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MOZAMBIQUE ENVIRONMENTAL THREATS AND OPPORTUNITIES ASSESSMENT

January 2013

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Cover photo: Mangrove poles being harvested for local construction, Angoche, Nampula Province. Photo by B. Byers, September 2012.

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AUTHORITY

Prepared for USAID-Mozambique.

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PREPARED BY

ETOA Team: Bruce Byers (Team Leader), Rezia Cumbi, Mario Falcão, Felisbela Gaspar, Valerio Macandza, and Marcos Pereira.

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ABBREVIATIONS AND ACRONYMS

ABCG	Africa Biodiversity Collaborative Group
ADF	African Development Fund
AFDB	African Development Bank
ANAC	National Agency of Conservation Areas
ATB	Agriculture, Trade and Business
AWF	African Wildlife Foundation
BIOFUND	Foundation for the Conservation of Biodiversity
CBD	Convention on Biological Diversity
CBNRM	Community-Based Natural Resources Management
CCAP	Coastal City Adaptation Program
CDCS	Country Development Cooperation Strategy
CFR	Code of Federal Regulations
CITES	Convention on International Trade in Endangered Species
CO2	Carbon Dioxide
CONDES	National Council for Sustainable Development
CSO	Civil Society Organizations
DINAGECA	National Cadastral Service
DG	Democracy and Governance
DNAC	National Directorate of Conservation Areas
EEZ	Exclusive Economic Zone
EIA	Environmental Impact Assessment
EMP	Environmental Management Plan
ENSO	El Niño Southern Oscillation
ETOA	Environmental Threats and Opportunities Assessment
FAA	Foreign Assistance Act
FAO	Food and Agriculture Organization
FTF	Feed the Future
FUNAB	National Environmental Fund
GDP	Gross Domestic Product
G-FISH	Global FISH Alliance
GIZ	German Agency for Technical Co-operation

GOM	Government of Mozambique
IIAM	Institute of Agrarian Research
INE	Statistics National Institute
INGC	National Institute for Disaster Management
INIA	National Institute of Agronomic Research
IOTC	Indian Ocean Tuna Commission
ISSG	Invasive Species Specialist Group
IUCN	International Union for Conservation of Nature
MAE	Ministry of State Administration
MCT	Ministry of Science and Technology
ME	Ministry of Energy
MF	Ministry of Finance
MICOA	Ministry for the Coordination and Environmental Affairs
MIKE	Monitoring the Illegal Killing of Elephants
MINAG	Ministry of Agriculture
MIREM	Ministry of Mineral Resources
MISAU	Ministry of Health
MITUR	Ministry of Tourism
MOPH	Ministry of Public Works and Housing
MP	Ministry of Fisheries
MPA	Marine Protected Area
MPD	Ministry of Planning and Development
NGO	Non-Governmental Organization
NP	National Park
NR	National Reserve
NRM	Natural Resources Management
PA	Protected Area
PARP	Plan for the Reduction of Poverty
PEPFAR	President's Emergency Plan for AIDS Relief), ongoing maternal and child
PES	Payments for Ecosystem Services
PMI	Presidential Malaria Initiative
REDD	Reduced Emissions from Deforestation and Forest Degradation
SADC	Southern African Development Community

SAVE	Scientific, Academic, Voluntary and Educational
SCUBA	Self-Contained Underwater Breathing Apparatus
TB	Tuberculosis
TFCA	Trans-Frontier Conservation Areas
TNC	The Nature Conservancy
UEM	Universidade Eduardo Mondlane
UNDP	United Nations Development Program
UNEP	United Nations Environment Program
UNFCCC	United Nations Framework Convention on Climate Change
UNWTO	UN World Tourism Organization
US	United States
USAID	United States Agency for International Development
USFS-IP	United States Forest Service International Programs
USG	United States Government
WCMC	World Conservation Monitoring Centre
WCS	Wildlife Conservation Society
WIOMSA	Western Indian Ocean Marine Science Association
WWF	World Wildlife Fund

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More than 75 people, representatives of a diverse range of environmental actors and stakeholders, from the heads of government agencies to farmers in rural villages, willingly made time to talk to us and freely shared their knowledge and opinions. The Environmental Threats and Opportunities Assessment (ETOA) Team would like to express our deep appreciation to all of them. The ETOA Team received much information and heard many viewpoints from the people we met, and if in any way we have misunderstood them or misrepresented their views, the fault is ours.

We wish to thank Jason Katz, the USAID-Mozambique Mission Environmental Officer, who facilitated our assessment work through his direction and support of our communication with implementing partners in the field and with USAID-Mozambique Mission staff. We would especially like to thank USAID implementing partners, local experts, and stakeholders who assisted us on field site visits to several of Mozambique's terrestrial and coastal ecosystems, where we saw both successes and challenges first-hand. We also thank Walter Knausenberger of the USAID Africa Bureau, who arranged meetings between the Team Leader and representatives of the USAID-Washington Biodiversity and Forestry, and Climate Change Teams.

EXECUTIVE SUMMARY

Purpose of the ETOA

The main objectives of this assessment were to:

- summarize the current state of Mozambique's biological diversity, forests, and environment;
- describe the direct biophysical threats to Mozambique's biodiversity, forests, and environment, and identify the causes of those threats;
- identify actions needed to reduce and/or mitigate the causes of those threats in the current political, economic, and social context;
- identify any actions proposed by USAID-Mozambique that could threaten biodiversity, forests, or environmental integrity and resilience, and
- identify opportunities for USAID-Mozambique to support the needed actions within its proposed Country Development Cooperation Strategy (CDCS) and planned programs.

This assessment fulfills a legal requirement of the Foreign Assistance Act (FAA), which requires that a Tropical Forests and Biodiversity analysis be conducted in conjunction with the development of new U.S. foreign assistance strategies and programs. It is also intended to identify opportunities to better integrate the Mission's portfolio across development sectors by suggesting linkages with agriculture, democracy and governance, economic growth, health, and education activities. Finally, it will note any possible environmental compliance problems the Mission might face under FAA Section 117 or Regulation 22 Code of Federal Regulations (CFR) 216 if they develop a strategy that involves activities that might either directly or indirectly threaten biodiversity, tropical forests, or the natural environment.

Methodology

Information for this assessment was gathered by a four-person ETOA Team through review of relevant documents and web-based information; interviews and meetings with representatives of key stakeholder groups; and field site visits. We talked to more than 75 people, including from relevant national government agencies, international and national non-governmental organizations (NGOs), international donors, USAID-Mozambique Mission staff, residents of natural resource-dependent communities, and private sector representatives. Our information also came from site visits to 1) the Maputo Special Reserve; 2) Ponta do Ouro Partial Marine Reserve; 3) Nampula Province: Nampula City, and the CARE-WWF Primeras and Segundas Program in and around Angoche; Limpopo National Park (NP); and medicinal plant and charcoal markets in Maputo. We analyzed the content of our interviews to identify the categories of "actions necessary" for biodiversity and forest conservation perceived to be most important. All information gathered by the team was synthesized to identify proposed USAID activities that might threaten biodiversity and forests, to identify opportunities for USAID activities to contribute to the needed actions, and to make recommendations to the Mission.

State of the Environment

Because the "core" of this ETOA consists of the Tropical Forests and Biodiversity (FAA 118-119) Assessments that are legally required by the U.S. Foreign Assistance Act, those topics frame our review of the state of Mozambique's environment. The terrestrial, aquatic, and marine ecosystems of Mozambique, and the tens of thousands of species that inhabit them, provide the ecosystem products, services, and non-material benefits on which Mozambique's economy and development depend. Agricultural ecosystems and agro-biodiversity are the foundation for the country's agricultural economy. In Chapter 2 of this report we briefly review the state of Mozambique's ecosystems and species, and we discuss the economic and other benefits they provide in Chapter 3. In Chapter 5 we summarize the laws, policies, and government institutions that guide and implement environmental management and biodiversity conservation in the country. We also summarize the support and partnership provided by international donors and NGOs.

Threats and Causes

This ETOA uses the "threats-based approach" that guides USAID's biodiversity programming as the conceptual framework for our analysis. As discussed in Chapter 4, we identified the principal direct threats to Mozambique's ecosystems and species, and traced their immediate and deeper, "root" causes. The most important direct threat to Mozambique's biodiversity is the conversion, loss, degradation, and fragmentation of natural ecosystems. Overexploitation of high-value species, the introduction of invasive non-native species, pollution, and climate change round out the list of direct threats to Mozambique's biodiversity and environment. Although many diverse activities cause these direct threats, the specific proximate causes appear to be rooted in a smaller number of deeper root causes, or "drivers."

Actions Necessary

FAA Sections 118 and 119 call for assessments to identify the "actions necessary" to conserve tropical forests and biological diversity, respectively (see Chapter 7). One source of "actions needed" was a review of documents prepared by the Government of Mozambique, including their Fourth National Report to the Convention on Biological Diversity (2009). Our main source of actions needed was interviews and meetings with representatives of key stakeholder groups . From those interviews we compiled a list of 174 "actions necessary," some of which were mentioned many times, by different stakeholders. This content analysis allowed the ETOA Team to rank the perceived importance of the many possible needs. Actions needed that were mentioned repeatedly clustered as "themes"; in fact, 126 of the 174 actions listed by key informants fit into only eight themes. The major thematic categories of actions needed are to:

- Improve Enforcement of Environmental Laws
- Build Capacity of Communities & Civil Society Organizations for Meaningful Engagement in Environmental Decision Making
- Stop Forest Conversion to Agriculture & Stabilize the Agricultural Frontier
- Improve Land Use & Coastal Zone Planning
- Coordinate and Harmonize Actions of Relevant Ministries & Agencies & Develop a Functional Institutional Structure for Sustainable Environmental Management

- Develop Livelihood & Economic Alternatives/Opportunities to Destructive Practices
- Sustainably Manage Artisanal (and Other) Fisheries
- Improve Woodfuel Efficiency and Find Alternatives to Wood and Charcoal

These actions needed for biodiversity, forest, and environmental conservation are actions that remove or reduce the causes of the threats that we identified.

Opportunities for USAID-Mozambique Programs to Contribute to Environmental Conservation

The language of Sections 118 and 119 of the Foreign Assistance Act requires that we discuss "the extent to which the actions proposed for support by the Agency meet the needs thus identified" (see Chapter 8). The following table suggests which of the current and proposed programs at USAID-Mozambique are contributing, or could contribute, to some of the actions needed that were identified by the ETOA Team.

Theme: "Need to…."		**USAID Program/SO**			
	ATB-NRM/BIO	ATB-CCAP	ATB-FTF	DG	HLTH
Improve Enforcement of Environmental Laws	X	X		X	X
Build Capacity of Communities & Civil Society Organizations for Meaningful Engagement in Environmental Decision Making	X	X		X	
Stop Forest Conversion to Agriculture & Stabilize the Agricultural Frontier	X		X		
Improve Land Use & Coastal Zone Planning	X	X	X	X	
Coordinate and Harmonize Actions of Relevant Ministries & Agencies & Develop a Functional Institutional Structure for Sustainable Environmental Management	X	X	X	X	X
Develop Livelihood & Economic Alternatives/Opportunities to Destructive Practices	X	X	X		X
Sustainably Manage Artisanal (and Other) Fisheries	X		X		X
Improve Woodfuel Efficiency and Find Alternatives to Wood and Charcoal	X	X	X		X
Other (climate change adaptation, environmental information, behavior-change, fire control, human-wildlife conflict, financial sustainability of PAs, etc.)	X		X		

Opportunities to Contribute to Improved Enforcement of Environmental Laws

According to our content analysis of interviews of key stakeholders, the most commonly perceived category of "actions needed" was to "Improve Enforcement of Environmental Laws." The Environmental Law of 1997 requires Environmental Impact Assessments (EIAs) and

Environmental Managements plans in order for development projects to obtain environmental licenses, and MICOA's National Directorate of Environmental Impact Assessment is responsible for reviewing and approving EIAs, and for issuing the licenses. However, according to the Director of this unit, their resources and capacity are extremely limited. The ETOA Team believes that one good opportunity to contribute to meeting this overarching "action needed" would be through support for national EIA capacity-building.

Opportunities to Contribute to Building Capacity of Communities, Civil Society Organizations, and the Media for Meaningful Engagement in Environmental Decision Making

The opportunity to contribute to meeting this need could be realized through a linkage between ATB Office activities in support of NRM and biodiversity conservation and a number of the objectives of the USAID-Mozambique Democracy and Governance (DG) Program. We recommend that the Mission take advantage of this opportunity.

Opportunities to Contribute to Stopping Forest Conversion to Agriculture & Stabilizing the Agricultural Frontier

A significant opportunity to contribute to meeting this need could come through a closer integration of natural resources management (NRM) and Feed the Future (FTF) activities, in particular the co-location of FTF "conservation agriculture" support and Agriculture, Trade and Business (ATB) Office's NRM and biodiversity conservation activities. We recommend that the new Country Development Cooperation Strategy (CDCS) reflect this opportunity.

Opportunities to Contribute to Improving Land Use & Coastal Zone Planning

USAID could contribute to this need mainly through its support for national capacity to conduct EIAs. Land use planning will contribute to stabilizing the agricultural frontier, and coastal zone planning will conserve coastal habitats such as mangroves, to protect their biodiversity and the value of ecosystem products and services they provide.

Opportunities to Contribute to Coordinating & Harmonizing Actions of Relevant Ministries & Agencies & Developing a Functional Institutional Structure for Sustainable Environmental Management

Although ATB Office and DG Program activities could contribute to this need, we believe that better opportunities to contribute to other categories of needs exist at this time.

Opportunities to Contribute to Developing Livelihood and Economic Opportunities as Alternatives to Destructive Practices

Promotion of conservation agriculture in areas of biological significance is one opportunity to help Mozambique meet this need. Payments for Ecosystems Services, such as conservation and restoration of mangroves, is another opportunity to support this kind of action.

Opportunities to Contribute to Sustainably Managing Artisanal (and Other) Fisheries

Sustainable management of artisanal fisheries is needed to maintain their important contribution to the food security and nutrition of coastal communities, and will require capacity-building within these communities so that they can engage with national and local fisheries authorities in a meaningful way. Fisheries management following CBNRM principles is needed. Because of the ecological linkages between mangroves and fisheries, mangrove conservation and restoration is essential in artisanal fishing communities.

Opportunities to Contribute to Improving Woodfuel Efficiency and Finding Alternatives

USAID-Mozambique would have an opportunity to contribute to this need, should it choose to do so, in activities associated with other FTF or ATB Office NRM and biodiversity conservation activities.

Opportunities to Contribute to Other Actions Needed for Protecting the Environment and Biodiversity

Our analysis identified an excellent opportunity to contribut to ecosystem-based approaches for climate change adaptation through support for mangrove conservation and restoration. Conserving and/or restoring healthy, biodiverse mangrove ecosystems is needed to ensure the continued delivery of their ecosystem services, which increase the resilience of coastal communities to climate change.

The SOW for this ETOA specifically stated that "a focus on linkages to USAID/Mozambique's Health strategy and programs should be highlighted within the ETOA." There are many themes that link environmental management and biodiversity conservation to health issues, including:

- artisanal fishing and nutrition
- conservation agriculture (esp. legume crops) and nutrition
- wild plants and traditional medicine
- bio-prospecting for new drugs
- woodfuel and charcoal and respiratory diseases (esp. of women and children)
- diseases transmitted between wildlife and humans and/or domestic animals
- diversion of anti-malarial bed nets for fishing

Recommendations

Our SOW called for the ETOA to "…and identify opportunities to integrate environmental management across USAID/Mozambique's strategic objectives." It also states that "This assessment will identify important linkages across sectors and new initiatives with respect to environmental conditions and threats which USAID/Mozambique must be aware of as it drafts

its Country Development Cooperation Strategy (CDCS). The assessment will also provide recommendations for how best to address these conditions to protect the natural resource base and thereby continue to provide the goods and services needed for healthy communities and economic growth." We therefore offer the following recommendations:

Integrate Environment and Conservation and Other USAID Programs Rather Than Segregate Them

Although one of the principles of current USAID Project Design Guidance is to "apply selectivity and focus," it appears that geographic "focusing," but in a sectorally "stovepiped" and unintegrated way, is preventing some good opportunities for synergy among USAID-Mozambique's programs from being realized. We believe that better integration and coordination – both geographically and thematically – between the Mission's environment and NRM activities and activities in other programs would lead to more effective programs. If some of the activities of the Feed the Future Program, Coastal City Adaptation Program, and proposed biodiversity conservation and natural resources management activities occurred in the same places, and if some activities of other USAID-Mozambique programs (e.g., DG, Health, Education) were deliberately co-located in those places, we think that USAID investments could be more effective and sustainable.

Review and Redesign the Proposed Biodiversity Program

The Biodiversity Program that is being proposed by the ATB Office is

mainly limited to supporting nature-based economic opportunites and advocacy for biodiversity conservation in or near protected areas.. The ETOA Team is of the opinion that this is an overly narrow focus, given the range of actions needed that we identified.

Given the new information obtained in this ETOA, we recommend that the proposed Biodiversity Program be thoroughly reviewed, and at least partially redesigned, using the updated evidence about actions needed for environmental conservation obtained by this Assessment. An open and strategic design process based on the current ETOA findings could lead, we believe, to a more strategic, effective, and potentially catalytic investment of USAID biodiversity, climate change, and agriculture funding.

Focus by Theme Rather Than Geographic Location

The ETOA Team recommends that a redesigned ATB Office program aimed at improved environmental management and biodiversity conservation focus on one or more of the eight main categories of "actions needed" that were identified in this ETOA. We believe a program with a thematic design would be more strategic, effective, and potentially catalytic of needed changes. It could potentially integrate ATB biodiversity and natural resources management activities with other Mission programs in a way that takes advantage of the multiple opportunities presented in this ETOA report.

Our highest recommendation is for a program that includes activities to "Build Capacity of Communities, Civil Society Organizations, and the Media for Meaningful Engagement in Environmental Decision Making," cross-cutting across sites and ecosystems, and involving the

Mission's DG Office. We also think USAID-Mozambique should take advantage of opportunities to link FTF and biodiversity and forest conservation through activities aimed to "Stop Forest Conversion to Agriculture & Stabilize the Agricultural Frontier," by applying FTF "conservation agriculture" techniques and technologies in sites of biological significance, including buffer zones of current or proposed protected areas.

Use Community-Based Natural Resources Management (CBNRM) Capacity-Building to Link Biodiversity Conservation with DG

Thirteen percent of the "actions needed" listed by our key informants clustered under the general theme of strengthening the capacity of communities and civil society organizations for meaningful engagement in environmental decision making." This seems to offer an ideal opportunity for a program involving USAID-Mozambique's DG Program, which lists strengthening the capacity of civil society and media to advocate for improved governance and accountability as one of its five objectives. The need to develop an effective policy and legal "platform" for, and models of, community-based natural resources management in Mozambique is a clear theme we heard. Although this need relates to all types of natural resources used by communities, one of the most important types of natural resource in Mozambique are the biodiverse fish and shellfish tapped by artisanal fisheries. These are extremely important to food security and nutrition for a large fraction of Mozambican's who live on the coasts.

Use Conservation Agriculture to Link Biodiversity Conservation and Agriculture

The ETOA Team found clear evidence that forest loss and degradation from expanding "slash and burn" agriculture is among the most important causes of biodiversity loss and environmental degradation in Mozambique. In order to stop this practice, and stabilize the agricultural frontier so that the countries remaining natural forests can be conserved, small farmers need farming techniques and crop varieties that maintain and increase soil fertility and crop yields on the same plot of land. The "conservation agriculture" component of the Mission's FTF program is clearly relevant to meeting these needs. We strongly recommend that promoting conservation agriculture with small farmers in forest areas of biological significance (e.g., high-value miombo woodlands, coastal forests, buffer zones of protected areas) in order to help stop the expansion of farms into forests through "slash and burn" farming should be a theme of the ATB natural resources management and biodiversity conservation program under the new USAID-Mozambique CDCS. If attention is not focused on this cause of the most important overall threat to terrestrial biodiversity in Mozambique, it has the potential to completely overwhelm and waste the investments USAID may have made in biodiversity conservation in protected areas or elsewhere.

Incorporate Mangrove Conservation and Restoration Into the Coastal City Adaptation Program (CCAP)

Mangrove conservation and restoration represents an important opportunity to demonstrate the value of an ecosystem-based approach to climate change adaptation. The physical protection from cyclones, winds, waves, and storm surges that mangrove provide, and their ability to trap and hold sediment and thereby build land, are ecosystem services that increase the resilience of

coastal communities. Mangrove restoration needed in many places, but the silvicultural science of how to restore each of the main species (there are nine species in Mozambique) in its proper intertidal zone is not complete. More pilot work on mangrove restoration needs to be done, and to be linked with CBNRM in coastal communities of fisher-farmers.

It is worthwhile noting that reducing deforestation and forest degradation in mangroves, and/or restoration of mangrove, is thus both an adaptation ***and*** a mitigation measure, not to mention a biodiversity conservation measure. Mangrove trees, and the highly organic mud in which they grow, sequester carbon from the atmosphere, thus mitigating greenhouse gas emissions from fossil fuels and other sources.

We recommend that strengthening the "green infrastructure" upon which coastal cities already depend, through mangrove conservation and restoration, be a much stronger component of the CCAP program than currently seems to be planned, and that one or more additional cities be chosen (e.g., Angoche) in which mangroves may provide ***the*** main infrastructure for coastal city protection. Payments for Ecosystem Services mechanisms for mangrove conservation and restoration should be explored. The possibility that the carbon sequestration benefits of such mangroves could be sold on the international carbon market should also be explored, as a way of developing bundled PES mechanisms for different ecosystem services.

Incorporate Artisanal Fisheries Into the FTF and Health Programs

Artisanal fisheries, themselves dependent on the health and integrity of coastal ecosystems such as coral reefs, mangroves, and seagrass beds, are extremely important for the food security and nutrition of Mozambique. The FTF Program has improving nutrition as one of its objectives. This seems to the ETOA Team to provide a significant point of linkage between the FTF Program and a significant category of "actions needed" to conserve biodiversity and natural resources. We believe that linkages with the USAID-Mozambique Integrated Health Program could also be effective, because nutrition is a component of that program. We recommend exploring these linkages in developing the new USAID-Mozambique CDCS.

1.0 INTRODUCTION

1.1 PURPOSE

Biodiversity conservation is of fundamental importance to USAID, given its mission as a development agency, because, as stated on the USAID website, "Biodiversity is the very foundation for all the Earth's essential goods and services. The air we breathe, water we drink, and the food we eat all depend on the Earth's rich biodiversity." (USAID, 2012c)

The Foreign Assistance Act (FAA), which authorizes US bilateral foreign aid programs, requires that a Tropical Forests and/or Biodiversity analysis be conducted in conjunction with the development of new U.S. foreign assistance strategies and programs. In the amendments to the Foreign Assistance Act of 1961, Sections 118 and 119, the legislation states:

"FAA Sec 118 (e) Country Analysis Requirements. Each country development strategy statement or other country plan prepared by the Agency for International Development shall include an analysis of

(1) the actions necessary in that country to achieve conservation and sustainable management of tropical forests, and

(2) the extent to which the actions proposed for support by the Agency meet the needs thus identified.

FAA Sec 119 (d) Country Analysis Requirements. Each country development strategy statement or other country plan prepared by the Agency for International Development shall include an analysis of-

(1) the actions necessary in that country to conserve biological diversity, and

(2) the extent to which the actions proposed for support by the Agency meet the needs

thus identified."

The Africa Bureau has often recommended that Missions combine the mandatory FAA 118-119 analyses with a strategy-level "preview" environmental assessment related to FAA 117, in an ETOA.

Missions benefit from FAA 118-119 assessments or ETOAs for the following reasons:

- These assessments can save time and money by giving a USAID Mission a "heads up" about possible environmental compliance problems they would face later under Regulation 22 CFR 216, USAID's environmental assessment and compliance regulation, if they develop a strategy that involves activities that might either directly or indirectly threaten biodiversity, tropical forests, or the natural environment;
- FAA 118-119 assessments and ETOAs can identify opportunities for increasing the success and sustainability of a Mission's strategic objectives in other sectors (such as agriculture, democracy and governance, economic growth, health, disaster preparedness, and conflict mitigation and management);
- these analyses help Missions identify opportunities for using funds earmarked by Congress for biodiversity conservation; and,
- These analyses are legal requirements under the Foreign Assistance Act. ,

USAID-Mozambique last conducted an ETOA in 2002. Since the last assessment, the political and economic situation in Mozambique has changed significantly. USAID-Mozambique is now developing a new Country Development Cooperation Strategy for its programs (2012-2017), and it contracted the ETOA Team through the US Forest Service International Programs Office to conduct this assessment.

The main objectives of the current ETOA were to:

- summarize the current state of Mozambique's biological diversity, forests, and environment;
- describe the direct biophysical threats to Mozambique's biodiversity, forests, and environment, and identify the causes of those threats;
- identify actions needed to reduce and/or mitigate the causes of those threats in the current political, economic, and social context;
- identify any actions proposed by USAID-Mozambique that could threaten biodiversity, forests, or environmental integrity and resilience, and
- identify potential contributions to the needed actions by USAID-Mozambique within its proposed programs.

In order to meet these objectives, this report provides all of the information requested in the Scope of Work (SOW) (Annex B) to the extent possible. It should be noted that although ETOAs are supposed to identify contributions that could be made by USAID missions, and make recommendations, they are not intended as project or program design documents, and cannot provide the detailed information and analysis needed for sound project design. They can only identify opportunities for future programming, and suggest where further information may be needed for program design.

1.2 METHODS

Information needed to meet the above objectives was collected by a team of consultants (see Annex C, Biographical Sketches of ETOA Team Members) contracted by the U.S. Forest Service International Programs (USFS-IP). The information-gathering and analysis process followed USAID guidance on a threats-based approach to biodiversity conservation described in ***Biodiversity Conservation: A Guide for USAID Staff and Partners*** (USAID, 2005a), and the "best practice" guidelines provided in ***Tropical Forestry and Biodiversity (FAA 118-119) Analyses: Lessons Learned and Best Practices from Recent USAID Experience*** (USAID, 2005b).

Information was gathered from several sources, and information from one source was validated by, and supplemented with, information from other sources. The sources of information include the following:

- Review of relevant documents, including the previous USAID-Mozambique ETOA of 2002 (ARD, 2002) and Mozambique Biodiversity and Tropical Forests 118/118 Assessment (USAID-Mozambique, 2008); Mozambique's Fourth National Report to the Convention on Biological Diversity (MICOA, 2009); two Government of Mozambique climate change documents (CDS, 2011; INGC, 2009); donor project documents; reports in the scientific literature; and web-based reports.

- Interviews and meetings with more than 75 people representing key stakeholder groups (see Annex D, Persons Contacted), including national government agencies, international and national NGOs, private sector representatives, staff of organizations implementing USAID projects, international donors, and USAID-Mozambique Mission staff; and
- Site visits to: 1) the Maputo Special Reserve; 2) Ponta do Ouro Partial Marine Reserve; 3) Nampula Province: Nampula City, and the CARE-WWF Primeiras and Segundas Program in and around Angoche; Limpopo National Park (NP); and medicinal plant and charcoal markets in Maputo.

We analyzed the content of our interviews to identify the categories of "actions necessary" for biodiversity and forest conservation perceived to be most important. All information gathered by the team was analyzed and synthesized to identify proposed USAID activities that might threaten biodiversity and forests, to identify opportunities for USAID activities to contribute to the needed actions, and to make recommendations to the Mission.

