 2010), Malawi, Uganda and Tanzania, and are already in place and being implemented in Mozambique, for example, through carbon-credit afforestation schemes around Gorongosa National Park (Envirotrade). A number of initiatives have begun piloting REDD under voluntary mechanisms in Kenya, Malawi, Tanzania and Uganda, such as the Forest Carbon Portal.

Other Sustainable Funding Initiatives

Other local ways to fund conservation activities sustainably (such as at KBAs) include the development of nature-based enterprises, ecotourism initiatives, revolving and rotating funds, and renting out facilities (where available).

Gap Analysis

Table 10.6 shows the correlation between the number of projects under each thematic area (biodiversity, poverty reduction, climate change, ecosystem services, protected areas, species and corridor conservation) and overall funding levels. It shows that the largest flows of current investments in the hotspot seem to be going to protected area systems, climate change and, to a lesser extent, species conservation—noting that almost 70 percent of the species-oriented funding benefits the hotspot's primates. (Even though the numbers of projects with a biodiversity and poverty reduction component are highest, they are not that relevant for this analysis because (i) as we only looked at projects with a biodiversity conservation component, the score would be 100 percent by default; and (ii) poverty reduction is mainstreamed across almost 40 percent of projects, but it is impossible to tag a definitive amount of money to this theme. However we can safely assume that involving local stakeholders and improving local livelihoods is an increasingly standard component of conservation/sustainable development projects in the hotspot.)

Table 10.6. Overall Score of Thematic Investments in the Eastern Afromontane Hotspot

	Biodiversity	Poverty reduction	Climate Change	Ecosystem Services	Protected Areas	Species conservation	Corridor/ Landscape approach
Number of Projects that Include This Component	350	139	49	32	42	95	28
Ranking in Numbers	1	2	5	6	4	3	7
Overall Investment Levels	High	High	High	Low	High	Medium	Low

During the national and subregional consultation workshops, and through the questionnaires, an assessment was made of what the current funding gaps and priorities are in the hotspot.[92] Interestingly, in many cases gaps/priorities were indicated in areas that receive most funding already, both in terms of themes and in terms of sites.

National Consultations and Questionnaires

Conservation research (including surveys, inventories, monitoring, student grants and database development) came up as a key priority for investment in Kenya, Tanzania and Uganda— while respondents in DRC and Rwanda mentioned biodiversity information gaps as an important reason for their selection of specific sites that require urgent interventions (see below also). Mainstreaming biodiversity and conservation concerns in development planning is a key problem in Zimbabwe. Despite the massive investment in protected area networks in Burundi, DRC, Ethiopia, Rwanda and Tanzania, it was perceived in each of these countries that significantly more resources are required to maintain, manage and expand the national protected area networks. Similarly, increasing the existing funding streams toward poverty reduction was indicated as a priority in Ethiopia, Kenya, Tanzania and Uganda.

The participants at the joint consultation workshop in Rwanda for Rwanda, Burundi and DRC came to the conclusion that they needed more financial support toward PES evaluations and implementation. Climate change was mentioned in most questionnaires/workshops, but never made it on any of the priority lists, probably because significant funding is already being channelled toward this theme. Species and corridor conservation were each mentioned once, during the Kenyan and the Rwandan workshop respectively. Other priorities that were identified across the hotspot include capacity building (as a crosscutting element in Ethiopia and Uganda), improved governance and political stability (in Tanzania and Zimbabwe respectively), and the revision and implementation of the National Biodiversity Strategy and Action Plan (NBSAP) in Uganda. It was noted, however, during the discussions at each of the workshops that many—if not all—of the identified priority funding needs hang together, overlap and depend on each other, and should therefore be considered in conjunction rather than as separate issues.

[92] These cover the African countries only, as no workshops took place in the Arabian Peninsula, and the Saudi Arabia and Yemen questionnaires provided no information on these sections.

In eight of the 11 questionnaires, specific sites (KBAs) were listed as priority sites for investment. Again, these often included sites where interventions are already ongoing (or have been ongoing recently). Nevertheless, it was noted that investments are often limited and/or short-term, and that conservation impact has not yet been achieved or would not be sustained if more funding were not forthcoming. In other cases, interventions do take place at sites but only in a small area (part of the site), or only on a particular species/theme. In addition, as mentioned above, the need for further biodiversity research and surveys was identified for a number of sites in DRC and Rwanda. Another reason to continue and/or increase funding toward sites where interventions already take place is because the threats are still present. Additionally, urgent action was called for at high-priority KBA sites where no projects are being implemented yet but where the threats to biodiversity are high.

Subregional Consultation Workshop (Africa)

During the subregional workshop in Addis Ababa (April 2011), the participants looked again at 11 key funding gaps that were mentioned more than once in the questionnaires and re-prioritized them from a regional perspective. This produced the following list:

1. KBA management and protection
2. Climate change adaptation and mitigation
3. Payment for ecosystem services and sustainable financing (combined)
4. Alternative nature-based livelihoods
5. Research
6. Environmental education; governance and advocacy; and human-wildlife conflicts and wildlife corridors
7. Capacity building, restoration and invasive species management (all lowest priority)

Some of these issues were subsequently recognized as crosscutting (climate change, research, environmental education and capacity building). The remaining top three priorities (KBA management and protection, sustainable financing and livelihoods) have been used to define the Eastern Afromontane Hotspot strategic directions and investment priorities (see Chapters 11 and 12).

10.5 Conclusions

Based on the analyses carried out in this chapter, it can be assumed that approximately $1 billion was invested in the Eastern Afromontane Hotspot between 2007 and 2011. Even though this seems like a huge amount of money, it is only about 1 percent of the total official development assistance that has been invested in the 16 hotspot countries over that period (extrapolating the 2007-2009 OECD/WorldBank data to cover the five-year period). It also has not solved the problem of the increasing loss of biodiversity, damaged ecosystem services, reduced climate change resilience and threats to local livelihoods in the hotspot.

Over the five years, the various groups of donors (multilateral, bilateral and trusts and foundations) have largely invested in projects that combine conservation and livelihood objectives, that support the hotspot's protected area systems, and that address the issues of climate change mitigation and adaptation. Species-focused funding has mainly benefited the hotspot's primates, while projects that aim to protect or restore ecosystem services are increasingly becoming a priority among donors.

Nevertheless, funding gaps remain in all of these areas, at species, site (KBA) and landscape/corridor level, as the threats to biodiversity only seem to increase. And while the majority of the investments in the hotspot are geared toward government agencies, local and national civil society organizations remain in constant need of short- and, even more critically, long-term funding to play their role in addressing these threats at all levels.

11. CEPF NICHE FOR INVESTMENT

11.1 Thematic Niche

CEPF is designed to facilitate rapid and flexible funding to civil society to act in areas where globally significant biodiversity is under the greatest threat. Funds should add incremental value to existing initiatives and should aim to ensure that the outcomes realized through investments are sustained. These criteria provide the basic framework for identifying the niche for CEPF in the Eastern Afromontane Hotspot.

The Eastern Afromontane Hotspot is large and diverse, and characterized by immense natural beauty and biodiversity. The region's natural wealth contrasts with its poverty, which at regional, national and district levels, is used to justify development projects that can undermine conservation. Increasingly, people are exploiting the "free" natural resources in their immediate environments at unsustainable rates. While the longer-term issues of poverty reduction are likely to involve macroeconomic changes, in the immediate term it demands targeted microeconomic interventions that reduce unsustainable use of natural resources and provide incentives for conservation.

Although the pace of development in the region has recently accelerated despite the global economic downturn, it is not yet sufficient to improve human well-being at the scale that is needed. In parallel, biodiversity is severely threatened in the hotspot. Pressures are both top-down and bottom-up, the former from urgently needed development projects that frequently fail to take biodiversity into account, and the latter from the subsistence lifestyles that force local communities to rely on the resources in their immediate surroundings. These twin pressures demand a strategy that addresses both landscape planning and local livelihood initiatives. Agriculture is simultaneously the most important means of livelihood for communities around the KBAs and the most important threat to biodiversity. Other important considerations include the search for energy sources that leads to deforestation, incremental and extreme threats from climate change, the limited capacities of civil societies in the region, and the gaps in protection and funding that past investments by donors have been unable to address despite the granting of almost a billion dollars since 2007. Almost 40 percent of all the KBAs in the hotspot have no formal protection status.

The profiling exercise made it clear that development was a key issue for long term, sustainable protection of biodiversity in the Eastern Afromontane Hotspot. This is due to the main causes of biodiversity degradation being directly linked to inappropriate development projects for local communities, and because the future of conservation lies in the decisions that are going to be made in the coming years in terms of development policies by the national governments, regional entities and to a certain extent by external agents such as donors (whose large investments still influence development directions), international foundations and organizations, or private investors from developed and emergent countries. At the same time, the profiling exercise highlighted a lack of understanding of the importance of biodiversity on the part of decision makers, and also a lack of dialogue and coordination between stakeholders that have an obvious interest in enhanced coordination, including NGOs from both the conservation and the development worlds.

Tackling development issues in the most threatened and most important biological sites in the Eastern Afromontane Hotspot has been the driver for the design of CEPF's investment strategy and its specific strategic directions and investment priorities. Acknowledging the fact that CEPF investment will be in any case a drop in the ocean of international funding, private and public, CEPF proposes to enable civil society to have a more prominent role into driving development in a more biodiversity-friendly direction. The three main axes below have been the basis for the development of CEPF's strategic directions and investment priorities, and also have been recognized by the conservation community during CEPF's consultations as the most important bottlenecks for which funding is at present far from sufficient.

These include: 1) that community organizations lack both the funding to design local actions plans and to implement the biodiversity-related components contained therein; 2) that insufficient support is available to stimulate productive partnerships and engagement between civil society organizations and the private sector, and 3) that that is a great need for conservation organizations, together with development groups, to develop their knowledge base on threats to biodiversity and the means to react quickly to counteract them, and to work and advocate for biodiversity at all levels of decision making including with government, donors and private sector entities.
It is within this context and combination of factors that CEPF has determined its niche in the Eastern Afromontane Hotspot, which will be to support civil society to apply innovative approaches to conservation in under-capacitated and underfunded protected areas, KBAs and priority corridors. Efforts must be made to demonstrate the link between biodiversity and people by improving livelihoods, and by mainstreaming biodiversity and sustainability into existing policies, plans and development programs. These innovative approaches are articulated in the CEPF investment strategy as strategic directions and investment priorities, and are designed to enable people living in or near priority sites and corridors to benefit, and the areas themselves to achieve financial sustainability. CEPF can make a valuable and lasting contribution by supporting civil society to promote interventions that not only aim to mainstream biodiversity into development and planning, but also demonstrate and scale up approaches that link sustainable practices with benefits to people. Civil society in the hotspot has the experience and presence to make these contributions, but at present few organizations are focused on the wider development agenda.

11.2 Geographical Niche

To ensure the greatest incremental contribution to the conservation of the global biodiversity values of the Eastern Afromontane Hotspot over a five-year investment period, the 261 terrestrial and 49 freshwater KBAs and 14 conservation corridors (or landscape planning units) identified for the hotspot were refined into a focused set of priority outcomes for CEPF investment.

The following criteria were used to refine the geographic focus for CEPF investment:

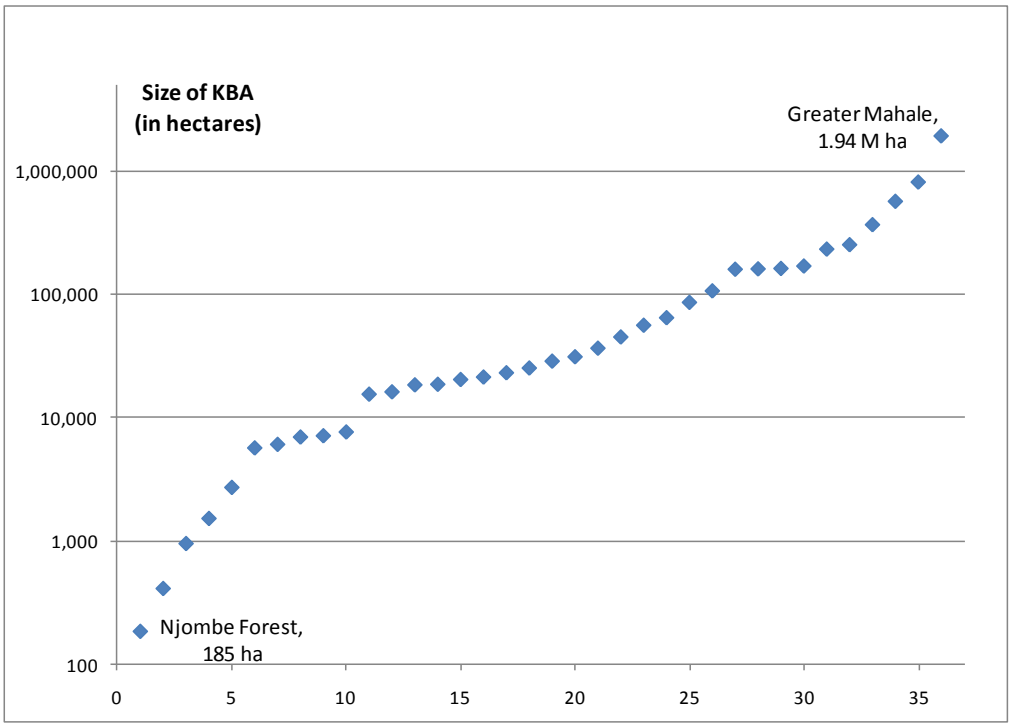
a) high biodiversity priority;
b) low level of investment from other donors, with the objective of complementing existing investments;
c) low level of revenue from tourism or other economic activities;

d) low level of protection—either unprotected areas or those without adequate management;
e) sites under significant threat;
f) opportunity for civil society action;
g) opportunity to contribute to poverty reduction outcomes;
h) opportunity to link terrestrial and freshwater sites; and
i) manageability for CEPF and the investment's regional implementation team.

A score was given to each KBA for (a), (b and c) and (d). Then the prioritization was discussed with stakeholders and experts on the basis of criteria (e), (f), (g) and (h). The last filter was the manageability criterion, giving a preference, among sites with comparable scores, to sites belonging to the same corridors or clusters of sites in a region. The prioritization exercise included continuous back and forth between geographical focus and definition of strategic direction.

The refinement process led to the identification of six priority corridors, two groups of KBAs that lie outside but are closely associated with a corridor, three additional terrestrial KBAs and five freshwater KBAs that merit CEPF attention. The 36 CEPF Priority Terrestrial KBAs cover approximately 5.5 million hectares, which represent 18% of the total KBA area, or 5.5% of the total surface of the Hotspot (which is a bit more than 1 million square kilometer). The majority of the sites range from 15,000 to 100,000 hectares, while the largest reaches 2 million hectares (see figure 11.1).

Figure 11.1. Distribution of CEPF Priority KBAs according to their size



12. CEPF INVESTMENT STRATEGY AND PROGRAMMATIC FOCUS

The CEPF will focus investment on the following six corridors and additional sites.

- **The Itombwe-Nyungwe Landscape** comprises four terrestrial KBAs in DRC, Burundi and Rwanda. The Itombwe Mountains, by far the largest KBA of the corridor (820,000 hectares), are also an important catchment area for Lake Kivu, a priority freshwater KBA.
- **The Northern Lake Niassa Mountain Complex** comprises seven high-priority KBAs of small to medium size in Malawi, Tanzania and Zambia, all sites being important catchments for Lake Malawi, the highest priority freshwater KBA within the hotspot.
- **The western part of the Kaffa and Yayu Coffee Biosphere Reserve** comprises only one high-priority KBA at the present time, but this region of Ethiopia is still under-explored (and underinvested by the international community). Several forest patches in this corridor appear to be very important in terms of biodiversity as well as water management (for example, these are sources of the floodplains of the Gambella complex).
- **The Lake Tana Catchment**, which comprises four terrestrial and three freshwater (one high-priority) KBAs, is a highly populated area where the link between development and conservation is particularly critical. Three other small KBAs of high biodiversity value are just outside the corridor but are within the same state, and these are contained in an area called the **Amharic Escarpment**.
- **The Arabian Peninsula Highlands**, with six priority KBAs, are facing a unique situation within the hotspot in terms of significant threats and unrealized civil society potential. This corridor would benefit from specific interventions that aim primarily at developing civil society and the knowledge base.
- **The Chimanimani-Nyanga Mountains** have an incredibly high biodiversity value within the hotspot, while at the same time having almost no investment at all at present. Therefore, the Chimanimani Mountains (shared by Mozambique and Zimbabwe) and the five smaller KBAs in Zimbabwe have been retained for specific interventions to enhance the knowledge base and develop much needed conservation action. The three KBAs comprising the **Montane Islands of Mozambique** are associated with this corridor and are subject to similar conditions.
- **Three sites outside of the priority corridors** are regarded as being of utmost importance and therefore have been included as a focus for CEPF investment. These are **LaLuama-Katanga-Mount Kabobo, Greater Mahale** and **the Imatong Mountains**. LaLuama-Katanga-Mount Kabobo in DRC and Greater Mahale in Tanzania present great opportunities for developing sustainable financing schemes in particular and are in need of urgent support, the latter being also a key catchment area for Lake Tanganyika. The last site, Imatong Mountains in South Sudan, is relatively unknown but is likely to have extremely high biodiversity. Further, it could be an important site to help support the emergence of civil society in South Sudan.

The list of corridors and KBAs is presented Table 12.1, and freshwater KBAs are listed in Table 12.2. These tables also indicate the eligibility of each site for CEPF investment in each strategic direction and investment priority. Restrictions on eligibility for an investment priority are due to the need to ensure that CEPF investments are focused both thematically and geographically. The priority sites and corridors are presented on map 12.2.

Table 12.1. CEPF Priority Terrestrial Corridors and KBAs

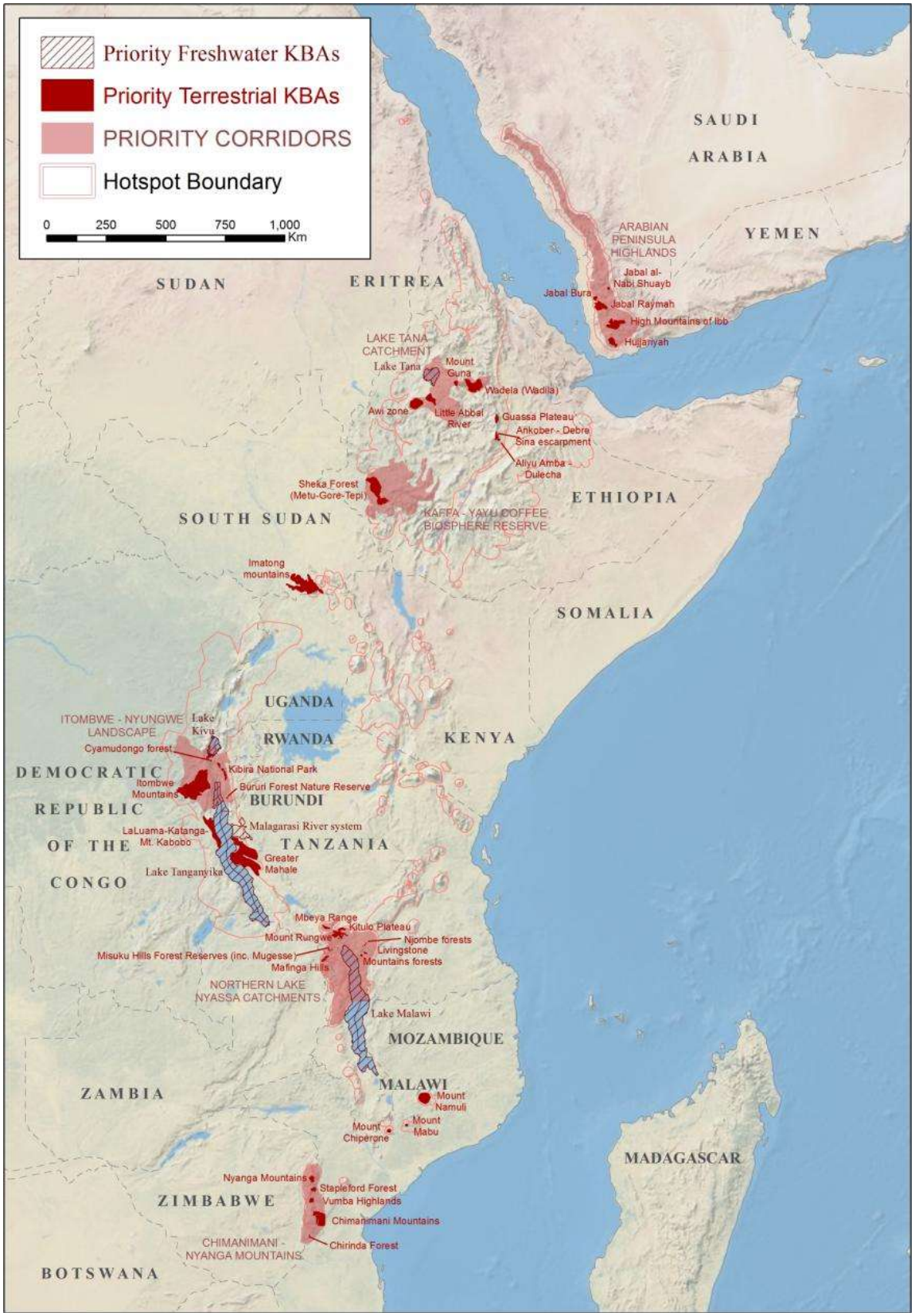
							1.1	1.2	1.3	2.1	2.2	2.3	3.1	3.2	3.3	3.4
KBA #	**Corridor name**	**KBA name**	**Country**	**Size (ha)**	**Protection status**	**Threatened species**	Local planning	National mainstreaming	Private sector engagement	Protection of priority KBAs	Emerging threats	Knowledge base, research	Carbon funds	Water & Noncarbon PES	Capacity building / funds	Institutional dev. Of CSOs
29	Itombwe - Nyungwe Landscape	Bururi Forest Nature Reserve	BURUNDI	1,525	Protected	3										
118		Kibira National Park	BURUNDI	36,768	Protected	13										
84		Itombwe Mountains	DRC	820,796	Partial	26										
42		Cyamudongo Forest	RWANDA	412	Protected	1										
164	Northern Lake Niassa Mountain Complex	Misuku Hills Forest Reserves (incl. Mugesse)	MALAWI	2,724	Partial	5										
124		Kitulo Plateau	TANZANIA	64,996	Protected	26										
142		Livingstone Mountains forests	TANZANIA	7,154	Partial	3										
182		Mount Rungwe	TANZANIA	45,343	Protected	25										
196		Njombe forests	TANZANIA	185	Partial	21										
158		Mbeya Range	TANZANIA	14,767	Protected	15										
144		Mafinga Hills	ZAMBIA	18,721	Partial	11										
224	Kaffa and Yayu Coffee Biosphere Reserve	Sheka Forest (Metu-Gore-Tepi)	ETHIOPIA	369,963	Protected	6										
141	Lake Tana Catchment	Little Abbai River	ETHIOPIA	86,570	Not protected*	2										
169	Landscape	Mount Guna	ETHIOPIA	20,477	Not protected*	1										
15		Awi Zone	ETHIOPIA	160,805	Partial	2										
253		Wadela (Wadila)	ETHIOPIA	234,375	Not protected*	1										

4	Not in corridor / Amharic	Aliyu Amba - Dulecha	ETHIOPIA	6,985	Not protected*	1															
7	Escarpment	Ankober - Debre Sina escarpment	ETHIOPIA	18,518	Partial	4															
67		Guassa Plateau	ETHIOPIA	31,310	Not protected*	6															
73	Arabian Peninsula	High Mountains of Ibb	YEMEN	163,266	Not protected*	24															
79	Highlands	Hujjariyah	YEMEN	56,457	Not protected*	10															
88		Jabal al-Nabi Shuayb	YEMEN	5,699	Not protected*	10															
89		Jabal Bura	YEMEN	15,565	Protected	7															
93		Jabal Iraf	YEMEN	7,679	Not protected*	4															
98		Jabal Raymah	YEMEN	107,371	Not protected*	5															
37 & 38	Chimanimani-Nyanga Mountains	Chimanimani Mountains	MOZ. and ZIMBABWE	170,750 *(MOZ)* 21,437 *(ZIM)*	Partial	100															
39		Chirinda Forest	ZIMBABWE	954	Protected	3															
201		Nyanga Mountains	ZIMBABWE	28,863	Protected	28															
235		Stapleford Forest	ZIMBABWE	23,223	Protected	13															
252		Vumba Highlands	ZIMBABWE	25,385	Partial	8															
166	Not in corridor / Montane	Mount Chiperone	MOZ.	16,257	Not protected*	2															
176	Islands of Mozambique	Mount Mabu	MOZ.	6,089	Not protected*	3															
180		Mount Namuli	MOZ.	161,902	Not protected*	29															
81	Not in corridor	Imatong mountains	SOUTH SUDAN	572,458	Not protected*	1															
65	Greater Mahale Landscape	Greater Mahale	TANZANIA	1,944,602	Partial	12															
138	Mount Kabobo - Margungu Highlands	LaLuama-Katanga-Mount Kabobo	DRC	254,423	Not protected*	9															

Table 12.2. CEPF Priority Freshwater Key Biodiversity Areas

KBA #	KBA Name	Corridor	Country	Size (ha)	Protection Status	Threatened Species
FW24	Lake Tana	Lake Tana Catchment Landscape	Ethiopia	305,499	Unprotected	12
FW32	Malagarasi River system	Greater Mahale Landscape	Tanzania	356,285	Partial	5
FW17 and FW18	Lake Kivu	Itombwe-Nyungwe Landscape	DRC and Rwanda	268,186	Unprotected	17
FW19 and FW20	Lake Malawi (Lake Niassa)	Northern Lake Niassa Mountain Complex (in part)	Malawi and Mozambique	685,997	Partial	109
FW25, FW26, FW27 and FW28	Lake Tanganyika	Itombwe-Nyungwe Landscape	Burundi, DRC, Tanzania and Zambia	3,275,047	Partial	21

Figure 12.2. Map of CEPF priority sites and corridors.



Four strategic directions will guide the CEPF investment. These strategic directions and their associated investment priorities were determined through an intensive consultative process with stakeholders and reflect the views of civil society in the hotspot.

Table 12.3. Strategic Directions and Investment Priorities

Strategic Directions	Investment Priorities
1. Mainstream biodiversity into wider development policies, plans and projects to deliver the co-benefits of biodiversity conservation, improved local livelihoods and economic development in priority corridors.	1.1. Enhance civil society efforts to develop and implement local government and community-level planning processes to mainstream biodiversity conservation, and leverage donor and project funding for livelihood activities that explicitly address causes of environmental degradation in and around priority KBAs in priority corridors.
	1.2. Promote civil society efforts and mechanisms to mainstream biodiversity conservation into national development policies and plans, and into territorial planning in priority corridors and countries.
	1.3. Support civil society to build positive relationships with the private sector to develop sustainable, long-term economic activities that will benefit biodiversity and reduce poverty in priority corridors.
2. Improve the protection and management of the KBA network throughout the hotspot.	2.1. Increase the protection status (via creation or expansion of protected areas) and/or develop, update and implement management plans for terrestrial priority KBAs.
	2.2. Support the role of civil society organizations in the application of site safeguard policies and procedures, including the strengthening of environmental impact assessment implementation in order to address ongoing and emerging threats to priority KBAs ,including freshwater KBAs.
	2.3. Advance the identification and prioritization of KBAs in Africa and the Arabian Peninsula.
3. Initiate and support sustainable financing and related actions for the conservation of priority KBAs and corridors.	3.1. Support civil society organizations to develop forest carbon partnerships and projects that advance biodiversity conservation in priority KBAs in Africa.
	3.2. Support civil society organizations to develop partnerships and projects for non-carbon payment for ecosystem services schemes and other market mechanisms in priority KBAs in Africa, particularly priority freshwater KBAs that influence freshwater biodiversity, livelihoods and health.
	3.3. Support training for civil society organizations in fund-raising and project management, especially training such organizations at all levels with respect to emerging opportunities for sustainable financing for KBAs in Africa.
	3.4. Support the institutional development of civil society organizations in Eritrea, South Sudan and Yemen, and their role in the conservation of KBAs in their respective countries.
4. Provide strategic leadership and effective coordination of CEPF investment through a regional implementation team.	4.1 Operationalize and coordinate CEPF's grant-making processes and procedures to ensure effective implementation of CEPF's strategy throughout the hotspot.
	4.2 Build a broad constituency of civil society groups working across institutional and political boundaries toward achieving the shared conservation goals described in the ecosystem profile.

Strategic Direction 1: Mainstream biodiversity into wider development policies, plans and projects to deliver the co-benefits of biodiversity conservation, improved local livelihoods and economic development in priority corridors.

This strategic direction recognizes that the most important root cause of threats to biodiversity identified in the local and regional consultations is poverty, aggravated by population growth. It is also aligned with the top priority given to rural development in almost all the development strategies of the hotspot countries, and with achievement of the Millennium Development Goals throughout the region (notably goals 1. Eradicate extreme poverty and hunger; 7. Ensure environmental sustainability; and 8. Develop a global partnership for development). There are also strong synergies among improved agricultural practices, utilization of sustainable energy and Smart REDD+, while the diversification of livelihood options strengthens resilience against climate change.

The link between poverty and biodiversity loss is complicated, and neither poverty nor population growth necessarily leads to environmental degradation. But it is clear in the hotspot that poverty, increasing populations and lack of alternative options underlie two of the most devastating threats identified at site level: the increasing transformation of biodiversity habitats into farmland and forest degradation through fuelwood and charcoal extraction. These activities undermine the long-term future for communities and the wider interests of society at large, especially with respect to ecosystem services.

While there is an urgent need, CEPF resources are insufficient to finance livelihood programs on a large scale. This strategic direction will therefore support activities that seek to influence governments and local authorities' actions and planning, and to integrate with and/or capitalize on existing and proposed development projects and plans. This will help mainstream and build a justification for biodiversity conservation at priority KBAs as part of wider development agendas in the priority corridors. In the context of this wider development planning, it will also support livelihood initiatives at priority KBAs that aim to demonstrate new approaches to the integration of livelihood and biodiversity conservation or that help facilitate the scaling-up and/or transfer of well-tested approaches that have already demonstrated the co-benefits of integration.

This strategic direction builds on a solid foundation of civil society experience and interest in the hotspot, where support for livelihoods and the integration of conservation and development has long been a key area of intervention by civil society organizations. It focuses on three key livelihood needs where synergies with biodiversity conservation have considerable potential: (i) affordable and sustainable energy, and the need to manage fuelwood resources and develop alternatives; (ii) food security and the need to enhance agricultural productivity to support local needs; and (iii) disposable income to help the breakaway from a subsistence lifestyle and develop local economies. All three are fundamental requirements for human livelihood and well-being, and will need to be advanced in order for conservation priorities to be addressed. This strategic direction will also provide civil society organizations with the opportunity to link their conservation expertise with existing and future development and investment initiatives, in order to make a lasting change in how these initiatives are perceived, planned and implemented.

This strategic direction also builds on the recognition of the growing importance of the private sector in the hotspot and in Africa, its role in economic development and its potential impact on biodiversity. In countries experiencing double-digit growth and witnessing important foreign investments, the private sector appears as a clear stakeholder for improving conservation in the hotspot.

Investment Priority 1.1: Enhance civil society efforts to develop and implement local government and community-level planning processes to mainstream biodiversity conservation and leverage donor and project funding for livelihood activities that explicitly address causes of environmental degradation in and around priority KBAs in priority corridors.
The region is the theater of important investments in local development activities by local and international NGOs, with funding from government or, more often, from institutional donors and foundations. At the community level, these investments are not necessarily planned in advance, and when participatory planning exercises are undertaken, they rarely consider biodiversity conservation activities.

At the same time, a holistic approach of future development paths at the local level is necessary. Agricultural productivity in the hotspot is notoriously low, resulting in the waste of a resource (arable land) that is becoming increasingly scarce as populations grow and more land is degraded. This can lead directly to demands for the degazettement of protected areas and resistance to the expansion of the protected area network. Forested land that is perceived as particularly fertile—because it has not had the nutrients leached out of it by poor farming methods—is especially vulnerable to such pressures. The high demand for wood to meet domestic needs is one of the most pressing issues in the hotspot and is of common concern to development and conservation communities.

The consultation process made it clear that there is a need for identifying and implementing projects that promote integration of biodiversity into local planning and policies, and in particular to ensure that such plans and policies take into consideration the long-term sustainable benefits of biodiversity conservation as a means to reduce poverty, improve livelihoods and achieve health and food security.

This investment priority aims to encourage existing and incoming development projects with a focus on rural energy and food production, and the government agencies that invite and or approve their presence, to include activities that contribute to the conservation of KBAs and adjacent areas.

Under this investment priority, CEPF will finance activities that support:

- Involvement of environmental civil society in existing local development planning process to ensure a better integration of biodiversity in priority KBAs;
- Initiation of local development planning process in priority KBAs, bringing together development and environment NGOs. The plans would address in an integrated way the most important issues for livelihoods and biodiversity such as agricultural production, forest (and natural areas) protection, water resources preservation, energy production, alternative livelihood activities and health; the plans would take into account the adaptation (and potentially mitigation) of climate change.

- Advocacy activities to contact donors (government, institutional donors, foundations, NGOs) to establish the different components of local plans.
- Direct support to activities that have a direct and measurable impact on biodiversity, such as alternative livelihood options, better natural resources management, etc.
- Components related to biodiversity protection in livelihood activities supported by other donors (such as monitoring biodiversity).
- Activities to scale up and disseminate the working methodologies and projects in relation to Investment Priority 1.2.

List of eligible corridors and sites for 1.1:
- Northern Lake Niassa Mountain Complex
- Itombwe-Nyungwe Landscape
- Western part of Kaffa and Yayu Biosphere Reserve (from Sheka westward)
- Lake Tana Catchment Landscape and sites from the Amharic Escarpment

Investment Priority 1.2: Promote civil society efforts and mechanisms to mainstream biodiversity conservation into national development policies and plans, and into territorial planning in priority corridors and countries.
Building on the previous investment priority, which focuses on the community/local level, this priority focuses on the need to engage directly with the wider development agenda. The emphasis here will be on supporting projects that are linked to wider development plans and agendas that are being advanced in relation to the priority corridors and KBAs. Civil society organizations will be supported to pursue links and integration of biodiversity into these development and investment programs through a variety of innovative mechanisms.

A key objective of this investment priority is to ensure that KBA conservation is integrated into national/district land use and development plans by providing the opportunity for civil society to engage with planning processes led by government and donors. Civil society organizations will be supported to provide information to decision makers in a form useful for planning, for example decision support tools. Civil society organizations will also be supported to develop alliances and partnerships—in particular with stakeholders from the development world—in pursuit of joint planning objectives with other stakeholders (for instance, when there is the potential to secure benefits through planning for both biodiversity and livelihoods). Funding could also support civil society organization participation in the preparation of large-scale strategic environmental assessments (SEAs) that aim to integrate with specific sectors (such as mining, biofuels), and to enable civil society organizations to put environmental considerations into policies, plans and programs (see also link with site safeguard action in investment priority 2.2 for urgent threats to KBAs).

This investment priority allows CEPF to build on the large body of eco-regional landscape planning work done previously by WWF, ARCOS and others, and that is available for the Albertine Rift, Eastern Arc (excluded from investment in this profile), Ethiopian coffee forests, Lake Malawi, and Mounts Mulanje, Kilimanjaro, Kenya and Elgon.

In this hotspot, with numerous patches of habitat and small, often highly fragmented KBAs, a focus on habitat restoration or compatible land uses within production landscapes and other areas

around the priority sites will be critical. Watershed management is especially relevant to development planning. For instance, habitat conservation and restoration in upper catchment areas can greatly reduce dam siltation and thereby increase long-term energy provision. Also, KBAs can function in a wider landscape context to limit the spread of invasive alien species, particularly for freshwater habitats.

This investment priority is particularly significant in relation to climate change and national and regional plans and initiatives for climate change adaptation and mitigation. In the context of climate change, maintaining natural ecotones across altitudinal gradients and connectivity among terrestrial and freshwater habitats and sites (KBAs) in the hotspot will be especially important for biodiversity and the conservation of ecosystem services. Civil society organizations will be supported to develop partnerships and contribute to mitigation and adaptation strategies within the hotspot (including national adaptation strategies under the UNFCC and the UNDP African Adaptation Program).

Under this investment priority, CEPF will fund activities that support:

- Advocacy work at the policy level, with national authorities or major donor agencies (institutional or foundation) to ensure integration of biodiversity concerns in high-level planning. These activities would focus specifically on policies that might have a high impact on biodiversity in the concerned countries, such as agriculture, energy or fisheries.
- Engaging civil society organizations in land-use/territorial planning processes at national/district scale in priority corridors to ensure KBA conservation needs are taken into account.
- Strengthening or creating networks, platforms or alliances bringing together environmental civil society organizations or bridging environmental and development organizations for a better integration of biodiversity and development.
- Participation of environmental civil society in the development of regional/national climate change policies and plans to ensure mainstreaming of biodiversity.
- Mainstreaming biodiversity at landscape level planning, such as for reforestation, creating buffer areas around protected areas through agroforestry, controlling invasive alien species and watershed management.
- Improving (and disseminating) knowledge of baseline data and monitoring of change and impacts, especially in relation to forest cover at landscape levels or variation in fish stocks for freshwater KBAs in concerned corridors.
- Developing tools and trainings for decision makers to enhance their comprehension of biodiversity and how to take its conservation into account in development planning.
- Pooling and sharing experience within and between priority corridors in the development and implementation of biodiversity conservation and livelihood projects to learn from and facilitate the transfer or scaling-up of best practices.
- Where regulatory and legal frameworks are barriers to implementation or integration, projects to support creation of an appropriate legal, regulatory, institutional, rights-based environment at the local level and directly linked to priority KBAs.
- Participation of civil society in strategic environmental assessments when they are tied to policies that could impact KBAs and biodiversity in the concerned corridors.

List of eligible corridors for 1.2:
- Northern Lake Niassa Mountain Complex
- Itombwe-Nyungwe Landscape
- Western part of Kaffa and Yayu Biosphere Reserve (from Sheka westward)
- Lake Tana Catchment Landscape and sites from the Amharic Escarpment

List of eligible countries (for national policies):
- Ethiopia
- Burundi
- Rwanda
- DRC
- Tanzania
- Zambia
- Malawi

Investment Priority 1.3: Support civil society to build positive relationships with the private sector to develop sustainable, long-term economic activities that will benefit biodiversity and reduce poverty in priority corridors.

The private sector is becoming increasingly important with regard to its role in economic development and poverty reduction. This investment priority aims to reduce the negative impact of this sector and to enhance its potential to have a positive impact on biodiversity. As foreign investments grow, it is extremely evident that the private sector must be regarded as a key stakeholder that can contribute to improving conservation in the hotspot.

This investment priority will support civil society organizations in their role of advisors to the private sector. Under this investment priority, private sector enterprises could also receive grants directly for nonprofit activities, following the CEPF regulations for granting to the private sector.

One of the main goals is to mainstream biodiversity conservation in productive landscapes, in particular for export products with high added value. This could naturally be the case for large estates, such as tea or coffee plantations in Malawi or Uganda that host important biodiversity areas or could serve as biological corridors for surrounding sites if better managed. Other situations include areas slated for biofuel production, or landscapes dominated by small-scale, family-owned plantations that, in spite of the multiplicity of their owners, are in contact with one or a small group of buyers and could improve their management to better care for biodiversity. Certification and labels have proved useful for improving biodiversity management in such situations, and the region offers multiple opportunities to develop schemes with co-benefits for local communities and biodiversity, with traditional cash crops (such as coffee and tea) or more innovative products depending on local market opportunities.

Factors that have limited and/or led to the demise of biodiversity and livelihood ventures in the hotspot will get particular attention. The investment will support actions that address governance and user rights to access resources (including practices that avoid elite capture of benefits) and will apply strict selection criteria to ensure that requisite skill sets are available or will be acquired through project implementation (with adequate civil society organization support) to

ensure high quality products, supportive value chains and the establishment of sustainable enterprises to limit the risk of market failure at the end of projects.

Another important activity that could be developed with the private sector is tourism. This ecosystem profile has revealed that the mountain ecosystems are at present underrepresented in the range of tourism options available to most countries—apart from a few key examples such as trekking on Kilimanjaro or Mount Kenya. Most countries have put an emphasis on ecotourism in their development plans. Linking with the private sector could be catalytic to bring direct revenues from conservation to communities and create jobs, in particular when the population density is still compatible with conservation. Naturally, this could be done only in sites with a specific potential. Particular attention will be given to long-term sustainability of the proposed activities. In countries where such a potential exists for protected areas, CEPF could support activities to facilitate long-term management concessions with the private sector (Zambia, DRC, Ethiopia).

Finally, the potential for using local private corporate responsibility funding has been raised as an opportunity that merits exploration. At present, in countries where it exists, this private sector funding opportunity has been used in most of cases for social activities. But the potential exists to drive a portion of the funds available to pay for biodiversity actions. Small grants would be made available to local civil society for specific, targeted actions aiming at leveraging this underestimated but potentially sustainable source of funding.

Under this investment priority, CEPF will fund activities that support:

- Development of standards and labels for biodiversity-friendly production of high added-value export products. This could comprise—but is not limited to—coffee, tea or timber.
- Identification and implementation of sustainable economic activities engaging private sector and communities, in order to bring direct economic benefits to communities to engage in conservation. Such activities would help civil society organizations link with the private sector in developing additional appropriate ecotourism ventures that exploit the many similar attractions and opportunities in the hotspot, channel benefits to local communities, and build political support for KBA conservation (in particular in Ethiopia). Nontimber forest products can also be targeted for alternative livelihoods funding if they are extracted according to a sustainable management plan and any additional local agreements and management mechanisms.
- Projects that investigate the potential for corporate responsibility programs with local private sector entities.

List of priority corridors and sites for 1.3:

- Northern Lake Niassa Mountain Complex
- Western part of Kaffa and Yayu Biosphere Reserve (from Sheka westward)
- Lake Tana Catchment Landscape and sites from the Amharic Escarpment

Strategic Direction 2: Improve the protection and management of the KBA network throughout the hotspot.

The ecosystem profile describes six major weaknesses in the current protection and management of KBAs:

1. First, with some notable exceptions, most protected KBAs in the hotspot are chronically under-resourced and either lack sound management plans or suffer from their inadequate implementation. A widespread weakness is the lack of baseline data and monitoring of biodiversity and management effectiveness.
2. Existing regional protected area networks (including all the standard IUCN categories and other forms of reserves) fail to cover all the KBAs, even those that are biologically the most important. At least 38 percent of recognized KBAs currently have no legal protected status of any kind, and an unknown number of candidate or potential IBAs are also completely unprotected.
3. Even well managed protected areas are isolated islands of habitat, providing very little connectivity between KBAs. A lack of connectivity means that ecological processes such as migration and gene flow may not be sustained and biodiversity will inevitably decline. In this montane hotspot, maintaining connectivity across altitudinal gradients is particularly important, especially in the face of climate change.
4. Freshwater KBAs are very poorly covered by the protected areas network, and there is very little integration between the management of freshwater and terrestrial ecosystems. This is of particular concern given the urgent need to step up measures to address alien invasive species and avoid species extinctions in these KBAs.

5. Despite recognition and in many cases legal protection, many KBAs are threatened, some by projects with powerful interests and without adequate planning, impact assessments or regard for existing legal and policy safeguards. In some cases this involves proposals for removal of protected area designation (Chapters 6, 7 and 8).
6. There are believed to be a significant number of potential KBAs that are currently unrecognized, or treated in this profile as candidate KBAs, as a result of gaps in biodiversity knowledge, as well as sites whose true conservation importance is not realized because the IUCN threat status for many groups has yet to be assessed (Chapters 4 and 10). This is severely hindering objective, priority-driven conservation planning.

All consultations identified better protection and management of the protected area network as a major priority. However, addressing these issues in full demands a level of funding that is well beyond the resources currently available to CEPF. CEPF investment will therefore need to be carefully targeted geographically and in particular support projects that can play a catalytic role by increasing public and donor concerns for their future.

Investment Priority 2.1: Increase the protection status (via creation or expansion of protected areas) and/or develop, update and implement management plans for terrestrial priority KBAs.

This investment priority will target terrestrial priority KBAs in the hotspot, particularly KBAs that are currently unprotected or only partially protected. Funding will be available to prepare proposals and advocate for their designation with appropriate national protected area status. Funding will be available to civil society organizations and government-civil society

partnerships to advance the necessary technical and legal processes to achieve legal recognition. Particular attention will be given to sites where there is already a commitment to advance protection (for example, where sites are included in national biodiversity strategies and action plans or national commitments in the implementation of the Convention on Biological Diversity program of work on protected areas) and where proposals to CEPF are backed up by strong support for a civil society role from the relevant government authorities.