2.0 STATE OF THE ENVIRONMENT

The "core" of this ETOA consists of the Tropical Forests and Biodiversity (FAA 118-119) Assessments that are legally required by the U.S. Foreign Assistance Act, and therefore these topics will frame the discussion of the state of Mozambique's environment. The modern concept of biological diversity, or "biodiversity" for short, encompasses the variety and variability of life at three levels of organization: ecosystems, species, and genes. Since Mozambique lies within tropical latitudes, all of its forests are tropical, and they are treated in this report as a component of the biodiversity of the country. In other words, since all of Mozambique's tropical forest ecosystems are part of the country's biodiversity, FAA Section 119 covering biodiversity basically includes and subsumes the narrower Section 118, which deals with tropical forests.

This chapter provides an overview of Mozambique's biodiversity at the ecosystem and species levels, and a brief discussion of genetic diversity, agro-biodiversity, and ecosystem services. We discuss the protected area system of the country, and summarize the views of international organizations about conservation priorities in Mozambique. We also summarize trends in the area of coverage or ecological integrity of ecosystems, or populations of species of concern, in cases where such information is available. This chapter is meant only to provide context for understanding threats to biodiversity and forests in Mozambique, and actions needed to address them, topics which are discussed in later chapters of this report.

2.1 BIOPHYSICAL SETTING

Mozambique is located in southeastern Africa bordering Tanzania, Malawi, Zambia, Zimbabwe, South Africa, and Swaziland. It lies between 10º 27' and 26º 52' south latitude and 30º 12 and 40º 51 east longitude. Most of the country is tropical, lying north of the Tropic of Capricorn. Mozambique has a total land area of about 786,000 km2, and about 13,000 km2 of freshwater lake territory (mainly Lake Niassa), making it about twice as large as the US state of California (CIA, 2012). About 25 main rivers flow through the country to the Indian Ocean, and most are transnational, having their catchment basins in other countries. The Zambezi River is the largest of these, cutting across central Mozambique. With an Indian Ocean coastline of 2,750 km, and a marine Exclusive Economic Zone of 572,000 km2 (Pew, 2012), Mozambique's territory is approximately 58% land and 42% ocean.

The country is generally low-lying, with coastal plains below 200 meters covering about 42% of the land, especially in the south and in a belt along the coast. Plateau areas, with average elevations between 200 and 500 meters, cover about 29% of the country. Highlands ranging from 500 to 1000 meters cover about 25% of the land surface, with a large proportion occurring in the north and west. Mountain areas, with elevations above 1000 meters, occupy about 4% of Mozambique, and are located along the border with Malawi and Zimbabwe.

The climate is strongly influenced by altitude, proximity to the sea and latitude. It is semi-arid and subtropical in the south and tropical in the north, with strongly seasonal rainfall. There are two distinct seasons, a warm, wet season from November to March, and a cooler, dry season from April to October. Rainfall varies between about 1,400 millimeters a year near the Zambezi Delta to about 300 millimeters a year in the lowlands of the southern interior. The driest areas of the country lie in the interior of Gaza Province. Mountainous areas in the north and west have

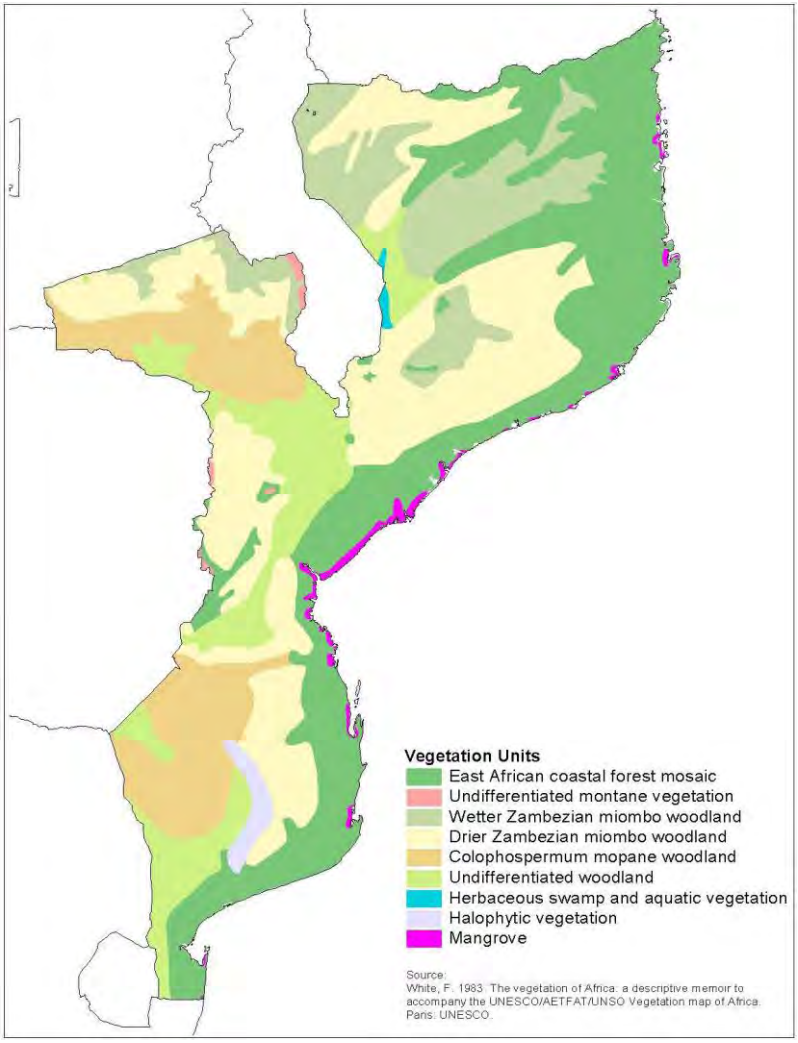
around 2,000 millimeters of rainfall a year. Precipitation can vary dramatically from year to year. Thus, droughts and floods are common, and natural.

Soils in Mozambique are generally old and nutrient-poor. There are seven major soil groups according to the National Soils Map (INIA, 1995). In general, all are chemically poor and have low to medium fertility, except for fluvisols, which are found in river floodplains, and make up only about 6% of the soils of the country.

2.2 ECOSYSTEMS

Terrestrial Ecosystems

Figure 2.1 Potential Natural Vegetation of Mozambique



The climate and soils of Mozambique create the conditions for the development of its natural vegetation. According to the most recent National Forest Inventory, conducted between 2005 and 2007, forests cover an area of 406,000 km2, about 51% of the country, while other wooded formations (thickets, shrubs and forests with shifting cultivation) cover around 147,000 km2,

about 19% of the country (Marzoli, 2007b, p. 8). A national Land Cover map produced by this National Forest Inventory is found in Annex E.

Table 2.1 Land Cover

Land Cover Type	Percent of Total Land Cover
Forest and Woodland	51
Other wooded formations (thickets, shrubs and forests with shifting cultivation)	19
Agricultural crop lands	15
Grasslands and pastures	12
Other areas	3

(Source: Marzoli 2007b, p. 7)

Miombo Woodlands

Miombo woodlands of various kinds are the predominant terrestrial ecosystem type in Mozambique. Miombo woodlands are dry tropical woodlands, dominated by species of broad-leaved trees in the legume subfamily called the *Caesalpinioideae* by botanists. These woodlands occupy a large area of southern Africa and are adapted to the generally poor soils and the strongly seasonal rainfall regime of this region (Timberlake and Chidumayo, 2011, Byers, 2001). Most miombo trees lose their leaves during the annual dry season. Tree canopy cover in these tropical woodland ranges from 20% to almost closed-canopy forests in wetter areas. A grass understory is almost always present, so in ecological terms miombo ecosystems can also be described as savanna woodland (ARD, 2002).

Coastal Forest

According to the most recent National Forest Inventory (Marzoli, 2007a), Mozambique has 13,400 km2 of coastal forests, mainly found from the northern border to the Zambezi River. Coastal forests in northern Mozambique are now coming under increasing threat as development and exploitation of natural resources expands. Their extent and the levels of species diversity and endemism are poorly known. (Timberlake, et al., 2010) "The Coastal Forests of Eastern Africa, stretching along the Indian Ocean coastline from Somalia to Mozambique, are considered by Conservation International to be a global biodiversity hotspot – an area of high diversity and endemism under increasing threat. Although the largest remaining extent of these forests is reported to be found in Mozambique, very little is known on their extent, condition and composition here." Since 2003, 68 species new to Mozambique have been recorded from Cabo Delgado in addition to 36 possible new species. Seven coastal forest species were assessed as Endangered." (Timberlake, et al., 2011, p. 1)

Mopane Woodlands

These woodlands are dominated by the mopane tree, *Colospermum mopane*, and are found in hot, dry, low-elevation areas with alkaline soils. In Mozambique they are found mainly in the west, in the Zambezi Valley in Tete Province, and in the southwest in Gaza Province.

Grassland, Wooded Savanna, and Bushland

In the dry areas of the south, tree canopy cover may be less than 20% in some areas, and could be described as savanna grassland or thorn scrub vegetation. (ARD, 2002)

Montane Ecosystems

Montane ecosystems include both moist evergreen forests and at the highest elevations, Afroalpine grasslands, shrublands, and moorlands. These are found in western Mozambique in the Chimanimani and Penha Longa Mountains, and in northern Tete Province on the Angónia Plateau.

Forest Ecosystems: Status and Trends:

The rate of deforestation calculated by the 2007 National Forest Inventory (Marzoli, 2007a) is 0.58% per year. It was estimated by comparing forest cover change between 1990 and 2002. The main causes of deforestation and forest degradation are clearing for agriculture (shifting cultivation), firewood collection and charcoal making for commercial purposes, forest fires, hunting using traditional techniques (use of fire), exploitation of construction material, timber harvesting and establishment of forest commercial plantations.

Freshwater and Wetland Ecosystems

Mozambique has freshwater and wetland ecosystems of recognized national, regional or international importance, of which Lake Niassa and the Zambezi Delta are outstanding examples. The main types of freshwater and wetland ecosystems are rivers and their riparian zones and deltas, natural lakes, and artificial lakes created by dams.

Lake Niassa, located between Mozambique, Malawi and Tanzania, is the southernmost of the large Rift Valley lakes. Located at an altitude of approximately 500 meters above sea level, it has a maximum depth of approximately 700 m (Vollmer, 2005) and an area of 30,000 km2, about 13,000 km2 of which is the territory of Mozambique. Similar to other large lakes in the Rift Valley system, it has rare habitats of global importance and it is famous for its endemism, of which the cichlids are a striking example (Ribbink et al., 1983).

Cahora Bassa Lake is the largest artificial lake in Mozambique, formed by the Cahora Bassa Dam on the Zambezi River. Artisanal and semi-industrial fisheries have developed on this lake, mainly for kapenta (*Limnothrissa miodon*). Kapenta was introduced to Lake Kariba from Lake Victoria in the late 1960s, and then successfully established in Cahora Bassa. Not much is known about the ecology of the lake, but the construction of the dam and the introduction of alien species (such as kapenta and Nile tilapia) is affecting the diversity of the local fish fauna (MICOA, 2009).

The Marromeu complex and interlinked Zambezi delta is a very important wetland system, which was recently nominated as a Ramsar site. The area supports one of the largest populations of aquatic birds in Mozambique, including the great white (*Pelecanus onocratalus*) and pink-backed pelican (*Pelecanus rufescens*), great cormorant (*Phalacrocorax carbo*), yellow billed stork (*Mycteria ibis*), African open bill (*Anastomus lamelligerus)*, sacred ibis (*Threskionris aethipoicus*) and many species of heron and ducks. It is an important breeding site for the wattled crane (*Bugeranus carunculatus*). Thousands of migratory Palearctic and intra-African species depend seasonally on these habitats, including flamingos. A number of species in the different habitats of the complex are endangered and threatened, or are of important commercial value (MICOA, 2009).

Coastal lakes, swamps, and temporally rain-filled pans behind the coastal dune systems of southern Mozambique are a characteristic and important type of wetland ecosystem (Hatton, 1995; Hart & Boane, 2004). More than 100 of these coastal lakes occur from Vilankulos to Ponta do Ouro (MICOA, 2009). Their limnology and physico-chemical characteristics vary. Those that are intermittently connected to the sea are more brackish and tend to harbor an estuarine, salinity-tolerant fish fauna, while those located further inland have a freshwater fish fauna (Hart & Boane, 2004). Some of the largest and most important of these coastal lakes for biodiversity, fisheries, and tourism are Lake Bilene, Nhambavale, Quissico, Inharrime, and Piti. The lakes are important feeding and breeding grounds for birds. Some of the most accessible are currently under severe stress from unregulated development, tourism and pollution.

Coastal and Marine Ecosystems

Coastal and marine ecosystems occupy an area of about 572,000 km2, the area of Mozambique's Exclusive Economic Zone (EEZ) (Pew, 2012), or approximately 42% of the country.

Dunes and Beaches

Coastal dunes are most extensive between Bazaruto Island and Ponta do Ouro, a distance of about 850 km, This coast is characterized by high parabolic dunes and north-trending capes and barrier lakes. The dunes attain heights of 120 meters and are considered to be the tallest vegetated dunes in the world (Hatton, 1995; Louro, 2005). The flora is quite diverse and has been proposed as an Indian Ocean Coastal center of plant diversity, called the Maputaland-Pondoland Region (van Wyk (1994). The area is an important source of medicinal plants for the local communities (Barbosa, 1995; Bandeira, et al., 2001), some of which are endemic.

Sandy beaches cover about 1200 km of the Mozambique coastline (Pereira, et al., 2010), and provide suitable habitat for nesting of five species of endangered marine turtles. Extensive beaches along the tall vegetated dunes are a common feature in southern Mozambique. The zone between dunes and sandy beaches is typically colonized by herbaceous pioneers, which trap sand particles and build the dunes, which are later stabilized by woody vegetation. The fauna of sandy beaches is typically dominated by ghost crabs and coastal birds that forage on detritus and small invertebrates. These ecosystems are under severe stress from unregulated development, tourism and deforestation (Louro, 2005).

Seagrass Beds

Seagrass beds have been estimated to cover about 439 km2 in Mozambique. The Quirimbas Archipelago, Fernão Veloso Bay, Bazaruto Archipelago and Maputo Bay have extensive areas of seagrasses (Bandeira & Gell, 2003). Thirteen species of seagrasses have been identified. Seagrass beds play an important ecological role as nursery and feeding areas for many species, including commercially-valuable species and some endangered species, such as sea turtles and dugongs. Seagrass beds are the habitat for several invertebrate species collected by coastal people, typically women and children, who do the harvesting at low tide (Bandeira & Gell, 2003). Artisanal beach seine fisheries in northern Mozambique depend on seagrass ecosystems. In general seagrass beds are being threatened by erosion, sedimentation, pollution from sewage discharge, overfishing, destructive fishing practices, and trampling (Bandeira, 2002; Bandeira and Gell, 2003).

Coral Reefs

Mozambique possesses an estimated coral reef area of 1890 km2 (Spalding, et al., 2001). Reefs are distributed almost continuously along the northern coast, from the Rovuma River to the Primeiras and Segundas Archipelago just north of the Sofala Bank (Rodrigues, et al., 2000). Mozambican reefs are mainly fringing reefs, generally dominated by hard corals, although in some locations soft corals are also abundant (Schleyer, 1999a; Benayahu, et al., 2003; Videira and Pereira, 2007). From the Bazaruto archipelago to Ponta do Ouro, rocky reefs are colonized to varying extent mainly by soft corals (Pereira, 2003; Schleyer and Celliers, 2005).

Because of the large latitudinal range of its coastline, Mozambique's reefs have a rich diversity of species. More than 900 species of reef-associated fishes, from 97 families, have been identified (Pereira, 2000). Despite incomplete knowledge of coral taxonomy, about 300 species of hard corals(of 59 genera) have been identified (Sheppard, 1987; Veron, 1993; Obura, 2012) and more than 50 species of soft corals, of 15 genera (Schleyer, 1999a; Schleyer & Celliers, 2000; Benayahu *et al*. 2003). Other taxa such as ascidians, sponges, and many other invertebrates are also highly diverse, but poorly known.

Coral reefs and associated ecosystems sustain a significant proportion of the small-scale fisheries in the country, especially in the northern provinces (Loureiro, 1998; Degnbol et al., 2002). They are the basis for rapidly growing coastal tourism taking place in the south, where SCUBA diving on reefs is the main attraction for tourists (Abrantes and Pereira, 2003; Pereira and Schleyer, 2005).

Coral Reefs: Status and Trends

Coral reefs in Mozambique form the basis for fisheries supporting about 6.6 million people in 48 coastal districts. The status of most reefs is good, with high cover of hard and soft corals, although the fish population abundance is very low or is dominated by small size classes of herbivore fish. The coral reefs in Mozambique are recovering from losses in 1998 that were caused by widespread coral bleaching triggered by unusually high sea surface temperatures linked to the El Niño Southern Oscillation (ENSO) (Schleyer, et al., 1999). however, the condition of some remains poor because of damaging fishing practices associated with heavy subsistence fishing. Initiatives are under way to develop new, multiple-use marine protected

areas (MPAs) in north, central and south Mozambique (e.g., Primeras and Segundas, Tofo and Bilene) that involve local communities in co-management to improve the level of reef conservation in Mozambique (Muthiga, et al., 2008, p. 100).

Mangroves

Mangrove forests cover an estimated area of about 4000 km2 (Saket and Matusse, 1994) mostly along more sheltered stretches of the coast, where freshwater mixing and sediment deposition is occurring, such as estuaries and deltas of large rivers such as the Zambezi, Púnguè and Save (Saket and Matusse, 1994; Barbosa, et al., 2001). Other important mangrove areas include the Limpopo River mouth, Maputo, Inhambane and Angoche Bays, the Bons Sinais estuarine system in Quelimane, and an almost continuous belt on the northern coast up to the Rovuma River mouth. Nine species of mangrove trees have been identified in Mozambique.

Mangroves provide a multitude of uses to local communities including poles for home and boat construction, fencing, firewood, fish traps, and medicines (Barbosa, et al., 2001). Apart from these direct uses, mangroves have been known to provided indirect ecosystem services such as coastal protection (Macamo, et al., 2011), nursery and refuge habitats for important commercial species (Ronnback et al., 2002; Macia, 2004) and even as a cost-effective alternative for sewage treatment (e.g. Amaral, et al., 2009; Cannicci, et al., 2009).

Mangroves: Status and Trends

"It is assumed that the mangrove deforestation rate from 1990 to 2010 will remain equal to the period 1990 to 2005, which is 2 666 ha/y." (FAO, 2010, p. 23) FAO, 2010, model predicts an area of 351,000 ha of mangroves in 2010. (FAO, 2010, p. 23)

Mangroves near Angoche, Nampula Province
Photo: B. Byers, Sept. 2012

Open-ocean Pelagic Ecosystems

About 14% of Mozambique's marine area is over the continental shelf; the majority of its EEZ is deep water. Not much is known about the pelagic ecosystems in Mozambique. Recent (Silva, et al., 2009; Sobrino, et al., 2009) and past research cruises focused mainly on fish stock assessments and exploration of new stocks or target species. Therefore, aspects of biodiversity, oceanography and bathymetry are poorly understood even those with high relevance to fisheries (e.g., upwelling patterns). The pelagic zone is deemed quite productive, with several species of tuna and other pelagic fish species being commercially harvested by foreign fleets (Santana Afonso, 2006).

Agricultural Ecosystems

About 85% of Mozambicans live in rural areas and agriculture is the dominant sector in Mozambique's economy. Agricultural production is carried out on family farms, commercial farms (state and private), and cooperative farms. The livelihoods of the vast majority of Mozambicans is based around the "machamba" family farm. There are about 3.8 million family farms, with an average of about five persons per family. Around 19% of the land in Mozambique is cultivated (Marzoli, 2007b), and family farms use 90% of the cultivated area and provide a livelihood for 80% of the population. The average farm size for more than 90% of rural households is 2.4 hectares, and about 28% are female-headed households. Traditional farming

methods with few modern agricultural inputs are used; only 5.5% are irrigated, 3.9% apply fertilizers, and 2.6% apply pesticides. Yields are low by the standards of industrial agriculture, but with good weather conditions family farms produce enough food to meet household needs. Only 29% of small farmers sell any crop output, but nevertheless contribute about 50% of the marketed output of staple foods. Many farmers practice shifting cultivation, with fallow intervals of roughly three years (Falcão, 2005; INE, 2011).

Smallholder farmers mainly grow food crops such as maize, rice, cassava, groundnuts, beans, sweet potatoes, citrus, copra, and cash crops such as sugarcane, cotton and tobacco. Key agricultural exports include cashew nuts, cotton, sugarcane, copra, tea and citrus; these export crops take up about 25% of the cultivated land in Mozambique (Abdula and Falcão, 2012).

Agricultural products are important exports for Mozambique. According to export statistics from 1994-2009 from the National Statistical Institute (INE), the main exports include: cashew nuts, cotton, tobacco, timber, lobsters, and prawns (INE, 2011). Cotton, sesame and tobacco are the main exported products, but in recent years sesame exports have increased, mainly to China.

2.3 SPECIES

Species Diversity and Endemism

As a tropical and sub-tropical country with relatively high ecosystem diversity, the total number of species found in Mozambique exceeds that of most countries. Because species diversity is correlated with ecosystem productivity, the highest levels of species richness are found in montane forests and coral reefs.

Due to the prolonged period without biological field surveys during the war (1977 – 1992), the knowledge of species diversity in many taxa is poor. Recent expeditions have discovered new species and documented the presence of species not previously recorded in Mozambique. "Almost 5,700 plant species have been recorded in the country, and the actual number is certainly much higher. About 250 of these are found only in Mozambique (they are what biologists call "endemic"). The mountain areas of Mozambique are relatively rich in endemic species, with at least 45 unique plants found in the Chimanimani Mountains, for example. Another area of exceptional plant diversity is south of Maputo, straddling the border with South Africa. This area has more than 2,500 species of plants in its coastal forests, wetlands and mangroves." ARD, 2002, p. 6) The hotspots of plant diversity and endemism include the Maputaland and Chimanimani centers of endemism, the coastal forests of northern Mozambique, and inselberg archipelago of northern Mozambique

Five species of sea turtles occur along the Mozambican coast: *Caretta caretta* (Loggerhead turtle), *Lepidochelys olivacea* (Olive Ridley turtle), *Chelonia mydas* (Green turtle), *Dermochelys coriacea (*Leatherback*)* and *Eretmochelys imbricata* (Hawskbill turtle). Hotspots of marine turtle nesting are the beaches of Ponta do Ouro Marine Reserve, Bilene Beach, Bazaruto Archipelago, Quirimbas Archipelago, and Ilhas Primeiras and Segundas.

Eighteen species of marine mammals occur in Mozambique: seven species of dolphins, eight whales, two seals, and the dugong. Dugongs occur only in the Inhambane Bay and Bazaruto Archipelago (Guissamulo, 1996).

Table 2.2 Vertebrate Species Diversity and Endemism

Taxon	Number of Species	Endemic Species
Birds	816	115
Mammals	271	21
Reptiles	280	91
Amphibians	84	2
Fish	2019	5
Total	3470	

Source: Schneider, et al., 2007, p. 1

Threatened and Endangered Species

Up to 300 species of plants are listed on Mozambique's "Red List" of threatened and endangered species. Fifty five percent of the Red List Species are endemic species in Mozambique (Izidine & Bandeira, 2002). Populations of large mammals are and generally increasing, recovering from the progressive decline registered during the period of civil war. According to Schneider et al. (2007) 105 species of mammals are of conservation concern, being globally threatened or protected by national legislation. The most threatened large mammal species in Mozambique include white rhinoceros (*Ceratotherium simum*), tsesebe (*Damaliscus lunatus*), sitatunga (*Tragelaphus spekei*), black rhinoceros (*Diceros bicornis*), giraffe (*Giraffa camelopardalis*), roan antelope (*Hippotragus equinum*), mountain reedbuck (*Redunca fulvorufula*), and cheetah (*Acinomyx jutabus*). White rhinoceros, giraffes and roan antelope have been re-introduced in the Limpopo NP, whereas Maputo National Reserve (NR) benefited from the introduction of giraffes. Two hundred and sixty four bird species are of conservation concern due to their unfavourable conservation status globally or at national level (Schneider et al. 2007). All marine turtles are on the Red List. Dugongs are seriously endangered, the population in Bazaruto Archipelago being probably the most viable population in eastern Africa region (MICOA, 2006).

Keystone Species

Although species richness, or numbers, reflects the evolutionary history of a place, ecologists recognize that some species have a much larger effect on ecosystem structure and function than other species. These species, with the ability to shape the structure and functioning of the ecosystems they inhabit, are known as "keystone" species. In many of Mozambique's ecosystems, elephants were the keystone species. When a keystone species is locally extirpated, ecosystems can change dramatically, often to states from which restoration to the original ecosystem is difficult or impossible. A reduction in elephant populations may lead to bush dominated systems with less grass for grazing wildlife or pastoralist livestock. After severe decline and near extinction in some protected areas during the civil war, Mozambique's elephant population is growing due to protection in protected areas and the CITES ivory trade ban. A recent upsurge in poaching in some parts of the country, however, is a threat that will be discussed in Chapter 4.

2.4 PROTECTED AREAS AND CONSERVATION PRIORITIES

Mozambique's protected area system is designed to conserve its ecosystems and species. Protected areas include landscapes and seascapes falling in one of the following categories: national parks, national reserves (including partial reserves), forest reserves, integral reserves, and hunting concessions. The responsible authority for the management of all national parks, national reserves, coutadas and community wildlife management programs is the Ministry of Tourism through the National Directorate of Conservation Areas. The Ministry of Agriculture, National Directorate of Forests and Lands is responsible for the management of forest reserves.

Protected Areas Network

Most protected areas were established in the 1960 and 1970, under the Decree n^{o} 40040, of 20th January 1955. During the civil war (1977 – 1992) no protected areas were established and the existing ones were mostly abandoned due to lack of security. These areas were invaded by local people for housing or cultivation and were heavily affected by illegal and excessive use of natural resources, particularly bush meat to feed soldiers and to supply the market. A process of protected area restoration started in 1995 with the re-establishment of management bodies and preparation of management plans; creation of new parks, reserves and hunting areas; shifting of protected area boundaries; formulation of policies and laws such as the Environmental Law, Forest and Wildlife Law, and Land Law. Three Trans-Frontier Conservation Areas (TFCAs), have been established: Limpopo TFCA between Mozambique, South Africa and Zimbabwe; Lebombo TFCA between Mozambique, South Africa, and Swaziland; and Chimanimani TFCA between Mozambique and Zimbabwe. In developing the Lebombo TFCA, the Futi Corridor (about 240km²) was proclaimed as a formal conservation area in 2011, to strengthen the connectivity between the Maputo NR in Mozambique and the Tembe Elephant Park in South Africa.