Additionally this investment priority will provide funding to develop and implement new (if none exists) or improved management plans. Funding will be available to support collaborative ventures between civil society organizations and government authorities. Particular attention will be given to planning for sites where protected area management arrangements already exist, where there is considerable added value to civil society involvement, and where authorities have a track record of success in the development and implementation of management plans. The highest priority for CEPF will be to support planning that aims to address particularly urgent threats to a KBA. Approaches to the development of management plans will need to be consultative, involving local communities adjacent to protected areas, and could include the exploration of options for comanagement and benefit-sharing or development of alternative livelihoods for communities. Support may also be provided for the development of monitoring schemes for biodiversity within the protected area and the application of GEF's Management Effectiveness Tracking Tool. This investment priority will also enable the granting of seed funding to initiate the implementation of management plans, focusing on components that are particularly urgent and link clearly to the conservation of globally threatened biodiversity.

List of eligible sites for 2.1:
All priority KBAs (see Table 12.1)

Investment Priority 2.2: Support the role of civil society organizations in the application of site safeguard policies and procedures, including the strengthening of environmental impact assessment implementation in order to address ongoing and emerging threats to all terrestrial KBAs (including freshwater KBAs).
As the economy in the region develops, KBAs are coming under increasing threat from development proposals. Environmental impact assessment legislation is in place in all the countries in the hotspot. Yet enforcement and implementation are weak everywhere, and there are cases of flagrant disregard for environmental legislation. The capacity to conduct environmental impact assessments is limited, and the standards are often low. Given their scientific and conservation expertise, and the political space for independent action in most hotspot countries, civil society organizations can play an important role in bridging the gap between good law and bad practice. Further, civil society advocacy and alliances can support government agencies to maintain and perform their legal mandates to protect biodiversity and ensure that environmental safeguards are applied. This is an emergent role for civil society in the hotspot, and it represents a clear niche for CEPF when funding is not available from other donors and when an ability to respond rapidly is frequently required.

Alongside national environmental impact assessment legislation, a number of financing institutions use one or more KBA criteria in the application of site safeguard policies in order to avoid or minimize/mitigate the impacts of projects on critical biodiversity habitats. These include

the World Bank (through its Natural Habitats Policy), the International Finance Corp. (through Performance Standard 6), as well as more than 100 private sector banks (which have adopted the Equator Principles and follow International Finance Corp Standards). Other tools for protecting KBAs and biodiversity in relation to various developments include existing and emerging certification and accreditation schemes (such as those relating to fair trade and sustainability in production of commodities, and the development and implementation of carbon finance projects as applied by the Climate, Community and Biodiversity Alliance). Civil society organization input can ensure that biodiversity safeguards and standards are effectively applied, and that government and industry are aware of them before they commit to investments that could be environmentally damaging.

Advocacy and technical input to environmental impact assessments, review of such assessments, support for consultations with local stakeholders, the building of alliances across different interest groups, and the development of economic alternatives are all interventions that may be supported by CEPF in response to any KBA coming under threat. Projects under this investment priority will draw on lessons learned from previous efforts (such as those documented by the African Environmental Law & Policy program of the Environmental Law Institute). A "learning by doing" approach will be followed, with external supporting expertise availed as needed.

List of eligible sites for 2.2:
All 261 terrestrial KBAs (see list in Appendix 2) and the five priority freshwater KBAs (see Table 12.2). Priority will be given to sites under an identified and urgent threat.

Investment Priority 2.3: Advance the identification and prioritization of KBAs in Africa and the Arabian Peninsula, including those that have irreplaceable plant diversity.
The knowledge of globally threatened biodiversity and its distribution is far from adequate for ensuring comprehensive biodiversity conservation in the hotspot. This problem exists across all taxa that have been used to trigger the identification of KBAs in the hotspot (though information for birds, mammals and amphibians is more comprehensive). It is particularly acute for sites in Yemen, Ethiopia, Eritrea, South Sudan, Somalia, DRC and Mozambique, where the areas involved are (variously) especially large and/or inaccessible, the biodiversity especially rich, or where research efforts have been restricted by a lack of security, capacity and resources. These uncertainties have resulted in a large number of potential KBAs that could be considered candidates, and by KBAs that are scored at a lower biological importance (3 or 4) than what may be deserved.

In particular, efforts are needed to categorize plants, reptiles and invertebrates according to their conservation status and IUCN Red List categories; the absence of such assessments greatly hinders planning and prioritization of action in the hotspot. During the current profiling exercise, a major challenge was to incorporate the hundreds of plant species that are endemic to a single site s or are restricted to very few localities (a trigger for KBA status according to the irreplaceability criterion).

Climate change vulnerability of species has also been assessed for all birds, amphibians and some plants under the IUCN Red List program. This work is ongoing and provides a biologically meaningful way to model the impacts of climate change on the rare, threatened and endemic

species in the hotspot. Linking updates of the Red List to climate change vulnerability assessments in hotspot countries would be a major contribution to conservation in the hotspot by CEPF.

There are also discoveries of new species and new species location records occurring all the time, especially among amphibians and reptiles—but also among relatively well-studied groups like birds and mammals. The loss of biodiversity due to lack of knowledge about its distribution and vulnerability undermines conservation efforts in the hotspot.

This investment priority will therefore support highly targeted field surveys and/or desk-based Red List/vulnerability assessments to fill gaps in biological knowledge. In particular, and in relation to Investment Priority 2.2, it will support fieldwork when a site is threatened and there is an urgent need for information, and status and vulnerability assessments when an urgent case can be made to advance the identification and prioritization of KBAs.

List of priority eligible countries and sites for 2.3:

- Portions of the Eastern Afromontane Hotspot in Yemen, Eritrea, Ethiopia, South Sudan and southeastern DRC
- Sites of the Chimanimani-Nyanga Mountains corridors and adjacent Montane Islands of Mozambique
- Sites of the Northern Lake Niassa Mountain complex

Strategic Direction 3: Initiate and support sustainable financing and related actions for the conservation of priority KBAs and corridors.

A variety of sustainable financing mechanisms for biodiversity conservation are now on the table, the most promising of which spring from the relatively recent recognition of the values of ecosystem services. These have the potential to contribute toward management costs and also provide incentives for local stakeholders. Within this hotspot, ecosystem service values are massive, and potentially many opportunities exist for the sustainable financing of KBAs under PES schemes. Options include forest carbon projects such as REDD+, which specifically target carbon sequestration for combating climate change, or watershed PES (in which downstream water users pay upstream land managers in mountain regions to manage forest and farmland to maintain water flow and quality). This strategic direction will assist civil society to exploit these opportunities.

Ecosystem-service-based funding mechanisms have the potential to provide sustainable financing to KBAs and corridors, but are unlikely to do the same for national civil society organizations. This strategic direction will therefore also support efforts to improve institutional (civil society) fundraising and financial and project management, recognizing that adequate financing underpins the survival of most civil society organizations in the hotspot and is critical for their continued efforts to achieve conservation in the hotspot.

Investment Priority 3.1: Support civil society organizations to develop forest carbon partnerships and projects that advance biodiversity conservation in priority KBAs in Africa.

Various sustainable financing mechanisms are based on forest carbon. The REDD /REDD+ initiative is the best known and has generated a great deal of enthusiasm and interest after being

endorsed by the 2005 COP11 in Montreal. It offers an obvious and cost-effective strategy for combating climate change and achieving other potential benefits (poverty reduction, conservation of biodiversity and maintenance of other ecosystem services that depend on forests, such as pollination, water provision and purification). However, there are serious practical constraints on the ground. The REDD initiative is new, and the mechanisms by which it can be implemented and monitored are largely untested. Institutional capacity for forest management in most countries in the hotspot is weak. Poverty and underdevelopment are often extreme in communities adjacent to forests, and institutional frameworks for delivering REDD benefits to them are fragmented or absent. REDD also has to be implemented in broader national contexts in which legal frameworks for dispute resolution are lacking and the history of effective delivery from the public sector is also poor.

This investment priority will therefore be pragmatically targeted toward forest carbon financing in general, including voluntary carbon trading involving avoided deforestation and the private sector. It will provide financial and technical support for civil society to contribute toward ongoing forest carbon initiatives or the planning of new ones in priority KBAs. Particular attention will be given to funding civil society involvement in early-stage feasibility assessments, forging partnerships with the private sector, building biodiversity conservation components (including safeguards) into forest carbon schemes, and leveraging private sector funding for the preparation of project design documents and accreditation and certification schemes (such as standards from the Climate, Community and Biodiversity Alliance). CEPF funds may also be used to facilitate the pooling and sharing of experience in relation to forest carbon finance and biodiversity conservation within and between priority corridors.

List of corridors and sites eligible for 3.1:

- Northern Lake Niassa Mountain Complex
- Itombwe-Nyungwe Landscape
- Western part of Kaffa and Yayu Biosphere Reserve (from Sheka westward)
- Greater Mahale KBA
- Mount Kabobo-Margungu Highlands KBA

Investment Priority 3.2: Develop partnerships and projects for noncarbon PES schemes and other market mechanisms at priority KBAs in Africa, particularly priority freshwater KBAs that influence freshwater biodiversity, livelihoods and health.

PES involves mutually beneficial contracts between consumers and suppliers of ecosystem services. Under PES agreements, a service provider (such as a farmer or land owner) or person/organizations whose activities impact a service (such as a local community) is paid by, or on behalf of, beneficiaries of the same service (a corporate entity or public agency) for practices that provide marginal improvements in service delivery (increase in service beyond what would have been provided without the payment). PES schemes are thus voluntary transactions in which a well-defined ecosystem service (or land use likely to secure that service) is "bought" by at least one ecosystem service buyer from at least one ecosystem service provider. Within the hotspot, PES schemes are most likely to be an opportunity for KBAs that provide water for the irrigation of cash crops, hydropower and operations such as mining.

This IP will support actions which recognize and seek to address the challenging issues that have arisen in advancing PES projects to date in Africa. In order to be successful PES projects require major investments and need to be designed carefully for the particular socio-economic, political, and environmental contexts in which they are set, underpinned by good science (spatial analysis, data, and ecological understanding) and sound business plans (with realistic valuation protocols and compensation payments). Difficulties include the lack of formal property rights, poor monitoring capacity, and information asymmetries that place local communities, national CSOs, and even government agencies at a disadvantage relative to potential buyers of Ecosystem Services. There are also problems arising from knowledge gaps and scientific uncertainty, e. g. in defining the boundaries of the socio-ecological systems that determine the context for PES implementation, or in understanding how the resource system actually works. PES schemes for water are plagued by a lack of sufficient historical, seasonal and current data on water flows and extraction, with most water users not having gauges to measure the amount of water they use. There are further uncertainties re attribution of damage to services, e. g. in understanding how changes in land use affect water supplies and at what scale they do so, and in the related difficulty of identifying the actual providers of the ecosystem service who should be the beneficiaries of PES schemes .

These reasons might place PES schemes beyond the individual capacity of any civil society organization in the hotspot. Civil society organizations do, however, have an important role to play in the development of PES as a sustainable financing mechanism for biodiversity conservation in the hotspot. CEPF funding to civil society organizations might include the preparation of early-stage feasibility assessments, the development of appropriate partnerships and strategic alliances with government agencies and the private sector, the exploration and/or development of PES opportunities with direct or combined biodiversity benefits, the facilitation of community involvement, and the development of business plans. Finally, there may be opportunities for small-scale PES schemes with potential livelihood benefits such as direct payments for biodiversity conservation in areas adjacent to eco-lodges, or via corporate social responsibility programs of private sector companies that may be primarily motivated by altruism and public relations interests. CEPF funds may also be used to facilitate the pooling and sharing of experience in relation to ecosystem-service finance and biodiversity conservation within and between priority corridors to build on work in this area to date.

List of corridors and sites eligible for 3.2:

- Northern Lake Niassa Mountain Complex
- Lake Tana Catchment
- Itombwe-Nyungwe Landscape
- Greater Mahale KBA (in relation to the Malagarasi River system)

Investment Priority 3.3: Support training for civil society organizations in fundraising and project management, especially with respect to emerging opportunities for sustainable financing of KBAs in Africa.

This investment priority addresses the need for enhanced capacities in project fund-raising and management within civil society organizations involved in biodiversity conservation in the hotspot. Capacity assessments show that a high proportion of grassroots community organizations have not managed projects before, cannot implement small projects without

support, and lack technical/financial reporting and proposal writing skills. Even for larger organizations, which implement a high proportion of environmental initiatives in the hotspot (either individually or in partnership with governments), there are core fundraising and capacity constraints.

This investment priority will train recipients in project management, proposal writing and fund-raising through "learning by doing." Examples of this include on-the-job management support to community-based organizations that are implementing CEPF grants; through fund-raising workshops that produce funding proposals for identified donor agencies as a key output; and by supporting long-term mentoring schemes between larger NGOs/civil society organizations and community-based organizations. This investment priority will also allow for the development, production and dissemination of capacity development tools such as project management and fund-raising handbooks and for sharing of best practices and lessons learned. Collaboration will be sought with the Conservation Leadership Programme, a partnership between Conservation International, BirdLife International, Fauna and Flora International, and the Wildlife Conservation Society, which provides targeted project management and fund-raising training/mentoring programs and a small-grants conservation projects scheme.

Particular focus will be given under this investment priority to civil society organizations involved in the design and development of carbon finance and PES schemes since they represent a major challenge and opportunity to provide sustainable financial and biodiversity benefits to communities and community-based organizations in or adjacent to priority KBAs.

List of countries eligible for 3.3:
All African countries of the hotspot, with the condition that benefiting NGOs and projects are linked with conservation of Eastern Afromontane ecosystems.

Investment Priority 3.4: Support the institutional development of civil society organizations in Eritrea, South Sudan and Yemen, and their role in the conservation of KBAs in their respective countries.
The profile has highlighted the limited development of civil society in relation to biodiversity conservation in Eritrea, South Sudan and Yemen—a situation in stark contrast to other parts of the hotspot. CEPF will support the early-stage development of civil society conservation organizations in these countries and their involvement in KBA conservation initiatives at an appropriate scale. Support will depend on a more detailed opportunity and needs assessment, but may involve support for start-up of new organizations and the development of existing bodies, and may cover assistance with purely institutional issues such as governance and management of NGOs, as well as direct small-scale funding support for conservation work. Considerable prospects exist for supporting partnering and mentoring between emerging civil society in these three countries and well-established organizations in North and East Africa (such as Ethiopia) or the adjacent Mediterranean Basin Hotspot, where investment will shortly be under way.

List of countries eligible for 3.4:
- Yemen
- Eritrea
- South Sudan

Strategic Direction 4: Provide strategic leadership and effective coordination of CEPF investment through a regional implementation team (RIT).

In every hotspot approved for investment as of July 2007, CEPF will support a RIT to convert the plans in the ecosystem profile into a cohesive portfolio of grants that exceeds in impact the sum of its parts. Each regional implementation team will consist of one or more civil society organizations active in conservation in the region. For example, a team could be a partnership of civil society groups or could be a lead organization with a formal plan to engage others in overseeing implementation, such as through an inclusive advisory committee.

The regional implementation team will be selected by the CEPF Donor Council based on an approved terms of reference, competitive process and selection criteria available at www.cepf.net. The team will operate in a transparent and open manner, consistent with the CEPF mission and all provisions of the CEPF Operational Manual. Organizations that are members of the RIT will not be eligible to apply for other CEPF grants within the same hotspot. Applications from formal affiliates of those organizations that have an independent board of directors will be accepted and will be subject to additional external review.

The regional implementation team will provide strategic leadership and local knowledge to build a broad constituency of civil society groups working across institutional and political boundaries toward achieving the conservation goals described in the ecosystem profile. The team's major functions and specific activities will be based on an approved terms of reference. Major functions of the team will be to:

- Establish and coordinate a process for proposal solicitation and review.
- Manage a program of small grants (less than $20,000).
- Provide reporting and monitoring.
- Coordinate and communicate CEPF investment, build partnerships and promote information exchange in the hotspot.
- Build the capacity of grantees.

These functions are regarded as being distinctly administrative, or distinctly programmatic. As these functions are very different, they are assigned to separate investment priorities.

Investment Priority 4.1: Operationalize and coordinate CEPF's grant-making processes and procedures to ensure effective implementation of CEPF's strategy throughout the hotspot.

This investment priority covers the three terms of reference that are administrative in nature:

- Establish and coordinate a process for proposal solicitation and review.
- Manage a program of small grants (less than $20,000).
- Provide reporting and monitoring.

Administrative costs are those expenses incurred by the RIT to support the various aspects of managing CEPF small and large grant contracts. The RIT assumes significant administrative responsibilities as manager of CEPF's small grants, including budgeting, processing proposals,

and drafting and monitoring contracts. For large grants, RITs assist grantees and the CEPF Secretariat in receiving and processing grant applications, ensuring compliance with CEPF policies, and facilitating on-time and accurate grantee and portfolio reporting and monitoring.

In particular, the regional implementation team has a very important role to play in solicitation of proposals and their review. The activities span a wide range, from sending out calls for proposals to establishing review committees to making final recommendations for approval or rejection. While much of this work is labeled as being administrative, it does have a sound foundation in program, as grants need to be strategic and of high quality. As such, the activities covered under this investment priority include evaluation of applications and making recommendations on which projects to support. These tasks require technical expertise, knowledge of strategy, and the ability to understand that all selected projects will make a unique contribution to the achievement of CEPF's objectives.

This investment priority also covers the management of a small grants program. Small grants play an extremely important role in the CEPF portfolio. These grants can address themes or geographic areas of importance, can serve as planning grants, or they can play a supporting role to achieving objectives in a particular corridor. The strategic role that these grants should play cannot be underestimated. Therefore, although most of the activities pertaining to this function are administrative, two very important ones must be highlighted: a) conduct strategic oversight of the small grants portfolio to ensure coherence with the overall grant portfolio, CEPF donor partners and others active in the region, and b) decide on the award of all grant applications.

It is essential to realize that without these activities, both of which ensure that small grants are integrated and strategic, the small grants program would not be able to contribute to the achievement of CEPF's objectives. Nonetheless, this function is regarded as primarily administrative.

This investment priority also covers reporting and monitoring. This entails collecting data on portfolio performance, ensuring compliance with reporting requirements, ensuring that grantees understand and implement safeguards policies, and reviewing reports. It also includes visits to grantees and may lead to follow-up capacity building. This will ensure effective project implementation and monitoring, and requires technical expertise to be performed and for it to be effective in adaptive management. However, this function is also regarded as primarily administrative.

Investment Priority 4.2: Build a broad constituency of civil society groups working across institutional and political boundaries toward achieving the shared conservation goals described in the ecosystem profile.

This investment priority covers the two terms of reference that are programmatic in nature:

- Coordinate and communicate CEPF investment, build partnerships and promote information exchange in the hotspot.
- Build the capacity of grantees.

These regional implementation team activities include programmatic duties that directly support strategic development of the portfolio and contribute in their own right to the achievement of critical conservation results that yield portfolio-wide benefits. Such activities may include facilitating learning exchanges between grantees and stakeholders, identifying leverage opportunities for CEPF, or collaborating with other donors and their conservation projects. Programmatic activities require the RIT to maintain in-house conservation expertise to ensure that CEPF funds are strategically channeled to optimize the achievement of its conservation objectives.

This investment priority also covers capacity building, a function that is regarded as being at core of RIT responsibilities. It places the RIT at the head of the strategy by making it responsible for coordination, communication, collaboration, and liaison with donors, partners, governments and others. It also puts the RIT in charge of assuring that the CEPF portfolio is geared to meeting the objectives laid out in the ecosystem profile. It includes the promotion of synergy between CEPF's objectives and local, national and regional initiatives.

This function includes all aspects of capacity building. It is a cornerstone of CEPF's work, ensuring that partners have the institutional and individual ability to design and implement projects that are essential to achievement of CEPF's objectives. This is not capacity building for the sake of capacity building; rather, it is targeted specifically to appropriate strategic stakeholders and ensures delivery of our conservation objectives through improved projects and higher quality implementation. History has shown that these capacity building efforts are essential to ensuring good projects that are integrated into a wider hotspot strategy and a common conservation vision.

13. SUSTAINABILITY

The CEPF investment strategy is designed to achieve sustainability both in terms of impacts (achievement of objectives relating to biodiversity and ecosystem conservation, civil society and development) and in terms of wider and longer-term financing to improve conservation outcomes in the hotspot.

Several underlying principles will ensure that the CEPF investment, although limited in relation to the huge area of the hotspot, will achieve more than just the immediate effects of initiatives financed during the investment period. These include:

- targeting the limited funds available at the highest priority KBAs and issues identified in the profile;
- using funds in a catalytic way to scale up and support related initiatives with compatible objectives;
- developing strategic partnerships and alliances (civil society, governments, private sector) to make best use of limited resources and to achieve leverage of additional funding from other sources;
- disseminating and replicating lessons learned, good practice and successful models from within the region and elsewhere;
- employing and building on existing knowledge, skills and strengths within civil society in the hotspot;
- building capacity, mentoring and providing other support to civil society, in particular to strengthen national and regional advocacy and fund-raising for the hotspot;
- linking civil society-led initiatives to wider development processes and government strategies to achieve greater impact, such as national biodiversity strategies, action plans and programs of work on protected areas (both parts of the Convention on Biological Diversity), and national adaptation plans of actions.

Strategic Directions Contributions to Sustainability

Strategic Direction 1: Mainstream biodiversity into wider development policies, plans and projects to deliver the co-benefits of biodiversity conservation, improved local livelihoods and economic development in priority corridors.

Sustainability is at the heart of this strategic direction. Initiatives to mainstream biodiversity and KBA conservation into development agendas and programs will contribute to both the wider geographic spread and longer-term sustainability of impacts. This strategic direction focuses not only the interventions necessary to change policies and plans, but also on the promotion of improved livelihoods, as successful livelihood initiatives bring economic and social benefits to local communities. When positively linked to biodiversity conservation and KBA management objectives, these initiatives result in conservation benefits without the requirement for constant donor funding. Examples include reduced pressure on KBAs and surrounding land through improved agricultural production on existing farmland; increased local support for KBA protection because people derive benefits from KBA conservation management (for example, through ecotourism); and programs that bring social benefits and lead to less degrading land and resource use (such as sustainable energy initiatives). Programs under this strategic direction will

use best practice in governance, user rights and skills development to ensure that sustainable enterprises are created, and that biodiversity conservation is included in local, national and regional plans, policies and projects. Ultimately, these efforts will ensure that local government understands and supports biodiversity conservation because the benefits to people and nature are clear.

Strategic Direction 2: Improve the protection and management of the KBA network throughout the hotspot.

Improved protection and conservation management of priority KBAs and corridors is targeted at achieving more resilient ecosystems and greater connectivity of key threatened habitats within the hotspot. Habitat rehabilitation, reduced degradation, removal of other threats, increased connectivity and improved conservation management will all lead to sustainable outcomes. Habitats, sites, corridors and species populations that are increasingly "self-sustaining" and more resilient to climate change require lower levels of future investment in management. Stronger legal protection, governance, management structures, human capacity and resources for KBA management all contribute to longer-term sustainability of conservation outcomes. Greater awareness and recognition of the KBA network in planning and development processes, enforcement of site safeguard and other regulations, and increased knowledge of biodiversity for better prioritization all underpin the development of a more effective and robust KBA network for sustainable conservation outcomes.