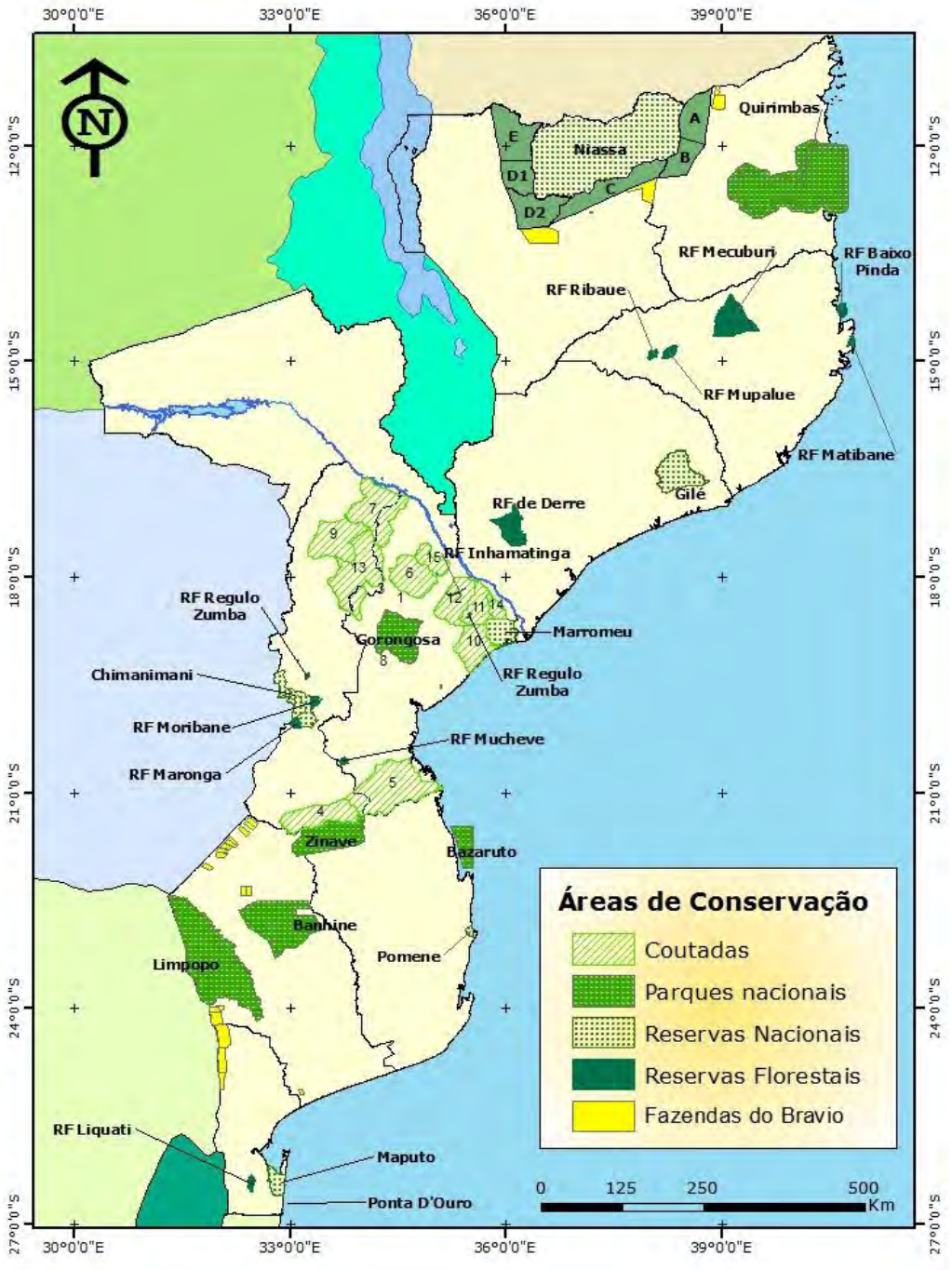
This resulted in an increase in the percentage of the total land covered by protected areas from 11.4% in 1995 (MICOA 1998) to about 25% in 2012.

Known biodiversity hotspots such as the Maputaland centre of endemism, the afromontane habitats around the Chimanimani Mountain and the Gorongosa Mountain - Rift Valley - Marromeu complex are all included within the protected area network. However, some biodiversity-rich areas remain outside protected areas, for example, the inselberg archipelago of northern Mozambique, which hosts unique fauna and flora. The gaps in representation within the protected area system are more pronounced in coastal and marine ecosystems, which have historically been neglected in conservation priorities. To overcome this imbalance, there are currently several proposals in advanced stages for the proclamation of coastal and marine protected areas. The Ilhas Primeiras e Segundas Marine Partial Reserve has just been declared (November 6, 2012), and is Mozambique's newest protected area, with an area of 10,400 km2, the largest marine environmental reserve in Africa.

The protected area system includes six national parks, eight national reserves (two are partial reserves, in which some uses not permitted in regular national reserves are), 13 forest reserves, two integral reserves and 14 hunting concessions, called "*coutadas*." These hunting concessions are public lands designated for sport hunting and the protection of species, with hunting rights contracted to hunting operators by the State. In addition to protected areas, there are two

community wildlife. The Marromeu NR and the Lake Niassa Partial Reserve have been proclaimed as Ramsar sites due to their richness in wetlands supporting a large diversity of aquatic avifauna, including Palaearctic and intra-African intra-African migratory species. There are proposals for new TFCAs, namely Rovuma between Mozambique and Tanzania, and Zimoza TFCA between Mozambique, Zimbabwe and Zambia. In addition to these categories proclaimed by the Council of Ministers, there are several sacred forests proclaimed at provincial and district level due to their historic and cultural value for local communities.

Figure 2.2 Protected Areas of Mozambique (Integral and partial reserves are not included in the map. Numbers represent hunting concessions (*coutadas*) and letters in the surroundings of Niassa NR indicate hunting blocks).



Conservation Areas Designated by International Conventions or Agreements

In addition to its national system of protected areas, Mozambique is a party to several international conventions and participates in other international programs that designate areas for conservation focus. Mozambique ratified the Convention Concerning the Protection of the World Cultural and Natural Heritage in 1982, and currently has only one UNESCO World Heritage Site, the Island of Mozambique, protected for its cultural values. In addition, four sites have been submitted on the tentative list: the Ponta do Ouro Marine Protected Area, for its natural heritage values; the Querimbas Archipelago, for both natural and cultural values; and the Vumba Mountains and Manyikeni and Chibuene, two proposed sites of world cultural heritage value (UNESCO, 2012).

Mozambique is a party to the Convention on Wetlands, and presently has two designated as Ramsar Sites, Wetlands of International Importance: Lake Niassa and its Coastal Zone, and the Marromeu Complex, , with a combined area of 2,051,700 hectares (Ramsar, 2011).

Conservation Priorities of International NGOs

Many large international conservation organizations work in Mozambique, and each has focused its work geographically and/or thematically in one way or another. These conservation foci or priorities are based on criteria and strategies that reflect the mission and history of each NGO. Each NGO program is derived from its views of the values and benefits of biodiversity, combined with information from conservation science. All of these NGOs are more and more taking an ecosystem and landscape (or seascape) scale approach in their work. One reason for this is the recognition that habitat loss and degradation is generally the most important threat to biodiversity at all levels, and that species-level conservation is impossible without ecosystem-level conservation.

- Mozambique has parts of three of WWF's 36 "Earth's most special places": East African Coast, Miombo Woodlands, and the Great Rift Lakes of Africa.
- Mozambican ecosystems are inhabited by a number of what WWF calls "priority and endangered species," including elephants, marine turtles, and East African cichlids.
- Mozambique hosts two of the African Wildlife Foundation's priority conservation landscapes, which they call the Zambezi and Limpopo Heartlands. The African Wildlife Foundation (AWF) also focuses on the conservation of several Mozambican species, including elephants and carnivores.
- The Nature Conservancy is currently focusing on Northern Coastal Mozambique and the Primeras and Segundas archipelago.
- Two of what Conservation International calls "biodiversity hotspots" are partly found in Mozambique: Coastal Forests of Eastern Africa, and the Eastern Afromontane. CI also prioritizes work in the woodlands and savannas of Southern Africa, which they call the "Miombo-Mopane Wilderness."
- BirdLife International has identified 15 Important Bird Areas in Mozambique

3.0 VALUES AND BENEFITS OF BIODIVERSITY

Biodiversity conservation is of fundamental importance to USAID, given its mission as a development agency. Biological diversity provides social and economic benefits of three distinct kinds: ecosystem products, ecosystem services, and non-material benefits (USAID, 2005a; Byers, 2012). Values of each of these types of benefits of Mozambique's biodiversity are summarized below.

3.1 ECOSYSTEM PRODUCTS

Ecosystem products are direct material benefits for such things as food, fiber, building materials, medicines, fuel, and ornamental plants and pets. These products are extremely important to the functioning of the Mozambican economy and the well-being of the human population. Values and uses of some of the many products are discussed below.

Firewood and Charcoal

In Southern Africa , more than 90 % of rural households depend on woodfuel, including fuelwood and charcoal, for their energy requirements (Falcão, et al., no date). In Mozambique fuelwood and charcoal accounted "for approximately 83% of the total energy consumed," according to the National Directorate of Energy. Rural areas, which represent more than 80% of the total population of the country, and also the peri-urban areas, are the major consumers of biomass, mainly in the form of woodfuel, charcoal, and crop residues. Approximately 80% of the population living on the edges of cities such as Maputo use wood and charcoal for cooking purposes. (Atanassov and Mahumane, 2012, p. 1)

Bushmeat/Game Meat

Bushmeat is an important source of animal protein for rural communities, particularly those living in or near wildlife-rich protected areas. Reliance on bushmeat is driven partly by the lack of alternative sources of meat for subsistence, but also by cultural preferences. According to the Forest and Wildlife Law, and its Regulations, subsistence hunting is allowed in multiple-use areas, areas of historic and cultural value, community forests and hunting areas. A hunting license is required, but it is free of charge for community members. Most subsistence bushmeat hunters probably do not bother to get such a license. When bushmeat harvesting becomes commercial, for sale to local and urban markets, it can have a devastating impact on mammal populations. A large percentage of bushmeat hunting is illegal because it takes place without a license, and/or in protected areas or other places where it is not allowed. Illegal hunting techniques, including snares, fires, and hunting at night may be used, and some protected species may be taken.

Bushmeat species (common duiker and suni) going to market, Funhalouro District, Inhambane Province
Photo: N. Bila

Fisheries

Mozambique is characterized by a high diversity of fisheries, but in general these are grouped into three main sub-sectors: artisanal, semi-industrial and industrial. The fisheries sector plays an important role in the country's exports with a total revenue of about US$160 million/year. Economically the shallow-water shrimp fishery (which includes both semi- and industrial fleets) is the most important in the country, with an estimated revenue of about US$100 million/year (Sumale, 2005). Socially, the artisanal (and subsistence) fisheries sub-sector is the most important source of food and employment for the local communities, with 90,000 to 120,000 people employed (Santana Afonso, 2006; Jacket et al., 2010). Total marine products are estimated at between 100 000 to 120 000 tonnes per year and consumption is estimated at 7.5 kg per capita (Santana Afonso, 2006).

A recent study on the state of the various artisanal fisheries in two southern provinces (Gaza and Inhambane; Pereira et al., 2009) has shown a declining trend in majority of fisheries, with the chief recommendation being the reduction of fishing effort. The trend is extensive to most other fisheries (especially the shallow-water shrimp fishery) and provinces in the country (IIP, 2009), which was reported earlier (Hoguane and Pereira, 2003).

Honey and Beeswax

Mozambique has a long tradition of honey production. Honey is used by local people to generate income, for brewing alcoholic drinks, preparation of medicines and as a sweetener. Approximately 70% of the honey producers use traditional hives made from bark. Most of the honey produced in southern Mozambique is from bees foraging on indigenous trees. The hives are placed by local households living very close to the forest and by outsiders. Honey yields using the traditional methods are usually quite low around 5 to 10 kg/year/beehive, which is much lower than the production possible from modern hives. Small private associations with modern and transition hives make up the other 30% of honey producers. No official production statistics exist in Mozambique, but Gorongosa (Sofala Province), and Tambara, Guro and Sussundenga (Manica Province) are probably the most important honey producing regions in Mozambique because of the availability of miombo forest as foraging areas and the geography and climate of the sites (Ham, et al. 2010).

Honey production is also a factor that contributes to the destruction of forest. Traditional bee keeping is done with bark hives, which are produced by complete bark removal from the trunk of large trees, and in the process killing them. Collecting honey sometimes involves cutting trees in which a wild hive is located. Smoke and fire is always used to chase bees away from wild or bark hives, and uncontrolled fires can result from honey collection.

Medicines

About 10% of the 5,700 plant species found in Mozambique are used in traditional medicine (Bandeira, et al., 2000). Many of these undoubtedly contain compounds that give them their medicinal properties (Fyhrquist, 2007). More information about the ecology and population status of most plants used in traditional medicine would be needed to determine sustainable levels of harvest for these species. Some of the many medicinal plants found in markets in Maputo or nearby rural areas include: *Hipoxis hemerocallidea, Bridelia cathartica , Tiliacora funifera, Warburgia salutaris, Kigelia africana, Aloe komatiensis,*and *Securidaca longipedunculata* (Sabino, 2008). Medicinal plants are the main medicine used for health care for more than 60% of the population.

Medicinal plants at Xipamanine Market, Maputo
Photo: B. Byers, Sept. 2012

3.2 ECOSYSTEM SERVICES

Ecosystem services are best defined as the benefits to humans that result from ecosystem functions and processes, such as:

- Major biogeochemical and nutrient cycles (e.g., of water, carbon, nitrogen, phosphorus);
- Natural pest control by predators in food webs;
- Pollination by insects, bats, and birds;
- Decomposition of biomass, wastes, and pollution;
- Soil formation, retention, erosion prevention, and maintenance of soil fertility; and
- Climate regulation.

Biodiversity is the source of all ecosystem services, not an ecosystem service itself, despite much confusion in the literature (Byers, 2012). The diverse species in a given environment interact with each other and the physical environment to create the ecosystem functions and processes listed above. Because biodiversity is the source of ecosystem services, biodiversity conservation is a fundamental requirement for conserving ecosystem services.

The role of species diversity in maintaining ecological processes and functions is not well understood scientifically, and is an active topic of scientific research. However, studies often show a positive relationship between the number of species in an ecosystem and the level and

stability of ecological processes. Research in North American grasslands has shown that greater species-level biodiversity provides greater resilience to drought (Tilman and Downing, 1994), an example of how biodiversity is important for maintaining certain ecosystem services, such as controlling soil erosion and maintaining nutrient cycling.

A few examples of ecosystem services are discussed below:

Watershed and Hydrological Services

The natural ecosystems of Mozambique's mountains protect many of the watersheds of the country (although most of Mozambique's large rivers are trans-national, with headwaters in neighboring countries). Water is an essential renewable natural resource, and one that has no substitute. It is, therefore, extremely difficult to value if only standard "market" economic methods of valuation are used. The value of water used for a given purpose will depend on the opportunity cost of not using it. In some cases, as with drinking water, this is essentially infinite, since life depends on water. In many other cases, however, we decide how much water to use based on its price and accessibility.

Carbon Sequestration

Forests remove carbon from the atmosphere and store it in their biomass. This has obvious economic value if it mitigates costs predicted to result from CO2-induced global climate change. Global markets to value and trade this sequestered carbon are developing slowly. These markets currently are mainly voluntary, but more regulated markets under a post-Kyoto United Nations Framework Convention on Climate Change (UNFCCC) "architecture" are expected. Mozambique is positioning to take advantage of incentives that may become available for reducing deforestation and forest degradation, including through the conservation and sustainable management of forests and the enhancement of forest carbon stocks (REDD+).

Mangrove Coastal Protection

Mangroves build up coastlines because their extensive root systems slow water flow and trap sediment. They also buffer coasts from winds, waves, tides, and storm surges caused by cyclones. Unregulated mangrove cutting is prevalent throughout the range of mangroves in Mozambique and has led to coastal erosion and sea level rise that has caused socio-economic losses in areas such as the Ilha dos Búzios (off Angoche), where the mangrove belt was completely removed and 100 families had to be relocated due to sea level rise. Similar cases have been observed in Maputo (Hatton, 1995) and Beira (Hassan, 1997), where coastal erosion has seriously threatened public and private infrastructure, physical and ecological integrity of ecosystems.

3.3 NON-MATERIAL BENEFITS OF ECOSYSTEMS

Besides providing direct material benefits to humans in the form of ecosystem products, and indirect material benefits in terms of ecosystem services, natural ecosystems and species also provide a range of non-material benefits that are important to human well-being and

development. These include historical, cultural, spiritual, recreational, educational, and scientific benefits (USAID, 2005a).

Nature-Based Tourism

The protected areas system of Mozambique is managed by the National Directorate of Conservation Areas (DNAC) of the Ministry of Tourism, except for Forest Reserves, which are under the authority of the MINAG. Tourism is already important in some areas such as Inhaca Island near Maputo, but the potential for nature-based development in coastal and inland protected areas is thought to be large, and is certainly expanding. National parks and other protected areas are seen as one of the main attractions for tourism in the country. Surveys conducted in Southern Mozambique (Bjerner and Johansson, 2001; Abrantes and Pereira, 2003; Pereira and Schleyer, 2005) have clearly shown that the majority of tourists visiting southern Mozambique are from South Africa, and seek nature-based attractions such as diving and deep-sea and shore-based recreational fishing. While general statistics on the number of tourists visiting the country are lacking, the industry is perceived to be an important economic driver at least at local level. Bjerner and Johansson (2001) estimated a consumer surplus of between US$2.6 and 4.9 million from diving-based tourism at Ponta do Ouro, but concluded that most of the profits were leaking to South Africa, while increasing environmental degradation was occurring because of lack of effective management. The situation has certainly changed in Ponta do Ouro, with the proclamation of the Ponta do Ouro Partial Marine Reserve in August 2009, the situation there has improved, but elsewhere in southern Mozambique (e.g. Gaza and Inhambane Provinces) the protection and management of coastal tourism assets faces serious challenges. For example, there are no diving codes of conduct being implemented consistently at a national level, and despite a few local initiatives (e.g., Ponta do Ouro Partial Marine Reserve, and a few diving centers in Tofo and Zavora), diving etiquette and conduct rely on the dive master in charge. Very few Mozambicans are involved in the diving industry, either as divers or as instructors, which poses a challenge and an opportunity.

Spiritual Values

In some cases, traditional spiritual values are a powerful motivation for conservation, such as in the case of sacred forests in Mozambique. Many of these sacred forests, such as the Potone Forest, near Angoche (Nampula Province) and Licuati Forest in Maputo Province, are sources of wild plants gathered by traditional healers for use in traditional medicine.

On the basis of a case study from Mozambique, Virtanen (2002) concluded that forests protected because of traditional spiritual beliefs "…have a practical conservation value, especially as fire refuges and in the preservation of metapopulations of endangered species." Sacred forests in the Zambezi Valley of northern Zimbabwe, near Tete Province, were found to have been cleared at far lower rates than nearby forests not considered sacred (Byers, et.al., 2001).

Potone Sacred Forest near Angoche, Nampula Province
Photo: B. Byers, Sept. 2012

4.0 THREATS AND CAUSES

In this ETOA we have used the "threats-based approach" that guides USAID's biodiversity programming as the conceptual framework for our analysis (USAID, 2005a). Using this logical framework, we first identify the direct, biophysical threats to biodiversity in Mozambique. Conservation biologists recognize five main categories of direct threats to biodiversity:

- Conversion, loss, degradation, and fragmentation of natural habitats
- Overharvesting or overexploitation of particular species
- Invasive non-native species that harm native ecosystems or species
- Pollution or contamination that harms natural habitats or species
- Climate change effects that harm natural habitats or species

The immediate, proximate causes, and the long-term "root" causes or "drivers" of all of these direct threats generally fall into one of three categories:

- Social causes;
- Political, institutional or governance causes; and
- Economic causes

Once the causes of the direct threats to biodiversity and the environment have been identified, the actions needed to address, reduce, and/or remove them can be determined (USAID, 2005a).

4.1 HABITAT LOSS AND DEGRADATION

As is almost always the case, the most important direct threat to biodiversity comes in the form of the conversion, loss, degradation, and fragmentation of natural ecosystems. The table below identifies the human actions that lead to such loss or degradation on an ecosystem-by-ecosystem basis, and then lists some of the main proximate causes of these actions.

Table 4.1: Threats and Causes of Loss or Degradation of Ecosystems

Ecosystem	Threats	Causes
Terrestrial		
Miombo Woodland	Loss, fragmentation, & degradation from: Agricultural expansion from shifting cultivation ("slash and burn") by small subsistence farmers Conversion to industrial forest plantations of exotic species Firewood cutting & charcoal production Logging (permitted and illegal) of high-value species Bushmeat snaring and hunting	Use of agricultural practices that do not maintain soil fertility Financial & policy incentives that promote replacement of natural vegetation with plantations Lack of sustainable charcoal & fuelwood production, and alternative cooking fuels Inadequate land use planning and agreements Inadequate capacity of communities to engage in environmental decision making

	Poaching of elephants (a keystone species)	Low capacity to monitor and enforce laws and regulations Unclear, insecure, and/or overlapping land and resource tenure Inadequate resources for anti-poaching control
Coastal Forests	Loss, fragmentation, & degradation from: Agricultural expansion from shifting cultivation ("slash and burn") by small subsistence farmers Firewood cutting & charcoal production Logging (permitted and illegal) of high-value species Bushmeat snaring and hunting Coastal zone development for mining, offshore gas and/or oil, or for other coastal infrastructure (e.g., ports)	Use of agricultural practices that do not maintain soil fertility Lack of sustainable charcoal & fuelwood production, and alternative cooking fuels Inadequate land use planning and agreements Inadequate capacity of communities to engage in environmental decision making Low capacity to monitor and enforce laws and regulations Unclear, insecure, and/or overlapping land and resource tenure
Mopane Woodlands, Other Woodlands and Savannas	Loss, fragmentation, & degradation from: Mining & associated development (e.g., coal strip mining, Tete Province)	Inadequate land use planning and agreements Unclear, insecure, and/or overlapping land and resource tenure
Montane Forests	Loss, fragmentation, & degradation from: Agricultural expansion (mainly subsistence smallholders, "slash and burn") Firewood cutting & charcoal production Bushmeat snaring and hunting	Use of agricultural practices that do not maintain soil fertility Lack of sustainable charcoal & fuelwood production, and alternative cooking fuels Inadequate land use planning and agreements Low capacity to monitor and enforce laws and regulations
Freshwater		
Lakes	Degradation from: Overfishing Sedimentation Nutrient runoff & pollution (e.g.	Low capacity to monitor and enforce laws and regulations Inadequate capacity of communities to engage in environmental decision making

	sewage) Introduced exotic species	Lack of invasive species monitoring and control strategy
Wetlands	Loss & degradation from: Reduced inflows or altered seasonal timing flows Conversion to agricultural uses (farms, pastures)	Upstream water abstraction & forest degradation in upstream watersheds Inadequate land use planning and agreements Low capacity to monitor and enforce laws and regulations
Rivers	Degradation from: Reduced flow & changes in seasonal flow regimes Loss of riparian vegetation from agriculture, grazing	Upstream water abstraction & forest degradation in upstream watersheds Inadequate land use planning and agreements Low capacity to monitor and enforce land, water laws and regulations
Marine		
Coral Reefs	Loss & degradation from: Overfishing of keystone reef species Destructive fishing practices (e.g., dynamite, poison, small-mesh nets, beach seining) Sedimentation and nutrient-loading pollution from onshore activities Coral bleaching & damage from global climate change (warming & ocean acidification)	Undefined/poorly defined marine resource tenure Marine resource management agencies lack enforcement systems & capacity (boats, fuel, patrol staff) Inadequate capacity of communities to engage in environmental decision making Lack of sewage treatment from urban areas and tourism infrastructure Climate change from unsustainable global fossil fuel economy
Mangroves	Cutting – legal but unmanaged and illegal cutting	Inadequate coastal zone planning and agreements Low capacity to monitor and enforce laws and regulations Inadequate capacity of communities to engage in environmental decision making
Seagrass	Overfishing Destructive fishing practices (e.g.,	Marine resource management agencies lack enforcement

Beds	small-mesh nets, beach seining) Sedimentation and nutrient-loading pollution from onshore activities	systems & capacity (boats, fuel, patrol staff) Inadequate capacity of communities to engage in environmental decision making
Beaches & Dunes	Loss, fragmentation, & degradation from: Coastal development (hotels, houses, ports) Heavy sands mining	Insecure land tenure for traditional coastal communities & irregular/extra-legal land allocation Inadequate coastal zone planning and agreements Low capacity to monitor and enforce laws and regulations Inadequate capacity of communities to engage in environmental decision making
Near-shore Marine	Overharvesting of valuable species and by-catch Use of harmful fishing gear (e.g. beach seines, small-mesh nets) and practices (e.g. dynamite fishing)	Undefined/poorly defined marine resource tenure Marine resource management agencies lack enforcement systems & capacity (boats, fuel, patrol staff) Inadequate capacity of communities to engage in environmental decision making
Pelagic/ Offshore Marine	Overharvesting of tunas & other commercially valuable species	Unmanaged/unregulated commercial fishing by foreign fleets Marine resource management agencies lack enforcement systems & capacity (boats, fuel, patrol staff) Inadequate scientific understanding of ecology of large marine ecosystem

New field being cleared in Potone Sacred Forest near Angoche, Nampula Province
Photo: B. Byers, Sept. 2012

Cassava field on the edge of Potone Forest near Agoche
Photo: B. Byers, Sept. 2012

Emerging Causes of Habitat Loss

Extractive Industries Development

Newly discovered coal deposits in the Tete Province and hydrocarbons (natural gas, oil, and tarsands) off the coast of the Cabo Delgado Province have spurred significant expansion in the mining industry and rural infrastructure development. It is estimated that the revenues from these resources could double Government income, significantly changing the politics of natural resource management at a national scale. Heavy sands (titanium) are also of interest, as various sites along the coast of Mozambique are being studied for potential titanium extraction.

Forest Plantations

Large plantation concessions have been agreed upon with international forestry companies for the development of exotic plantations for export throughout the rural provinces, specifically the Niassa, Sofala, Manica and Zambezia provinces. The ongoing establishment of these plantations has already significantly increased job growth, but also experienced challenges in regards to land-use planning. Furthermore, not all the land in the concessions is degraded, and some companies have expressed interest in setting aside and restoring natural forest areas within their concessions. The 20% community benefit sharing law for forestry is also of particular interest.

4.2 OVEREXPLOITATION OF HIGH-VALUE SPECIES

Over-exploitation or overharvesting of economically valuable species is the second most important direct threat to Mozambique's biodiversity. Some of the species threatened in this way are listed in Table 4.2, and more details are given regarding an upsurge in the killing of elephants and bushmeat.