Strategic Direction 3: Initiate and support sustainable financing and related actions for the conservation of priority KBAs and corridors.

This strategic direction targets sustainable financing for KBA conservation through a variety of existing potential mechanisms and by strengthening the capacity of civil society to raise funds and manage funding and projects. Engagement of civil society with the private sector and governments in the implementation of forest carbon and noncarbon PES schemes provides opportunities to leverage significant additional funding for conservation in the hotspot to build on the CEPF investment both during and beyond the investment period. Strengthening civil society capacity (in Africa) and developing new capacity (in the Arabian Peninsula) provides solid foundations for sustainable financing and conservation program management in the longer term. Civil society plays huge, important roles in conservation in the hotspot and has proved a very effective and sustainable mechanism, even in times of extreme conflict.

Strategic Direction 4: Provide strategic leadership and effective coordination of CEPF investment through a regional implementation team.

The development of a broad regional civil society constituency with shared goals, supported by a coordinating team that provides leadership and mentoring and ensures harmonization of CEPF and other investments to implement the strategy, will lead to a sustainable and effective network of civil society partners for hotspot conservation.

CEPF Investment and Financial Sustainability

The hotspot stretches over a curving arc of more than 7,000 kilometers from Saudi Arabia to Mozambique. The KBAs cover an area of more than 50 million hectares, of which only 38 percent have full legal protection and variable amounts of government funding. In the past five years, almost $1 billion dollars (at least $946 million) has been invested to support environmental and related issues within the hotspot, and yet its biodiversity remains seriously threatened. The priority KBAs identified for CEPF investment represent approximately 5.5 million hectares, so the CEPF contribution would equate to roughly $2 per hectare over five years for all the KBAs, on average. While this figure is not negligible, it remains low if compared with an estimated average requirement of $2.68/hectare/year for the direct costs of effective management of protected areas in sub-Saharan Africa (Moore *et al.* 2004, Moore *pers. com.* for the adjustment of the figure for inflation). It is therefore clear that CEPF cannot expect and should not aim to cover the management cost, but rather to support paths leading to long-term sustainability.

Ensuring the sustainability of CEPF interventions in this hotspot is a significant challenge, and an awareness of the magnitude of the challenge has been built into the strategy. One of its major intentions is to leverage financial support from other donors and investors. Leveraging strategies are a hallmark of CEPF's hotspot program: in the first 18 investments, an estimated $261 million was raised from $124 million provided by CEPF to hotspot civil society organizations. The need for leveraging and additional funding is even more acute in the Eastern Afromontane Hotspot, and opportunities need to be capitalized on.

The combination of partnerships, leveraging financial and technical support, engagement in planning initiatives from local to landscape scale, tapping into increasing awareness of the economic values of ecosystem services, and support of and building the capacity within civil society offers the best hope for a sustainable conservation strategy for the hotspot.

LOGICAL FRAMEWORK

Objective	Targets	Means of Verification	Important Assumptions
Strengthening the involvement and effectiveness of civil society in achieving conservation and management of globally important biodiversity in the Eastern Afromontane Hotspot	At least 60 civil society actors participate in conservation programs guided by the ecosystem profile The conservation community in the Hotspot is better organized, show improved capacities, and has improved collaboration with development stakeholders. At least 25 priority key biodiversity areas with strengthened protection and management, representing at least 1.2 million hectares, and including at least 500.000 hectares of new protected areas. At least 1.7 million hectares of production landscapes under improved management for biodiversity conservation and ecosystem services. New sustainable financing schemes exist for at least one priority site in each of the priority corridors.	RIT progress reports Individual grantee progress reports METT scores for targeted KBAs and corridors CEPF Civil Society Tracking Tool Annual portfolio overview reports Mid-term and final program evaluations National reports to CBD and other global biodiversity conservation mechanisms	The CEPF grants portfolio will effectively guide and coordinate conservation action in the Eastern Afromontane Hotspot

Intermediate Outcomes	Intermediate Indicators	Means of Verification	Important Assumptions
Outcome 1. Biodiversity mainstreamed into wider development policies, plans and projects, delivering the co-benefits of biodiversity conservation, improved local livelihoods and economic development in 4 priority corridors (and associated KBA groups) and 7 countries. **Budget: $3,200,000**	Number of local and community development plans or other processes in which biodiversity conservation priorities and actions are incorporated through civil society engagement in the process Number of national development plans or other processes in which biodiversity conservation priorities and actions are incorporated through civil society engagement Amount of funding directed at livelihood activities (using CEPF investment as leverage) which also benefit biodiversity conservation in and around KBAs in priority corridors Number of private sector ventures which benefit biodiversity and local livelihoods	Approved local and community development plans Approved/ adopted national and regional plans, strategies and other policy documents RIT and individual project/ country progress reports MoUs, other agreements between civil society organizations and donors/government agencies/private sector Certification/accreditation/labeling of private sector ventures	Local, national and regional policy environments are supportive of the integration of biodiversity and development and a focus on priority KBAs and corridors Other agencies and donors are willing to focus their efforts around priority KBAs Civil society organizations are able to offer private sector companies sufficient incentives to engage in partnership to benefit biodiversity and reduce poverty Opportunities can be found or created to link biodiversity conservation and livelihoods objectives at priority KBAs

Intermediate Outcomes	Intermediate Indicators	Means of Verification	Important Assumptions
Outcome 2. Improved protection and management of the KBA network through involvement of civil society. **Budget: $2,800,000**	Number of terrestrial KBAs under enhanced protection status and number of hectares covered. Number of management plans developed or improved, with enhanced implementation underway, and number of hectares covered. Number of engagements of civil society in EIA and site safeguard processes resulting in strengthened implementation at the most urgently threatened sites Number of new KBAs identified and changes in KBAs status resulting from an improved knowledge and information (including sites for irreplaceable plant diversity)	Gazette notices, promulgations, other legal documents specifying new or extended protected areas Approved PA/ KBA management plans and progress/ monitoring reports; NBSAPs; national reports to CBD, Ramsar etc. GEF's METT reports Individual project and KBA progress and M&E reports EIA and project reports; government decisions; media/ news reports Published/ recorded biodiversity survey data and KBA analyses/ proposals National/ regional/ international databases (especially World Biodiversity Database)	Political will exists nationally to allow engagement of civil society with government processes for PA management Local, national and regional policy environment supports the creation of new PAs Other donors and projects support management planning and implementation of plans Local, national and regional policy environment is supportive of EIA/safeguard processes and is open to the role of civil society

Intermediate Outcomes	Intermediate Indicators	Means of Verification	Important Assumptions
Outcome 3. Financing mechanisms established in 4 priority corridors and 2 additional sites ensuring substantial long-term financing for conservation activities in the most important sites, and conservation community enabled to raise funds and develop similar mechanisms in the Hotspot. **Budget: $2,300,000**	Number of forest carbon partnerships and projects established and achieving biodiversity conservation objectives in each of three priority corridors and in two individual KBAs Increased levels of CSO capacity in all Hotspot countries for conservation fund raising and project management New conservation community developed and playing an effective role in KBA conservation in Eritrea, South Sudan, and Yemen	MoUs/ other partnership agreements; project reports Feasibility studies, business plans, reports (forest carbon & other PES initiatives) Investors' reports Project and KBA/ PA progress and financial reports RIT and individual project progress and financial reports Funding applications submitted by CSOs and levels of funding obtained CEPF Civil Society Tracking Tool (improvements from baseline to 2017 in Eritrea, South Sudan, Yemen)	The global economy remains sufficiently robust for investors to commit to biodiversity conservation, REDD and PES schemes An enabling policy/legal environment exists or can be put in place to facilitate REDD and PES schemes Civil conflict does not interfere with portfolio implementation Civil society development and engagement in conservation management is politically acceptable and feasible in all countries

Intermediate Outcomes	Intermediate Indicators	Means of Verification	Important Assumptions
Outcome 4. Strategic leadership and effective coordination of CEPF investment provide, and a broad constituency of civil society groups built across institutional and political boundaries, through a regional implementation team (RIT). **Budget: $1,500,000** *-$980.000 for IP4.1 (administrative)* *- $520.000 for IP4.2 (support to civil society)*	All groups receiving grants achieve a satisfactory score on final performance scorecard RIT performance in fulfilling approved terms of reference All civil society groups in investment areas know CEPF and are given equal chance to participate to Call for proposals Amount of co-funding (for activities implemented by CEPF grantees) that have been facilitated by the RIT At least 60% of the CEPF grantees have improved management capacities thanks to RIT capacity building activities.	Final performance scorecards of grantees CEPF Civil Society Tracking Tool RIT reports to CEPF CEPF Secretariat supervision report Mid-term and final program evaluations	Regional partners can be identified who are prepared to participate in the RIT Civil society groups prepared to collaborate and able to engage with RIT and CEPF mechanism

ACCRONYMS AND ABBREVIATIONS

ABS	Access and Benefit Sharing
ACCNNR	African Convention on the Conservation of Nature and Natural Resources
ADOs	Neighborhood Development Associations
ADVs	Village Development Associations
AEWA	African-Eurasian Waterfowl Agreement
AFD	l'Agence Française de Développement
AfDB	African Development Bank
AMCEN	African Ministerial Conference on the Environment
ANAW	Africa Network for Animal Welfare
APN	African Parks Network
ARCOS	Albertine Rift Conservation Society
ASL	Above sea level
AUC	African Union Commission
AU-IBAR	African Union's Interafrica Bureau for Animal Resources
AWF	African Wildlife Foundation
AZE	Alliance for Zero Extinction
BH	Biodiversity Hotspot
BP	Before present
BSL	Below sea level
CAIT	Climate Analysis Indicators Tool
CARPE	Central Africa Regional Program for the Environment (USAID)
CBD	Convention on Biological Diversity
CBFM	Community Based Forest Management
CBFP	Congo Basin Forest Partnership
CBNRM	Community Based Natural Resource Management
CBO	Community Based Organization
CDM	UN Clean Development Mechanism
CE	Crisis Ecoregions
CEPF	Critical Ecosystem Partnership Fund
CFA	Cooperative Framework Agreement
CFAs	Community Forest Associations
CFM	Collaborative Forest Management
CI	Conservation International
CIFOR	The Centre for International Forestry Research
CITES	Convention on International Trade in Endangered Species
CIVICUS	The World Alliance for Citizen Participation
CLVFO	Convention on Lake Victoria Fisheries Organization
CMS	Convention on Migratory Species
COMIFAC	Central Africa Forest Commission
COP	Conference of the Parties
CPB	Cartagena Protocol on Biosafety
CPD	Centre of Plant Diversity
CPO	Conservation Priorities and Outreach

CR	Critical (IUCN Red List category)
CSD	Conservation and Sustainable Development Strategy
CSO	Civil Society Organization
CSR	Corporate Social Responsibility
DANIDA	Danish International Development Agency
DFGF	Dian Fossey Gorilla Fund
DFID	Department for International Development (UK)
DGIS	Netherlands Directorate-General for International Development
DRC	Democratic Republic of the Congo
EACF	Eastern Arc Mountains and Coastal Forests of Tanzania and Kenya
EAEN	Eastern Africa Environmental Network
EAM	Eastern Afromontane
EAMHS	Eastern Afromontane Biodiversity Hotspot
EAWLS	East African Wildlife Society
EbA	Ecosystem Based Approach
EBA	Endemic Bird Area
ECA	United Nations Economic Commission for Africa
EHRCO	Ethiopian Human Rights Council
EIA	Environmental impact assessment
EN	Endangered (IUCN Red List category)
ENSO	El Nino Southern Oscillation
ES	Ecosystem services
ESIA	Environmental and social impact assessment
ESV	Ecosystem Service Value
EU	European Union
EWNHS	Ethiopian Wildlife and Natural History Society
FAO	Food and Agriculture Organization
FCPF	(World Bank) Forest Carbon Partnership Facility
FF	Frontier Forest
FFI	Fauna and Flora International
FIB	Fédération des Industries du Bois (FIB)
FZS	Frankfurt Zoological Society
G200	Global 200 Ecoregions
GCC	Gulf Cooperation Council
GCCA	(European Commission initiated) Global Climate Change Alliance
GCMs	General Circulation Models (GCMs)
GDP	Gross Domestic Product
GEF	Global Environment Facility
GEF-IFAD	Global Environment Facility (GEF) and the International Fund for Agricultural Development (IFAD)
GHG	Greenhouse Gases
GISP	Global Invasive Species Program
GCCA	Global Climate Change Alliance
GNI	Gross National Income
GRASP	Great Ape Survival Project

GRV	Great Rift Valley
ha	Hectares
HBWA	High Biodiversity Wilderness Area
HDI	Human Development Index (UNDP)
HIPC	Heavily Indebted Poor Countries
HoA-REN	Horn of Africa Regional Environment Network
IAC	International Advisory Committee
IAS	Invasive alien species
IBA	Important Bird Area
ICC	International Criminal Court
icipe	International Centre for Insect Physiology and Ecology
ICCN	Institut Congolais pour la Conservation de la Nature (ICCN)
ICNL	International Centre for Not-for-Profit Law
IFC	International Finance Corporation
IGCP	International Gorilla Conservation Program
IP	Investment Priority
ITCZ	Inter-Tropical Convergence Zone
IUCN	International Union for the Conservation of Nature (PACO (Program for Central and West Africa) and ESARO (Eastern and Southern Africa Regional Office)
JGF	Jane Goodall Fund
JFM	Joint Forest Management
KBA	Key Biodiversity Area
KBNP	Kahuzi-Biega National Park
KENVO	Kijabe Environment Volunteers Kenya
KFWG	Kenya Forests Working Group
KP	Kyoto Protocol on Climate Change
LA	Lusaka Agreement on Co-operative Enforcement Operations Directed at Illegal Trade in Wild fauna and Flora
LRA	Lord's Resistance Army
LW	Last of the Wild
M	Million
m^3	Cubic metres
MC	Megadiversity Country
MDG	Millennium Development Goal
MONUC	United Nations Organization Mission in the Democratic Republic of the Congo
Myr	Million years
NAO	North Atlantic Oscillation
NAPAs	National Adaptation Strategies
NBI	Nile Basin Initiative
NBSAP	National Biodiversity Strategies and Action Plans
NEAP	National Environmental Action Plan
NEPAD	New Partnership for Africa's Development
NGO	Non-governmental Organization
NMK	National Museums of Kenya

NORAD	Norwegian Agency for Development Cooperation
NSES	National Strategy for Environmental Sustainability
NTFP	Non-timber Forest Product
PA	Protected Area
PES	Payment for Ecosystem Services
PFM	Participatory Forest Management
PPP	Public-private partnership
PWES	Payment for Watershed Ecosystem Services
RAMSAR	Convention on Wetlands of International Importance
RAPAC	Réseau des Aires Protégées d'Afrique Centrale
RBGE	Royal Botanic Gardens Edinburgh
RDB	Rwanda Development Board
REC	Regional Economic Community
REDD	Reducing Emissions from Deforestation and Forest Degradation
RIT	Regional Implementation Team
RSPB	Royal Society for the Protection of Birds
SD	Strategic Direction
SEA	Strategic Environmental Assessments
SFC	Semi-forest coffee
TANAPA	Tanzania National Parks
TEEB	The Economics of Ecosystems and Biodiversity
TFCG	Tanzania Forest Conservation Group
UAE	United Arab Emirates
UNCCD	United Nations Convention to Combat Desertification
UNDP-RBA	United Nations Development Program – Regional Bureau for Africa
UNFCCC	United Nations Framework Convention on Climate Change
UNFF	United Nations Forum on Forests
UNHCR	United Nations High Commission for Refugees
USD	US dollar
USFWS	US Fish and Wildlife Service
UWA	Uganda Wildlife Authority
VFR	Village Forest Reserve
VNP	Virungas National Park
VNP	Volcanoes National Park
VU	Vulnerable (IUCN Red List category)
WCS	Wildlife Conservation Society
WDPA	World Database on Protected Areas
WFP	The World Food Program
WHC	World Heritage Convention
WSSD	World Summit on Sustainable Development
WWF	World Wide Fund for Nature
WWF-TPO	World Wide Fund for Nature – Tanzania Programme Office

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APPENDICES

Appendix 1. Species Outcomes in the Eastern Afromontane Hotspot

The list of priority species consists of all Globally Threatened species found in the hotspot: those that are listed as Critically Endangered, Endangered, or Vulnerable according to the IUCN Red List. 677 Globally Threatened species are known to occur in the hotspot. For IUCN Threat Status, the “1” corresponds to the threat category. For Distribution by Country, the “1” refers to “present in country.” Species Total refers to the number of countries within which the species is found.

This table is available on CEPF website as a separate document.

Appendix 2. Site Outcomes in the Eastern Afromontane Hotspot

The list of priority sites consists of 261 Terrestrial Key Biodiversity Areas and 49 Freshwater Key Biodiversity Areas (KBAs). KBAs were identified based on the confirmed presence of Globally Threatened, restricted range, or congregatory species. Taxonomic groups considered include birds, mammals, amphibians, reptiles, plants, freshwater fish, mollusks, dragonflies and damselflies. "KBA Number" refers to the code used to label the KBAs on the maps that follow. Since, by definition, KBAs should be manageable as single units, delineation generally follows existing management units such as protected areas, and respects political boundaries. As such, several lakes, mountains and other natural units were split into multiple KBAs. For instance, three Terrestrial KBAs are divided between two countries. Eleven Freshwater KBAs are also transboundary sites. Of those 11 Freshwater KBAs, Lake Tanganyika and Rusizi River are divided among 4 and 3 countries respectively, whereas the remaining 9 each are divided between with two countries. The transboundary KBAs can be easily identified as they have identical names followed by their respective country name as a suffix. To avoid double counting, species are only counted under one of the transboundary sites.

Map Number	KBA Name	New Corridor Name	Country	Area (Ha)	IBAs/AZEs	Protection Status	Biological Priority	CEPF PRIORITY	AMPHIBIA	AVES	CRAB	FISH	MAMMALIA	MOLLUSCA	ODONATA	PLANT	REPTILIA	TAXA TOTAL
1	Aberdare Mountains	Mount Kenya-Aberdare Landscape	KENYA	185,165	IBA	Partial	2		2	3			3			8		16
2	Abijatta - Shalla Lakes National Park	Not in corridor	ETHIOPIA	162,797	IBA	Protected	4			1								1
3	Akaki - Aba-Samuel Wetlands	Not in corridor	ETHIOPIA	2,022	IBA	Unknown/ Unprotected	4			1								1
4	Aliyu Amba - Dulecha	Not in corridor	ETHIOPIA	6,985	IBA	Unknown/ Unprotected	2	1		1								1
5	Alledeghi Wildlife Reserve	Not in corridor	ETHIOPIA	145,891	NONE	Protected	2						1					1
6	Anferara Forests	Not in corridor	ETHIOPIA	430,621	IBA	Partial	3		1	2						1		4
7	Ankober - Debre Sina Escarpment	Not in corridor	ETHIOPIA	18,518	IBA	Partial	2	1		3						1		4

8	An-Namas Highlands	Arabian Peninsula Highlands	SAUDI ARABIA	69,082	NONE	Unknown/ Unprotected	2									6		6
9	Arboroba Escarpment	Not in corridor	ERITREA	302	IBA	Unknown/ Unprotected	4			1								1
10	Arusha National Park (Arusha+Mt. Meru)	Kilimanjaro - Meru - North Pare Mountains	TANZANIA	42,324	IBA	Protected	2	2	1	1						4		6
11	Asir National Park	Not in corridor	SAUDI ARABIA	8,239	NONE	Unknown/ Unprotected	2									4		4
12	Asmara Escarpment	Not in corridor	ERITREA	26,433	IBA	Unknown/ Unprotected	4			1								1
13	Assimba Natural Forest	Not in corridor	ETHIOPIA	8,495	NONE	Unknown/ Unprotected	3						2			1		3
14	Awash National Park	Not in corridor	ETHIOPIA	73,832	IBA	Protected	2	2		2			3					5
15	Awi Zone	Not in corridor	ETHIOPIA	160,805	IBA	Partial	2	1		1			1					2
16	Bahir Dar - Lake Tana	Lake Tana Catchment Landscape	ETHIOPIA	395,519	IBA	Unknown/ Unprotected	4			1								1
17	Bale Mountains National Park	Bale Mountain Massif	ETHIOPIA	957,296	IBA, AZE	Partial	1		6	3			10			3		22
18	Banti Forest Reserve	Chimanimani - Nyanga Mountains	ZIMBABWE	1,758	IBA	Protected	4			1								1
19	Belete-Gera Forest	Kaffa and Yayu Coffee Biosphere Reserve	ETHIOPIA	152,109	NONE	Protected	3		3				1					4
20	Berga floodplain	Not in corridor	ETHIOPIA	4,978	IBA	Unknown/ Unprotected	2	2		3								3
21	Bishoftu Lake	Not in corridor	ETHIOPIA	103	IBA	Unknown/ Unprotected	3			2								2
22	Bonga Forest	Kaffa and Yayu Coffee Biosphere Reserve	ETHIOPIA	164,872	IBA	Protected	2		4				1			8		13
23	Borana-Saynt	Not in corridor	ETHIOPIA	7,820	IBA	Protected	2			1			3					4
24	Boyo Wetland	Not in corridor	ETHIOPIA	12,501	IBA	Unknown/ Unprotected	4			1								1

25	Budongo Forest Reserve	Greater Virunga - Murchison Landscape	UGANDA	81,492	IBA	Protected	2	2		1			1					2
26	Bugoma Central Forest Reserve	Greater Virunga - Murchison Landscape	UGANDA	64,660	IBA	Protected	2			1			2					3
27	Bugungu Wildlife Reserve	Greater Virunga - Murchison Landscape	UGANDA	33,818	NONE	Protected	4						1					1
28	Bulongwa	Northern Lake Niassa Mountain Complex	TANZANIA	202	NONE	Protected	4									1		1
29	Bururi Forest Nature Reserve	Itombwe - Nyungwe Landscape	BURUNDI	1,525	IBA	Protected	2	1	1	1			1					3
30	Bwindi Impenetrable National Park	Greater Virunga - Murchison Landscape	UGANDA	31,933	IBA	Protected	1		6	5			10			1		22
31	Central Plateau - Keren	Not in corridor	ERITREA	23,091	IBA	Unknown/ Unprotected	4			1								1
32	Challa Hills	Greater Mahale Landscape	TANZANIA	3,158	NONE	Protected	2									1		1
33	Chebera Chorchora National Park	Not in corridor	ETHIOPIA	163,268	NONE	Unknown/ Unprotected	4						3					3
34	Chelekleka Lake and Swamp	Not in corridor	ETHIOPIA	23,776	IBA	Unknown/ Unprotected	3			3								3
35	Cherangani Hills	Not in corridor	KENYA	104,272	IBA	Partial	2						1			3		4
36	Chilimo-Gaji Forest	Not in corridor	ETHIOPIA	23,941	IBA	Protected	3									2		2
37	Chimanimani Mountains Mozambique	Chimanimani - Nyanga Mountains	MOZAMBIQUE	170,750	IBA, AZE	Partial	1	1	TRB	TRB	TRB	TRB	TRB	TRB	TRB	TRB	TRB	
38	Chimanimani Mountains Zimbabwe	Chimanimani - Nyanga Mountains	ZIMBABWE	21,437	IBA, AZE	Protected	1	1	3	2			1		2	92		100
39	Chirinda Forest	Chimanimani - Nyanga Mountains	ZIMBABWE	954	IBA	Protected	2	1	1							2		3
40	Choke Mountains	Lake Tana Catchment Landscape	ETHIOPIA	108,535	IBA	Unknown/ Unprotected	3			1								1
41	Chyulu Hills	Not in corridor	KENYA	40,747	IBA	Partial	2			1								1

42	Cyamudongo Forest	Itombwe - Nyungwe Landscape	RWANDA	412	IBA	Protected	2	1		1									1
43	Dedza Forest Reserve	Not in corridor	MALAWI	18,867	NONE	Partial	2									1			1
44	Deme-Laha	Not in corridor	ETHIOPIA	100,025	NONE	Protected	3		1										1
45	Dessaa forest	Not in corridor	ETHIOPIA	60,407	IBA	Unknown/ Unprotected	3			2									2
46	Dilu Meda (Tefki)	Not in corridor	ETHIOPIA	2,546	IBA	Unknown/ Unprotected	4			1									1
47	Dindin-Arba Gugu	Bale Mountain Massif	ETHIOPIA	68,749	NONE	Protected	2						1						1
48	East Usambara Mountains	Usambara Mountains - South Pare Landscape	TANZANIA	38,776	IBA, AZE	Protected	1		15	9	2		6		2	56			90
49	Eastern Hararghe (Bisdimo Babile)	Not in corridor	ETHIOPIA	1,420,649	IBA	Partial	3			1									1
50	Echuya Forest Reserve	Greater Virunga - Murchison Landscape	UGANDA	3,580	IBA	Protected	2	2	3	1			2						6
51	Eluanata Dam	Kilimanjaro - Meru - North Pare Mountains	TANZANIA	568	IBA	Unknown/ Unprotected	4			1									1
52	Entoto Natural Park	Not in corridor	ETHIOPIA	2,254	IBA	Unknown/ Unprotected	3									2			2
53	Finchaa and Chomen swamps	Not in corridor	ETHIOPIA	35,079	IBA	Unknown/ Unprotected	4			2									2
54	Fogera Plains	Lake Tana Catchment Landscape	ETHIOPIA	84,206	IBA	Unknown/ Unprotected	4			2			1						3
55	Forests west of Lake Edward	Greater Virunga - Murchison Landscape	DRC	175,443	IBA	Partial	2	2	4	7									11
56	Gara Muleta	Not in corridor	ETHIOPIA	2,655	NONE	Protected	2						2			1			3
57	Gedo Forest	Not in corridor	ETHIOPIA	13,202	NONE	Protected	3									3			3
58	Gefersa Reservoir	Not in corridor	ETHIOPIA	128	IBA	Unknown/ Unprotected	4			1									1

59	Genale River	Not in corridor	ETHIOPIA	93,274	IBA	Unknown/ Unprotected	3			1						2		3
60	Ghinda	Not in corridor	ERITREA	82,053	IBA	Unknown/ Unprotected	4			1								1
61	Gishwati	Greater Virunga - Murchison Landscape	RWANDA	27,094	IBA	Protected	3						1					1
62	Godere Forest	Kaffa and Yayu Coffee Biosphere Reserve	ETHIOPIA	169,824	NONE	Protected	3		1				1					2
63	Gombe	Greater Mahale Landscape	TANZANIA	22,171	NONE	Partial	3						4					4
64	Gorongosa Mountain	Not in corridor	MOZAMBIQUE	56,691	IBA	Partial	2		1							3		4
65	Greater Mahale	Greater Mahale Landscape	TANZANIA	1,944,602	IBA	Partial	2	1		1			4			7		12
66	Green Lake	Not in corridor	ETHIOPIA	60	IBA	Unknown/ Unprotected	4			2								2
67	Guassa Plateau	Not in corridor	ETHIOPIA	31,310	IBA	Unknown/ Unprotected	2	1		2			3			1		6
68	Gudo plain	Not in corridor	ETHIOPIA	631	IBA	Unknown/ Unprotected	4			1								1
69	Gughe Mountains	Not in corridor	ETHIOPIA	33,279	AZE	Unknown/ Unprotected	1	2	3							1		4
70	Hajjah Mountains	Arabian Peninsula Highlands	YEMEN	45,248	NONE	Unknown/ Unprotected	3									11		11
71	Haraz Mountains	Arabian Peninsula Highlands	YEMEN	27,689	NONE	Unknown/ Unprotected	3									14		14
72	Harena-Kokosa	Bale Mountain Massif	ETHIOPIA	218,279	NONE	Protected	1	2	1				3		2	2		8
73	High Mountains of Ibb	Arabian Peninsula Highlands	YEMEN	163,266	NONE	Unknown/ Unprotected	1	1		5						19		24
74	Hima Al-Hamid	Arabian Peninsula Highlands	SAUDI ARABIA	938	NONE	Unknown/ Unprotected	2									2		2
75	Hima Bani Sar	Arabian Peninsula Highlands	SAUDI ARABIA	331	NONE	Unknown/ Unprotected	2									2		2

76	Hima Quraysh	Arabian Peninsula Highlands	SAUDI ARABIA	1,546	NONE	Unknown/ Unprotected	2									2		2
77	Hima Thmalah	Not in corridor	SAUDI ARABIA	740	NONE	Unknown/ Unprotected	2									2		2
78	Hugumburda Grat-Kahsu forests	Not in corridor	ETHIOPIA	46,330	IBA	Partial	3									1		1
79	Hujjariyah	Arabian Peninsula Highlands	YEMEN	56,457	NONE	Unknown/ Unprotected	2	1								10		10
80	Ijdwi Island (Lake Kivu)	Itombwe - Nyungwe Landscape	DRC	26,752	NONE	Unknown/ Unprotected	3						2					2
81	Imatong mountains	Not in corridor	SUDAN	572,458	IBA	Unknown/ Unprotected	1	1		1								1
82	Irangi Forest	Not in corridor	DRC	381,332	NONE	Partial	2	2		2			1					3
83	Iringa	Mount Udzungwa - Uluguru Landscape	TANZANIA	592	NONE	Protected	2									7		7
84	Itombwe Mountains	Itombwe - Nyungwe Landscape	DRC	820,796	IBA, AZE	Partial	1	1	10	11		2	2			1		26
85	Itwara	Greater Virunga - Murchison Landscape	UGANDA	8,680	NONE	Unknown/ Unprotected	3						1					1
86	Jabal Al Lawz-Jabal Madhbur	Not in corridor	YEMEN	36,083	NONE	Unknown/ Unprotected	4									6		6
87	Jabal Al Qahar-Lejib Gorge	Arabian Peninsula Highlands	SAUDI ARABIA	21,415	IBA	Protected	3									7		7
88	Jabal al-Nabi Shuayb	Arabian Peninsula Highlands	YEMEN	5,699	IBA	Unknown/ Unprotected	2	1								10		10
89	Jabal Bura	Arabian Peninsula Highlands	YEMEN	15,565	IBA	Protected	2	1		1						6		7
90	Jabal Dawran	Arabian Peninsula Highlands	YEMEN	4,366	NONE	Unknown/ Unprotected	4									5		5
91	Jabal Faifa	Arabian Peninsula Highlands	SAUDI ARABIA	12,218	NONE	Unknown/ Unprotected	2									12		12
92	Jabal Habashi	Arabian Peninsula Highlands	YEMEN	7,616	NONE	Unknown/ Unprotected	3									6		6

93	Jabal Iraf	Arabian Peninsula Highlands	YEMEN	7,679	NONE	Unknown/ Unprotected	2	1								4		4
94	Jabal Jandaf-Wadi Turj	Not in corridor	SAUDI ARABIA	110,356	NONE	Proposed	2									7		7
95	Jabal Marran	Arabian Peninsula Highlands	YEMEN	42,959	NONE	Unknown/ Unprotected	3									5		5
96	Jabal Milhan	Arabian Peninsula Highlands	YEMEN	71,547	NONE	Unknown/ Unprotected	3									8		8
97	Jabal Radwa	Not in corridor	SAUDI ARABIA	43,972	NONE	Unknown/ Unprotected	2									3		3
98	Jabal Raymah	Arabian Peninsula Highlands	YEMEN	107,371	NONE	Unknown/ Unprotected	2	1								5		5
99	Jabal Razih	Arabian Peninsula Highlands	YEMEN	24,622	NONE	Unknown/ Unprotected	3									9		9
100	Jabal Sabir	Arabian Peninsula Highlands	YEMEN	13,227	NONE	Unknown/ Unprotected	3									11		11
101	Jabal Sawda	Arabian Peninsula Highlands	SAUDI ARABIA	25,242	NONE	Proposed	2									10		10
102	Jabal Sawraq	Arabian Peninsula Highlands	YEMEN	9,977	NONE	Unknown/ Unprotected	4									3		3
103	Jabal Shada	Arabian Peninsula Highlands	SAUDI ARABIA	4,665	NONE	Partial	2									10		10
104	Jabal Sumarah	Arabian Peninsula Highlands	YEMEN	36,555	NONE	Unknown/ Unprotected	3			4						11		15
105	Jabal Uthrub-Al-Fawqa	Arabian Peninsula Highlands	SAUDI ARABIA	44,854	NONE	Unknown/ Unprotected	2									7		7
106	Jabal Wirqan	Not in corridor	SAUDI ARABIA	4,165	NONE	Unknown/ Unprotected	2									2		2
107	Jello Muktar	Not in corridor	ETHIOPIA	89,770	NONE	Partial	2						1					1
108	Jemma and Jara valleys	Not in corridor	ETHIOPIA	91,367	IBA	Unknown/ Unprotected	3			1								1
109	Jibat Forest	Not in corridor	ETHIOPIA	36,713	IBA	Protected	3		1	1						1		3

110	Kagombe Forest Reserve	Greater Virunga - Murchison Landscape	UGANDA	30,063	IBA	Protected	3						2					2
111	Kahuzi-Biega National Park	Itombwe - Nyungwe Landscape	DRC	561,784	IBA, AZE	Protected	1		6	7			13					26
112	Kalinzu Forest Reserve	Greater Virunga - Murchison Landscape	UGANDA	14,065	NONE	Protected	2	2	1							12		13
113	Karuma	Greater Virunga - Murchison Landscape	UGANDA	54,102	IBA	Protected	3						3					3
114	Kasyoha - Kitomi Forest Reserve	Greater Virunga - Murchison Landscape	UGANDA	40,154	IBA	Protected	3		2				2			2	1	7
115	Kawkaban - Shibam	Arabian Peninsula Highlands	YEMEN	8,646	NONE	Unknown/ Unprotected	3			4						5		9
116	Kianyaga Valleys	Mount Kenya-Aberdare Landscape	KENYA	60,455	IBA	Unknown/ Unprotected	3			1								1
117	Kibale National Park	Greater Virunga - Murchison Landscape	UGANDA	79,627	IBA	Protected	2		1				5			1		7
118	Kibira National Park	Itombwe - Nyungwe Landscape	BURUNDI	36,768	IBA	Protected	1	1	1	3			7				2	13
119	Kiboriani Mountains	Mount Udzungwa - Uluguru Landscape	TANZANIA	31,955	NONE	Unknown/ Unprotected	4									4		4
120	Kidepo	Not in corridor	SUDAN	753,942	IBA	Unknown/ Unprotected	4			1								1
121	Kidepo Valley National Park	Not in corridor	UGANDA	145,665	IBA	Protected	3			2								2
122	Kikuyu Escarpment forest	Mount Kenya-Aberdare Landscape	KENYA	37,451	IBA	Protected	2	2		1						1		2
123	Kinangop grasslands	Mount Kenya-Aberdare Landscape	KENYA	71,882	IBA	Unknown/ Unprotected	2	2		2						10		12
124	Kitulo Plateau	Northern Lake Niassa Mountain Complex	TANZANIA	64,996	IBA	Protected	2	1		1			1			24		26
125	Koffe Swamp	Kaffa and Yayu Coffee Biosphere Reserve	ETHIOPIA	337	IBA	Unknown/ Unprotected	4			1								1
126	Koffole (Arsi)	Bale Mountain Massif	ETHIOPIA	1,022,797	NONE	Protected	2	2	1				3			2		6

127	Koka dam and Lake Gelila	Not in corridor	ETHIOPIA	18,421	IBA	Unknown/ Unprotected	1			1			1					2
128	Konso-Segen	Not in corridor	ETHIOPIA	75,562	IBA	Partial	3									1		1
129	Kubayu Forest	Bale Mountain Massif	ETHIOPIA	79,691	NONE	Protected	2		1				2					3
130	Kyambura Wildlife Reserve	Greater Virunga - Murchison Landscape	UGANDA	15,498	IBA	Protected	3			3			5					8
131	Laikipia National Reserve	Mount Kenya-Aberdare Landscape	KENYA	35,183	NONE	Protected	3						1					1
132	Lake Ashenge	Not in corridor	ETHIOPIA	2,701	IBA	Unknown/ Unprotected	3			2						1		3
133	Lake Awassa	Not in corridor	ETHIOPIA	9,976	IBA	Unknown/ Unprotected	2			1								1
134	Lake Bogoria National Reserve	Mount Kenya-Aberdare Landscape	KENYA	14,965	IBA	Protected	4			1								1
135	Lake Langano	Not in corridor	ETHIOPIA	29,418	IBA	Partial	4			1								1
136	Lake Ol' Bolossat	Mount Kenya-Aberdare Landscape	KENYA	4,649	NONE	Unknown/ Unprotected	2			1								1
137	Lake Zeway	Not in corridor	ETHIOPIA	51,687	IBA	Unknown/ Unprotected	3						1					1
138	LaLuama-Katanga-Mt. Kabobo	Mount Kabobo - Margungu Highlands	DRC	254,423	IBA	Unknown/ Unprotected	2	1	4	2			3					9
139	Lendu Plateau	Greater Virunga - Murchison Landscape	DRC	410,472	IBA	Unknown/ Unprotected	2	2		2								2
140	Liben Plains	Not in corridor	ETHIOPIA	91,328	IBA, AZE	Unknown/ Unprotected	1	2		1						1		2
141	Little Abbai River	Lake Tana Catchment Landscape	ETHIOPIA	86,570	AZE	Unknown/ Unprotected	1	1					2					2
142	Livingstone Mountains forests	Northern Lake Niassa Mountain Complex	TANZANIA	7,154	IBA	Partial	2	1		2						1		3
143	Lyango Hill FR (Mbizi)	Greater Mahale Landscape	TANZANIA	90,197	NONE	Partial	3						1			14		15

144	Mafinga Hills	Northern Lake Niassa Mountain Complex	ZAMBIA	18,721	NONE	Partial	2	1								11		11
145	Mafraq al-Mukha	Arabian Peninsula Highlands	YEMEN	83,579	IBA	Unknown/ Unprotected	4			1						1		2
146	Mafuga Forest Reserve	Greater Virunga - Murchison Landscape	UGANDA	3,784	NONE	Protected	3		1									1
147	Mahenge Mountains	Not in corridor	TANZANIA	3,367	NONE	Protected	2		1							6		7
148	Mahwit	Arabian Peninsula Highlands	YEMEN	9,191	NONE	Unknown/ Unprotected	3									8		8
149	Mankubsa - Welenso Forest	Not in corridor	ETHIOPIA	19,967	NONE	Protected	3			2						1		3
150	Mareb Escarpment	Not in corridor	ERITREA	5,509	IBA	Unknown/ Unprotected	4			1								1
151	Marsabit	Not in corridor	KENYA	69,767	NONE	Partial	2									6		6
152	Marungu highlands	Mount Kabobo - Margungu Highlands	DRC	971,141	IBA	Unknown/ Unprotected	4			1								1
153	Masai Mara	Not in corridor	KENYA	525,364	IBA	Partial	2			2			1			4		7
154	Matthews Range	Not in corridor	KENYA	197,981	NONE	Partial	2	2								2		2
155	Matiri Forest Reserve	Greater Virunga - Murchison Landscape	UGANDA	13,212	NONE	Protected	2	2					2					2
156	Mau forest complex	Not in corridor	KENYA	269,823	IBA	Partial	4			1						1		2
157	Mau Narok - Molo Grasslands	Not in corridor	KENYA	72,435	IBA	Unknown/ Unprotected	2			3						2		5
158	Mbeya Range	Northern Lake Niassa Mountain Complex	TANZANIA	14,767	NONE	Protected	2	2								15		15
159	Mega Mountains	Not in corridor	ETHIOPIA	160,930	NONE	Protected	2			1						1		2
160	Mena-Angetu Forest	Bale Mountain Massif	ETHIOPIA	172,451	NONE	Protected	2		1				3					4

161	Menagesha State Forest	Not in corridor	ETHIOPIA	9,589	NONE	Protected	3									2		2
162	Mgahinga Gorilla National Park	Greater Virunga - Murchison Landscape	UGANDA	4,103	IBA	Protected	2		1	2			1					4
163	Mid-Abbay (Blue Nile) River Basin	Not in corridor	ETHIOPIA	860,322	NONE	Unknown/ Unprotected	3			1						1		2
164	Misuku Hills Forest Reserves (inc. Mugesse)	Northern Lake Niassa Mountain Complex	MALAWI	2,724	IBA	Partial	2	1		1						4		5
165	Mount Abune Yosef	Not in corridor	ETHIOPIA	4,578	IBA	Unknown/ Unprotected	2	2		1			2					3
166	Mount Chiperone	Not in corridor	MOZAMBIQUE	16,257	IBA	Unknown/ Unprotected	2	1		2								2
167	Mount Elgon Kenya	Not in corridor	KENYA	112,898	IBA, AZE	Partial	1		TRB	TRB	TRB	TRB	TRB	TRB	TRB	TRB	TRB	TRB
168	Mount Elgon Uganda	Not in corridor	UGANDA	180,484	IBA, AZE	Partial	1	2	1	1			2			8		12
169	Mount Guna	Lake Tana Catchment Landscape	ETHIOPIA	20,477	NONE	Unknown/ Unprotected	2	1					1					1
170	Mount Hanang	Not in corridor	TANZANIA	5,889	NONE	Protected	4									4		4
171	Mount Hoyo Reserve	Greater Virunga - Murchison Landscape	DRC	58,436	IBA	Protected	2	2	1	1								2
172	Mount Kadam	Not in corridor	UGANDA	31,244	NONE	Protected	4									2		2
173	Mount Kenya	Mount Kenya-Aberdare Landscape	KENYA	257,996	IBA, AZE	Protected	1		2	3			3	1	1	15		25
174	Mount Kilimanjaro	Kilimanjaro - Meru - North Pare Mountains	TANZANIA	185,139	IBA	Protected	2			2			3			15		20
175	Mount Kulal Forest	Not in corridor	KENYA	40,351	NONE	Protected	4									4		4
176	Mount Mabu	Not in corridor	MOZAMBIQUE	6,089	IBA	Unknown/ Unprotected	1	1		1						2		3
177	Mount Moroto Forest Reserve	Not in corridor	UGANDA	48,140	IBA	Protected	3			1								1

178	Mount Morrumbala	Not in corridor	MOZAMBIQUE	12,150	NONE	Protected	4									2		2
179	Mount Mulanje Forest Reserve	Not in corridor	MALAWI	59,958	IBA, AZE	Protected	1		2							82		84
180	Mount Namuli	Not in corridor	MOZAMBIQUE	161,902	IBA, AZE	Unknown/ Unprotected	1	1		2			1			26		29
181	Mount Nyiru	Not in corridor	KENYA	45,684	NONE	Protected	2									1		1
182	Mount Rungwe	Northern Lake Niassa Mountain Complex	TANZANIA	45,343	IBA	Protected	1	1	4	3			3			15		25
183	Mount Ufiome	Not in corridor	TANZANIA	5,649	NONE	Protected	4									1		1
184	Mount Zuquala	Not in corridor	ETHIOPIA	6,848	IBA	Unknown/ Unprotected	3									1		1
185	Mtangatanga and Perekezi forest reserves	Northern Lake Niassa Mountain Complex	MALAWI	22,578	IBA	Partial	3			1								1
186	Mugo Highlands	Not in corridor	ETHIOPIA	16,351	IBA	Unknown/ Unprotected	3			2								2
187	Mukungu-Rukamabasi	Not in corridor	BURUNDI	6,704	NONE	Unknown/ Unprotected	3						1					1
188	Mukura Reserve	Greater Virunga - Murchison Landscape	RWANDA	4,117	NONE	Protected	3			1								1
189	Mukurweini valleys	Mount Kenya-Aberdare Landscape	KENYA	111,738	IBA	Unknown/ Unprotected	3			1								1
190	Murchison Falls National Park	Greater Virunga - Murchison Landscape	UGANDA	387,315	IBA	Protected	1			2			4				1	7
191	Mweru Wantipa National Park	Mount Kabobo - Margungu Highlands	ZAMBIA	312,430	IBA	Protected	3			1			4					5
192	Najran Mountains	Arabian Peninsula Highlands	SAUDI ARABIA	221,160	NONE	Unknown/ Unprotected	2									1		1
193	Nechisar National Park	Not in corridor	ETHIOPIA	260,814	IBA	Partial	1			1			2			1		4
194	Ngorongoro Conservation Area	Not in corridor	TANZANIA	810,001	IBA	Protected	2			2			2			4		8