Table 4.2: Threats and Causes of Overexploitation of High-Value Species

Species	Threats	Causes
Elephant	Illegal hunting for international (mainly Asian) ivory market	Low capacity to monitor and enforce wildlife laws and regulations International demand and markets (e.g., China, other Asia) Corruption
High-value Timber Species (e.g. Afzelia spp, Pterocarpus spp. (kiaat), Diospyros mespiliformis (jackalberry)	Illegal cutting for domestic and international timber markets	Low capacity to monitor and enforce forest laws and regulations International demand and markets (e.g., China, other Asia) Corruption

Prawns (Metapenaeus monocerus, Penaeus indicus, P. monodon)	Unregulated fishing, some illegal Lack of sustainable management	Low capacity to monitor and enforce fishing laws and regulations International demand and markets
Pelagic Fish (yellowfin tuna, marlín, skipjack tuna, big eye tuna)	Illegal, and some legal but unregulated deep-sea fishing, mainly by foreign fleets Lack of sustainable management	Low capacity to monitor and enforce fishing laws and regulations International demand and markets

Upsurge in Elephant Poaching

According to a report from CITES, the Convention on International Trade in Endangered Species, published in June 2012, elephant poaching levels are the worst in a decade and recorded ivory seizures are at their highest levels since 1989. China and Thailand are the two primary destinations for illegal ivory consignments exported from Africa according to the seizure data. Most of the ivory smuggling containers move to Asia through Indian Ocean seaports in East African countries, including from Mozambique. Data on elephant poaching from the CITES Monitoring the Illegal Killing of Elephants (MIKE) Program have documented a steady increase since 2005, with the levels in 2011 being the highest since monitoring began in 2002. The MIKE analysis shows poaching to be highest where human livelihoods are most insecure and where governance and law enforcement are weakest. It also suggests that poaching is driven by demand for ivory in East Asia. (UNEP-WCMC, 2012). A U.S. Senate Foreign Relations Committee Hearing on 24 May 2012, focused on "Ivory and Insecurity: The Global Implications of Poaching in Africa." (US Senate Foreign Relations Committee, 2012)

Elephant poaching in Mozambique has always been a problem, particularly during the civil war when elephant populations around the county were decimated. Elephant numbers since then have grown steadily. In 2009 however, the number of poached elephants on the reserves in northern Mozambique (Niassa and Quirimbas) spiked, with 2011 being the worst year on record. Based on the most recent aerial survey, a total of 2084 elephant carcasses have been identified. Carcasses dating back to 2009 are also included in this figure. What is alarming however is that elephant bulls are those specifically being targeted for their ivory. Their numbers have dropped from approximately 2,500 to 804 in 2011, and wildlife conservationists expect poaching to worsen in 2012. Elephants move across wildlife corridors into Tanzania and vice-versa. This makes recording exact numbers difficult. The estimated number of elephants in Northern Mozambique is approximately 20,000. Only 12,000 were recorded in the last survey.

Elephant ivory prices can be to $300 per kilogram at the source, and in China the price may reach $1000/kg. At these prices, a ranger in most game parks in Africa can make more money by selling one large tusk than they earn in salary in an entire year. In 2011, 266 confiscated ivory tusks disappeared from a warehouse in Maputo owned by the Ministry of Agriculture, according to the NGO Save the Elephants.

4.3 INVASIVE SPECIES

Invasive alien species are a threat to ecosystem integrity and native species in some ecosystems of Mozambique.

Two freshwater fish species have been introduced in Lake Chicamba (Manica Province), and have become naturalized: the Nile tilapia (*Oreochromis niloticus*), a very aggressive and successful colonizer (Weyl, 2008) and the largemouth bass (*Micropterus salmoides*), which supports an important subsistence fishery and has established itself as the top predator (Weyl & Hecht, 1999). The ecological effects of these introductions are still not fully understood, and Wyel (1999), advised strongly against the use of the Nile tilapia as an aquaculture species. The Nile tilapia has also been reported to have negative effects of the native ichthyofauna of Lake Cahora Bassa (MICOA, 2009).

The Indian house crow (*Corvus splendens*) is an invasive species that was confined to Inhaca Island but now has expanded its range to the greater Maputo metropolitan area. Nhancale (1998) studied the ecology of the Indian house crow at Inhaca and concluded that fewer impacts to the indigenous avifauna were observed in comparison to those inflicted to the human population and that an eradication program was needed.

Fifty-two invasive plants are listed in the Global Invasive Species Database as occurring in Mozambique (ISSG, 2012).

4.4 POLLUTION

Pollution can be a major threat – even the major threat in rare cases – to ecosystems and species. In most of Mozambique, however, other direct threats are more important than pollution. Pollution from untreated sewage discharged from coastal cities and beach tourism facilities can cause significant damage to nearby coral reefs (Muthiga, et al., 2008). Sediment from coastal agriculture and construction can also damage reefs. Fertilizer and pesticides used on fields can be washed into nearby streams, rivers, and wetlands, threatening fish, amphibians, insects, crustaceans, mollusks, and other aquatic species.

4.5 CLIMATE CHANGE

Climate change is a potential threat of unknown magnitude, which may accentuate other direct threats already discussed above, especially habitat loss, degradation, and fragmentation, and the threat from invasive species

Like much of the continent, large parts of Mozambique currently experience a tropical, semi-arid climate, in which rainfall is extremely variable from year to year. Rainfall variation is strongly influenced by sea surface temperature anomalies associated with the El Nino-Southern Oscillation (ENSO). Drought and extreme rainfall events are the norm, not an exception. African biodiversity is, in many respects, the product of long-term natural cycles of climate change over tens of millions of years. The long-distance seasonal migrations of African ungulates are adaptations to track this natural climate variability. For humans, the mobility of pastoralists, and the diversity of crops among agriculturalists are the traditional means of cultural adaptation to climate variability in Africa.

Mozambique's National Institute for Disaster Management (INGC) produced a comprehensive summary of the projected vulnerabilities and adaptation needs of the country (INGC, 2009). Available climate data were used to assess recent trends, and downscaled climate projects were used to assess vulnerabilities related to temperature, precipitation, hydrology of rivers and groundwater, floods, agriculture and crops, fires, cyclones, sea level rise, and health. Mozambique is recognized as one of the countries of Africa that are most vulnerable to climate change along its coasts because of the large expanse of densely-populated, low-lying coastal plain. Historical data show an increase in extreme events – floods, droughts, and cyclones – over the past three decades, and these are projected to become even more common with climate change.

A recent FAO report, "Adaptation to Climate Change in Semi-Arid Environments: Experience and Lessons from Mozambique," focuses on the Limpopo Valley, and says that "Southern Africa and Mozambique are highly vulnerable to the impacts of climate change. The region is frequently exposed to droughts, floods, variable rainfall and heat, which are expected to worsen, and sensitivity to such exposure of the natural resource-based livelihood system is very high. The project area is remote and highly underdeveloped and the population is poor, food insecure, and not resilient to the impact of climate shocks. Due to water scarcity, not sufficient for humans and livestock except in a few communities along the Limpopo River, livelihood options are limited. Livelihoods are underpinned almost entirely by the little available water, agricultural lands and rangelands, and natural forests, and current practices and usage are threatening to become unsustainable. Existing coping mechanisms and safety nets are heavily reliant on the natural resources base, and livelihoods are seriously at risk under the projected climate changes. Urgent action is required to strengthen resilience now and into the future, when climate change will present significant additional stress." (Midgley, et al., 2012, p. v)

Howarth (2012) presented climate projections for central Mozambique. The current generation of General Circulation Models (GCMs) projects that this region will warm by a median value of 3.0ºC over the course of the next century with substantial variability based on the time of year and the specific model employed in the analysis. Relatively small changes are anticipated in average precipitation. The models, however, project a significant increase in interannual variability, suggesting a likely increase in the probability of droughts.

There seems to be some level of debate and uncertainty about the need for detailed climate modeling in assessing the threat of climate change. The USAID-supported Africa Biodiversity Collaborative Group, a consortium of seven U.S.-based international conservation NGOs with field programs in Africa, conducted a "Review of Climate Change Adaptation Initiatives" among their members in 2011. One of the "key recommendations" of that review is: "Take into account the diminished value of downscaling coarse resolution global climate models beyond recommended limits of the climate modeling community when project teams utilize modeling of climate change impacts on biodiversity and environments at high spatial resolution." (ABCG, 2011, p. 3)

The INGC study of climate change vulnerability noted that "the station network over Mozambique provides coverage of only 1 station per 29,000km² (compared to 1 tation/1,017km² in South Africa), and has major geographical gaps especially in Gaza and Tete provinces. Significant amounts of missing data limit its application for trend analysis, as well as the applicability of the data for downscaling future climate and using it to suggest changes in other areas" (INGC, 2009, p. 6).A recent study conducted for the WWF Coastal East Africa Initiative

by the Climate System Analysis Group of the University of Cape Town concluded that "The challenge therefore is to project the likely impacts of climate change at the regional scale while being fully cognisant of the large uncertainties and often relatively poor understanding of regional climate variability." (WWF 2012, p. 49) The ABCG Review (ABCG, 2011) echoes the need for more climate data, and for alternatives to deterministic modeling for thinking about climate change adaptation.

Ocean acidification, a potential effect of the increasing level of CO2 in the atmosphere that is causing global warming, may have significant ecological effects on coral reefs and other marine ecosystems (Kleypas , et al., 1999). The increased acidity makes it more difficult for corals to obtain calcium carbonate from seawater and deposit it in their skeletons, and thereby impairs reef-building. Ultimately, this process could ultimately destroy existing coral reefs. These issues have not been studied deeply in Mozambique, but monitoring and research being conducted in South Africa (Schleyer, et al., 2008) could provide insights about the fate of coral reefs in the region.

5.0 LAWS, POLICIES, AND GOVERNMENT INSTITUTIONS

Laws, policies, and government institutions that play a role in biodiversity conservation, forest management, and environmental protection in Mozambique are briefly summarized below. The ETOA Team did not gather the kind of information that would enable us to objectively evaluate the effectiveness of these laws, policies, and institutions.

5.1 LAWS AND POLICIES

Constitution of the Republic of Mozambique

The Constitution of the Republic of Mozambique approved by the Parliament in 2004 states that all citizens have the right of living in a balanced environment and the obligation of protecting it from degradation. The Constitution also states that natural resources located in the soil, underground, sea and fresh water belong to the State. It calls for the need of establishing areas for the protection of nature. Accordingly, the State should adopt policies to protect the environment and encourage sustainable use of natural resources. It is in this regard that Mozambique has approved policies, laws and regulations to protect the environment for future generations. Of particular relevance to ETOA are the following:

Environmental Law (Law nº 20/97 of 1th October 1997) and Regulations

The preparation of the Environmental Law followed the launching of the Environmental Policy in 1995, which is the umbrella legal framework for the sustainable development of the country. MICOA is responsible for enforcing the Environmental Law, including environmental auditing. The Environmental Law calls for the need of wise use and protection of the environment. Specific to the protection of biodiversity, this law provides the legal framework for the establishment of protected areas, and states that activities that threaten the long-term maintenance of biodiversity are not allowed. This law opens space for community participation in activities contributing to environmental protection.

Accordingly, the "precautionary principle" is to be used to prevent environmental degradation, and development projects should be implemented only after environmental licensing, which requires Environmental Impact Assessments (EIAs) and Environmental Management Plans (EMPs). To guide EIA preparation, the EIA Regulation was approved in 2004. EIA preparation includes a process of public participation, which should follow the general guidelines for the process of public participation (Ministerial Diploma nº 130/2006, of 19th of July).

Regulation for the Control of Invasive Exotic Species (Decree nº 25/2008, of 1st July).

This regulation was approved in the context of complying with obligation of parties to the Convention on Biological Diversity. The regulation supports measures to prevent the introduction of invasive exotic species that threaten ecosystems, habitats and native species, and to control and eliminate species that have already been introduced. MICOA coordinates the implementation of this regulation.

Forests and Wildlife Strategy and Development Policy (Resolution nº 10/97, of 7th April), Forestry and Wildlife Law (Law nº 10/99, of 7th July) and Regulations of the Forestry and Wildlife Law (Decree nº 12/2002, of 6th June 2002)

The National Forestry and Wildlife Policy, approved in 1997, provides general guidelines for the sustainable use of forests and wildlife resources for the social, economic and environmental benefit of current and future generations of Mozambicans. After the approval of the Forestry and Wildlife Policy, the Mozambican Government approved the Forestry and Wildlife Law in 1999. The Forestry and Wildlife Law establishes the principles and rules for the protection, conservation and sustainable use of forest and wildlife resources. This law states that forest and wildlife resources belong to the State, and calls for establishing protected areas to conserve biodiversity, which should be managed with the involvement of local communities. Local communities should also be part of management councils responsible for the management of forests and wildlife resources outside protected areas. The Regulations of the Forestry and Wildlife Law, adopted in 2002, include all details with regard to licensing procedures, forestry exploitation, game farms, fines, etc. The Regulations list protected wildlife species, and classifies tree species according to the quality of their timber.

Land Policy (Resolution nº 10/95, of 28th February) and Land law (Law nº 19/1997, of 1st of October)

In line with the Constitution, the Land Policy and Land Law state that the land and natural resources belong to the State. In addition to establishing the procedures and conditions governing land use by citizens and foreign investors, this law calls for the need of establishing areas of total protection, where extractive use of natural resources should not be allowed.

Tourism Policy and Implementation Strategy (Resolution n° 14, of 04th of April 2003)

The Tourism Policy was launched in 2003 to establish the legal framework for tourism development in the country. In 2004, the Strategic Plan for Tourism Development in was approved, covering the period 2004-2013. This Strategy defines the vision and mission of the tourism sector, the priority investment areas, conservation areas and establishes the action plan for the sector. **The Tourism Law (Law nº 4/2004, of 17 of June)** establishes the principles and guidelines for the implementation of sustainable tourism activities. Of relevance for this ETOA is that the Tourism Law states that tourism development should take environmental protection into account, including conserving forests, wildlife, water, and other features of the physical environment that attract tourists. The Tourism Law also states that tourism should contribute to the conservation of ecosystems, habitats and species, and therefore it can take place within protected areas, but in strict compliance with the management plan of the protected area. Currently, protected areas management is the responsibility of the National Directorate of Conservation Areas (DNAC) of the Ministry of Tourism.

Water Law (Law nº 16/91, of 3rd of August)

This law establishes that all inland waters and ground water belong to the State and people of Mozambique. Accordingly, water can not be alienated, and citizens have free access to use public waters for domestic consumption, livestock, and small scale irrigation. The use of large quantities of water for irrigation, industry, or other purposes requires a license, which is granted if the use of water will not cause overwhelming ecological and environmental disturbances.

Conservation Policy and Implementation Strategy (Resolution n° 63/2009)

This Policy provides further guidance for biodiversity conservation in Mozambique. It defines the vision, mission, and principles of conservation, defines the roles of the main stakeholders, and establishes the institutional framework for conservation and the mechanism of inter-institutional coordination. It includes strategies for the management of conservation areas, including a recommendation to create a new, parastatal agency to manage the protected area system, the National Agency of Conservation Areas (ANAC). Currently, protected areas management is the responsibility of the National Directorate of Conservation Areas (DNAC). In recommending the creation of ANAC, it was argued that as a parastatal agency will have administrative and financial autonomy, ANAC would be more creative and flexible in managing protected areas than a public agency would be, and would improve the financial sustainability of conservation. ANAC is in the process of being formed. A draft of the Conservation Areas Law was prepared in 2011-2012, but is still under revision before being submitted for approval by the Council of Ministers.

Policies of Mining Sector

Apart from the umbrella environmental policy, law and regulations, the mining sector has made rapid progress in the last decade to develop specific environmental legislation. This is recognition that the fast growing mining industry might cause environmental degradation if environmental issues are not adequately addressed in the sector. The following legislation has been approved to regulate the mining sector:

- Petroleum Law (Law nº 3/2001, of 21st of February)
- Mining Law (Law nº 14/2002, of 26th of June)
- Regulation of the Mining Law (Decree nº 28/2003, of 17th of July)
- Environmental Regulation for Mining Activities (Decree nº 26/2004, of 20th of August)
- Regulation for Petroleum Operations (Decree nº 24/2004, of 20th of August)
- Basic Rules for Environmental Management of Mining Activities (Ministerial Diploma nº 189/2006, of 14th of December)

Territorial Planning Law (Law nº 19/2007 of 18th of July)

The Territorial Planning Law was approved in 2007 to create a legal environment to achieve the following objectives:

- sustainable use of natural resources,
- environmental protection,
- best use of the potential of each area,
- improve the quality of housing and other infrastructure,
- improve the safety of people living in areas vulnerable to disasters, and
- improve the quality of life for the citizens.

This Law calls for the need of preventing environmental degradation and to protect the rights of access to natural resources by the citizens.

General Regulation for Maritime Fishing (Decree nº 43/2003, of 10th of December)

This regulation establishes protected areas for the preservation of fisheries resources. These protected areas include marine parks, marine reserves and protected marine areas.

Regulation for Recreational and Sport Fishing (Decree nº 51/99, of 31st of August)

This regulation includes rules for this type of fishing, including fees and fines. It presents a list of protected fish species.

Regulation for the prevention of pollution and protection of the marine and coastal environment (Decree nº 45/2006, of 30th of November)

This regulation presents restrictions applicable to coastal zones.

Green Economy Roadmap

At the Rio+20 United Nations Conference on Sustainable Development, President Guebuza officially launched the country's "Green Economy Roadmap," stating that a "[green economy] is the future that we Mozambicans want", which will allow Mozambique to become "an inclusive, middle-income country by 2030, based on the protection, restoration and rational use of natural capital and ecosystem services, to guarantee inclusive and efficient sustainable development, within planetary limits." The President emphasized that working together "to save the earth and its biodiversity is an imperative. It is an ethical duty, a moral obligation." Minister for Planning and Development, Aiuba Cuereneia, , emphasized that the transition to a Green Economy requires the integration of "natural capital accounting in planning processes," and that both "new and renewable resources be exploited sustainably and according to the best available practices" (Rio Conventions Pavilion, 2012).

At the launch event in Rio, Antonio Saide, Director of New and Renewable Energy of the Ministry of Energy of Mozambique, highlighted three pillars central to Mozambique's Green Economy – sustainable infrastructure; sustainable and efficient use of natural capital, and adaptive capacity and resilient livelihoods resilience. Dr. Donald Kaberuka, President of the African Development Bank, praised President Guebuza for his leadership and vision, noting

Mozambique has joined the ranks of countries that are "redefining the growth process from an African perspective." These policy statements from the Mozambican Government, if taken seriously and implemented, would reshape the country's economy in fundamental ways.

According to the United Nations Environment Program's Green Economy Initiative, a "green economy" …is one whose growth in income and employment is driven by public and private investments that reduce carbon emissions and pollution, enhance energy and resource efficiency, and prevent the loss of biodiversity and ecosystem services. These investments need to be catalyzed and supported by targeted public expenditure, policy reforms and regulation changes. This development path should maintain, enhance and, where necessary, rebuild natural capital as a critical economic asset and source of public benefits, especially for poor people whose livelihoods and security depend strongly on nature" (Green Economy Initiative, 2012). If donors took seriously Mozambique's commitment to a Green Economy Roadmap, they would also reshape their assistance programs in some fundamental ways. The African Development Bank is currently supporting analytical work in support of the Green Economy Roadmap (AFDB, 2012).

5.2 INSTITUTIONS

General Comment About the Institutional Framework

Progress has been made in establishing institutions whose mandates contribute to environmental protection, biodiversity conservation and forest management. However, there are weakness in institutional capacity, organization and coordination. The responsibilities for the various aspects of environmental protection are dispersed among several ministries. This makes difficult the concentration of human and financial resources and equipment for the protection of the environment. In addition, the limits of responsibilities among institutions are not clear, which coupled with weak coordination results in duplication of efforts among institutions.

National-Level Institutions

The Governance of Mozambique is guided by the Government Plan for 5 years (2010-2014), whose prime objective is the eradication of poverty through the implementation of the Action Plan for the Reduction of Poverty (PARP). Because poverty is a key driver of environmental degradation and environmental resources play a key role in alleviating poverty, environmental management is a priority area of Government Plan and PARP. These documents call for the need of mainstreaming environmental issues in all relevant sectors of the economy to ensure that efforts to reduce poverty do not result in severe environmental degradation.

Since the World Summit on Sustainable Development held in Rio de Janeiro in 1992, Mozambique has established institutions to address the need of protecting biodiversity and tropical forests. Of high relevance are the following institutions:

Ministry for the Coordination and Environmental Affairs (MICOA)

MICOA is charged with preparing environmental policies and strategies and coordinating their implementation. MICOA is the Government of Mozambique's focal point for all international

conventions related to biodiversity conservation (e.g., CBD, CITES), and it coordinates Mozambique's REDD+ preparations and the climate change adaptation strategy.

Through the National Directorate of Environmental Impact Assessment, MICOA is responsible for reviewing and approving EIAs, and for issuing environmental licenses for development projects. However, economic sectors responsible for the specific development project proposed are also part of the EIA technical reviewing team.

Through the National Directorate of Territorial Planning and Ordering, MICOA is responsible for preparing land use plans. The coordination of coastal zone management issues, natural resource management and urban environment are of the responsibility of the National Directorate of Environmental Management. Environmental education and promotion of public awareness on environmental issues is the prime task of the National Directorate of Environmental Education and Promotion. In terms of research and training, MICOA hosts the Coastal Zone Sustainable Development Center (created by the Decree nr 5/2003, of 18th February), Natural Resource Sustainable Development Center (CDS – RN) (created by the Decree nr 7/2003, of 18th October), Urban zones Sustainable Development Center (created by the Decree nr 6/2003, of 18th October), Center for Marine and Coastal Research and Institute of Environment and Physical Planning, responsible for research, training and extension in coastal zone management, natural resource management, urban environment, marine resources and training of environmental technicians, respectively. The National Environmental Fund (FUNAB) was created in 2000 to promote the sustainable use of natural resources and environmental protection. At the provincial level MICOA is represented by the Provincial Directorate for the Coordination of Environmental Affairs in each province, and at the district level by the District Services of Planning and Infrastruture.

The capacity of MICOA to review EIA reports and to coordinate activities for the protection of the environment is weak due to the lack of highly qualified and specialized staff, and limited funding to involve other sectors in activities that would contribute to its coordination role. In addition, MICOA is involved in implementing activities for environmental protection, such as EIA supervision, and these responsibilities sometimes distract from, or conflict with, its role as a coordinating agency. Although MICOA was created to raise the profile of environmental protection in Mozambique, and enforce the Environmental Law of 1997, many other sectoral ministries do not give priority to environmental protection, but rather promote their own activities. For example, the first priority of the Ministry of Agriculture is to increase agricultural production to attain food security, and the first priority of the Ministry of Mineral Resources is to increase the amount of different minerals produced – and these ministries give environmental protection a lower priority. In other words, MICOA has not had the capacity to truly "mainstream" environmental issues in the plans and budgets of other ministries.

National Council for Sustainable Development (CONDES)

CONDES was created by the Environmental Law of 1997 to serve as an advisory body to the Council of Ministers and as a tool for hearing public opinion on environmental matters. The objective of CONDES is to strengthen coordination and mainstreaming of environmental issues in all sectors of the society to achieve sustainable development. According to the Regulation for the Functioning of CONDES (Decree nº 40/2000, of 17th of October), this body has the following specific tasks:

- Issue comments on sector policies and laws related to natural resource management
- Issue comments on proposals for the ratification of environmental conventions related to the environment
- Draft proposals of incentives to encourage economic agencies to adopt environmentally sound procedures in the use of natural resources
- Propose mechanisms for the simplification of the licensing process for the use of natural resources
- Advise ministers dealing with different mineral resources on specific issues related to their mandate

This body is chaired by the Prime Minister, and all ministries that affect, or are affected by, the state of the environment have a seat within CONDES, including MICOA, MINAG, Ministry of Fisheries, MITUR, Ministry of Energy, Ministry of Mineral Resources, MPD, MF, etc. CONDES is the highest level in the hierarchy of environmental coordination and mainstreaming institutions, and it is supposed to provide the political support for MICOA. CONDES has a Technical Council, chaired by MICOA, with representatives from different ministries, which plays an advisory role to CONDES. CONDES has no offices at the provincial and district levels, which weakens political support to the Provincial Directorates of MICOA.

Ministry of Agriculture (MINAG)

This Ministry is responsible for preparing policies and strategies for agricultural development in Mozambique. MINAG leads the implementation of the strategic plan for the development of the agrarian sector (PEDSA, 2010-2019), which includes ***a strong component of agricultural intensification to increase crop production***, and the productivity and sustainable use of natural resources. MINAG hosts the National Directorate of Lands and Forests, which among other responsibilities, issues licenses for the exploitation of forest and wildlife resources and land tenure titles. MINAG is responsible for managing wildlife that is outside protected areas.

The National Directorate of Agrarian Services and National Directorate of Extension are responsible for developing and disseminating technologies for sustainable crop production, including ***conservation agriculture***. The National Directorate of Veterinary Services handles issues of livestock production, including sustainable use of rangelands, epidemiological surveillance to control animal diseases and to prevent the transmission of animal diseases between livestock, wildlife and humans. MINAG also hosts the Institute of Agrarian Research in Mozambique (IIAM), which has the responsibility of conducting research to support the needs of increased crop and livestock production and productivity and sustainable use of natural resources. At the provincial level MINAG is represented by the Provincial Directorate of Agriculture and at the district level by the District Services of Economic Activities.

Ministry of Tourism (MITUR)

MITUR is responsible for preparing policies and strategies for tourism development in Mozambique. MITUR implements the strategic plan for the development of the tourism sector, which calls for the need of protecting natural resources that sustain tourism development. This ministry hosts the National Directorate of Conservation Areas (DNAC), the government agencies

responsible for the management of protected areas. The DNAC also sets hunting quotas and issues licenses for hunting areas (coutadas) and for community-based wildlife management areas (e.g. Tchuma Tchato and Chipanje Chetu). The Unit for the Coordination of Transfrontier Conservation Areas is in charge of the management of transboundary issues in the three designated TFCAs, namely Limpopo, Lebombo and Chimanimani. MITUR is responsible for issuing licenses for tourism development.

DNAC's responsibilities for protected areas management are supposed to be transferred eventually to the National Agency of Conservation Areas (ANAC), the parastatal protected areas management agency, according to the Conservation Policy of 2009. ANAC is still in the process of being formed. ANAC, although supposed to be an agency with financial and administrative autonomy, will report to MITUR.

Another relevant agency at MITUR is the National Directorate of Tourism Promotion, which is responsible for promoting tourism, including within protected areas. At the provincial level MITUR is represented by Provincial Directorates of Tourism, and at the district level by the District Services of Economic Activities.

Ministry of Planning and Development (MPD) and Ministry of Finance (MF)

The direct relevance of these ministries to environmental protection is through coordinating annual activity plans across ministries and allocating funds for the implementation of planned activities, respectively. MPD and MF are members of CONDES. At the provincial level MPD and MF are represented by the Provincial Directorates of Planning and Finance, and at the district level by the District Administration.

Ministry of Fisheries (MP)

This Ministry has the responsibility of assuring the sound management of fisheries resources. Of particular relevance is the research on marine and freshwater resources conducted by the National Institute of Fisheries Research (IIP). Other relevant agencies in research and management of fisheries resources include the National Fisheries Administration and Small Scale Fisheries Development Institute (IDPPE). At the provincial level, MP is represented by the Provincial Directorates of Fisheries, and at the district level by the District Services of Economic Activities.

Ministry of Mineral Resources (MIREM)

MIREM is responsible for developing policies for, and regulating and monitoring, mining activities. This Ministry is supposed to ensure that the fast growing mining industry does not cause severe environmental degradation. The emerging prospecting and extraction of gas, oil, coal, heavy sands, gold, and precious and semiprecious stones fall under MIREM. Although EIA review and environmental licenses are of the responsibility of MICOA, MIREM has additional specific environmental legislation that must be followed by all investors in this sector. Therefore, mining projects are subject to auditing from both MICOA and MIREM through the Department of Environment at the National Directorate of Mining. At the provincial level, MIREM is represented by the Provincial Directorates of Mineral Resources and Energy, and at the district level by the District Services of Planning and Infrastruture.