195	Nguru Mountains	Mount Udzungwa - Uluguru Landscape	TANZANIA	31,676	IBA	Protected	1		3	2			4			32		41
196	Njombe forests	Northern Lake Niassa Mountain Complex	TANZANIA	185	IBA	Partial	2	1		2						19		21
197	North Pare Mountains	Kilimanjaro - Meru - North Pare Mountains	TANZANIA	6,738	IBA	Protected	2			1			1			7		9
198	Ntichisi Mountain Forest Reserve	Not in corridor	MALAWI	19,771	IBA	Protected	2	2		1						1		2
199	Nyamugari	Not in corridor	BURUNDI	15,602	NONE	Unknown/ Unprotected	3						1					1
200	Nyamuriro Swamp	Greater Virunga - Murchison Landscape	UGANDA	5,065	IBA	Unknown/ Unprotected	3			1								1
201	Nyanga Mountains	Chimanimani - Nyanga Mountains	ZIMBABWE	28,863	IBA, AZE	Protected	1	1	4	2			1			21		28
202	Nyika National Park Malawi	Northern Lake Niassa Mountain Complex	MALAWI	26,950	IBA	Protected	1		TRB	TRB	TRB	TRB	TRB	TRB	TRB	TRB	TRB	TRB
203	Nyika National Park Zambia	Northern Lake Niassa Mountain Complex	ZAMBIA	311,750	IBA	Protected	1		2	3			1			44		50
204	Nyungwe National Park	Itombwe - Nyungwe Landscape	RWANDA	101,579	IBA, AZE	Protected	1		7	7			7					21
205	Ol Jogi Rhinoceros S	Mount Kenya-Aberdare Landscape	KENYA	7,235	NONE	Unknown/ Unprotected	2						2					2
206	Omo National Park	Not in corridor	ETHIOPIA	429,438	IBA	Protected	3						1					1
207	Poroto Ridge	Northern Lake Niassa Mountain Complex	TANZANIA	11,175	NONE	Protected	4									4		4
208	Qafta-Shiraro National Park	Not in corridor	ETHIOPIA	387,390	NONE	Unknown/ Unprotected	4						2					2
209	Queen Elizabeth National Park and Lake George	Greater Virunga - Murchison Landscape	UGANDA	268,238	IBA	Protected	2			5			2					7
210	Raydah Escarpment	Arabian Peninsula Highlands	SAUDI ARABIA	2,595	NONE	Partial	2									11		11
211	Rubeho Mountains	Mount Udzungwa - Uluguru Landscape	TANZANIA	44,773	IBA, AZE	Protected	1		2	5			1			1		9

212	Rugezi Marsh	Greater Virunga - Murchison Landscape	RWANDA	10,291	IBA	Unknown/ Unprotected	3			2									2
213	Rusizi National Park	Itombwe - Nyungwe Landscape	BURUNDI	6,174	IBA	Protected	4						1						1
214	Rutshuru	Greater Virunga - Murchison Landscape	DRC	65,944	NONE	Protected	2	2	1				1						2
215	Rwenzori Mountains National Park	Greater Virunga - Murchison Landscape	UGANDA	98,237	IBA, AZE	Protected	1	2	5	1			14			5			25
216	Semenawi Bahri	Not in corridor	ERITREA	128,296	IBA	Unknown/ Unprotected	4			1									1
217	Semiliki National Park	Greater Virunga - Murchison Landscape	UGANDA	21,650	IBA	Protected	2	2							2				2
218	Semiliki Reserve	Greater Virunga - Murchison Landscape	UGANDA	104,716	IBA	Partial	4			2									2
219	Senafe	Not in corridor	ERITREA	42,490	IBA	Unknown/ Unprotected	3			2									2
220	Shaharah	Arabian Peninsula Highlands	YEMEN	13,608	NONE	Unknown/ Unprotected	3									9			9
221	Shako Forest	Kaffa and Yayu Coffee Biosphere Reserve	ETHIOPIA	140,697	NONE	Partial	3		1										1
222	Shallal ad-Dahna	Arabian Peninsula Highlands	SAUDI ARABIA	6,832	IBA	Unknown/ Unprotected	2			1						6			7
223	Shek Husein	Bale Mountain Massif	ETHIOPIA	649	IBA	Unknown/ Unprotected	3			1									1
224	Sheka Forest (Metu-Gore-Tepi)	Kaffa and Yayu Coffee Biosphere Reserve	ETHIOPIA	369,963	IBA, AZE	Protected	1	1	2	1			2			1			6
225	Shire lowlands in the Tekeze Valley	Not in corridor	ETHIOPIA	565,087	IBA	Partial	3									1			1
226	Sigmo-Geba Forest	Kaffa and Yayu Coffee Biosphere Reserve	ETHIOPIA	73,952	NONE	Protected	3									2			2
227	Simien Mountains National Park	Not in corridor	ETHIOPIA	107,959	IBA, AZE	Partial	1						5			1			6
228	Soche Mountain Forest Reserve	Not in corridor	MALAWI	458	IBA	Protected	4									1			1

229	Sof Omar	Not in corridor	ETHIOPIA	18,218	IBA	Unknown/ Unprotected	3			1			1					2
230	South Nandi Forest	Not in corridor	KENYA	13,427	IBA	Protected	2			1								1
231	South Nguruman	Not in corridor	KENYA	170,613	IBA	Unknown/ Unprotected	4			2								2
232	South Pare Mountains	Usambara Mountains - South Pare Landscape	TANZANIA	23,113	IBA	Protected	2		1				2			20		23
233	South Viphya Forest Reserve	Northern Lake Niassa Mountain Complex	MALAWI	155,044	IBA	Protected	4			1						1		2
234	Southern Plateau: Furrus	Not in corridor	ERITREA	3,226	IBA	Unknown/ Unprotected	4			1								1
235	Stapleford Forest	Chimanimani - Nyanga Mountains	ZIMBABWE	23,223	IBA	Protected	2	1		3			1			9		13
236	Sululta Plain	Not in corridor	ETHIOPIA	6,250	IBA	Unknown/ Unprotected	2	2		2								2
237	Sumbu National Park and Tondwa GMA	Mount Kabobo - Margungu Highlands	ZAMBIA	271,383	NONE	Protected	2	2		4			5					9
238	Taif Escarpment	Arabian Peninsula Highlands	SAUDI ARABIA	37,188	NONE	Partial	3			2			1			8		11
239	Taita Hills Forests	Not in corridor	KENYA	34,931	IBA, AZE	Partial	1		1	3				3		26		33
240	Ta'izz Wadis	Arabian Peninsula Highlands	YEMEN	1,639	IBA	Unknown/ Unprotected	3			4								4
241	Tannumah	Arabian Peninsula Highlands	SAUDI ARABIA	38,947	NONE	Unknown/ Unprotected	2									6		6
242	Tiro Boter - Becho Forest	Kaffa and Yayu Coffee Biosphere Reserve	ETHIOPIA	93,780	IBA	Protected	3									2		2
243	Udayn	Arabian Peninsula Highlands	YEMEN	13,408	NONE	Unknown/ Unprotected	3									6		6
244	Udzungwa Mountains	Mount Udzungwa - Uluguru Landscape	TANZANIA	541,404	IBA, AZE	Protected	1		20	12			8			54		94
245	Ufipa Plateau Loazi	Greater Mahale Landscape	TANZANIA	87,902	IBA	Partial	3						1			15		16

246	Ukaguru Mountains	Mount Udzungwa - Uluguru Landscape	TANZANIA	20,666	IBA, AZE	Protected	1		2	2						9		13
247	Uluguru Mountains	Mount Udzungwa - Uluguru Landscape	TANZANIA	36,106	IBA, AZE	Protected	1		15	7			5			117		144
248	Umalila Mountains	Northern Lake Niassa Mountain Complex	TANZANIA	11,582	IBA	Protected	4			1								1
249	Uzumara Forest Reserve	Northern Lake Niassa Mountain Complex	MALAWI	610	NONE	Protected	4			6								6
250	Virunga National Park	Greater Virunga - Murchison Landscape	DRC	784,368	IBA	Protected	2		10	7			10					27
251	Volcans National Park	Greater Virunga - Murchison Landscape	RWANDA	15,907	IBA	Protected	2		2	2			1					5
252	Vumba Highlands	Chimanimani - Nyanga Mountains	ZIMBABWE	25,385	IBA	Partial	1	1		2			1			5		8
253	Wadela (Wadila)	Not in corridor	ETHIOPIA	234,375	NONE	Unknown/ Unprotected	2	1								1		1
254	Wadi al-Birayn	Arabian Peninsula Highlands	YEMEN	4,130	IBA	Unknown/ Unprotected	4			4								4
255	Wadi Turabah and Jabal Ibrahim	Arabian Peninsula Highlands	SAUDI ARABIA	42,191	NONE	Proposed	2			3			1			7		11
256	West Usambara Mountains	Usambara Mountains - South Pare Landscape	TANZANIA	33,991	IBA, AZE	Protected	1		11	5	2		6			45		69
257	Yabello Sanctuary	Not in corridor	ETHIOPIA	248,789	IBA	Protected	2			2			1					3
258	Yayu Coffee Forest Biosphere Reserve	Kaffa and Yayu Coffee Biosphere Reserve	ETHIOPIA	229,718	NONE	Protected	3						2			1	1	4
259	Yegof forest	Not in corridor	ETHIOPIA	2,110	IBA	Unknown/ Unprotected	4			1								1
260	Yob Wildlife Reserve	Not in corridor	ERITREA	334,786	NONE	Protected	4						4					4
261	Zomba Mountains	Not in corridor	MALAWI	14,651	NONE	Protected	4									4		4

FW 1	Abbay (Blue Nile)	Lake Tana Catchment Landscape	ETHIOPIA	341,982	NONE	Unknown/ Unprotected	3					3							3
FW 2	Fogera plains Catchment	Lake Tana Catchment Landscape	ETHIOPIA	595,424	NONE	Unknown/ Unprotected	2					3		1					4
FW 3	Kalambo River-Ufipa Plateau Tanzania	Greater Mahale Landscape	TANZANIA	325,186	NONE	Partial	3					1							1
FW 4	Kalambo River-Ufipa Plateau Zambia	Mount Kabobo - Margungu Highlands	ZAMBIA	89,594	NONE	Partial	3												
FW 5	Kibira National Park Catchment Burundi	Itombwe - Nyungwe Landscape	BURUNDI	85,026	NONE	Partial	2					5			1				6
FW 6	Kibira National Park Catchment Rwanda	Itombwe - Nyungwe Landscape	RWANDA	12,675	NONE	Protected	2		TRB	TRB	TRB	TRB	TRB	TRB	TRB	TRB	TRB	TRB	TRB
FW 7	Kimani River	Northern Lake Niassa Mountain Complex	TANZANIA	480,796	NONE	Partial	3					1							1
FW 8	Kipengere Range	Northern Lake Niassa Mountain Complex	TANZANIA	171,887	NONE	Partial	2					2				1			3
FW 9	Lake Albert DRC	Greater Virunga - Murchison Landscape	DRC	212,818	NONE	Unknown/ Unprotected	1					2		4					6
FW 10	Lake Albert Uganda	Greater Virunga - Murchison Landscape	UGANDA	323,865	NONE	Unknown/ Unprotected	1		TRB	TRB	TRB	TRB	TRB	TRB	TRB	TRB	TRB	TRB	TRB
FW 11	Lake Ashenge Catchment	Not in corridor	ETHIOPIA	627,734	NONE	Partial	1							1					1
FW 12	Lake Bulera and Luhundo	Greater Virunga - Murchison Landscape	RWANDA	181,721	IBA	Partial	1					1							1
FW 13	Lake Chala and Lake Jipe Catchment Kenya	Kilimanjaro - Meru - North Pare Mountains	KENYA	137,239	NONE	Unknown/ Unprotected	1				1	1							2
FW 14	Lake Chala and Lake Jipe Catchment Tanzania	Kilimanjaro - Meru - North Pare Mountains	TANZANIA	253,578	NONE	Partial	1		TRB	TRB	TRB	TRB	TRB	TRB	TRB	TRB	TRB	TRB	TRB
FW 15	Lake Edward DRC	Greater Virunga - Murchison Landscape	DRC	160,484	NONE	Unknown/ Unprotected	2					15		2					17
FW 16	Lake Edward Uganda	Greater Virunga - Murchison Landscape	UGANDA	63,753	NONE	Unknown/ Unprotected	2		TRB	TRB	TRB	TRB	TRB	TRB	TRB	TRB	TRB	TRB	TRB
FW 17	Lake Kivu DRC	Itombwe - Nyungwe Landscape	DRC	170,454	NONE	Unknown/ Unprotected	1	1			3	14							17

FW 18	Lake Kivu Rwanda	Itombwe - Nyungwe Landscape	RWANDA	97,732	NONE	Unknown/ Unprotected	1	1	TRB	TRB	TRB	TRB	TRB	TRB	TRB	TRB	TRB	TRB
FW 19	Lake Malawi Malawi	Northern Lake Niassa Mountain Complex	MALAWI	2,230,291	NONE	Partial	1	1				103		6				109
FW 20	Lake Malawi Mozambique	Not in corridor	MOZAMBIQUE	685,997	NONE	Partial	1	1	TRB	TRB	TRB	TRB	TRB	TRB	TRB	TRB	TRB	TRB
FW 21	Lake Nakuru	Mount Kenya-Aberdare Landscape	KENYA	1,937,382	IBA	Protected	2							1				1
FW 22	Lake shore and Tributaries Mount Kabobo	Mount Kabobo - Margungu Highlands	DRC	149,625	NONE	Partial	3							1				1
FW 23	Lake Shore Itombwe Mountains	Itombwe - Nyungwe Landscape	DRC	176,997	NONE	Partial	3					2						2
FW 24	Lake Tana	Lake Tana Catchment Landscape	ETHIOPIA	305,499	NONE	Unknown/ Unprotected	1	1				11		1				12
FW 25	Lake Tanganyika Burundi	Itombwe - Nyungwe Landscape	BURUNDI	184,775	NONE	Partial	1	1				12	1	8				21
FW 26	Lake Tanganyika DRC	Mount Kabobo - Margungu Highlands	DRC	1,558,448	NONE	Partial	1	1	TRB	TRB	TRB	TRB	TRB	TRB	TRB	TRB	TRB	TRB
FW 27	Lake Tanganyika Tanzania	Greater Mahale Landscape	TANZANIA	1,327,650	NONE	Partial	1	1	TRB	TRB	TRB	TRB	TRB	TRB	TRB	TRB	TRB	TRB
FW 28	Lake Tanganyika Zambia	Mount Kabobo - Margungu Highlands	ZAMBIA	204,173	NONE	Partial	1	1	TRB	TRB	TRB	TRB	TRB	TRB	TRB	TRB	TRB	TRB
FW 29	Lufirio	Northern Lake Niassa Mountain Complex	TANZANIA	201,372	NONE	Partial	2					2						2
FW 30	Luiche River system	Greater Mahale Landscape	TANZANIA	227,693	NONE	Partial	2					1						1
FW 31	Lukuga River system	Mount Kabobo - Margungu Highlands	DRC	191,767	NONE	Partial	3					2						2
FW 32	Malagarasi River system	Greater Mahale Landscape	TANZANIA	356,285	NONE	Partial	1	1				4		1				5
FW 33	Marungu highlands Tributaries	Mount Kabobo - Margungu Highlands	DRC	501,099	NONE	Partial	3							1				1

FW 34	Mount Elgon Catchment Kenya	Not in corridor	KENYA	68,336	NONE	Unknown/ Unprotected	2				1				2				3
FW 35	Mount Elgon Catchment Uganda	Not in corridor	UGANDA	129,910	IBA	Unknown/ Unprotected	2		TRB	TRB	TRB	TRB	TRB	TRB	TRB	TRB	TRB	TRB	TRB
FW 36	Mts. Mugila rivers	Mount Kabobo - Margungu Highlands	DRC	218,290	NONE	Partial	3							1					1
FW 37	Ntichisi Mountain Catchment	Not in corridor	MALAWI	42,980	NONE	Protected	2								1				1
FW 38	Nyika Plateau	Northern Lake Niassa Mountain Complex	MALAWI	541,436	IBA	Protected	2				1								1
FW 39	Queen Elizabeth NP and Lake George Catchment	Greater Virunga - Murchison Landscape	UGANDA	1,192,301	NONE	Partial	2					14							14
FW 40	Rufugu River System	Greater Mahale Landscape	TANZANIA	432,019	NONE	Unknown/ Unprotected	2					1							1
FW 41	Ruhuhu	Northern Lake Niassa Mountain Complex	TANZANIA	264,170	NONE	Unknown/ Unprotected	2					2							2
FW 42	Rusizi River Burundi	Itombwe - Nyungwe Landscape	BURUNDI	111,144	IBA	Partial	2					6			1				7
FW 43	Rusizi River DRC	Itombwe - Nyungwe Landscape	DRC	268,696	IBA	Partial	2		TRB	TRB	TRB	TRB	TRB	TRB	TRB	TRB	TRB	TRB	TRB
FW 44	Rusizi River Rwanda	Itombwe - Nyungwe Landscape	RWANDA	101,642	IBA	Partial	2		TRB	TRB	TRB	TRB	TRB	TRB	TRB	TRB	TRB	TRB	TRB
FW 45	Semiliki National Park Catchment	Greater Virunga - Murchison Landscape	UGANDA	90,281	NONE	Unknown/ Unprotected	3			6			3					1	10
FW 46	Udzungwa Mountains Catchment	Mount Udzungwa - Uluguru Landscape	TANZANIA	1,162,270	NONE	Partial	3					3							3
FW 47	Uluguru Mountains Catchment	Mount Udzungwa - Uluguru Landscape	TANZANIA	2,779,899	NONE	Partial	3				1				1				2
FW 48	Virunga National Park and Rutshuru DRC	Greater Virunga - Murchison Landscape	DRC	613,034	NONE	Partial	1		TRB	TRB	TRB	TRB	TRB	TRB	TRB	TRB	TRB	TRB	TRB
FW 49	Virunga National Park and Rutshuru Uganda	Greater Virunga - Murchison Landscape	UGANDA	121,310	NONE	Partial	1				1			3	1				5

Appendix 3. Species Found in Each Key Biodiversity Area

This table is available on CEPF website as a separate document.

Appendix 4: Restricted Range Amphibians and Reptiles

While not a full list of species that considered restricted range, this partial list at least allowed us to identify additional KBAs for some non-threatened taxa, such as reptiles and plants, that are under-represented on the IUCN Red List of Threatened Species. The irreplaceability criteria for KBA identification should be applied completely in the near future for all taxa.

Taxonomic Group	Scientific Name
AMPHIBIA	Amietia ruwenzorica
AMPHIBIA	Arthroleptis hematogaster
AMPHIBIA	Arthroleptis pyrrhoscelis
REPTILIA	Adenorhinos barbouri
REPTILIA	Agama montana
REPTILIA	Amblyodips asteitana
REPTILIA	Aparallactus werneri
REPTILIA	Atheris acuminata
REPTILIA	Atheris ceratophora
REPTILIA	Atheris desaixi
REPTILIA	Atheris katangensis
REPTILIA	Atractaspis leleupi
REPTILIA	Atractaspis scorteccii
REPTILIA	Buhoma procterae
REPTILIA	Buhomav auerocegae
REPTILIA	Chamaeleo deremensis
REPTILIA	Chamaeleo laterispinis
REPTILIA	Chamaeleo tempeli
REPTILIA	Chamaeleo werneri
REPTILIA	Cnemaspis barbouri
REPTILIA	Cnemaspis uzungwae
REPTILIA	Crotaphopeltis tornieri
REPTILIA	Dipsadoboa werneri
REPTILIA	Elapsoidea nigra
REPTILIA	Gastropholis prasina
REPTILIA	Kinyongia fischeri
REPTILIA	Kinyongia oxyrhina
REPTILIA	Kinyongia tenue
REPTILIA	Leptosiaphos rhomboidalis
REPTILIA	Leptotyphlops parkeri
REPTILIA	Lycodonomorphus upembae
REPTILIA	Lycophidion uzungwense
REPTILIA	Lygodactylus conradti

Taxonomic Group	Scientific Name
REPTILIA	Lygodactylus gravis
REPTILIA	Lygodactylus williamsi
REPTILIA	Melanoseps uzungwensis
REPTILIA	Philothamnus macrops
REPTILIA	Prosymna ornatissima
REPTILIA	Prosymna semifasciata
REPTILIA	Rhampholeon acuminatus
REPTILIA	Rhampholeon beraduccii
REPTILIA	Rhampholeon moyeri
REPTILIA	Rhampholeon spinosus
REPTILIA	Rhampholeon temporalis
REPTILIA	Rhampholeon uluguruensis
REPTILIA	Rhampholeon viridis
REPTILIA	Rhinotyphlops erythraeus
REPTILIA	Rhinotyphlops kibarae
REPTILIA	Rhinotyphlops nigrocandidus
REPTILIA	Rhinotyphlops somalicus
REPTILIA	Rhinotyphlops South Sudanensis
REPTILIA	Rieppeleon brevicaudatus
REPTILIA	Scelotes uluguruensis
REPTILIA	Thelotornis usambaricus
REPTILIA	Thrasops schmidti
REPTILIA	Typhlops gierrai
REPTILIA	Typhlops uluguruensis
REPTILIA	Typhlops usambaricus
REPTILIA	Urocotyledon rasmusseni
REPTILIA	Urocotyledon wolterstorffi
REPTILIA	Xyelodontophis uluguruensis

APPENDIX 5: Key Demographic Indicators for the Afromontane Hotspot Countries

Country	Land area in sq km (2008) [93]	Population in mid-2011 (millions)[94]	Population density (number per sq km, based on 2008 popn estimate)[95]	Rate of natural increase (%)[96]	Projected population in mid-2025 (millions)[97]	Projected population in mid-2050 (millions)[98]
Burundi	25,680	10.2	314.4	3.2	15.5	27.1
Democratic Republic of Congo	2,267,050	67.8	28.3	2.8	95.4	148.5
Eritrea	101,000	5.9	49.5	2.6	8.0	11.4
Ethiopia	1,000,000	87.1	80.7	2.7	119.8	173.8
Kenya	569,140	41.6	67.7	2.7	59.1	96.9
Malawi	94,080	15.9	151.8	2.7	22.9	37.4
Mozambique	786,380	23.1	27.7	2.8	32.4	59.3
Rwanda	24,670	10.9	394.0	2.1	15.3	23.1
Saudi Arabia	2,000,000	27.9	12.4	1.8	36.0	44.6
Somalia	627,340	9.9	14.3	2.8	13.3	22.6
Sudan[99]	2,376,000	44.6	17.4	2.4	60.8	91.0
Tanzania, United Republic of	885,800	46.2	48.0	2.9	70.9	138.3
Uganda	197,100	34.5	160.6	3.4	54.1	105.6
Yemen	527,970	23.8	43.4	3.1	35.3	59.2
Zambia	743,390	13.5	17.0	3.1	21.0	45.0
Zimbabwe	386,850	12.1	32.2	1.9	17.4	25.2

[93]World databank. http://databank.worldbank.org/ddp/home.do?Step=12&id=4&CNO=2. Accessed 1/2/2011.
[94]Population Reference Bureau (2011). 2011 World Population Data Sheet
[95]World databank. http://databank.worldbank.org/ddp/home.do?Step=12&id=4&CNO=2. Accessed 1/2/2011
[96]Population Reference Bureau (2011).2011 World Population Data Sheet. The RNI is the birth rate minus the death rate, implying the annual rate of population growth without regard for migration.
[97]Population Reference Bureau (2011). 2011 World Population Data Sheet
[98]Population Reference Bureau (2011). 2011 World Population Data Sheet
[99] South Sudan gained independence from Sudan on July 9, 2011 but no separate data available for South Sudan at time of writing

Appendix 6: Hunger, Migration and Urbanization Statistics for Eastern Afromontane Hotspot Countries

Country	Global Hunger Index Scores[100]		Net Migration (Migrants per 1,000 population)[101]	Urban population 1990 (% of total)[102]	Urban population 2010 (% of total)[103]	Population without access to improved services - water (%, 2008)[104]	Population without access to improved services – sanitation (%, 2008)[105]
	1990	2010					
Burundi	31.8	38.3	8	6.3	11.0	28	54
Democratic Republic of Congo	24.7	41.0	-1	27.8	35.2	54	77
Eritrea	-	35.7	2	15.8	21.6	39	86
Ethiopia	43.7	29.8	-1	12.6	16.7	62	88
Kenya	20.3	19.8	0	18.2	22.2	41	69
Malawi	30.6	18.2	0	11.6	19.8	20	44
Mozambique	37.4	23.7	0	21.1	38.4	53	83
Rwanda	28.9	23.1	0	5.4	18.9	35	46
Saudi Arabia	6.2	<5	-8	76.6	82.1	-	-
Somalia	ND	ND	-6	29.7	37.5	70	77
South Sudan	26.4	20.9	1	26.6	40.1	43	66
Tanzania, United Republic of	22.9	20.7	-1	18.9	26.4	46	76
Uganda	19.1	15.0	-1	11.1	13.3	33	52
Yemen	30.1	27.3	-1	20.9	31.8	38	48
Zambia	25.6	24.9	-1	39.4	35.7	40	51
Zimbabwe	18.6	20.9	0	29	38.3	18	56

[100] Grebmer *et al.* (2010) "2010 Global Hunger Index The Challenge of Hunger". Deutsche Welthungerhilfe e .v., International Food Policy Research Institute, Concern World Wide

[101] Population Reference Bureau (2010).2010 World Population Data Sheet. This is the estimated rate of net immigration (immigration minus emigration) per 1,000 population for a recent year based upon the official national rate or derived as a residual from estimated birth, death, and population growth rates. It should be noted that migration rates can vary substantially from year to year for any particular country, as can the definition of an immigrant.

[102] UNDP (2010).Human Development Report 2010. The Real Wealth of Nations: Pathways to Human Development. Because data are based on national definitions of what constitutes a city or metropolitan area, cross-country comparison should be made with caution.

[103] UNDP (2010).Human Development Report 2010. The Real Wealth of Nations: Pathways to Human Development. Because data are based on national definitions of what constitutes a city or metropolitan area, cross-country comparison should be made with caution.

[104] UNDP (2010).Human Development Report 2010. The Real Wealth of Nations: Pathways to Human Development.

[105] UNDP (2010).Human Development Report 2010. The Real Wealth of Nations: Pathways to Human Development.

Appendix 7: Key Human Development and Economic Statistics for the Hotspot Countries

Country	GNI per capita (in millions of US$, 2009)[106]	World Bank Income Group[107]	Population below income poverty line (PPP US$1.25/day (%) 2000-2008)[108]	Life expectancy at birth (in years)[109]	Population below national poverty line 2008-2008 (%)	Mortality rate for under 5 years olds (per 1,000 live births in 2008)[110]	Adult literacy rate (% ages 15 and older)[111]	Human Development Index score (2010)[112]	HDI rank [113]	HDI improvement rank 1980-2010[114]
Burundi	150	Low	81.3	51.4	-	168	65.9	0.282	166	17
Democratic Republic of Congo	160	Low	59.2	48.0	71.3	199	66.6	0.239	168	94
Eritrea	270*	Low	-	60.4		58	65.3	NA	NA	NA
Ethiopia	330	Low	39	56.1	44.2	109	35.9	0.328	157	..
Kenya	760	Low	19.7	55.6	46.6	128	86.5	0.470	128	87
Malawi	280	Low	73.9	54.6	52.4	100	72.8	0.385	153	20
Mozambique	440	Low	74.7	48.4	55.2	130	54.0	0.284	165	33
Rwanda	460	Low	76.6	51.1	56.9	112	70.3	0.385	152	13
Saudi Arabia	11700*	High	-	73.3	-	21	85.5	0.752	55	21
Somalia	-	Low	-	50.4	-	200	NA	NA	NA	NA
South Sudan	1220	Lower-middle	-	58.9	-	109	69.3	0.379	154	18
Tanzania, United Republic of	500	Low	88.5	56.9	35.7	104	72.6	0.398	148	..
Uganda	460	Low	51.5	54.1	31.1	135	74.6	0.422	143	..

[106]World Bank - http://data.worldbank.org/indicator/NY.GNP.PCAP.CD accessed 1/2/2011; * = data for 2008; ** = data for 2005

[107]Low income - $995 or less; Lower-middle-income economies ($996 to $3,945); Upper-middle-income economies ($3,946 to $12,195); High-income economies ($12,196 or more). Data from http://data.worldbank.org/about/country-classifications/country-and-lending-groups#Low_income accessed 1/2/2011

[108]UNDP (2010).Human Development Report 2010. The Real Wealth of Nations: Pathways to Human Development. Data refer to most recent year available during period specified

[109]UNDP (2010).Human Development Report 2010. The Real Wealth of Nations: Pathways to Human Development.

[110]UNDP (2010).Human Development Report 2010. The Real Wealth of Nations: Pathways to Human Development.

[111]UNDP (2010).Human Development Report 2010. The Real Wealth of Nations: Pathways to Human Development. Mostly data for period 2005-2008, except Ethiopia, which refers to earlier year

[112]UNDP (2010).Human Development Report 2010. The Real Wealth of Nations: Pathways to Human Development.

[113]UNDP (2010).Human Development Report 2010. The Real Wealth of Nations: Pathways to Human Development.

[114]Lower numbers indicate faster improvement

Yemen	1060	Lower-middle	17.5	63.9	-	69	60.9	0.439	133	..
Zambia	970	Low	64.3	47.3	68.0	148	70.7	0.395	150	92
Zimbabwe	360**	Low	-	47.0	-	96	91.4	0.140	169	95

Appendix 8: Importance of Agricultural Sector in Hotspot Countries (FAO 2009, Figures for 2007)

Country	% economically active population engaged in agriculture	% land under agriculture (arable land and permanent crops but excluding pasture)	% land under agriculture, including pasture	Share in total water use by agriculture	Share of GDP (2006 figures)	Agricultural exports as share of total exports (%) 2006 figures
Burundi	90	52.38	89.37	77.1	31.3	76.1
DRC	59	3.37	9.99	30.6	40.0	1.7
Eritrea	75	6.36	74.67	96.7	14.5	11.9
Ethiopia	79	15.08	35.08	93.6	43.8	86.3
Kenya	72	10.02	47.44	63.9	28.7	53.8
Malawi	80	33.16	52.83	80.2	30.5	98.1
Mozambique	81	6.10	62.06	87.3	20.3	13.3
Rwanda	90	59.79	78.03	68.0	38.5	47.8
Saudi Arabia	6	1.69	80.77	NA	4.3	0.7
Somalia	67	1.64	70.18	99.7	62.3	20.1
Sudan[115]	54	8.23	57.56	96.7	31.1	8.2
Tanzania	77	11.52	38.61	89.4	38.0	29.3
Uganda	76	39.07	65.00	40.0	31.7	47.2
Yemen	42	3.08	44.75	90.0	8.7	2.3
Zambia	65	7.11	34.42	75.9	16.3	8.6
Zimbabwe	58	8.66	39.94	78.9	13.9	83.3

[115] South Sudan gained independence from Sudan on July 9, 2011 but no separate data available for South Sudan at time of writing

Appendix 9: Forest Cover and Trends over last Twenty Years (from FAO, 2010)

Country	Total forest cover (1,000 ha) in 2010	Annual change rate 2005-2010	Forest as % land cover	Forest area (1,000 ha)		Total change 1990-2010 (1,000 ha)	Total change (%) 1990-2010	Average annual change % (1990-2010)	Planted forest	
				1990	2010				1,000 ha	% of forest area
Burundi	172	-2 (-1.01)	7	289	172	-117	-40.5	-2.0	69	40
DRC	154135	-311 (-0.20)	68	160363	154135	-6228	-3.9	-0.2	59	n.s.
Eritrea	1532	-4 (-0.28)	15	1621	1532	-89	-5.5	-0.3	34	2
Ethiopia	12296	-141 (-1.11)	11	15114	12296	-2818	-18.6	-0.9	511	4
Kenya	3467	-11 (-0.31)	6	3708	3467	-241	-6.5	-0.3	197	6
Malawi	3237	-33 (-0.99)	34	3896	3237	-659	-16.9	-0.8	365	11
Mozambique	39022	-211 (-0.53)	50	43378	39022	-4356	-10.0	-0.5	62	n.s.
Rwanda	435	10 (2.47)	18	318	435	117	36.8	1.8	373	86
Saudi Arabia	977	0 (0)	n.s.	977	977	0	0.0	0.0	0	0
Somalia	6747	-77 (-1.10)	11	8282	6747	-1535	-18.5	-0.9	3	n.s.
Sudan[116]	69949	-54 (-0.08)	29	76381	69949	-6432	-8.4	-0.4	6068	9
Tanzania	33428	-88 (-2.72)	38	41495	33428	-8067	-19.4	-1.0	240	1
Uganda	2988	-403 (-1.16)	15	4751	2988	-1763	-37.1	-1.9	51	2
Yemen	549	0 (0)	1	549	549	0	0.0	0.0	0	0
Zambia	49468	-167(-0.33)	67	52800	49468	-3332	-6.3	-0.3	62	n.s.
Zimbabwe	15624	-327 (-1.97)	40	22164	15624	-6540	-29.5	-1.5	108	1

[116] South Sudan gained independence from Sudan on July 9, 2011 but no separate data available for South Sudan at time of writing

Appendix10: Primary Designated Use of Forest in Hotspot Countries (from FAO, 2010)

Country	Primary designated use of forest (2010)						% forest area within protected areas	Carbon stock in living forest biomass in 2010 (millon tonnes)
	Production	Water and soil protection	Conservation of biodiversity	Social services	Multiple use	None or unknown		
Burundi	9	0	0	0	0	91		17
DRC	5	0	17	0	0	78		19639
Eritrea	2	1	5	0	1	91	4	-
Ethiopia	4	0	0	0	96	0	-	219
Kenya	6	94	0	0	0	0	-	476
Malawi	37	0	23	0	0	40	23	144
Mozambique	67	22	11	0	0	0	11	1626
Rwanda	74	12	0	0	14	0		39
Saudi Arabia	0	0	0	0	100	0		-
Somalia	n.s.	0	0	0	100	0	-	394
Sudan[117]	50	0	12	0	67	0		
Tanzania	71	0	6	0	24	0	6	2019
Uganda	12	0	36	15	0	37	24	109
Yemen	0	0	0	0	100	0		5
Zambia	24	0	22	0	17	37	22	2416
Zimbabwe	10	3	5	0	82	0	5	492

[117] South Sudan gained independence from Sudan on July 9, 2011 but no separate data available for South Sudan at time of writing

Appendix 11: Brief review of National Adaptation Programs of Action (NAPA) and status of national-scale REDD+ programmes (2010)

Burundi	**Summary of the NAPA** Conservation and restoration of the environment is an important theme in the NAPA of Burundi (MLMTE 2007). The efficient use of wood resources, the protection of buffer zones along Lake Tanganyika and the rehabilitation of degraded areas are included. Priority actions identified in the NAPA: 1. The improvement of early-warning seasonal climate forecasts 2. The rehabilitation of degraded areas - safeguard existing woodlots and reforest degraded areas, and identify and popularize drought resistant forest species 3. The safeguarding of natural environments - enhance the management of existing protected areas and transform natural ecosystems identified as threatened or vulnerable into protected areas. 4. Rainwater Harvesting - popularize rainwater harvesting techniques for agricultural and domestic use 5. Erosion control in the region of Mumirwa - set up erosion control mechanisms in sensitive areas 6. Establish and protect buffer zones in Lake Tanganyika floodplain and around the lakes of Bugesera 7. Popularize short cycle and drought-resistant food crops 8. Popularize low-level grazing techniques - identify and popularize the breeding of species adapted to local climate conditions 9. Capacity building to promote energy saving techniques - identify and popularise improved wood use techniques and renewable new energies 10. Stabilisation of river dynamics in Mumirwa including the city of Bujumbura 11. Climate change adaptation education - train and inform decision makers and other actors, including local communities, on adaptation to climate variability 12. Increase the number of hydropower micro stations **REDD+ status** Burundi is not a UN-REDD Program country, neither is it a part of the World Bank Forest Carbon Facility. A search revealed no REDD+ projects or proposed projects in the country.

Democratic Republic of the Congo	The conservation of the Eastern Afromontane hotspot is not listed as a national priority in the DRC NAPA (MOE 2006) but there are several other projects that have been initiated that contribute to general forest conservation. **Status of REDD+** The DRC is a UN-REDD partner country and is exploring land use based climate change mitigation opportunities and the development of national-scale supporting capacity and policy. Whereas the Congo Basin forest remains largely intact, the higher altitude forests of the Albertine Rift are undergoing rapid deforestation. There is considerable scope for introducing avoided deforestation projects in the Albertine Rift area of the DRC. The DRC has entered the implementation phase of its REDD national program towards readiness through coordinated efforts of the United Nations-REDD Program and an initial grant from the Forest Carbon Partnership Facility. It has completed an R-PIN and R-PP. These efforts involve the engagement of a range of national stakeholders, such as indigenous peoples and other forest-dependent communities. The efforts have the objective of addressing issues, such as rights to lands, territories and resources and social justice, and how indigenous peoples could be involved in the conservation efforts and benefit directly from the economic, environmental and social benefits resulting from REDD+. A Climate-REDD working group was established in June 2009 by civil society. As a result of this process of engagement with representatives from Groupe de Travail Forestier, the National League of Indigenous Pygmy Organisations of the Congo (LINAPYCO), Dynamique des Groupes des Peuples Autochtones, and the National Resources Network, among others, a decree supporting REDD by establishing a National Coordination Committee, an Interministerial Committee and a National REDD Committee was approved by the Council of Ministers in October 2009, with the expectation of being signed subsequently by the prime minister. Recently, the Bonobo Conservation Initiative's reforestation project has been established using native species in Maringa-Lopori-Wamba region: the establishment of the Bonobo Peace Forest. A new forest-covered area will be established to realize a standard natural habitat unit of bonobo (Pan paniscus).
Eritrea	**Summary of the NAPA** Afforestation and agroforestry are priority adaptation and mitigation activities in Eritrea (MLWE 2007). There is very little information available on the protected area network in Eritrea. Priority actions identified in the NAPA 1. Introducing community based pilot rangeland improvement and management in selected agro-ecological areas in the north western lowlands rangeland 2. Introducing community based pilot projects to intensify existing production models and select suitable sheep and goat breeds in the eastern lowlands 3. Encourage afforestation and agroforestry through community forestry initiatives 4. Groundwater recharging for irrigation wells 5. Introduction and expansion of irrigated agriculture especially spate irrigated agriculture (for crop and livestock production) It is unclear if the afforestation and agroforestry project is based on exotic monocultures or indigenous forestry. The potential exists that if either program is established they could reduce reliance on indigenous forests. **Status of REDD+** Eritrea is neither a UN-REDD Program country, nor a member of the World Bank Forest Partnership Facility and has not developed a R-PP or R-PIN. A search of the internet reveals no REDD+ projects within the country.

Ethiopia	**Summary of the NAPA** In recent history, Ethiopia has experienced several significant drought events which are predicted to continue to occur into the future. The majority of the NAPA priorities deal with drought adaptation and food security. Importantly afforestation and reforestation carbon sequestration projects in the Rift Valley are also a priority (Tadege 2007). **REDD+ Status** Ethiopia is not a UN-REDD Program country. It is a member of the World Bank Forest Partnership Facility and has developed a draft R-PP and an R-PIN. Aside from the development of national-scale REDD, Sodo Reforestation Project has so far planted approximately 450,000 trees with the project site being completely reforested using a mixture of tree planting and natural regeneration. In addition, the Humbo Assisted Reforestation Project is a proposed reforestation activity that involves the restoration of indigenous tree species in a mountainous region in South Western Ethiopia. World Vision is developing both projects.
Kenya	Kenya has not yet submitted a NAPA. There are at present several civil society projects in place to counter climate change impacts, noticeably those introduced by the Greenbelt Movement. For more potential and current payment for ecosystem (PES) projects see Katoomba_Kenya in addition to the list below. **REDD+ Status** Kenya is a UN-REDD support country but not a full UN-REDD partner country as yet. It is a member of the World Bank Forest Carbon Facility and has developed an R-PIN and a draft R-PP. Forest management and increasing the country's forest cover by 4.1 million ha is an objective of the National Climate Change Response Strategy. In addition, there are several project scale REDD+ initiatives in various stages of development in Kenya: - The Wildlife Works' Kasingau Corridor REDD project has recently been verified by the VCS and CCBA standard. It is the first REDD+ project globally to be certified through the VCS. - The Treeflights Kenya planting project is located in Bore near to Malindi in Kenya's Coastal Province. It is different from all our other planting projects in that rather than planting on one site, here the trees are distributed to local farmers to plant on their own land. - The Aberdare Range/ Mt. Kenya Kamae-Kipipiri Small Scale A/R Project will reforest 1763 hectares of degraded forest lands in the Aberdare Range and Mt. Kenya Regions. Lands chosen are in the catchment areas of the Tana River within the Aberdare and Mt. Kenya Reserve Forest. - The Forest Again Kakamega Forest project is being developed on behalf of the Kenyan Forest Service on public land located in the Kakamega Forest Reserve in the Western Province of Kenya.

Malawi	**Summary of the NAPA** Although the restoration of the catchment of the Shire river has been identified as a priority in the NAPA (MMNRE 2006), there are no other identified activities that are directly related to the conservation of biodiversity or ecosystem services. As deforestation is widely spread, there is thus ample opportunity for the introduction of REDD+ projects. Priority actions identified in NAPA: 1. Improving community resilience to climate change through the development of sustainable rural livelihoods 2. Restoring forests in the Upper, Middle and Lower Shire Valleys catchments to reduce siltation and the associated water flow problems 3. Improving agricultural production under erratic rains and changing climatic conditions 4. Improving Malawi's preparedness to cope with droughts and floods 5. Improving climate monitoring to enhance Malawi's early warning capability and decision making and sustainable utilization of Lake Malawi and lakeshore areas resources **REDD+ Status** Malawi is neither a UN-REDD Programme country, nor a member of the World Bank Forest Partnership Facility and has not developed a R-PP or R-PIN. In terms of project scale activities, a forest conservation project is being lead by the Malawi Environmental Endowment Trust. The overall aim of the project is to avoid deforestation and forest degradation within Mkuwazi Forest Reserve and Nyika National Park in the Northern part of Malawi. Contact: Betty Mahuka Email: betty@naturetrust.mw There REDD Horizon program (http://xweb.geos.ed.ac.uk/~ihw/Redd_Horizon/Home.html) is civil society initiative between the University of Mzuzu, Malawi and the University of Edinburgh aimed at the development of REDD initiatives in Malawi. The contact person is Ian Woodhouse (i.h.woodhouse@ed.ac.uk)
Mozambique	**Summary of the NAPA** With its long coastline, Mozambique has identified management of impact of climate change on the coastal zone as a priority (MICOA 2007). Due to recent large flood events, the development of early warning systems is a particular priority identified in the NAPA. REDD was not identified as one of the top priorities but the country is part of the World Bank FCPF and has produced a R-PP outlining a strategy to realize REDD+. Priority actions identified in NAPA: 1. Strengthening of an early warning system 2. Strengthening capacities of agricultural producers to cope with climate change 3. Reduction of climate change impacts in coastal zones 4. Management of water resources under climate change **REDD+ Status** Whereas Mozambique is not a UN-REDD Program country, it is a member of the World Bank Forest Partnership Facility and has compiled an R-PIN. With regard to project scale initiatives, Envirotrade has implemented the Gorongoza Community Carbon Project and is investigating a second opportunity in the Zambezi Delta.

Rwanda	**Summary of the NAPA** The country is densely populated with considerable transformation of forest and indigenous ecosystems into small-scale agriculture. Protection against soil erosion and flooding has been identified as the top national priority (MLEFWM 2006). Reducing deforestation by implementing alternate or improved biomass fuel use is a priority that will potentially have many positive spin offs for biodiversity conservation. Priority actions identified in NAPA: 1. Land conservation and protection against erosion and floods at districts level of vulnerable regions to climate change; 2. Improving hydro meteorological information and early warning systems to control extreme phenomena due to climate change 3. Development of irrigated areas by gravity water systems from perennial streams and rivers in vulnerable zones to prolonged drought 4. Support vulnerable regions through planning and implementing measures and techniques related to land conservation, water harvesting and intensive agriculture, and promoting existing and new resistant varieties of crops adapted to different bioclimatic soil; 5. Increase adaptive capacity of grouped settlement "Imidugudu" located in vulnerable regions to climate change by the improvement of potable water, sanitation and alternative energy services, and the promotion of non-agricultural jobs; 6. Increase food and medicine modes of distribution to respond to extreme climate change and sensitize to stocking and conservation of agriculture products; **REDD+ status** Rwanda is neither a UN-REDD Programme country, nor a member of the World Bank Forest Partnership Facility and has not developed a R-PP or R-PIN
Saudi Arabia	As a major oil producer, Saudi Arabia is reluctant to engage in policy that could potentially damage the industry. It is not a Least Developed Country and has thus no NAPA in place. It also has no national REDD program and only 0.5% of the country is forested. Saudi Arabia does not rely on biomass for its energy needs and deforestation is therefore almost non-existent. Only 2% of the country has IUCN Category I-IV protected status, but a further 6% has other formal protected area status. Due to the limited extent and its isolated nature in Saudi Arabia it is uncertain if the current protected area network will offer protection under a changing climate. Saudi Arabia is neither a UN-REDD Programme country, nor a member of the World Bank Forest Partnership Facility and has not developed a R-PP or R-PIN.
Somalia	At present the country is in a period of unrest and little information regarding climate change adaptation or mitigation could be found.
Sudan	**Summary of the NAPA** Environmental restoration and biodiversity conservation is listed as a priority in the NAPA submitted (MEPD 2007). No record of reforestation or avoided deforestation activities could be found. Priority adaptation actions identified in NAPA: 1. Enhancing resilience to increasing rainfall variability through rangeland rehabilitation and water harvesting in the Butana area of Gedarif State 2. Reducing the vulnerability of communities in drought-prone areas of southern Darfur State through improved water harvesting practices 3. Improving sustainable agricultural practices under increasing heat-stress in the River Nile State 4. Environmental conservation and biodiversity restoration in northern Kordofan State as a coping mechanism for rangeland protection under conditions of increasing climate variability 5. Strategies to adapt to drought-induced water shortages in highly vulnerable areas in Central Equatorial State The actions are, however, not focused on the Afromontane Hotspot.