Ministry of Energy (ME)

The Ministry of Energy is directly relevant to forest and biodiversity conservation because of its role in the biomass energy sector. This Ministry would play a key role, for example, in the design and dissemination of energy saving stoves, and more efficient charcoal kilns. This ministry also deals with renewable energy: hydropower, solar, and wind energy. The management of natural gas after extraction, and the importation and distribution of petroleum fuels is of the responsibility of the ME. At the provincial level, the ME is represented by the Provincial Directorates of Mineral Resources and Energy, and at the district level by the District Services of Planning and Infrastruture.

Ministry of Public Works and Housing (MOPH)

Among other responsibilities, through the National Directorate of Waters (DNA), MOPH is responsible for drafting and implementing policies and strategies related to the management of watersheds, to ensure sustainable use of water resources for socio-economic activities (e.g. irrigation), domestic use, and control of floods and mitigation of droughts. Therefore, MOPH plays a key role in early warining systems related to floods. MOPH is also the leading institution in the building and rehabilitation of infrastruture such as roads and bridges to ensure the mobility of people and goods, as well as for the development of infrastruture for water supply for domestic use and for sanitation. At the provincial level, the MOPH is represented by the Provincial Directorates of Public Works and Housing, and at the district level by the District Services of Planning and Infrastruture.

Ministry of Science and Technology (MCT)

This ministry coordinates and promotes initiatives of scientific research, technological innovation and identification of adequate and sustainable technologies for the development needs of different sectors of the economy and for the needs of conserving the quality of the environment. Through the National Research Fund, MCT promotes basic and applied and innovative research on natural resource management, climate change and other fields of direct relevance to environmental conservation and forest management. MCT also provides scholarships for Master's and PhD degrees, contributing to building Mozambique's human resources in science and technology. MCT also hosts the National Council of Ethnobotany and the National Council of Biotechnology, which have direct relevance to biodiversity conservation. At the provincial level, MCT is represented by the Provincial Directorate of Science and Technology, and at district level by the District Services of Education, Youth, Science and Technology.

Ministry of Education

This ministry is responsible for the expansion of the school network for the reduction of illiteracy. It is also responsible for the introduction of environmental matters in the curricula of all levels of education, to create a critical mass on environmental issues. At the provincial level, this ministry is represented by the Provincial Directorate of Education and at the district level by the District Services of Education, Youth, Science and Technology.

Ministry of State Administration (MAE)

Of relevance for enviromental management, this ministry hosts the **National Institute for Disaster Management (INGC)**, which coordinates the implementation of actions of disaster preparedness and response, including preparations for climate change impacts. INGC works closely with national and international research and training institutions and meteorological institutes to produce early warnings with regard to floods, droughts and tropical cyclones. INGC coordinates with MICOA, MINAG, MISAU, MOPH and other relevant sectors in planning adaptation measures to reduce the impacts of disasters on food security, human health and infrastructure.

Ministry of Health (MISAU)

This ministry has wide-ranging responsibilities for improving health care in Mozambique. Of direct relevance to the conservation of biodiversity, its Traditional Medicine Institute has collaborated with traditional healers, both to better understand their traditional practices, including the use of wild medicinal plants, and to improve the knowledge of these practitioners about primary health care issues from a modern, scientific perspective. At the provincial level, MISAU is represented by Provincial Directorates of Health, and at the district level by the District Services of Heath, Women and Social Action.

Academia

Universities are important actors in environmental management and the conservation of biodiversity and tropical forests because they:

- train the professionals needed in various sectors of the economy;
- train students in biodiversity conservation, forestry, agriculture, environmental education, and related fields; and
- have the capacity for research on issues important to natural resources and environmental management, including biodiversity conservation.

At Eduardo Mondlane University, relevant faculties include the Faculty of Agronomy and Forestry Engineering, and the Departments of Biological Sciences, Geography, Physics. The Technical University of Mozambique, UniZambeze, UniLurio, Catholic University, and other academic institutions also provide these important services. Eduardo Mondlane University has been designated as the Scientific Authority for the Convention on International Trade on Endangered Species of Flora and Fauna.

Community-Based Natural Resource Management (CBNRM) Institutions

The Forests and Wildlife Strategy and Development Policy (1997), Law (1999), and Regulations (2002) empower local communities to own and participate in the management of natural resources through community-based natural resources management (CBNRM) initiatives (Brouwer and Falcão, 2001). The Forestry and Wildlife Law establishes a process of participatory management in which a management council (***conselho de gestão***) is created, composed of representatives of the community, local government, private operators, and other

associations. The Regulations of 2002 acknowledge the role of local communities in the management of natural resources, and allows them to enter into partnership with the private sector in forestry and wildlife-based enterprises. The Regulations also state that 20% of the revenues generated from the exploitation of forests and wildlife resources should be allocated to the communities living in the proximity of the exploitation area.

The Tourism Law (2004) also states that community participation in tourism development must be strengthened to ensure that benefits from the use of natural resources for tourism are channelled to improvement of the living standards of local communities. The Strategic Plan for Tourism Development in Mozambique (2004 – 2013) defines the vision and mission of the tourism sector, priority investment areas, and outlines an action plan for the sector. This Plan acknowledges the need to manage the natural resources with the participation of local communities (Community Based Natural Resource Managment - CBNRM). (Falcão, 2011, pp. 45-46) These policies and laws provide the legal basis for CBNRM in Mozambique.

The adoption and implementation of the CBNRM approach in Mozambique was greatly influenced by neighboring countries such as Zimbabwe and Zambia. In the 1980s this new approach of decentralisation of authority for natural resources management, especially wildlife, and involvement of local communities emerged rapidly, and most countries in Southern Africa have implemented some form of CBNRM. Despite some common principles of CBNRM, implementation differs from one country to another. The new CBNRM approach attempts to share social and political power over natural resources and to combine conservation and economic and social development, reflecting a wider process of socio-political and economic change that has been occuring in the region since the end of the colonial era.

The first CBNRM project in Mozambique was launched in 1994 in the community of Bawa, in Tete Province, on the border with Zimbabwe. This project, known as "Tchuma-Tchato," was supported and funded by the National Directorate of Forestry and Wildlife (DNFFB), the Ford Foundation, International Development Research Centre (IDRC), and International Union for Conservation of Nature and Natural Resources (IUCN). It was an attempt to resolve human-wildlife conflicts and open a dialogue between the local community and a safari hunting operator. Another objective was to reduce poaching. The relative success of the Tchuma-Tchato Project encouraged the rapid spread of new CBNRM projects in Mozambique. Four years after the establishment of Tchuma-Tchato, about 40 projects were being implemented by different government institutions and local and international NGOs, through the financial support of international donors (Falcão, 2011, pp. 23-24). The Chipanje Chetu Program in Niassa Province is another example of a CBNRM initiative that has received considerable international attention.

One way in which Mozambique differs from other southern African countries is the fact that local communities have no legal rights to the revenues from the use or exploitation of the natural resources such as wildlife and forests. The Tchuma-Tchato Project negotiated community rights to a share of the revenue from safari hunting activities through a special inter-ministerial agreement. This agreement, signed in 1995 by Ministers of Agriculture, Justice, Planning, and Finance, introduced new hunting taxes in the specific area of the project, which required that 33% of the revenue from safari activities would revert to the community. In other cases in Mozambique, in the absence of such special agreements, the only way for communities to benefit from the co-management of wildlife, forests, or other natural resources is through establishing community-based associations or enterprises for activities such as beekeeping, fishing, or

charcoal production. Such associations and enterprises have been widely encouraged by international donors implementing CBNRM projects (Falcão, 2011, pp. 23-24).

5.3 LAND TENURE

According to the Constitution of the Republic of Mozambique, the Land Policy (1995), Land Law (1997), and Land Law Regulations (1998), all land belongs to the State, and it cannot be sold or alienated. No private land rights exist, and all holdings are secondary rights. The Land Law establishes the procedures and conditions for the rights of land use by citizens and foreign investors. Two types of land rights are possible. One type of land right is based on traditional occupation and customary norms and practices. Local households have customary land tenure rights, and family farms are not required to have a lease or pay taxes on their land as long as the land is occupied within the regulations. Nearly all of the rural population owns their land through customary law, and the National Cadastral Service (DINAGECA) does not provide titles to land acquired through customary law. The Land Law prohibits the transfer of customary land through sale, rental or mortgaging, while it allows inheritance of land with title. Local authorities have the right to adjust the amount of land given to a family, depending on prevailing local conditions, while the commercial (private and state farm) and cooperative sectors have leasehold tenure rights. (Falcão, 2011, p. 13)

The second type of land right is land leased from the State as a concession. To obtain a concession, the applicant must follow a process described in the Land Law, including a wide consultation with local communities. Both individuals and legally defined collective bodies (profit and non-profit associations and cooperatives) may obtain land concessions for up to 50 years, renewable thereafter. The Land Law also specifies the responsibilities of different levels of government to grant land use rights. Provincial governors can approve land concessions or titles up to 1,000 hectares; the Minister of Agriculture approves applications for land use rights of areas between 1,000 and 10,000 hectares, and the Council of Ministers approves applications for land use rights of areas larger than 10,000 hectares.

USAID's Property Rights and Resource Governance Country Profile for Mozambique found that

"The dual objectives of Mozambique's progressive land law – support for rural community land-rights and encouragement of private investment – have been unevenly implemented. The legal framework provides communities with some degree of tenure security over their land, but despite significant public awareness-building efforts, a majority of the thousands of rural residents are unaware of their land rights as communities and as individuals. Those who are aware of their rights almost uniformly lack the financial and technical support necessary to assert those rights effectively. Communities that lack that support are ill-equipped to delimit their land, prepare development plans, consider investment opportunities or meaningfully engage in negotiations with prospective investors. Smallholders who lack such support are unable to demarcate and register their land rights, limiting their ability to participate in programs, access credit and defend their rights against third parties." (USAID, 2011d, p. 1)

5.4 TREATIES

Mozambique has ratified the following international conventions and protocols with direct relevance to the management of natural resources, conservation of biodiversity, and protection of the environment:

Table 5.1 International Conventions and Regional Protocols Ratified by Mozambique to Protect the Environment

Convention or Protocol	Year of Ratification
Convention on the International Trade in Endangered Species of Wild Flora and Fauna (CITES)	1981
Vienna Convention for the Protection of the Ozone	1993
Montreal Convention on Ozone Destroying Substances	1993
Bamako Convention on the Ban of the Import into Africa and the Control of Transboundary Movements of Hazardous Wastes within Africa	1996
United Nations Framework Convention on Climate Change	1994
United Nations Convention on Biological Diversity	1994
United Nations Convention to Combat Desertification in countries affected by severe drought or desertification, particularly in Africa	1996
Basel Convention on the Control of Across-Border Movement and Elimination of Dangerous Residues	1996
Cartagena Protocol on Biosafety	2001
Kyoto Protocol	2005
Convention for the Protection of the World Cultural and Natural Heritage	1982
Convention on Wetlands of International Importance (Ramsar Convention)	2003
Convention on the International Trade in Hazardous Chemicals (Rotterdam Convention)	
Convention on Persistent Organic Pollutants (POPs)	2004
Convention on Migratory Species (CMS)	
Memorandum of Agreement in the Indian Ocean and South East Asia for the marine turtles	
African Convention on the Conservation of Nature and Natural Resources	1981
SADC Protocol on Wildlife Conservation and Law Enforcement	1999
The Monitoring of Illegal Killing of Elephants (MIKE) in the SADC region	1997

International Treaty on the Establishment of the Greater Limpopo Transfrontier Conservation Area	2002
Protocol on Shared Watercourse Systems in the Southern Africa Development Community (SADC)	2000
Agreement on the Action Plan for the Environmentally Sound Management of the Common Zambezi River System	1987
The Convention on Protection, Management and Development of the Marine and Coastal Environment in the Eastern Africa Region (1985)	1996
Protocol for Tourism Development in the SADC region (1998)	2001

Apart from international conventions, Mozambique is also a member of the World Bank and IUCN, and therefore should also follow the guidelines of those organizations with regard to biodiversity conservation.

Two SADC Protocols listed in the table deserve special mention:

SADC Protocol on Wildlife Conservation and Law Enforcement

The primary objective of this Protocol is to establish within the Region and within the framework of the respective national laws of each State Party, common approaches to the conservation and sustainable use of wildlife resources and to assist with the effective enforcement of laws governing those resources. The protocol stresses the need for the conservation of shared wildlife resources through the establishment of transfrontier conservation areas; and calls for the need of facilitating community-based natural resources management practices.

Protocol on Shared Watercourses Systems in the SADC region

This Protocol entered into force in 1998. Member States within a shared watercourse system should:

- closely cooperate with regard to the study and execution of all projects likely to have an effect on the regime of the watercourse system;
- exchange available information and data regarding the hydrological, hydrogeological, water quality, meteorological and ecological condition of such watercourse system; and
- utilize a shared watercourse system in an equitable manner.

This Protocol establishes river basin management institutions in the region, which have among other responsibilities, to harmonize national water resources policies and legislation and to monitor the utilization of water for agriculture and other sectors.

6.0 NGO AND DONOR PROGRAMS AND ACTIVITIES

A very brief sketch of NGO and donor programs and activities is given here, with more information presented in annexes. As was true for the Mozambican laws, policies, and institutions discussed above, the ETOA Team did not have the methodologies or information that would allow us to evaluate the effectiveness of NGO and donor organizations and their activities in a realistic way, and we did not attempt to do so.

6.1 NON-GOVERNMENTAL ORGANIZATIONS

NGOs, both international and national, bring the voice of civil society to issues of biodiversity conservation and sustainable environmental management in Mozambique. They conduct research, implement programs, educate citizens and decision-makers, and advocate their views. Priorities of the large international conservation NGOs that work in Mozambique, including priority areas of geographic focus, were discussed in Section 2.6. Readers can refer to Annex F for more information on the priorities and activities of both the international NGOs and a partial list of national-level NGOs.

6.2 DONORS

A spectrum of international donors, both bilateral and from multilateral institutions, provide funding to support Mozambique's efforts in sustainable development, environmental management, and biodiversity conservation. Readers are referred to Annex G for further information on these donors and activities most relevant to this ETOA.

7.0 ACTIONS NEEDED TO CONSERVE BIODIVERSITY, FORESTS, AND ENVIRONMENT

The language of FAA Sections 118 and 119 calls for assessments to identify the actions necessary in that country to conserve tropical forests and biological diversity. These "actions necessary" will address and reduce the proximate and "root" causes of threats to biodiversity, including tropical forests, which were discussed in Chapter 4 of this report. Although these are the legal requirements underlying this ETOA, we have also tried to address all types of actions needed to protect the Mozambican environment.

The ETOA Team gathered information about "actions necessary" to conserve biodiversity and tropical forests from the diverse sources described in the introduction to this report. From our interviews and meetings with over 75 key informants (see Annex D: Persons Contacted), we compiled a list of 174 "actions necessary" as perceived by these environmental experts and stakeholders. The actions needed for biodiversity, forest, and environmental conservation are those actions that remove or reduce the social, political, and economic causes of the threats to biodiversity.

USAID's current guidance on project design states that "Project design should be informed by evidence, supported by analytical rigor" (USAID, 2011c, p. 2), and in following this guidance we developed an analytical framework based on the criteria of FAA Sections 118 and 119, in which content analysis of interview notes provided semi-quantitative evidence for the perceived importance of a range of "actions needed." Our analysis assumes that our diverse group of informants – professionals and experts working on biodiversity conservation and natural resources management in Mozambique – know more about these issues than anyone else.

Content analysis of our interviews showed that some actions needed were mentioned many times, by different informants and stakeholders. This provides a way of ranking the relative importance of many possible actions needed according to the perceptions of key informants. While this analytical approach is not perfect, we believe that it is much less biased, and more informative, than other non-quantitative methods of trying to determine "actions needed." Although it provides a measure of the perceived importance of the many "actions needed," perceived importance cannot necessarily be equated with "priority." In general, "prioritization" is a very tricky concept, because it depends on the values and objectives of those doing the "prioritizing," and criteria can vary widely among stakeholders;

Actions needed that were mentioned repeatedly clustered as "themes"; in fact, 126 of the 174 actions listed by key informants fit into only eight themes. These themes and their rankings by frequency are given in Table 7.1.

Table 7.1 Actions Needed from Key Informant Interviews

Theme: "Need/Need to…."	# of times mentioned
1) Improve Enforcement of Environmental Laws	28
2) Build Capacity of Communities,Civil Society Organizations, and the Media for Meaningful Engagement in Environmental Decision Making	23
3) Stop Forest Conversion to Agriculture & Stabilize the Agricultural Frontier	20

4) Improve Land Use & Coastal Zone Planning	14
5) Coordinate and Harmonize Actions of Relevant Ministries & Agencies & Develop a Functional Institutional Structure for Sustainable Environmental Management	13
6) Develop Livelihood & Economic Alternatives/Opportunities to Destructive Practices	13
7) Sustainably Manage Artisanal (and Other) Fisheries	9
8) Improve Woodfuel Efficiency and Find Alternatives to Wood and Charcoal	6
Subtotal	126/174 (72%)
Other (climate change adaptation, environmental information, behavior-change, fire control, human-wildlife conflict, financial sustainability of PAs, etc.)	48/174 (28%)
Total	**174/174**

The key issues and topics encompassed in these twelve main themes are briefly discussed below. For a full list of how the "actions needed" proposed by our key informants sorted into these thematic categories, see Annex I.

Improve Enforcement of Environmental Laws

Our key informants emphasized the need to control corruption, and for "Rule of Law" and a justice system that prosecutes environmental violations. Pressure on government to implement existing legislation is needed, and political interference in implementing laws must be reduced.

Improvement of the capacity for law enforcement at all levels is needed, and laws should be enforced uniformly. More public awareness of environmental laws and penalties for violating them is needed. There should be stronger law enforcement for poaching, especially of high-value species like elephants and rhinos. More human and material resources are needed to manage and enforce laws in protected areas, and to patrol and protect Mozambique's marine EEZ from illegal, "pirate" fishing by Asian and other fishing boats. Mozambique needs an Endangered Species Law that protects threatened and endangered species and their habitats. A much higher proportion of the fees paid for environmental licenses should be used to strengthen the capacity of MICOA's National Directorate of Environmental Impact Assessment so that it can fulfill its legal mandate.

Build Capacity of Communities, Civil Society Organizations, and the Media for Meaningful Engagement in Environmental Decision Making

According to our key informants, Mozambique needs a stronger civil society, a public of citizens and supporting NGOs demanding that government protect their environment and natural resources. Existing national NGOs need to be strengthened, and new ones developed. These informants talked of the need to increase community participation and involvement in resource and land use rights and responsibilities. There is a need for better public participation in the

Environmental Impact Assessment review process. Traditional healers and their associations should be involved in the management of sacred forests and traditional plant gathering areas. Effective community governance and NRM needs to be strengthened from the bottom up, from the grassroots, not from the top down. More capacity for effective civil society engagement is needed at the community and district level. Mozambican laws and policies, which are generally not bad, must be implemented through local communities. The country needs to develop some Mozambican models of community-based natural resources management (CBNRM), and create a national "platform" for CBNRM that includes sharing more benefits with local communities to incentivize their participation and management. The Mozambican Government needs to make government information of all kinds (laws, regulations, policies, plans, maps, and statistics) freely and easily accessible by citizens and civil society organizations. Public news media have an important role to play in this process of increasing transparency, accountability, and participation.

Stop Forest Conversion to Agriculture & Stabilize the Agricultural Frontier

According to our key informants, the Government should control the location and level of charcoal production to interrupt the forest degradation cycle that begins with charcoal production and ends with farming on cleared forest land. Land use planning that both protects biodiversity and environment, and allows for development, as called for in the Land Law, is needed. Ultimately, to stop conversion of forest to agriculture, there is a need to improve agricultural productivity through "conservation agriculture" and new and improved varieties and crops, and maintain and increase soil fertility on the same plot of land so that farmers do not have to clear new fields. The Institute of Agrarian Research (IIAM) needs to develop crop varieties suited to local soils (e.g., low-nutrient, dry, sandy) and that are more disease and pest resistant, and resilient to climate variation. An agricultural extension service that bridges the gap between research (IIAM) and farmers to promote conservation agriculture and sustainable farming is needed.

Improve Land Use & Coastal Zone Planning

Another theme emphasized by our key informants was the need for improvements in land use and coastal zone planning. A Strategic Environmental Assessment (SEA) for the entire coast of Mozambique is needed, leading to a new, integrated national coastal zone plan. Impending development of coastal and offshore gas, oil, heavy sands, and ports make this coastal zone planning urgent. Science-based coastal zoning and planning, based on improved ecological information, is needed to steer gas and oil, tourism, and other coastal infrastructure development away from sensitive, critical habitats. An SEA is needed for the coast south of Maputo because of the Techobanine Port proposal. On land, likewise, science-based zoning and planning is needed to steer large-scale development of forest plantations or agriculture into appropriate zones. Improved agro-ecological zoning maps need to make it clear that agricultural potential in Mozambique is in fact rather limited. Land use planning and coastal planning need to be integrated to maintain the ecological linkages between terrestrial and marine ecosystems.

Coordinate and Harmonize Actions of Relevant Ministries & Agencies & Develop a Functional Institutional Structure for Sustainable Environmental Management

Our key informants emphasized the critical need to reorganize environmental and conservation responsibilities within the government in order to develop a functional institutional structure or framework for sustainable environmental management. MICOA is not capable of fulfilling its responsibilities for environmental coordination. Strengthening of coordination and integration among government institutions in all sectors is needed for environmental management and sustainable development. Human resources and capacity in MICOA, and in the staff of other ministries with environmental relevance, are weak and need to be improved.

Develop Livelihood & Economic Alternatives/Opportunities to Destructive Practices

Our key informants mentioned a wide range of livelihood and economic alternatives to destructive practices. Some mentioned the need to increase nature-based tourism, and use more of the associated revenues for management and benefit-sharing with local communities. Some mentioned the need to develop access to international carbon markets through REDD+ Payments for Ecosystem Services (PES) mechanisms. There is a need to study, understand, and determine the role and value of mangroves in coastal protection from cyclones, and develop PES mechanisms for conserving them. Inventories of medicinal plants and conservation plans for overharvested or threatened species and their habitats are needed to maintain their value as traditional medicine. Bushmeat harvest and charcoal production need to be brought into sustainable management systems, not necessarily eliminated.

Sustainably Manage Artisanal (and Other) Fisheries

A number of "actions needed" involved maintaining sustainable artisanal and other fisheries. Informants mentioned the need to clarify marine tenure and rights issues, and to educate and inform fishing communities about laws. Establishing fishing sanctuaries and no-take zones with the participation and agreement of local communities is needed to restore and maintain fish stocks. Migratory fishermen should be strictly controlled by authorities, with consent of local communities. Livelihood alternatives for fishing communities must be developed, such as aquaculture, mariculture of crabs, and/or offshore semi-industrial fishing. The shrimp fishing effort on the Sofala Bank should be reduced. International public pressure on China and other Asian nations is needed to stop the harvest and export of shark fins by artisanal and other fishermen.

Improve Woodfuel Efficiency and Find Alternatives to Wood and Charcoal

Because the country's heavy reliance on firewood and charcoal is a major cause of forest degradation, our informants emphasized the need to increase efficiency or find alternatives to wood-based fuels for cooking. Government agencies, NGOs, and donors need to promote more efficient stoves and alternative sources of cooking fuel, such as access for poor/more households to natural gas. However, one of our informants pointed out that charcoal was a widely used form

of potentially renewable energy, and should be treated as an opportunity for low-emissions development through the use of more efficient charcoal-making kilns and more efficient stoves.

Charcoal and firewood for sale, Xiquelen Market, Maputo
Photo: B. Byers, Sept. 2012

Other Types of Actions Needed

Although approximately 72% of the list of 174 actions needed (see Annex H) mentioned by our informants could be clustered into one or another of the eight themes above, the other 28% were much more diverse, and in some cases more specific and targeted either to a particular geographic area (e.g., Potone Sacred Forest in Nampula Province, transnational rivers) or topic (e.g., human-wildlife conflict, sustainable financing mechansims for protected areas). The following list gives a flavor for some of the diversity of the other actions needed that could not easily be clustered into thematic categories. Need/need to:

- pharmacological studies of traditional medicinal plants to identify active compounds
- update the Red List (of endangered species) for Moz
- sustainable financing mechanisms for protected areas (e.g., BIOFUND)
- need eco-hydrological information for better management of transnational rivers
- need methodologies for assessing climate change vulnerabilities and strategies for adaptation
- promote forest plantations in degraded areas to restore forest cover, but apply a scientific site selection methodology for choosing areas to convert to commercial forest plantations

to ensure that restorable natural forests are not being replaced by commercial exotic species, and apply other appropriate social, environmental, and economic safeguards
- bring Mozambique through the demographic transition, stop population growth, and stabilize population
- build capacity in the Mozambican government to take advantage of the opportunity of the oil, gas, and coal "boom" and use it for equitable and sustainable development
- develop fencing or other methods to reduce human- wildlife conflict
- behavior-change campaigns in communities to reduce use of burning and uncontrolled fires, and technology for fire monitoring and mapping (e.g., satellite imagery, internet software)
- official designation of Potone Forest as a "sacred forest reserve" by national authorities

Climate Change Adaptation for Conservation and Conservation for Adaptation

In the chapter that follows, the thematic categories of "actions needed" will be compared with proposed programs and activities of USAID-Mozambique to identify potential contributions to meeting those needs, as required by FAA Sections 118 and 119.

8.0 CONTRIBUTION OF PROPOSED USAID-MOZAMBIQUE PROGRAMS

8.1 USAID CONTEXT

USAID Statement on Biodiversity and Development

According to USAID, biodiversity conservation is of fundamental importance to its mission as a development agency, because, as stated on the USAID website, "Biodiversity is the very foundation for all the Earth's essential goods and services. The air we breathe, water we drink, and the food we eat all depend on the Earth's rich biodiversity." (USAID, 2012c)

USAID Policy Framework 2011- 2015

The USAID Policy Framework 2011-2015 (USAID, 2011a) lists seven "core development objectives":

- Increase food security (Feed the Future initiative)
- Promote global health
- Reduce climate change impacts and promote low emissions growth
- Promote sustainable, broad-based economic growth
- Expand and sustain stable, prosperous, and democratic countries
- Provide humanitarian assistance and support disaster mitigation
- Prevent and respond to crises, conflict, and instability

Quite surprisingly, the document does not once mention biodiversity, ecosystems, or ecosystem services. The word "environment" is found in the Policy Framework, but mainly referring to non-natural "environments" such as the "fiscal environment," "business-enabling environment," or "media environment." If biodiversity is truly the foundation of development, and the source of food, water, and air upon which all humans depend for their lives none of the core development objectives above could be realized without conserving biodiversity.

The omission of words such as "ecosystems" and "biodiversity" in the Policy Framework seem to suggest, at the very least, that the importance of Earth's natural life-support systems are misunderstood and undervalued, apparently even within USAID policy-making circles. Somewhere there has been a failure by biodiversity scientists and ecologists to communicate the meaning and importance of biodiversity to policy makers.

Fortunately, counterbalancing this oversight in the Policy Framework, there is a renewed push to underpin development with sound science (USAID 2011a, pp. 34-35; USAID, 2011b). Applying sound science to development challenges would ensure that the next iteration of USAID's Policy Framework explicitly reflects the scientific fact that biodiversity conservation is "the very foundation" of any sustainable development, as stated on USAID's own website.