Tanzania	**Summary of the NAPA** Tanzania is in the process of implementing a national REDD program to address deforestation. The country relies heavily on fuelwood for its household energy needs. Tanzania already has an Afforestation/Reforestation project registered under the Voluntary Carbon Standard (VCS) and has several in the pipeline. At one stage it was exploring the introduction of biofuel schemes as potential climate change mitigation ventures but many of these have not materialised. The reforestation of Kilimanjaro has been identified as a national priority as well as the introduction of drought resistant crops (DOE 2007). Priority actions identified in NAPA: 1. Water efficiency in crop production irrigation to boost production and conserve water in all areas 2. Alternative farming systems and water harvesting 3. Develop alternative water storage programs and technology for communities 4. Community based catchments conservation and management programs 5. Explore and invest in alternative clean energy sources e.g. Wind, Solar, bio-diesel, etc. to compensate for lost hydro potential 6. Promotion of application of cogeneration in the industry sector for lost hydro potential 7. Afforestation programs in degraded lands using more adaptive and fast growing tree species 8. Develop community forest fire prevention plans and programs 9. Establishing and Strengthening community awareness programs on preventable major health hazards 10. Implement sustainable tourism activities in the coastal areas and relocation of vulnerable communities from low-lying areas. 11. Enhance wildlife extension services and assistance to rural communities in managing wildlife resources 12. Water harvesting and recycling 13. Construction of artificial structures, e.g., sea walls, artificially placing sand on the beaches and coastal drain beach management system 14. Establish good land tenure system and facilitate sustainable human settlements **REDD+ status** Tanzania is a UN-REDD Programme Country and has started developing its national REDD Programme. It is also a World Bank Forest Partnership Facility member and has developed an R-PIN and R-PP. Relative to the other countries within the Hotspot, Tanzania's national REDD+ program is well advance with the initiation of several early pilot projects. Contact details for the national REDD office in the Ministry of Natural Resources and Tourism are included below.

Uganda	**Summary of the NAPA** Community based tree growing and land degradation management has been identified as the top national projects in Uganda (MWLE 2007). Climate change predictions indicate that the country could lose vast coffee growing areas if there is an increase in temperature due to anthropogenic climate change (MWLE 2007). It is imperative that appropriate adaptation projects are put into place to counter this threat. Priority actions identified in NAPA: 1. Community tree growing projects 2. Land degradation management projects 3. Strengthening meteorological services 4. Community water and sanitation project 5. Water for production projects 6. Drought adaptation projects 7. Vectors, pests and Disease Control Projects 8. Indigenous Knowledge (IK) and natural resource management project 9. Climate change and development planning project The community tree-planting program should reduce the impact of unsustainable harvesting on indigenous forests. For more potential and current PES projects please see Katoomba_Uganda in addition to the list of initiatives below. **REDD+ status** Uganda is not a UN-REDD Programme country .It is a member of the World Bank Forest Carbon Facility and has developed an R-PIN and a draft R-PP. The contact details of the national focal point follow below. In addition to the development of national-scale REDD+, there are several project scale initiatives at various stages of development. Face the Future are reforesting 10,000ha of Kibale National Park that is located in western Uganda, is renowned for its diversity of monkeys and great apes, of which the best known is the chimpanzee. Trees with Benefits is a project aimed at creating awareness of climate change and related issues and increasing household incomes through carbon payments. The Uganda Nile Basin Reforestation Project consists of five small-scale CDM reforestation projects that aim to provide a new financing mechanism to overcome the current barriers to establish timber plantations in Uganda and to allow communities to benefit from the CDM. Lastly, the Kikonda Forest Reserve Reforestation Project covers 120km² and employs more than 200 people. It has been granted CarbonFix certification.

Yemen	**Summary of the NAPA** The country has prepared a NAPA (EPA 2009), but has not listed the improvement of the protected area network to ensure biodiversity conservation as a priority activity. However, the maintenance of mountain terraces is listed as a priority, which may assist in avoiding degradation and soil erosion within the high-altitude Afromontane areas. Yemen is neither a UN-REDD Programme country, nor a member of the World Bank Forest Partnership Facility and has not developed a R-PP or R-PIN. Priority adaptation actions identified in NAPA: 1 Develop and implement Integrated Coastal Zone Management programs 2 Water conservation through reuse of treated waste water and grey water from mosques, and irrigation saving techniques. 3 Develop and implement an awareness raising programs on adaptation to the potential impacts of climate change. 4 Establish and maintain a database for climate change and adaptation 5 Planting and re-planting of mangroves and palms for adaptation to projected rises in sea level 6 Develop and implement programs to improve Yemen's ability to cope with extreme weather events 7 Rainwater harvesting through various techniques including traditional methods. 8 Rehabilitation and maintenance of mountainous terraces. 9 Promotion of research on drought resistant and heat- and salinity- tolerant crops. 10 Design and implement sustainable land management strategies to combat desertification and land degradation 11 Sustainable management of fisheries resources 12 Incorporation of climate change and adaptation to school education

Zambia	**Summary of the NAPA** Zambia is a UN-REDD partner country. The country has a high deforestation rate. It relies heavily on biomass for its household energy needs and in this regard it has been implementing efficient stove projects in Lusaka with the aim of registering it as a climate change mitigation venture under the CDM. The promotion of regeneration of natural forests is a priority activity as is the introduction of alternative livelihoods to reduce vulnerability of communities that live next to Game Management Areas (MTENR 2007). Priority adaptation actions identified in NAPA: 1. Adaptation of the Effects of Drought in the context of Climate Change in Agro-Ecological Region I of Zambia 2. Strengthening of early warning systems to improve services to preparedness and adaptation to climate change 3. Promotion of alternatives sources of livelihoods to reduce vulnerability to climate change/variability to communities living around GMAs 4. Management of critical habitats 5. Promote natural regeneration of indigenous forests 6. Adaptation of land use practices (crops, fish and livestock) in light of climate change 7. Maintenance and provision of infrastructure to communities to reduce human-wildlife conflict 8. Eradication of invasive alien species 9. Capacity building for improved environmental health in rural areas 10. Climate proofing sanitation in urban areas **REDD+ status** Zambia is a UN-REDD Programme country, but not a member of the World Bank Forest Carbon Partnership Facility. Zambia has developed a REDD quick start initiative and are in the process of developing a National Joint Program. Although several organisations, for example Envirotrade are assessing potential REDD activities in Zambia, no project scale activities within the country have reached the implementation phase as yet. Contact details for the national UN-REDD office follow below. Several of the priority activities are pertinent to the conservation of biodiversity and ecosystem functioning.
Zimbabwe	Unfortunately Zimbabwe has not yet submitted a NAPA and little information could be found on national or local scale climate change mitigation or adaptation projects in the country. Zimbabwe is neither a UN-REDD Programme country, nor a member of the World Bank Forest Partnership Facility.

Appendix 12. Detailed Maps of Key Biodiversity Areas for each sub-regions

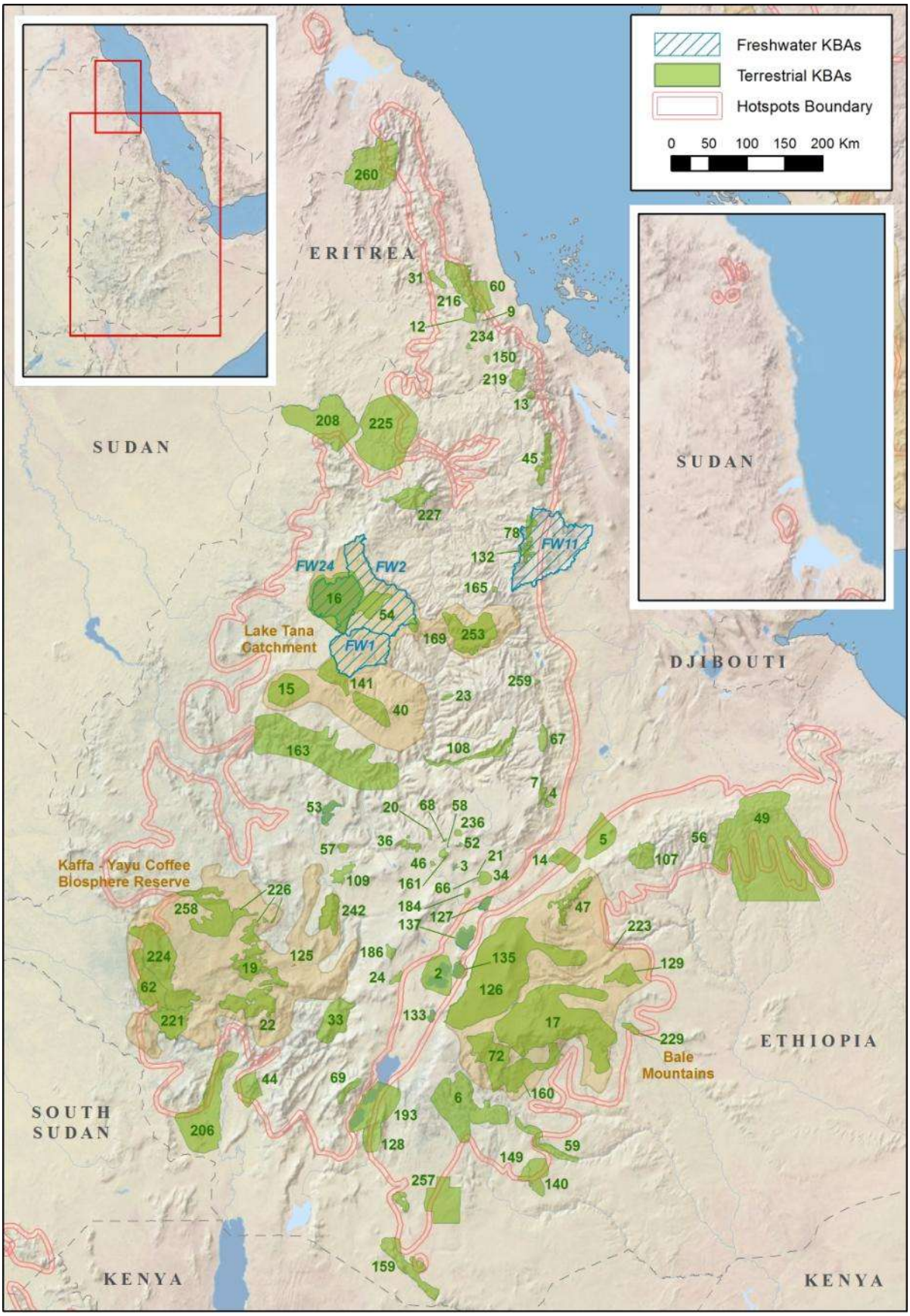
The following pages present the Key Biodiversity Areas for the following Sub-Regions:

- Arabian Peninsula
- Ethiopian Highlands
- Eastern Arc Mountains
- Albertine Rift
- Southern Mountain Islands

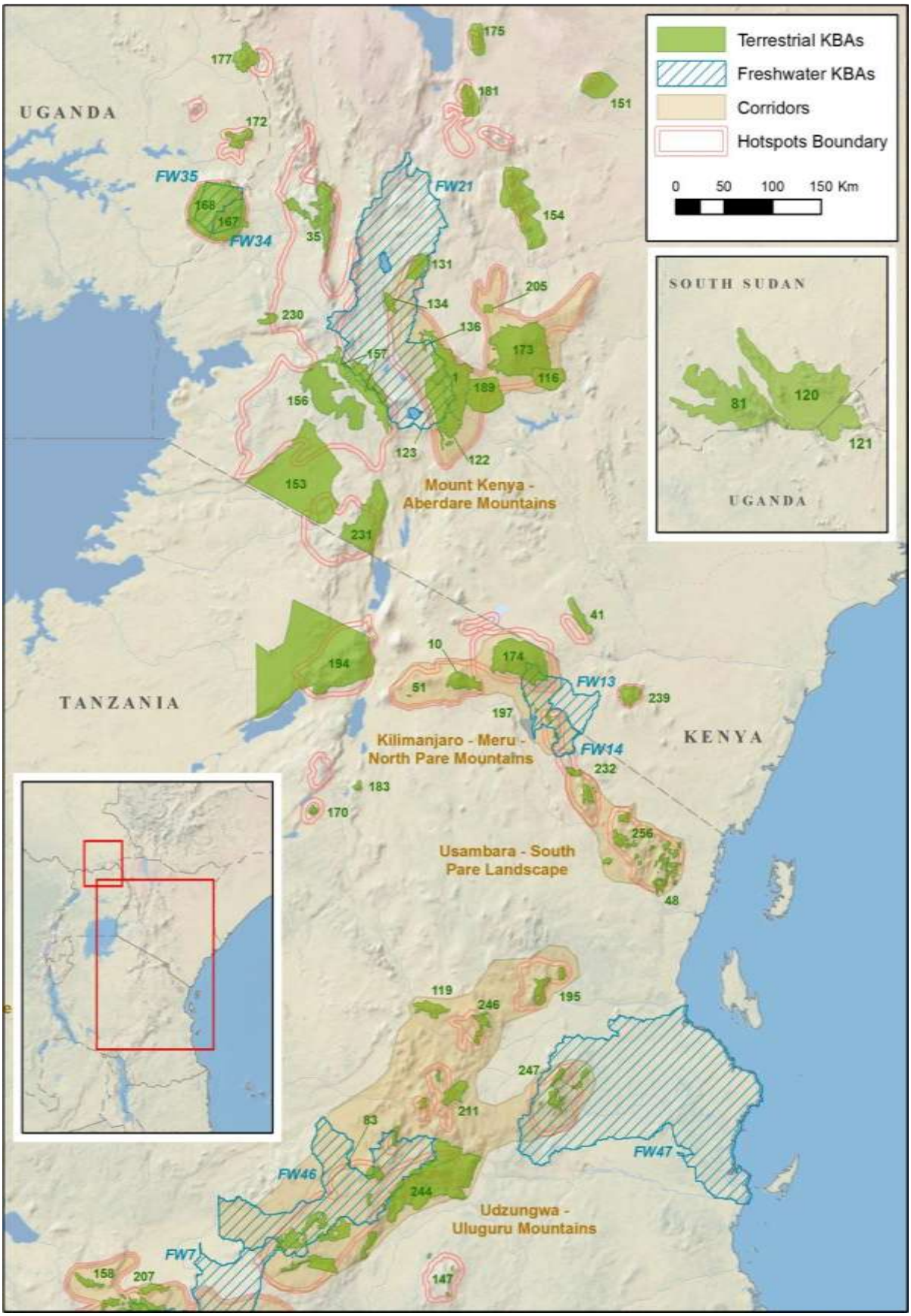
The reference number of the KBAs refer to the Table presented in Appendix 2.

Arabian Peninsula

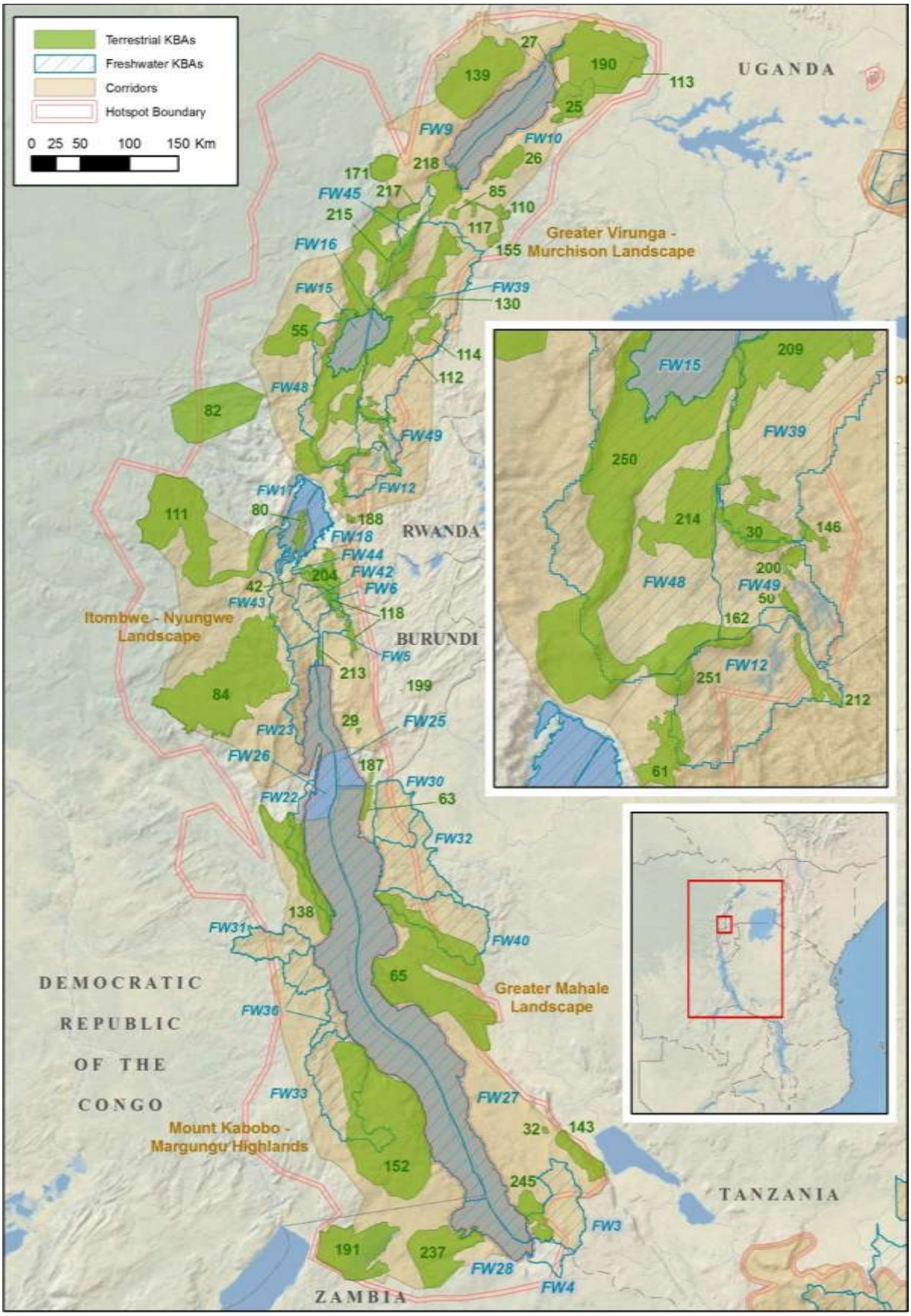
Ethiopian Highlands



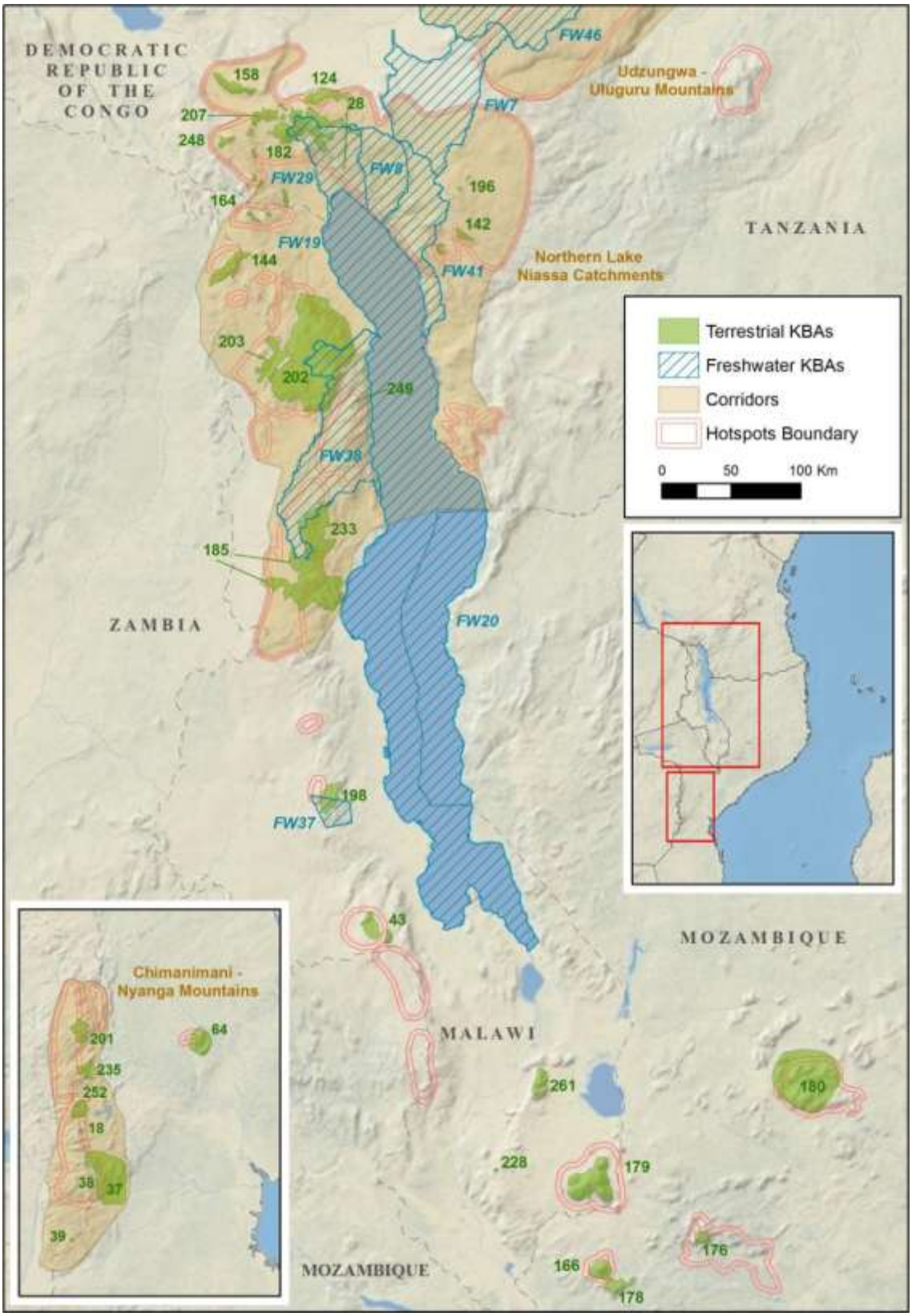
Eastern Arc Mountains



Albertine Rift



Southern Mountain Islands

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