The 2011-2015 Policy Framework also identifies seven "operational principles," each with relevance to biodiversity conservation programming:

- Promote gender equality and female empowerment
- Apply science, technology, and innovation strategically
- Apply selectivity and focus
- Measure and evaluate impact
- Build in sustainability from the start
- Apply integrated approaches to development
- Leverage "solution holders" and partner strategically

USAID Forward

USAID Forward (USAID 2011a, pp. 32-36; USAID 2012b) is a package of institutional reforms that focus on three main areas:

- Building Local Sustainability and Partnerships
- Fostering Innovation
- Strengthening Our Capacity to Deliver Results

These USAID Forward reforms have clear linkages with "actions needed" to conserve Mozambique's biodiversity, forests, and natural environment. For example, building the capacity of local communities, the second most commonly mentioned action needed in our interviews, relates closely to the USAID Forward theme of "Building Local Sustainability and Partnerships." Local sustainability requires "… working with more local organizations in developing countries to improve their capacity…. building capacity, not dependence…." (USAID, 2012b). Another link with USAID Forward themes is through the third most commonly mentioned action needed, the need to stop the conversion of forests to agriculture and stabilize the agricultural frontier, . To do so, a great deal of innovation, including "advances in science, technology, private sector activity and academic research…" will be needed to develop and promote "conservation agriculture" in Mozambique to "… help the poorest people… grow past aid." (USAID, 2012b)

USAID Climate Change and Development Strategy

USAID's Climate Change and Development Strategy lists ten "Guiding Principles" (USAID, 2012a, pp. 9-10):

1) Invest in policy reforms

2) Engage at multiple levels

3) Strengthen civil society and engage the full range of stakeholders

4) Respond to partner country priorities, needs, and capabilities

5) Leverage private sector investments to the maximum extent possible

6) Partner and coordinate with other donors

7) Make choices to minimize climate impacts while maximizing development benefits

8) Promote conflict sensitive programming

9) Utilize gender sensitive approaches across climate programming and engage youth

10) Value ecosystem services

Principle 10, "value ecosystem services," provides a strong linkage between biodiversity and forest conservation and sustainable management, because biodiversity is the source of all ecosystem services (Byers, 2012). The Climate Change and Development Strategy states that: **"**Although these services are critical to development, they are often not valued appropriately in the marketplace. For example, forests offer more than just timber for harvest… [they store] carbon; … reduce erosion, improve the quantity and quality of water. Strategic investments in ecosystem services can mitigate the impacts of climate change." (USAID, 2012a, p. 10)

USAID 2011 Project Design Guidance

USAID's 2011 Project Design Guidance (USAID, 2011c, p. 6) lists as one of its principles "Apply Integrated Approaches to Development." It explains this by saying "Development problems are complex and multi-dimensional. The project design process should be undertaken by integrated, multidisciplinary teams, and should identify all relevant and necessary factors affecting the success of a project, building on the CDCS. In some cases, for example, synergies can be gained where objectives in one area (like building civil society capacity) can be achieved through investments in other areas (like health service delivery)." The ETOA team identified many actions needed that require integrated action for effectiveness and sustainability, and these provide many opportunities to USAID-Mozambique to apply this principle in designing activities for environmentally-sustainable development, biodiversity conservation, food security, health, and climate change resilience.

As already mentioned, USAID's Project Design Guidance calls for using analysis and the best available evidence to frame development hypotheses, develop results frameworks, and design projects. Our analysis of actions needed from interviews with key stakeholders is an example of the kind of "consultations" called for in this guidance (USAID, 2011c, p. 7), which USAID-Mozambique can use to produce "evidence-based project designs," especially for projects relating to environmentally sustainable development and biodiversity conservation..

USAID's 2011 also Project Design Guidance calls for a new, mandatory "Sustainability Analysis," in addition to the mandatory "Environmental Analysis" that this ETOA represents (USAID, 2011c, p. 15). The Sustainability Analysis is supposed to analyze "institutional capacity," among other sustainability issues. Institutional effectiveness of government partners, including their ability to enforce laws and carry out responsibilities, is a part of this institutional capacity. In light of this recommendation, the ETOA Team believes that such a sustainability analysis of institutional partners proposed in the Biodiversity Project needs to be conducted.

USAID 2012 Resilience Policy and Program Guidance

In December 2012 USAID released new policy and program guidance for "Building Resilience to Recurrent Crisis" (USAID, 2012d). Although this document should provide a basis for many of the actions needed to conserve biodiversity and forests in Mozambique, especially those related to threats from climate change, the new policy does not even mention the words

biodiversity or ecosystem services, and does not acknowledge that conserving the natural environment is an indispensible foundation for resilience.

8.2 OVERVIEW OF USAID-MOZAMBIQUE PROGRAMS

Country Assistance Strategy

The context of, and broad outline for, USAID's programs in Mozambique is laid out in the Mozambique Country Assistance Strategy 2009-2014 (USG, 2009). In terms of the general development context, the Country Assistance Strategy states that: "Though Mozambique resides near the bottom of the bottom billion (Mozambique is 175 of 179 countries in the latest UN Human Development Index), the country is fortunate in that its diverse resource base (energy, mining, agriculture, fisheries, forestry, and tourism) and its 2,500 kilometers of coastline with three major ports help Mozambique avoid the "traps" associated with dependence on a single, major resource or being landlocked. In fact, these areas offer significant development potential." (USG, 2009, p. 2)"

Of direct relevance for this ETOA, two of the six "resources" mentioned (i.e., fisheries, forestry) are living natural resources, the direct products of biodiversity; agriculture is dependent on ecosystem services that result from biodiversity; and tourism in Mozambique is partly nature-based tourism, and so also dependent on healthy ecosystems. The assistance strategy seems to recognize this dependence of agricultural development on ecosystem and biodiversity conservation, saying "Ecosystem degradation and biodiversity loss could lead to agricultural decline and would jeopardize future prospects for labor-intensive natural resource based tourism." (USG, 2009, p.7) The assistance strategy also states (p. 7): "Natural resources, biodiversity, and unique ecosystems, which are the foundation for long-term economic growth, are being severely degraded or lost."

The Mozambique Country Assistance Strategy has five "strategic goals" (USG, 2009, p. 4):

1) Strengthen Democratic Governance

2) Improve Competitiveness of Key Economic Sectors

3) Improve Health

4) Expand Education and Training Opportunities

5) Enhance Capacity of Security Forces

The Assistance Strategy states that it is in "alignment with Mozambican strategies and plans.

This strategy is aligned closely with GOM strategies…." (USG, 2009, p. 2) In this regard, of special relevance to environmentally-sound and sustainable development is the "Green Economy Roadmap" for Mozambique, announced by President Guebuza earlier this year at the Rio+10 Summit (Rio Conventions Pavilion, 2012). This strategy of the GOM was not developed when the USG Country Assistance Strategy was being developed, and the ETOA Team believes that it is important for USAID to carefully review the Green Economy Roadmap and adjust its assistance strategy to support it as needed. The African Development Bank seems to be taking a leading role in assisting the GOM and developing donor support for the Green Economy Roadmap (AFDB, 2012). Both MICOA and MPD were involved in the launching of the

Roadmap in Rio, but it is not clear which of these ministries will lead the process within the GOM.

Also of special relevance to biodiversity conservation is the Conservation Policy and Implementation Strategy of 2009. The law and regulations for implementing this policy and strategy have not been approved yet, and one of the recommendations of the strategy, the creation of ANAC, is still in process. USAID will need to monitor the status of ANAC, and when ANAC is finally formed, the Agency will need to assess its institutional capacity and sustainability before deciding whether or how it should partner with this proposed agency.

Agriculture, Trade and Business (ATB)

The most direct opportunities for USAID-Mozambique to contribute to actions needed for environmental and biodiversity conservation seem likely to fall within the portfolio of the Agriculture, Trade and Business (ATB) Office. According to information contained in the Initial Environmental Examination for the Agriculture, Trade and Business (ATB) Portfolio (USAID, 2012c, p. 9), proposed ATB activities include:

- Feed the Future (FTF) Program**:** The Feed the Future Program is already underway. The Mozambique FTF strategy focuses on the Beira and Nacala trade corridors (Nampula, Zambezia and Manica Provinces for agriculture; Nampula and Zambezia Provinces for nutrition).
- Coastal City Adaptation Program (CCAP)**:** The CCAP is currently under procurement. The cities identified for partnerships include Pemba, Quelimane, and possibly Vilankulos.
- Biodiversity Program**:** This program was still in the design stage during the ETOA.

Agriculture and Feed the Future

The Feed the Future Program is already underway, supporting the U.S. Government's Feed the Future Multi-Year Strategy (2011-2015) for Mozambique (USG, 2011). Activities supporting agricultural development and the Feed the Future Program are listed in the ATB Portfolio's IEE (USAID-Mozambique, 2012c, p. 2) as:

- Supporting the development of government capacity in agriculture, agribusiness, and nutrition;
- Supporting increases in agricultural productivity and agribusiness competitiveness in selected provinces
- Supporting agricultural research, experimentation and related capacity-building;
- Supporting activities to improve nutrition; and
- Construction, rehabilitation, and/or operation of small-scale agricultural infrastructure.

Activities of the FTF program with the clearest linkages with, and most relevance for, the conservation of biodiversity and forests, are conservation agriculture and some aspects of USAID-Mozambique's support for agribusiness value chains. These provide opportunities,

discussed in Section 8.3, for USAID-Mozambique to contribute to the actions needed for conservation.

This FTF Strategy is derived partly from the USG Mozambique Country Assistance Strategy, which states that "Mozambique is endowed with extensive fertile land…" (USG, 2009, p. 7). This statement seems to contradict the findings of the Mozambique ETOA conducted in 2002, which reported that "Soils in Mozambique are generally old and nutrient-poor, and precipitation is strongly seasonal, with high variability from year to year. These factors pose many challenges to agriculture." (ARD, 2002, p. 5) That ETOA also stated that "Mozambique's lack of arable land places it among countries with the least arable land in the world, such as Columbia, Venezuela, Jordan, and Madagascar. For comparison, arable land in the United States is estimated at 19%, Bangladesh at 73%, Denmark at 60%, and India at 56% (Geography IQ, 2002). It should be noted that the most fertile, alluvial soils in the country are found on river floodplains, where agriculture must cope with periodic floods." (ARD, 2002, p. 7) A lack of fertile agricultural lands provides a strong argument for conservation agriculture, to maintain and potentially increase what soil fertility exists on each farm.

Climate Change Adaptation and CCAP

Mozambique is a priority country for adaptation interventions in the USAID Climate Change and Development Strategy (USG, 2009, p. 2). USAID-Mozambique designed the CCAP project to "increase climate resiliency in select coastal cities by supporting capacity building activities, performance-based incentives, and public advocacy. CCAP Project objectives [are to]:

- Improve the provision of climate-resilient urban services by municipalities;
- Increase adoption of climate resilience measures by communities and community organizations, i.e., civil society, nongovernmental, faith-based organizations, etc.;
- Increase access to risk-sharing tools, i.e., insurance plans, contingency funds, etc., for at-risk urban infrastructure and livelihoods." (USAID-Mozambique, 2012b)

Biodiversity Conservation and Natural Resources Management

The Mission's proposed natural resources management activities fall within its proposed Biodiversity Program. The proposed program has been modified since the ETOA Team visited Mozambique and received preliminary information about it (USAID-Mozambique, 2012a, 2012c). The recently-modified plans were not made available to the ETOA Team. This project will work with communities to support them to conserve their biodiversity, and work with all stakeholders to improve enforcement of serious violations of environmental laws, such as illegal logging and poaching of high-value species such as elephants and rhinos. The program will have three interrelated objectives:

- Improved management of biodiverse landscapes;
- Increased equitable economic opportunities compatible to biodiversity conservation; and
- Increased advocacy for biodiversity conservation. .

The ETOA Team has been told that the areas of geographic focus for the program will be the Niassa National Reserve, Lake Niassa National Reserve, and Gorongosa National Park.

Democracy and Governance (DG)

According to the Mozambique Country Assistance Strategy 2009-2014, the greatest threats to Mozambique's stability, regional influence, and future potential lie in the realm of democracy and governance, and therefore"helping Mozambique address governance challenges is the highest priority for our foreign assistance strategy" (USG, 2009, p. 5). The Mission's 2012 Democracy and Governance Factsheet (USAID-Mozambique, 2012d) reiterates this point, and states that "…corruption and lack of transparency hamper the government's ability to address the needs of its 23 million citizens. Moreover, the urgency for strengthening Mozambique's democratic governance systems is heightened by an impending natural resource wealth boom, and building human capacity both within the government and civil society is critically important" (USAID-Mozambique, 2012d). The DG program provides a platform for supporting some of the actions needed for improved conservation and NRM in Mozambique becaues:

- Improved governance is critical for sustainable NRM, and
- NRM can provide the "entry point" for many DG initiatives, andan opportunity for improving transparency, accountability, and governance.

USAID-Mozambique's DG program has five main objectives:

- Strengthen the capacity of civil society and media to advocate for improved governance and accountability
- Improve transparency of government institutions and reduce corruption
- Expand political competition by promoting free and fair elections
- Strengthen local governance
- Improve access to justice and security

Health

U.S. development assistance in its Integrated Health Program is by far the largest component of USG assistance, with an estimated investment of $782 million between 2009 and 2014. The Program "…integrates six major U.S. health interventions: the President's Emergency Plan for AIDS Relief (PEPFAR), the Presidential Malaria Initiative (PMI), ongoing maternal and child health and reproductive health programs, tuberculosis (TB) eradication, and water supply and sanitation infrastructure," as well as a nutrition component (USAID-Mozamabique, 2010, pp. 1-2).

Education

The USAID-Mozambique Education Program is focusing on Goal One of the USAID Education Strategy, "Improved reading skills for 100 million children in primary grades by 2015." In order to help reach the target number, the Mission is concentrating on schools in the most densely populated areas of Nampula and Zambezia Provinces. These Provinces have 42% of the Mozambican population, are underserved with respect to public investment in education, and other donors are not supporting education there (J. Dobson, personal communication).

USDA Forest Service International Programs

The USFS International Programs Office is collaborating with USAID in a number of activities relevant to environmental management, forestry, and biodiversity conservation, including:

- Support to the Agroforestry Village Project, a USDA Food for Progress Project, being implemented by TechnoServ, to obtain and interpret cloud-free satellite images of Niassa and Manica Provinces for land-use planning activities
- Technical support to the project through provision of soil scientist, hydrologist and ecologist to interpret and ground truth data in land-use planning process
- Fire trainings and assessments in and around Gorongosa National Park
- Mangrove carbon assessments: USFS experts worked with the University of Eduardo Mondlane and WWF to collect biomass and soil carbon data in mangroves in the Zambezi delta. This assessment will help establish a baseline carbon stock level for mangroves, and contribute to Mozambique's national forest and carbon inventories.

8.3 EXTENT TO WHICH USAID'S PROPOSED PROGRAMS COULD CONTRIBUTE TO ACTIONS NEEDED

The language given in Sections 118 and 119 of the Foreign Assistance Act, with which this ETOA Report must comply, requires that we discuss "the extent to which the actions proposed for support by the Agency meet the needs thus identified." The following table suggests which of the current and proposed programs at USAID-Mozambique are contributing, or could contribute, to some of the main kinds of actions needed that were identified in Chapter 7.

Table 8.1 Actions Needed and Potential Contribution of USAID-Mozambique Programs

Theme: "Need to…."		**USAID Program/SO**			
	ATB-BIO/NRM	ATB-CCAP	ATB-FTF	DG	HLTH
Improve Enforcement of Environmental Laws	X	X		X	X
Build Capacity of Communities, Civil Society Organizations, and the Media for Meaningful Engagement in Environmental Decision Making	X	X		X	
Stop Forest Conversion to Agriculture & Stabilize the Agricultural Frontier	X		X		
Improve Land Use & Coastal Zone Planning	X	X	X	X	
Coordinate and Harmonize Actions of Relevant Ministries & Agencies & Develop a Functional Institutional Structure for Sustainable Environmental Management	X	X	X	X	X
Develop Livelihood & Economic Alternatives/Opportunities to Destructive Practices	X	X	X		X
Sustainably Manage Artisanal (and Other) Fisheries	X		X		X
Improve Woodfuel Efficiency and Find Alternatives to Wood and Charcoal	X	X	X		X
Other (climate change adaptation, environmental information, behavior-change, fire control, human-wildlife conflict, financial sustainability of PAs, etc.)	X	X	X	X	

Key to USAID Programs

ATB- BIO/NRM: ATB Office activities related to biodiversity conservation and natural resources management;

ATB-CCAP: ATB Office Coastal City [Climate Change] Adaptation Program (under procurement)

ATB-FTF: ATB Office Feed the Future Program, under implementation

DG: Democracy and Governance Program

HLTH: Health Program

Linkages between proposed USAID activities and actions needed under each of these themes are discussed in more detail below.

Opportunities to Contribute to Improved Enforcement of Environmental Laws

According to our content analysis of interviews of key stakeholders, the most commonly perceived category of "actions needed" was to "Improve Enforcement of Environmental Laws," with 28 actions needed proposed under this theme. The Environmental Law of 1997 requires Environmental Impact Assessments (EIAs) and Environmental Managements plans in order for development projects to obtain environmental licenses, and the EIA Regulation was approved in 2004. MICOA's National Directorate of Environmental Impact Assessment is responsible for reviewing and approving EIAs, and for issuing environmental licenses for development projects. However, according to the Director of this unit, their resources and capacity are extremely limited (R. Niquice, personal communication).The ETOA Team believes that there is an excellent opportunity to contribute to meeting this overarching "action needed" through support for national EIA capacity-building.

Opportunities to Contribute to Building Capacity of Communities & Civil Society Organizations for Meaningful Engagement in Environmental Decision Making

The opportunity to contribute to meeting this need could be realized through a linkage between ATB Office activities in support of NRM and biodiversity conservation and a number of the objectives of the USAID-Mozambique DG Program. We recommend that the Mission take advantage of this opportunity in Chapter 9.

Opportunities to Contribute to Stopping Forest Conversion to Agriculture & Stabilizing the Agricultural Frontier

A significant opportunity to contribute to meeting this need could come through a closer integration of NRM and FTF activities, in particular the co-location of FTF "conservation agriculture" support (USAID-Mozambique, 2012a, p. 13) and ATB Office NRM and biodiversity conservation activities. We recommend this in Chapter 9.

Opportunities to Contribute to Improving Land Use & Coastal Zone Planning

USAID could contribute to this need mainly through its support for national capacity to conduct EIAs, we believe. Land use planning will contribute to stabilizing the agricultural frontier, and coastal zone planning will conserve coastal habitats such as mangroves, to protect their biodiversity and the value of ecosystem products and services they provide.

Opportunities to Contribute to Coordinating & Harmonizing Actions of Relevant Ministries & Agencies & Developing a Functional Institutional Structure for Sustainable Environmental Management

Although ATB Office and DG Program activities could contribute to this need, we believe that better opportunities to contribute to other categories of needs exist at this time.

Opportunities to Contribute to Developing Livelihood & Economic Alternatives/Opportunities to Destructive Practices

Promotion of conservation agriculture in areas of biological significance (see above) is one opportunity to do this, which we recommend in Chapter 9. Payments for Ecosystems Services, such as conservation and restoration of mangroves, is another opportunity, which we also recommend in Chapter 9.

Opportunities to Contribute to Sustainably Managing Artisanal (and Other) Fisheries

Sustainable management of artisanal fisheries is needed to maintain their important contribution to the food security and nutrition of coastal communities, and will require capacity-building within these communities so that they can engage with national and local fisheries authorities in a meaningful way. Fisheries management following CBNRM principles is needed. Because of the ecological linkages between mangroves and fisheries, mangrove conservation and restoration in artisanal fishing communities.

Opportunities to Contribute to Improving Woodfuel Efficiency and Finding Alternatives

USAID-Mozambique would have an opportunity to contribute to this need, should it choose to do so in activities associated with other FTF or ATB Office NRM and biodiversity conservation activities.

Opportunities to Contribute to Other Actions Needed for Protecting the Environment and Biodiversity

The SOW for this ETOA specifically stated that "a focus on linkages to USAID/Mozambique's Health strategy and programs should be highlighted within the ETOA." There are many opportunities to link environmental management and biodiversity conservation to health issues, including:

- artisanal fishing and nutrition
- conservation agriculture (esp. legume crops) and nutrition
- wild plants and traditional medicine
- bio-prospecting for new drugs
- wood & charcoal fuel and respiratory diseases (esp. of women and children)
- diseases transmitted between wildlife and humans and/or domestic animals (sometimes called “conservation medicine or “environmental medicine”)
- diversion of bed nets for fishing

In Chapter 9 we recommend that the new USAID-Mozambique CDCS incorporate artisanal fisheries into the Health Program.

Fish market in Angoche, Nampula Province
Photo: B. Byers, Sept. 2012

9.0 RECOMMENDATIONS

The recommendations given below emerged from analysis of the information we gathered and presented in this report. Information about the severity and extent of threats to the various ecosystems of Mozambique, and their causes, discussed in Chapter 4 of this report, suggests priorities for conservation. Our content analysis of "actions necessary" for environmental conservation in Mozambique identified eight main themes, or categories of actions needed. The main types of ecosystems (Miombo Woodland/Forest, Coast-Marine (or Lake Niassa), and Coastal Forests) and the overarching themes can be arrayed in a matrix that could be used as a conceptual framework for designing strategies and programs to conserve biodiversity and tropical forests in Mozambique.

Our SOW called for the ETOA to "identify opportunities to integrate environmental management across USAID/Mozambique's strategic objectives." It also states that "This assessment will identify important linkages across sectors and new initiatives with respect to environmental conditions and threats which USAID/Mozambique must be aware of as it drafts its Country Development Cooperation Strategy (CDCS). The assessment will also provide recommendations for how best to address these conditions to protect the natural resource base and thereby continue to provide the goods and services needed for healthy communities and economic growth." We were told by the Mission's Program Officer (P. Wesner, personal communication) that:

- the ETOA should give recommendations relevant to the CDCS that is now being developed,
- the Mission is open to all suggestions, no programs are yet set in stone, and "everything is on the table right now," and
- ideally the CDCS will reflect a Results Framework that is integrated, not sectorally "stovepiped."

We therefore offer the following recommendations:

Integrate Environment and Conservation and Other USAID Programs Rather Than Segregate Them

One of the principles in the USAID Project Design Guidance (USAID, 2012, p.5) is: **"**Apply Selectivity and Focus: In the design process, selectivity means targeting resources in the specific sectors and sub-sectors, geographic areas, social or ethnic groups, institutions, and/or systems through which interventions will yield the highest probability of success."

Although the ATB Initial Environmental Examination (IEE) states that the choice of geographic foci for their Feed the Future, Coastal City Adaptation Program, and proposed Biodiversity Program "… offer synergies with other Mission portfolio activities" (USAID-Mozambique, 2012c, p. 9), we believe that other, and/or additional, synergies would be possible if:

- some of the activities of these three programs themselves occurred in the same places, rather than occurring largely in widely separated places, and
- activities of other USAID-Mozambique programs (e.g., DG, Health, Education) were deliberately co-located in places with ATB projects that support improved environmental management and biodiversity conservation.

Geographic focusing, but in a sectorally "stovepiped" and unintegrated way, is preventing some good opportunities for synergy among USAID-Mozambique's programs from being realized. One such missed opportunity, for example, is not investing in "conservation agriculture," a component of FTF, in communities living in and around protected areas. Another example is the missed opportunity to link biodiversity conservation, nutrition (FTF and Health), and food security (FTF) by supporting the development of sustainable artisanal fisheries. The issue of geographic focusing should be conceptually revisited. Table 9.1 suggests some of the opportunities, thematically and geographically.

Table 9.1 Theme by Ecosystem Matrix Showing Cross-Sectoral Opportunities

Theme	Ecosystem		
	Miombo Woodland/Forest	**Coast-Marine (or Lake Niassa)**	**Coastal Forests**
Improve Enforcement of Environmental Laws	Niassa NR Lake Niassa NR Gorongosa NP	Lake Niassa	
Build Capacity of Communities, Civil Society Organizations, and the Media for Meaningful Engagement in Environmental Decision Making	DG synergies (and Biodiversity Program "advocacy" objective)	DG synergies(and Biodiversity Program "advocacy" objective)	DG synergies
Stop Forest Conversion to Agriculture & Stabilize the Agricultural Frontier	FTF synergies		FTF synergies
Improve Land Use & Coastal Zone Planning	DG synergies	DG synergies	DG synergies
Coordinate and Harmonize Actions of Relevant Ministries & Agencies & Develop a Functional Institutional Structure for Sustainable Environmental Management			
Develop Livelihood & Economic Alternatives/Opportunities to Destructive Practices	Niassa NR Lake Niassa NR Gorongosa NP	CCAP (PES for Mangrove "green infrastructure")	
Sustainably Manage Artisanal (and Other) Fisheries		Lake Niassa NR FTF and Health synergies	
Improve Woodfuel Efficiency and Find Alternatives to Wood and Charcoal			
Other (climate change adaptation, environmental information, behavior-change, fire control, human-wildlife conflict, financial sustainability of PAs, etc.)	Niassa & Lake Niassa NRs, Gorongosa NP (ecosystem-based approaches to climate change adaptation)	CCAP (mangrove "green infrastructure")	

KEY
Proposed Biodiversity Program
Democracy and Governance Opportunities
Feed the Future (FTF) Opportunities
Coastal City Adaptation Program Opportunities

Review and Redesign the Proposed Biodiversity Program

Section 8.2 summarized USAID-Mozambique's current and proposed programs. The Biodiversity Program that is being proposed by the ATB Office is potentially a key way in which USAID-Mozambique could support the "actions necessary" for environmental and biodiversity conservation in Mozambique identified by the ETOA. Since the ETOA Team reviewed information about this proposed program (USAID-Mozambique, 2012a; 2012b) it has been modified (J. Katz, personal communication), and we have not been provided with information about the details of those changes. However, placing what we know about the proposed ATB Biodiversity Program activities into the matrix shown in Figure 9.2 (pink-highlighted cells above), shows that the proposed project does not fully take advantage of the many opportunities discussed in Section 8.3 of this report.

The proposed project is mainly limited to supporting nature-based economic opportunites and advocacy for biodiversity conservation in or near protected areas. Much of the biodiversity that provides the foundation for Mozambique's sustainable development is found outside of its protected areas, and large areas of "biological significance" lie outside areas currently under formal conservation status. For these reasons, we believe that USAID-Mozambique would unnecessarily limit its opportunities to contribute to the actions needed for improved environmental management and biodiversity conservation if it only focused on the currently-proposed themes in three protected areas.

The currently-proposed ATB Biodiversity Program was designed on the basis of information about threats to biodiversity and tropical forests from the 2008 Mozambique Biodiversity and Tropical Forests 118/119 Assessment (USAID-Mozambique, 2008), and an analysis by the ATB Office (USAID-Mozambique, 2012a; R. Layng, personal communication). Given the new information obtained in this ETOA, we recommend that the proposed Biodiversity Program be thoroughly reviewed, and at least partially redesigned, using the updated evidence about actions needed for environmental conservation obtained by this ETOA. A review and redesign would be in line with USAID's current guidance on the "evidence-based design" of projects (USAID 2011c, p. 2). An open and strategic design process based on the current ETOA findings could lead, we believe, to a more effective and potentially catalytic investment of USAID biodiversity, climate change, and agriculture funding.

One of the proposed elements of the earlier proposals for the Biodiversity Program was support to ANAC, the new parastatal agency that is supposed to eventually run all of Mozambique's conservation areas. The status of this Agency is unclear to the ETOA Team, although we asked

many of our key informants about it. Political issues seem to be slowing its formation, and we believe it is premature for USAID to propose a component of financial support for ANAC in its new program until ANAC is in fact organized and running, and the political issues are sorted out by the Government of Mozambique.

Focus by Theme Rather Than Geographic Location

The ETOA Team recommends that a redesigned ATB Office program aimed at improved environmental management and biodiversity conservation focus on one or more of the eight main categories of "actions needed" that were identified in this ETOA. We believe a program with a thematic design would be more strategic, effective, and potentially catalytic of needed changes. It could potentially integrate ATB biodiversity and natural resources management activities with other Mission programs in a way that takes advantage of the multiple opportunities charted in Table 9.2 and discussed earlier in Section 8.3.

When USAID-Mozambique funds interventions in a particular location (e.g., Lake Niassa Reserve, Gorongosa NP, Quirimbas NP, Primeras and Segundas Marine Partial Reserve), the geographically-focused work should emphasize one or more of the selected themes. The site-based activities can then serve as a "case study," or pilot implementation, of actions needed under that theme. The lessons learned about that theme from that pilot investment should then be disseminated to other sites in other ecosystems, in the attempt to replicate them and learn lessons about scaling up.

Our highest recommendation is for a program that includes Theme 2, "Build Capacity of Communities, Civil Society Organizations, and the Media for Meaningful Engagement in Environmental Decision Making," cross-cutting across sites and ecosystems, and involving the Mission's DG Office. We also think USAID-Mozambique should take advantage of opportunities to link FTF and biodiversity and forest conservation through Theme 3, "Stop Forest Conversion to Agriculture & Stabilize the Agricultural Frontier," by applying FTF "conservation agriculture" techniques and technologies in sites of biological significance, including buffer zones of current or proposed protected areas.

Use CBNRM Capacity-Building to Link Biodiversity Conservation with DG

Our content analysis of interviews found that 23 "actions needed, " or 13% of the total, clustered under the general theme of "Build Capacity of Communities and Civil Society Organizations for Meaningful Engagement in Environmental Decision Making" (see Table 7.2). USAID-Mozambique's Democracy and Governance program lists strengthening the capacity of civil society and media to advocate for improved governance and accountability as one of its five objectives, stating that "USAID invests in Mozambican civil society organizations that promote better governance and monitor the performance of the delivery of key services by the government while serving as impartial watchdogs. Assistance will build the capacity of local organizations to help them understand and practice democracy, build coalitions, and advocate on behalf of the causes and communities they champion" (USAID-Mozambique, 2012d). Two otherobjectives of the DG Program also could contribute to this need:increasing transparency and reducing corruption, and strengthening local governance. It seems very clear that there is potential synergy between DG and biodiversity conservation and NRM under this theme.

Four of the 23 actions needed relate specifically to the need to develop an effective policy and legal "platform" for, and models of, community-based natural resources management in Mozambique. Although this need relates to all types of natural resources used by communities, one of the most important of these in Mozambique are the biodiverse fish and shellfish resources tapped by artisanal fisheries. These are extremely important to food security and nutrition for a large fraction of Mozambicans who live on the coasts. The USAID-funded Global Fish Alliance (G-FISH) has been working in Pemba, Mozambique, on local fisheries co-management, and has conducted a workshop (2011) and assessment (2012) to lay the groundwork for improved governance of local fisheries (G-FISH, 2011; McClanahan, et al., 2012). A statement from the 2012 assessment gives a sense of the relevance of this approach to the DG sector: "Management of resources relies heavily on the perceptions of resource users and managers, and their ability to share and implement common goals. The low probability of detection by enforcement patrols in fisheries suggests that the success of management is likely to be facilitated when stakeholders self-enforce management by agreeing on the types of management that they prefer, select leadership that represents and enforces their interests, and work collaboratively towards implementation of these activities. This is expected to require a blending of "top-down" and "bottom-up" approaches where the resulting co-management may require more democratic and collective agreement rather than technocratic imposition of decisionmaking." (McClanahan, et al., 2012, p. 3)

Since this category of "actions needed" was identified as addressing the causes of threats to biodiversity, it should be perfectly acceptable to USAID-Washington to use biodiversity-earmarked funds for community, media, and civil society capacity-building related to conservation or sustainable NRM, in places of biological significance (e.g., in or near protected areas, in forested areas or coastal areas not already designated as protected areas).

CARE-WWF Primeiras and Segundas Program's Farmer Field School team meets with Saja Village, Nampula Province
Photo: B. Byers, Sept. 2012

Use Conservation Agriculture to Link Biodiversity Conservation and Agriculture

Our content analysis of interviews found that 20 "actions needed," or 11% of the total, clustered under the general theme of "Stop Forest Conversion to Agriculture & Stabilize the Agricultural Frontier" (see Table 7.2). Some of the points made by key informants under this theme include the need:

- to increase yields of crops for small farmers through improved varieties & farming practices
- for an agricultural extension service that bridge the gap between research (IIAM) and farmers
- to promote "conservation agriculture" that maintains & increases soil fertility on the same plot of land
- to improve agricultural practices & crop yields (e.g. maize, rice, beans).
- To develop (IIAM) crops & varieties suited to local soils (poor & dry/sandy)

The "conservation agriculture" component of the Mission's FTF program is clearly relevant to meeting these needs: "the Conservation Agriculture project aims to improve the productivity and

incomes of smallholder farmers by promoting drought tolerant crop varieties, improving soil fertility and increasing moisture retention. The project builds upon USAID research/technology transfer and food security programs to generate and disseminate improved seed varieties and sustainable farming management practices." (USAID-Mozambique, 2012c, p. 13).

We strongly recommend that promoting conservation agriculture with small farmers in forest areas of biological significance (e.g., high-value miombo woodlands, coastal forests, buffer zones of protected areas) in order to help stop the expansion of farms into forests through "slash and burn" farming be a theme of the ATB natural resources management and biodiversity conservation program under the new USAID-Mozambique CDCS. Forest loss and degradation to slash and burn agriculture is the biggest threat to forests in Mozambique, including those in and near protected areas. If attention is not focused on this cause of the most important overall threat to terrestrial biodiversity in Mozambique, it has the potential to completely overwhelm and waste the investments USAID may have made in biodiversity conservation in protected areas or elsewhere. This should be a high priority.

As was the case for our previous recommendation, since this category of "actions needed" was identified as addressing the causes of threats to biodiversity, it should be perfectly acceptable to USAID-Washington to use biodiversity-earmarked funds for this kind of activity in places of biological significance (e.g., in or near protected areas, in forested areas or coastal areas not already designated as protected areas).

Incorporate Mangrove Conservation and Restoration Into the CCAP Program

One of the "illustrative activities" for Objective 1 listed in the CCAP SOW is: "Rehabilitate natural coastal protection measures, for example, mangrove forests, dunes, and dune vegetation to control erosion and reduce the impacts of storm surge " ((USAID-Mozambique, 2012b, p. 4).

The cities already selected for partnerships are Pemba and Quelimane. These municipalities were selected based on several criteria, including vulnerabilities to climate change such as vulnerability to coastal or inland flooding, epidemics, cyclones, need for replanting or revival of mangrove areas, need for local drainage, inland zoning, building codes, etc. ((USAID-Mozambique, 2012b, p. 6) One of the results of CCAP in targeted municipalities is "Increased application of "soft engineering" climate adaptation measures in urban areas (i.e., mangrove buffer zones, etc.)" (USAID-Mozambique, 2012b, p. 2)

Mangroves as "green infrastructure" are an example of ecosystem-based approaches to climate change adaptation (CBD, 2009; IUCN, 2009; TNC, 2010; UNFCCC, 2011). A consensus seems to be emerging among both conservation and development organizations that biodiversity conservation is fundamental for societal adaptation to climate change, to ensure the continued delivery of ecosystem services that increase resilience to climate change.

Beach at Inguri, low-lying neighborhood in Angoche, where approximately 30,000 people live on a peninsula only a few meters above sea level; a few remaining mangroves visible upper left.
Photo: B. Byers, Sept. 2012

Mangroves provide physical protection from cyclones, winds, waves, and storm surges they offer, and their ability to trap and hold sediment and thereby build land are ecosystem services they provide. Mangroves forests are themselves an example of biodiversity at the ecosystem level, and they are reservoirs of species diversity. Nine species of mangrove trees are found in Mozambique. Mangroves serve as nurseries and refuges for hundreds of birds, fish and invertebrate species. They are essential to the productivity and health of artisanal and offshore fisheries. According to the WWF-CARE Policy Brief "Making Adaptation Pro-Poor and Pro-Ecosystem," "mangroves can reduce storm surge impacts — "green infrastructure" like mangrove forests should be included in adaptation measures. With poor communities' buy-in for such initiatives, restoration and maintenance of ecosystem function can be cost-effective and mutually beneficial. Incorporating ecosystem approaches into people-centered adaptation addresses the interdependency between vulnerable communities and the environment, [and] avoids significant additional pressures on natural systems." (WWF-CARE, 2011)

Mangrove restoration needed in many places, but the silvicultural science of how to restore each of the main species (there are nine species in Mozambique) in its proper intertidal zone is not complete. More pilot work on mangrove restoration needs to be done, and to be linked with CBNRM in coastal communities of fisher-farmers.

It is worthwhile noting that reducing deforestation and forest degradation in mangroves, and/or restoration of mangrove, is thus both an adaptation ***and*** a mitigation measure, not to mention a

biodiversity conservation measure. Mangrove trees, and the highly organic mud in which they grow, sequester carbon from the atmosphere, thus mitigating greenhouse gas emissions from fossil fuels and other sources.

We recommend that mangrove conservation and restoration be be a much stronger component of the CCAP program than currently seems to be planned, and that one or more additional cities be chosen (e.g., Angoche) in which mangroves may provide ***the*** main infrastructure for coastal city protection. Municipal PES mechanisms for mangrove conservation and restoration should be explored – that is, using public funding sources such as taxes for fees to pay the costs of mangrove conservation and/or restoration, in exactly the same was such fees might be used for "hard" infrastructure to protect coastal cities. The possibility that the carbon sequestration benefits of such mangroves could be sold on the international carbon market should also be explored, as a way of developing bundled PES mechanisms for different ecosystem services, one related to climate resilience and one related to climate change mitigation and low-emissions development. Through the US Forest Service International Programs, USAID has supported early steps to measure mangrove carbon stocks, information that would be needed in designing carbon-market PES mechanisms for mangrove conservation and/or restoration.

Mangrove restoration near Namizope Village, Nampula Province
Photo: B. Byers, Sept. 2012

Incorporate Artisanal Fisheries Into the FTF and Health Programs

Our content analysis of interviews found that our key informants mentioned the need to "Sustainably Manage Artisanal (and Other) Fisheries" nine time, or about 5% of the total list. Artisanal fisheries are extremely important for the food security and nutrition of Mozambique. According to the African Development Fund, "Since over two thirds of the population live within 150km of the coast, the fisheries sector is an important source of both animal protein and employment. Some 90 000 people are employed in the sector -involved directly in fishing and fish gathering; fish processing and marketing. 90% are artisanal fishers, or those associated with the artisanal fisheries handling and distribution activities. About 50% of the people's protein intake are estimated to come from fish products. Fisheries become even more important to the coastal provinces as a large part of the population depends on fisheries for their livelihood." (ADF, 2001, p. vii).

The FTF Program has improving nutrition as one of its objectives. "The objective of Feed the Future program (FTF/Mozambique) is to increase equitable growth in the agriculture sector and to improve the nutritional status of Mozambicans in focus provinces….The integration of nutrition activities will be based on P.L. 480, Title II experience in Mozambique, which has shown that improved agricultural production and incomes alone will not have an impact on nutritional status. A set of comprehensive nutrition activities will be integrated with agricultural activities with a particular emphasis on improving access to nutritious foods, nutrition-related behaviors and health services." (USAID-Mozambique, 2012c, p. 13) This seems to the ETOA Team to provide a significant point of linkage with a significant category of "actions needed" to conserve biodiversity and natural resources. We believe that linkages with the USAID-Mozambique Integrated Health Program is likewise important, because nutrition is a component of that program.

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ANNEX B: ETOA SCOPE OF WORK (SOW)

Scope of Work
U.S. Forest Service – USAID/Mozambique
2012 Environmental Threats and Opportunities Assessment (ETOA)

1. Purpose

The purpose of this work is to conduct a country-wide assessment of environmental threats and opportunities, incorporating biodiversity and tropical forestry conservation needs and related issues, for the purposes of complying with sections 117, 118, and 119 of the Foreign Assistance Act of 1961, as amended, and to inform the USAID/Mozambique mission in strategic planning, under ADS 201.3.4.11 and ADS 204.5. This assessment will identify important linkages across sectors and new initiatives with respect to environmental conditions and threats which USAID/Mozambique must be aware of as it drafts its Country Development Cooperation Strategy (CDCS). The assessment will also provide recommendations for how best to address these conditions to protect the natural resource base and thereby continue to provide the goods and services needed for healthy communities and economic growth.

2. Background

2.1 Policies Governing Environmental Procedures

USAID environmental compliance is directed by U.S. policy and law. The Foreign Assistance Act (FAA) of 1961, Section 117, requires that the President take fully into account the impact of foreign assistance programs and projects on environment and natural resources (Sec 117 (c)(1)).

Section 118 states that each country development strategy statement or other country plan prepared by the U.S. Agency for International Development shall include an analysis of (1) *the actions necessary in that country to achieve conservation and sustainable management of tropical forests*, and (2) *the extent to which the actions proposed for support by the Agency meet the needs thus identified*. ADS 201.3.8.2 states that this is a mandatory analysis for country strategic plans.

Section 119 of the FAA relates to Biodiversity and Endangered Species. It states that "Each country development strategy statement or other country plan prepared by the Agency for International Development shall include an analysis of (1) the actions necessary in that country to conserve biological diversity and (2) the extent to which the actions proposed for support by the Agency meet the needs thus identified" (FAA, Sec. 119(d)).

2.2 Strategic Planning Process

The last ETOA was conducted in 2002, the last 118/119 in 2008, and USAID/Mozambique is currently in the process of developing a new CDCS. Incorporation of environmental threats and opportunities into USAID/Mozambique's strategic planning process will help to ensure compliance with the above regulations as well as ensure that activities are conducted in an environmentally sound manner. In addition, the ETOA will inform strategic objectives on how to better address and integrate critical environmental issues that affect and/or are affected by their

programs to enhance results across the Mission's strategy. This is especially important in the context of a rapidly changing programmatic environment within USAID/Mozambique but also within the Agency.

Mozambique has many new initiatives being implemented including the Global Health Initiative, Feed the Future, and Global Climate Change initiative. In addition, the USAID Forward reform agenda brings additional complexity to questions of capacity and effectiveness of USAID programming to conserve and mitigate impacts to biodiversity and tropical forests. To address the expanded scope in programs and priorities, the assessment will examine potential threats, causes and actions needed related to the conservation of tropical forests, biodiversity, and environment in general. It will then consider the extent to which USAID's proposed programming in all its SO sectors may contribute to meeting those actions needed. The ETOA will look for innovative, integrated strategic approaches that link forests, biodiversity, and environment to all USAID programming sectors and opportunities to address global climate change, food security, water governance and global health issues.

2.3 USAID Programs in Mozambique

GOVERNING JUSTLY AND DEMOCRATICALLY

For the past five years, USAID has worked to increase transparency and accountability in local governments and improve their capacity to deliver quality public services to all Mozambicans. USAID supports a capacity-building program that benefits members of the Attorney General's Central Office to Combat Corruption, as well as prosecutors and investigators from all 11 provinces. Improving democracy and governance is a top priority for USAID, and activities are being developed that focus on ensuring accountability, reducing corruption, and building civil society capacity.

INVESTING IN PEOPLE: HEALTH

Despite some of the worst health indicators in Africa, Mozambique is making significant progress in reducing mortality rates and improving access to primary health care services. USAID and the Ministry of Health are building the capacity of the public health system to ensure that quality basic health services are more accessible to the rural poor. To help prevent malaria—Mozambique's most serious health threat—USAID has purchased and distributed over a million insecticide-treated bednets. With USAID assistance, 87 percent of children are now fully immunized by their first birthday, and over 200 health facilities have been rehabilitated and equipped.

Sixteen percent of Mozambicans—1.7 million people—have HIV/AIDS; 58 percent of that total are women. USAID provides two-thirds of all the antiretroviral drugs taken by Mozambicans and supports Ministry of Health efforts to ensure availability of laboratory reagents and HIV/AIDS rapid test kits. Technical assistance improves the logistical management of medicines and medical supplies. USAID-managed mass media and community-based messaging reaches over 7 million Mozambicans with information on how to prevent HIV/AIDS.

INVESTING IN PEOPLE: EDUCATION

In Mozambique, 94 percent of girls enroll in primary school. Yet only 11 percent continue on to study at the secondary level, and just 1 percent moves to the college level. Among children who

finish primary school, six out of every ten leave the system without appropriate skills in reading, writing, and math. Over the next five years, one of USAID's primary goals will be to expand opportunities for quality education and training.

ECONOMIC GROWTH

Although the poverty rate is decreasing, Mozambique is still among the world's poorest countries, with 54 percent of the country living below the poverty line. USAID is helping thousands of vulnerable households improve their food security by adopting more productive agriculture technologies, improving nutrition and health practices, and connecting farmers to agricultural markets. USAID is also developing and strengthening farmer associations and agribusinesses; sales of agricultural commodities through these organizations increased from $12.5 million to $14.0 million during 2008 alone.

Mozambique's economic growth has been strong and sustained, with the gross domestic product growing at 4.5 percent in 2009. USAID is helping the Government of Mozambique and the private sector expand international market access for Mozambican products and enhance Mozambique's competitiveness by promoting labor-intensive exports, supporting sectors with high potential for job creation such as tourism, and improving the business climate. USAID supports tourism development zones and a framework for investments that help protect Mozambique's environment and natural resources. Through a public-private partnership, USAID is helping to reestablish Gorongosa Park as an ecotourism destination and to establish a marine reserve on Lake Niassa.

2.4 New Developments and Emerging Environmental Issues in Mozambique

Several new developments in Mozambique during the last decade could pose significant threats on the environment while at the same time offering real economic growth potential. The issues described below are designed to help guide and orient the ETOA team's preparations and research.

- Mineral deposits and extractive industry development – Newly discovered coal deposits in the Tete Province and hydrocarbons (natural gas, oil, and tarsands) off the coast of the Cabo Delgado Province have spurred significant expansion in the mining industry and rural infrastructure development. It is estimated that the revenues from these resources could double Government income, significantly changing the politics of natural resource management at a national scale. Heavy sands (titanium) are also of interest, as various sites along the coast of Mozambique are being studied for potential titanium extraction.
- Forest plantations – Large plantation concessions have been agreed upon with international forestry companies for the development of exotic plantations for export throughout the rural provinces, specifically the Niassa, Sofala, Manica and Zambezia provinces. The ongoing establishment of these plantations has already significantly increased job growth, but also experienced challenges in regards to land-use planning. Furthermore, not all the land in the concessions is degraded, and some companies have expressed interest in setting aside and restoring natural forest areas within their concessions. The 20% community benefit sharing law for forestry is also of particular interest.
- Eco-tourism development – Mozambique holds great potential with its coastline and natural resources for eco-tourism development. A cheaper alternative to its neighbor

South Africa, the national parks and reserves in Mozambique are slowly being rehabilitated with basic management re-established and the re-introduction of charismatic species. Game management areas in and around the Niassa Reserve for example are starting to turn a profit for the management authorities.

- Coastal development – The Government of Mozambique has engaged IMPACTO to produce a comprehensive development strategy and environmental assessment document for the entire coastline of Mozambique, highlighting the national priority for its development. Infrastructure (road, port, etc) development and expansion as well as extractive and tourism industry development will significantly alter the coastal landscape in the coming years.[1]

Furthermore, there are certain priority environmental issues unique to Mozambique that should be addressed:

- Climate change vulnerability – Science has confirmed that the Earth's climate is warming. Mozambique has been identified as being significantly vulnerable to climate change variation (increased temperatures, reduced precipitation, increased drought and other extreme weather events such as floods and hurricanes). These changes will have significant impacts on both terrestrial and marine ecological resources. Changing temperatures may also impact the length of seasons and ultimately change the migration patterns of a host of wildlife species.
- Coastal and disaster vulnerability – The long coast of Mozambique and situation of most of its population exacerbates the climate vulnerability of the country, especially to coastal natural disasters such as hurricanes. The National Disaster Management Institute (INGC), while located in the weaker Ministry of Environmental Coordination, is relatively strong and has significant donor support, recently producing several valuable studies and research in this area. Their work includes climate modeling and analysis of nine societal pillars, identifying the most vulnerable sectors and adaptation and mitigation strategies/activities.
- Parastatal Protected Area Management Authority – The Government of Mozambique is in the process of re-organizing its management of protected areas through the establishment of a new semi-autonomous parastatal agency, ANAC (*Administração Nacional das Áreas de Conservação*). ANAC will take over management of protected areas from the *Direcção Nacional das Áreas de Conservação* (DINAC) within Ministry of Tourism, and will be responsible to raise 75% of its own operating costs.

These will be important issues to consider in the ETOA.

3. Statement of Work

The ETOA team will assess the threats to biodiversity and tropical forests in Mozambique, the causes of those threats, and the actions necessary to address and mitigate those causes. Opportunities for USAID to contribute to the necessary actions will be identified, taking into

[1] The report is still being worked on. Impacto hopes to complete it by August 2012.

account the actions of the Government of Mozambique, international donors, and NGOs. The findings of the assessment will be reported in an assessment report.

3.1 Tasks

The tasks embodied in this SOW will include:

i. **State of the Environment**: An overall assessment of the status and trends of Mozambique's environment, especially biodiversity and tropical forest resources.

ii. **Social, Economic and Political Context**: An overview of the social and economic context of the country as well as a section on the governmental institutions, policies, and laws affecting the sustainable management and conservation of biodiversity and forests, and their enforcement and effectiveness.

iii. **Threats to the Environment**: Recent, current, and potential *primary* threats to the environment, biodiversity, and tropical forests; whether they are ecological (i.e., climate change, fire, pests), related to human use (i.e., agriculture, contamination), or institutional (i.e., failed policy, lack of enforcement) or transboundary issues, as appropriate. Impacts of climate change should be included here.

iv. **Government, NGO and other Donor Programs and Activities**: This section should include recent, current, and planned activities by donor organizations that support biodiversity and tropical forestry conservation as well as identification of multilateral organizations, NGOs, universities, and other local organizations involved in conservation. A general assessment of the effectiveness of these programs and activities to achieve biodiversity conservation should be included. Cross-referencing conservation needs with government priorities, conservation needs that lack donor or local support should be highlighted.

v. **Actions Needed and Opportunities to Conserve Biodiversity and Forests:** An analysis of actions needed to conserve biodiversity, including tropical forests, and to ensure sustainable environmental management, based on threats and their causes, will be presented in the report.

vi. **Linkages to USAID Strategy and Programs**: The report will discuss the extent to which USAID-Mozambiques current and proposed activities address the actions needed for conservation of biodiversity, forests, and the general environment. It will also call attention to environmental concerns raised by proposed activities, and identify opportunities to integrate environmental management across USAID/Mozambique's strategic objectives. The report will discuss opportunites related to USAID-Mozambique's:

   (a) Health Program: A focus on linkages to USAID/Mozambique's Health strategy and programs should be highlighted within the ETOA (disease vectors, climate change, social science, etc).

   (b) Feed the Future (FTF) Program: Agriculture issues related to such as land use and conversion of natural habitats, use of water, pesticides, and fertilizer be examined.

   (c) Other Areas of Interest: Due to prospective programming, USAID also requests that additional focus and analysis be included on the areas of:
   (i) Coastal Zones and Coastal Ecology
   (ii) Climate Change
   (iii)Disaster Preparedness and Adaptation

(iv) Eco-tourism
(v) Extractives – especially coal and hydrocarbons

3.2 Approach

Prior to traveling to the field, the contractor is expected to perform the following activities:

i. Hold meetings with the Bureau Environmental Officer (BEO) in the appropriate USAID/Washington bureau to ensure full understanding of USAID environmental procedures, the role of the regional bureau in environmental compliance, and purpose of this assignment. A meeting with the Regional Environmental Officer, Walter Knausenburger is also recommended. Discuss policy decisions and approaches that the BEO and agency environmental advisor are taking as per their authority under Reg.216.

ii. Gather and review background information on Mozambique, such as the country's natural resources, geography, , current status of the environment and biodiversity, institutional organization at both national and statutory levels, key stakeholders and donors in environment and natural resource management, legislation related to the environment and biodiversity, and other relevant information required for the country assessment.
    a. Important reference documents are listed in Annex 1.

iii. Meet or speak with key stakeholders or managers at the World Bank, MCC/MCA, USFWS, and U.S.-based NGOs including World Wildlife Fund, Wildlife Conservation Society, Carr Foundation, and other organizations involved in biodiversity conservation in Mozambique or relevant regional efforts.

3.3 In Country Field Objectives/Tasks

- ETOA team will conduct the assessment per the SOW above. Upon arriving in Mozambique the team will:
    - Meet with USAID/Mozambique to get a solid understanding of Mission program goals and objectives and its vision going forward; perspectives of this assignment and specific interests for the team, including advice and protocol on approaching USAID partners and host country organizations with respect to this assignment. The team shall be aware of sensitivities related to an assessment exercise (i.e., the potential for raising expectations, and the need to be clear about the purpose of the assessment) and respect Mission guidance. The team will discuss organizations to be contacted and any planned site visits with the Mission and coordinate as required. USAID/Mozambique will facilitate meetings with USAID Strategic Objective teams.
    - Hold meetings with development partners, NGOs, relevant government agencies, and other organizations that are knowledgeable about biodiversity and tropical forestry conservation or are implementing noteworthy projects and gather information locally.
        - Some priority stakeholders are listed in Annex 2.
- Conduct at least two site visits to gather field-level information in support of the ETOAThe sites for the field visit will be determined by the team during the assessment in consultation with USAID.

- For site visits, USAID recommends that the ETOA team visit the Nampula and Zambezi provinces, priority provinces for USAID programming, including FTF and Health.
  - Additionally, Tete and Cabo Delgado hold importance for extractives (coal, heavy sands, LNG) and tourism (Cabo).
  - Manica and Niassa are also of interest for forestry issues.
- Sites for the ETOA team to visit will be discussed and finalized with the USAID ABT team prior to the field mission.

3.4 Timing

The ETOA will be carried out to inform the final USAID/Mozambique CDCS process to be developed in Fiscal Year 2013 and, therefore, should be completed no later than October 2012.

3.5 Illustrative Level of Effort

USAID anticipates the assessment can be completed in approximately 12 weeks by a team of at least four full-time members, one of whom is the team leader. USAID requests a four week in-country field mission, including 2-4 site visits outside of Maputo. The team leader shall have USAID experience, with hands-on experience conducting assessments and be familiar with USAID environmental regulations and strategic planning processes. Experience in Mozambique is preferred. In order to address issues affecting Mozambique, team members should have a combination of skills and knowledge in biodiversity, natural resources management, institutional development, policy, and economics. At least two team members shall be Mozambican, who are knowledgeable about environmental and economic growth issues in Mozambique, with one member having recent Government of Mozambique experience.

3.6 Relationships and Responsibilities

The Contractor shall report to the USAID/Mozambique Mission Environmental Officer and the Natural Resources Officer. The Contractor will be responsible for identifying and obtaining reference materials needed for this study with support from USAID/Mozambique.

3.7 Deliverables

There shall be four deliverables under this contract:

i) Preliminary Work Plan and Schedule: The Contractor shall provide USAID with a work plan and schedule at least two weeks prior to the agreed upon field mission. The work plan and schedule shall also contain a list of those individuals and agencies that are to be interviewed, and a list of reports, evaluations, etc., to be reviewed.

ii) In-Country USAID Exit Briefing: Upon conclusion of the field mission, the team shall meet with USAID/Mozambique to provide them with a briefing on the preliminary findings.

iii) Draft Report: The Contractor shall submit a draft report to the ATB office of USAID Mozambique no later than four weeks after the end of the field mission. The draft report shall follow the outline provided in the SOW, as refined during the course of the contract in consultation with USAID. The report shall not exceed 60 pages, in English, excluding suitable annexes and pertinent figures (maps, institutional charts, tables) and references. Among the expected appendices is a briefly annotated

bibliography of the most important current reference materials related to the topic and a contact list for each of the organizations discussed in the report. USAID will provide comments on the draft report within two weeks of receiving it from the ETOA team.

iv) Final Report: The final report is due no later than two weeks after receiving USAID/Mozambique's comments on the first draft report. The Contractor will furnish both electronic file versions of all submissions (first draft and final report) and five copies in English, including one photocopy ready version of the final report.

Annex 1: Important Reference Documents

- General
  - 2012 Economist Intelligence Unit Report
  - Poverty Reduction Strategy (PARPA 2 or PARP 3): www.imf.org/external/pubs/ft/scr/2011/cr11132.pdf
  - Others to be added nearer to mission?
- USAID
  - CDCS Guidance
  - Country Assistance Strategy (CAS) – to be updated as CDCS in 2013
  - Portfolio Implementation Review (PIR) – ATB, DG, Health, and Education offices
  - FTF Moz Strategy – June 22, 2011
  - 2002 ETOA
  - 2008 118/119
- Environmental/Biodiversity
  - WWF docs (Biofund, Quirimbas, Lake Niassa, Zambezi delta, etc)
  - Coastal strategic environmental response (IMPACTO)[2]
  - Carr Foundation reports – Gorongosa
  - Others?
- Climate Change
  - National Disaster Preparedness Institute (INGC)
    - Phase 1 summary report - Climate Modeling
    - Phase 2 – Analysis of 9 societal sectors
    - Phase 3 in development
  - Moz RPP – Forest Carbon Partnership Facility
  - APA – National Adaptation Action Plan (NAPA)
  - USAID Urban CC project SOW – forthcoming
    - https://www.fbo.gov/index?s=opportunity&mode=form&id=e913a8aae0478f8392e1528425fe1636&tab=core&_cview=1
  - Others?
- Extractive documents
  - CTA newsletters
  - Natural Gas findings
  - Coal in Tete
  - Tarsands & Heavy sands (titanium)
- Forestry
  - TechnoServ Agroforestry Village Reports/documents – plantation forests
  - C4K report on benefit sharing
- Tourism
  - SOW for USAID Toursim BioD project
  - Others?
- Agriculture
  - USAID FTF strategy

[2] Malene Wiinbald, Dutch Consultant working with MICOA will inform of the latest: wiinbald.espsii@gmail.com

- Title II documents?
- TechnoServ USDA Food for Progress project
- Others?

Annex 2: Priority Stakeholders

- Government
  - Min Environmental Coordination
    - INGC
  - MinCoA
  - Min Ag/Forest
  - Min Tourism
  - ANAC
  - Min Planning and Development
  - Min mining/extractives/industry
- Donors
  - USAID
    - ATB (EG) – 50% funding
    - DG – land and extractives
    - Health (40% funding)
    - Education (secondary)
  - Norwegians - REDD
  - UNDP – Africa adaptation program, program summaries
  - World Bank – Greater Limpopo TransFrontier Conservation Area
  - Fins – plantation forestry
  - JICA – MRV/REDD
  - GIZ – sanitation of north, adaptation
  - MCA? – infrastructure, roads – coconut plantation disease
- NGOs
  - WWF – general
  - TNS – plantations
  - IMPACTO – EIAs, coastal strategy, health
  - Centro Terra Viva - governance
  - Verde Azul – EIAs
  - CARR foundation – Gorongosa
  - Environmental Justice
  - WCS/FFI/SGDRN – Niassa
- Other
  - University Eduardo Mondlane – advise govt on policy formulation
    - Dept of Biology, Forestry, Geography

ANNEX C: BIOGRAPHICAL SKETCHES OF THE ETOA TEAM

Bruce Byers, **Team** Leader, is a biodiversity conservation and natural resources management specialist with more than 25 years of experience in this field. His work combines an academic background in ecology and conservation biology with extensive practical experience in both applied ecology and social sciences. Dr. Byers has had extensive field experience in Asia, Africa, Europe, and Latin America; he has worked professionally in more than 30 countries. He has served as team leader for numerous major evaluations, assessments, and strategic planning exercises for USAID and international NGOS. He was the lead consultant and author of the 2005 USAID publication ***Tropical Forestry and Biodiversity (FAA 118 and 119) Analyses: Lessons Learned from Recent USAID Experience and Guidelines for USAID Staff***, which was based on a review of more than 30 USAID FAA 118-119 and ETOA reports. Dr. Byers was the senior advisor and lead technical writer in preparation of the USAID guide for biodiversity conservation programming: ***Biodiversity Conservation: A Guide for USAID Staff and Partners (2005)***. In 2008, he led the final evaluation of the USAID Global Conservation Program.

Rezia Cumbi, Wildlife Specialist

Ms. Cumbi received a Bachelor of Science Degree in Marine Biology from the University Eduardo Mondlane in 2004, and studied the abundance and distribution of the dolphins *Tursiops truncatus* and *Sousa chinensis* in Bazaruto Bay for her thesis. She has participated in a number of marine research surveys and wildlife censuses. She is currently studying for a Master's Degree in Natural Resources Management at UEM, and working at Ministry of Agriculture, Wildlife Department, as a specialist on human-wildlife conflict in Mozambique.

Mário Falcão, Forestry Specialist

Mário Falcão holds Bachelor of Science and M.Sc. in Forestry Finance and Project Evaluation from Stellenbosch University, South Africa, where he also received his Ph.D. in Forestry Management and Economics. Dr. Falcão is currently a Lecturer in the Department of Forest Engineering, Faculty of Agronomy and Forest Engineering, Eduardo Mondlane University, where he teaches a range of courses in Forest Economics. Dr. Falcão has participated in many research projects and consultancies, and is author or coauthor of many publications dealing with the economics of forest resources in Mozambique.

Felisbela Gaspar, Health Specialist

Felisbela Gaspar was trained as a biologist and ethnobotanist at Eduardo Mondlane University, and received a Master's of International Health Degree from the Faculty of Health Science, University of Copenhagen, Denmark, in 2009. Ms. Gaspar is a qualified Medical Technician, and has experience conducting field surveys in ethnobotany, environmental conservation, and health issues related to primary health care. As National Director of the Traditional Medicine Institute of the Ministry of Health, she is working on regulation and conservation of medicinal plants and other traditional medicinal resources, and on intellectual property rights for traditional knowledge related to traditional medicine. Ms. Gaspar has worked on a number of research and consulting teams with the World Health Organization and international NGOs such as UNICEF on issues related to malaria and HIV/AIDS.

Valerio Macandza, Wildlife & Conservation Specialist

Dr. Valerio Macandza holds a B.Sc. in Veterinary Medicine and an M.Sc. in Resource Conservation Biology from the University of the Witwatersrand, Johannesburg, South Africa. He received a Ph.D. in Wildlife Ecology and Conservation from that university in 2009, and is currently a Lecturer in Wildlife and Protected Areas Planning and Management,

Faculty of Agronomy and Forestry Engineering, Eduardo Mondlane University. Dr. Macondza has worked on a number of Environmental Impact Assessments, and on a range of studies and consultancies for MICOA and for WWF-Mozambique. He is author or coauthor of a number of scientific publications dealing with the ecology of antelopes and other grazers in and around Kruger National Park.

Marcos Pereira, Marine & Coastal Specialist

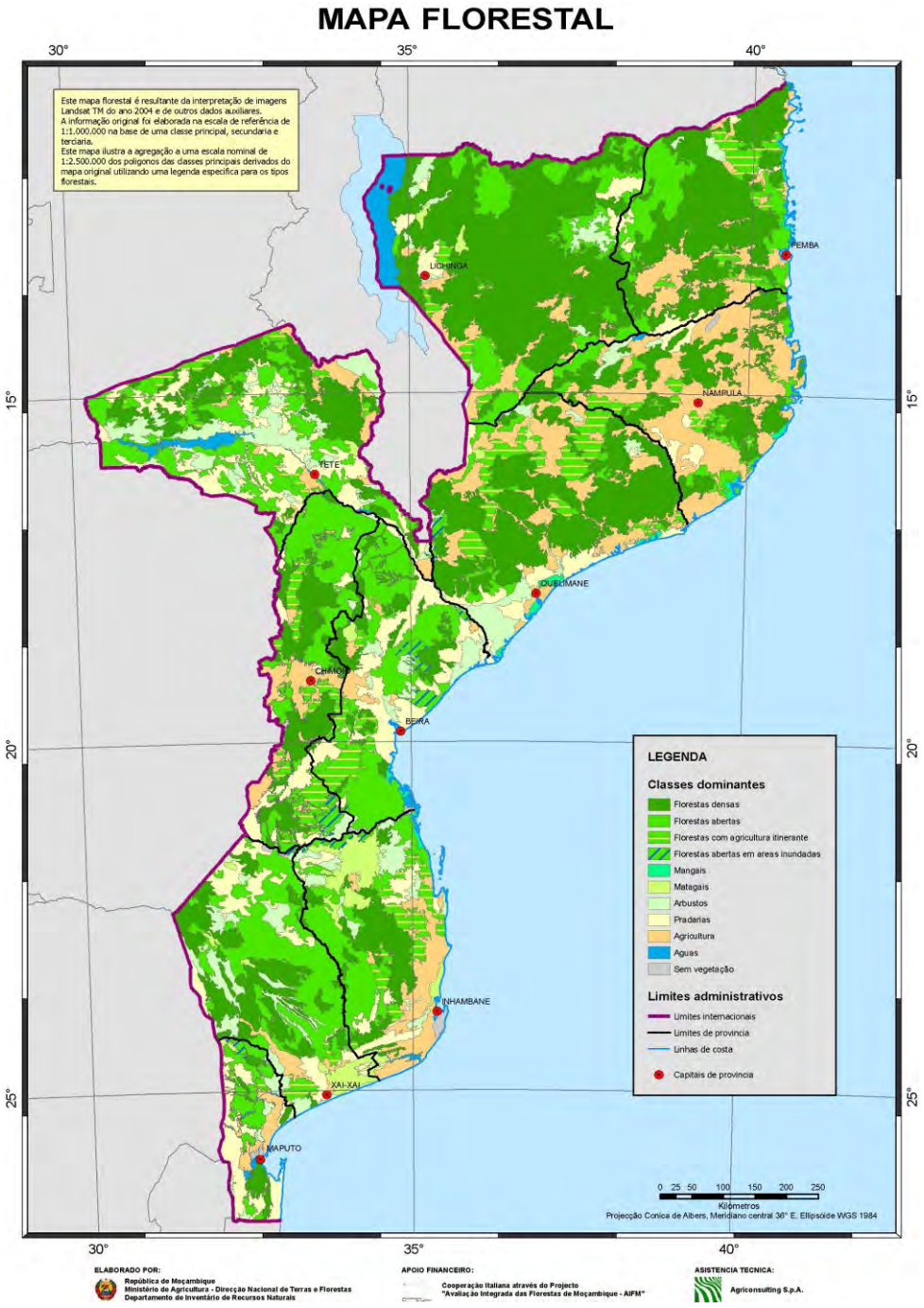
Marcos Pereira holds a Bachelor of Science Degree in Biology from Eduardo Mondlane University, and M.Sc. from the Oceanographic Research Institute, School of Life Sciences and Environment, University of Natal, Durban, South Africa. Mr. Pereira is a SCUBA diver and an expert on Mozambique's coral reefs, fishes, and sea turtles. He has participated in many research studies and consultancies on topics ranging from marine ecology to coastal tourism, and is the author or coauthor of many scientific publications in his field. He is currently an independent consultant based in Maputo.

ANNEX D: PERSONS CONTACTED, THEIR INSTITUTIONAL AFFILIATION, AND CONTACT INFORMATION

Organization or Institution	Person(s) Contacted and Title	Contact Information
WWF-Mozambique	Alice Costa, WWF-Mozambique, Marine & Coastal Program Coordinator	adabulacosta@wwf.org.mz +258827404770
WWF-Mozambique	Rito Mabunda, WWF-Mozambique, Forests Program Coordinator	ritomabunda@wwf.org.mz +25821483121
Eyes on the Horizon	Nick Raba, Director	nick.raba@kangela-mz.com +258843071940
UEM Biology Dept	Salomão Bandeira Filomena Barbosa, Herbarium Adriano Macie- Marine Sector Eng. Carla – Botany Dept.	sband@zebra.uem.mz filomenabarbosa@uem.mz adriano@zebra.uem.mz celia.macamo@uem.mz
Centro Terra Viva	Alda Salomão, Director Carlos Serra Jr. – Program Director	asalomao@ctv.org.mz Tel: +25821416131 cmanuelserra@gmail.com
MITUR/ACTF	Samiro Magane	
MITUR/ACTF	Afonso Madope	
IUCN	Roberto Zolho Richard Dixon, Senior Program Officer	
National Directorate for Environmental Management (DNGA)	Anselmina Liphola, National Director Sónia Muando + others	minaliphola@yahoo.com.br +25821466407 soniamuando@yahoo.com
National Directorate of Environmental Impact Assessment (DNAIA)	Rosalina Niquice, + technicians involved in EIA evaluation	
National Directorate of Lands and Forests (DNTF) meeting with	Mr. Paulo Barros Mr. Hilario Aquissa	
Government of Finland, Support to National Forestry Program	Berty van Hensbergen, President, SSC-Wood Technologies (consultant)	
Ponta do Ouro Partial Marine Reserve	Miguel Gonçalves, Reserve Manager	rmppo2009@gmail.com +258827276434
International Institute of Tropical Agriculture (Nampula Office)	Dr. Steve Boahen, Country Representative	s.boahen@cgiar.org +25826216381
CARE (Nampula Office)	Nicholas Dexter	
CARE-WWF Alliance Primeras & Segundas Program (Angoche)	John Guernier, Program Manager Marcos Assane,: Project Manager for Potone Sacred Forest zone Sabino Omar, Senior Advisor + Other Staff	jguernier@care-wwf-alliance.org +258823054201
Maputo Special Reserve	Armando Nguenha, Project Manager Rodolfo Cumbane, Ecologist	
IIAM (Agronomic Research Institute of Mozambique	Iva Carla Vaz: Herbarium Deparment	
UN	Casemiro Sande, Disaster Management Specialist	

Nampula Provice, Forestry and Wildlife Department	Ali Awasse, Technician	
Traditional Medicine Association (AMETRAMO), Nampula	Jane Muarica Batista**:** Head, Institute of Traditional Medicine-Nampula Provincial Health Directorate <u>Traditional Healers</u> Miguel Kupula Uazir Antonio Irene Inchokoba Augusto Tarique Hilario Tauancha Pantao Momade Ibrahimo Namoro Antonio Mecota Miguel Seia Agostinho Joao Ana F. Salvado Aiupa Antonio Constantino Acide Faz Bem Estevao Nivura	
Traditional Medicine Association (AMETRAMO), Angoche	Bernardo Jamal**:** Head, AMETRAMO <u>Other members</u>: Arminda Momade Jacinta Picar Alfredo Mopuita Francisco Mussa Lourenco Cigarro Fatima Aly Antonio Gabriel Arminda Antonio Muanjucua Faque Jarua Ossufo Rabia Couve Margarida Bacar Rabia Ronda	
Namutoria Village in Potoni Forest	<u>Local traditional leaders</u> • Secretary of the Village Natural Resources Management Committee • Chairman of the Committee • Adviser to the Committee <u>Other participants</u> • 6 forest rangers • 19 community members (9 men and 10 women)	
WWF-US	Caroline Simmonds, Deputy Director, Coastal East Africa	Tel: 202-495-4188 caroline.simmonds@wwfus.org
	Melissa Moye, Director of Conservation Finance	Tel: 202-495-4678 melissa.moye@wwfus.org

ANNEX E: LAND COVER 2007 MAP



Land Cover

Source: Marzoli, 2007a. National Forest Inventory, p. 14

ANNEX F: SUMMARY OF NGO PROGRAMS

International NGOs

NGO	Mozambique Focus Areas (geographical and/or thematic)
Carr Foundation	Gorongosa National Park
CARE	CARE-WWF Alliance Primeras and Segundas Program
Environmental Justice Network Forum	Toxic waste incineration? António Serra Jr. – was added by some team member as a contact?
Fauna & Flora International (FFI)	Niassa Reserve, Mt. Mabu
Global Fish Alliance (G-FISH)	Pemba
International Union for Conservation of Nature (IUCN)	
Peace Parks Foundation	Great Limpopo TFCA; Maputo Special Reserve & Ponta do Ouro Partial Marine Reserve
World Wide Fund for Nature (WWF)	
Wildlife Conservation Society (WCS)	Great Limpopo TFCA, human-wildlife health
Western Indian Ocean Marine Science Association (WIOMSA)	

National NGOs

NGO	Focus Area
Centro Terra Viva (CTV)	
Livaningo	
Sociedade para Gestão e Desenvolvimento da Reserva de Niassa (SGDRN)	Niassa Reserve

ANNEX G: SUMMARY OF DONOR PROGRAMS

Donor	Focus Areas/Notes
African Development Bank (AFDB)	
DANIDA	
DFID	
FAO	
FINNIDA (Finland)	plantation forestry
GIZ (Germany)	sanitation in north, [climate change?] adaptation
JICA (Japan)	REDD and MRV
Millennium Challenge Corporation (MCC) (US)	infrastructure, roads; coconut plantation disease
NORAD (Norway)	REDD+
SIDA (Sweden)	
UNDP	Sustainable Financing of Mozambique's Protected Areas (UNDP-GEF 2011-2015
World Bank	Greater Limpopo Transfrontier Conservation Area
USAID	See Chapter 8 for review

Source for Information Below: Moye and Nazerali, 2010, see Donors Annex

Critical Ecosystems Partnership Fund (CEPF): Founded in 2000, CEPF is a joint initiative of AFD, CI, the GEF, the Government of Japan, the John D. and Catherine T. MacArthur Foundation and the World Bank, and is managed by Conservation International. CEPF provides grants to civil society organizations to help protect biodiversity "hotspots" CEPF recently completed an ecosystem profile for the Maputaland-Pondoland-Albany Hotspot, including a five-year investment strategy which will be financed beginning in 2010. In Mozambique, areas identified for investment include the Ponto do Ouro Partial Marine Reserve, Lebombo Transfrontier Corridor and Licuati Forests. (http://www.cepf.net)

Denmark: Denmark finances a five-year (2006-2010) sector-wide program for the environment that provides institutional support for MICOA, natural resource management in Sofala, coastal zone management at the provincial and district level and the urban environment in greater Maputo. The program has supported work on the issue of communities living in conservation areas and their buffer zones.

Fauna and Flora International (FFI): Fauna and Flora International has supported the Niassa Reserve since 2002 through its Arcardia Land Trust, a fund which leverages funding from the UK-based Arcadia Fund. The Arcadia Land Trust has contributed US$1.86 million to the Society for the Management of Niassa Reserve, leveraging an additional US$3.9 million through other donations. (Arcadia Land Trust 2009) In 2009, FFI conducted an initial review of the potential for REDD in Niassa Reserve.

Finland: Finland's bilateral assistance in Mozambique focuses on education, health and rural development. Finland is developing a forest program that is expected to contribute to Mozambique's national forest program, addressing threats posed by increased logging and considering community needs.

France: French Development Agency (AFD) and French Global Environment Fund (FFEM): France is currently the largest donor for Mozambique's conservation areas, with support for the development of Gilé NR, Limpopo NP and Quirimbas NP. AFD also supports cross-cutting program for wildlife management and sustainable financing, both intended to

contribute to the sustainability of Mozambique's conservation areas. Through a C2D debt swap, France will be the first donor to contribute to BIOFUND Mozambique's capital.

Germany: German Development Bank (KfW) and Federal Ministry for Economic Cooperation and Development (BMZ): The German government is one of the most important contributors to the Program of Work on Protected Areas. Germany also supports sustainable financing through support for conservation trust funds, debt swaps and PES. In Mozambique, the German government's main intervention in conservation areas is in support of Limpopo NP through the Peace Parks Foundation. A third phase of financing (€10 million) is expected to begin in 2010.

Global Environment Facility: More than half of GEF investments worldwide support protected areas, including sustainable financing through conservation trust funds that support park operations and livelihoods of communities living around protected areas. GEF has provided US$23 million for biodiversity conservation in Mozambique since 1991, including support for TFCA projects. A new four-year GEF program (GEF5) will begin in 2010.

Global Conservation Fund (GCF), Conservation International: The Global Conservation Fund has provided financing through WWF for the establishment of a Primeiras and Segundas marine reserve. GCF has committed to granting US$1 million in endowment funds to BIOFUND for the support of the proposed reserve.

Gorongosa Restoration Project: In 2008, the Carr Foundation/Gorongosa Restoration Project signed a long-term agreement with the Government of Mozambique to restore and manage Gorongosa NP. Over the 20-year agreement, the Gorongosa Restoration Project will contribute at least US$24 million to the public-private partnership. It is expected that over time the partnership's sustainable business model – based on park entrance fees and conservation contributions from tourism and donors – will allow Gorongosa NP to generate sufficient revenues to sustain its operations. The Gorongosa Restoration Project currently has contracts, grants and cooperative agreements with IAEA, PlanetAction, Portugal, UNDP, USAID and Zoo Boise.

Japan: Japan is one of the donors supporting the TFCA project. In April 2010, the Japanese government pledged to provide about US$7.4 million in support of a program to preserve forests, thereby mitigating climate change.

Norway: Norway promotes sustainable development in Mozambique through support to sector programs on petroleum and fisheries, and has financed capacity building for CSR. Norway financed preparation of Mozambique's FCPF R-PIN and is currently supporting the South-South REDD initiative. Although NORAD financed Bazaruto NP through WWF, Norway is not currently providing any funding for conservation areas.

Peace Parks Foundation: The Peace Parks Foundation has been successful in raising funds for TFCAs through lotteries, private corporations and individuals and its network of "friends of" organizations in Europe and the U.S.A. For example, in February 2010, the Dutch Postcode lottery announced a grant to Peace Parks Foundation that includes €2 million (US$2.8 million) to create a corridor along the Futi River to allow for the movement of elephants between Tembe Elephant Park in South Africa and Maputo SR. The Peace Parks Foundation has also raised private donations for Maputo SR from the Principality of Monaco and Virgin United.

United Kingdom (Department for International Development - DFID): The UK is one of the largest bilateral donors in Mozambique. In line with its commitment to the Millennium Development Goals, DFID's funding focuses on health, education and governance. DFID is currently reviewing how climate change can be supported through its program in Mozambique. At the global level, DFID finances green technology, adaptation and carbon market development

United Nations Development Programme (UNDP): As one of the implementing agencies for the GEF, UNDP has been instrumental in supporting protected area financing and PES program around the world. In Mozambique, UNDP supports the Poverty-Environment Initiative (in collaboration with the United Nations Environment Programme (UNEP) and Irishaid), which has promoted strategic environmental assessment. UNDP and UNEP also implement a CDM capacity building project.

United States Agency for International Development (USAID): USAID is Mozambique's largest bilateral donor overall. USAID supports Gorongosa NP and the creation of Lake Niassa Reserve. Through the Northern Mozambique Tourism Project, USAID supports nature-based tourism. USAID has expressed interest in developing innovate carbon projects and public-private partnerships. The U.S. Fish and Wildlife Service supports human-animal conflict programs.

World Bank: The World Bank Group is one of the major donors for biodiversity and natural resources management through both loans and as an implementation agency for GEF resources. Two World Bank projects in Mozambique focus on sustainable tourism and conservation areas, including the TFCA project and the IFC Tourism Anchor Investment Program. The World Bank is managing new multi-donor climate change funds, such as the Pilot Program for Climate Resilience and the Scaling up Renewable Energy Program.

World Wide Fund for Nature (WWF): WWF raises funds through its international network of national organizations, accessing funds from private companies, major individual donors and foundations, as well as bilateral and multilateral agencies. Private donors for Quirimbas NP include Johnson and Johnson, the Sall Family Foundation and the Dutch Postcode Lottery. WWF worked with the Coca Cola Company and USAID to design a Global Development Alliance, a public-private partnership model developed by USAID, to finance creation of the Lake Niassa reserve.

ANNEX H: ACTIONS NEEDED ACCORDING TO KEY INFORMANTS

Actions Needed:

1) coastal zone planning; need a new coastal zone plan

2) an SEA for the entire coast of Moz

3) some responsible ministry to do appropriate planning (MPD? MICOA?)

4) ecological & environmental information to enable planning & harmonization of policies of various sectors

5) improved human resources & capacity in MICOA and/or other ministry env. staff

6) better environmental donor communication & coordination

7) reduce shrimp fishing effort on Sofala Bank

8) stop illegal & "pirate" fishing by Asian boats

9) control location & level of charcoal production to interrupt the forest degradation cycle that begins with charcoal production and ends with farming on cleared forest land

10) stronger law enforcement regarding poaching, esp. for ivory and rhino horn trade

11) need adequate land-use planning to steer large-scale ag. development, including for biofuels, into appropriate zones

12) need fuel-efficient stoves to reduce woodfuel & charcoal demand

13) need to enforce forest laws

14) need to enforce fishing laws & stop illegal fishing in EEZ

15) need international public pressure on China & other Asian nations to stop importing shark fins

16) need better ecological information to feed into coastal zone planning to steer oil & gas, tourism, transportation infrastructure development away from sensitive, critical habitats

17) science-based coastal zoning & planning

18) need funding for basic science, not only applied

19) need to reorganize and develop a functional institutional structure or framework for sustainable env. management (MICOA is not working)

20) inventory of status of medicinal plants & conservation plans for overharvested or threatened species

21) pharmacological studies of traditional medicinal plants to identify active compounds

22) management strategies to reduce human-wildlife (elephant) conflict in e.g. Querimbas

23) need to study, understand, and determine role & value of mangroves in coastal protection from cyclones, etc.

24) need better enforcement of laws & regulations supposedly protecting protected areas of various kinds

25) need to update the Red List (of endangered species) for Moz

26) need studies of CITES Appendix II species (trade allowed) to prove (or not) the healthy status of wild populations

27) need an Endangered Species Law that protects threatened & endangered species in Moz

28) need land use planning that both protects biodiversity & environment, and allows development (per Land Law)

29) need better citizen awareness & understanding of Land Law, land rights & responsibilities

30) need to increase community participation & involvement in resource and land use rights & responsibilities

31) need to reorganize the "institutional management framework" for biodiversity, forestry, environment (MICOA not working)

32) need a mechanism or institutional structure to integrate & coordinate environmental issues in development process

33) need "Rule of Law" & a justice system that prosecutes environmental violations

34) need a strong civil society, a public of citizens (not just NGOs) demanding that government protect their environment & natural resources

35) need better public participation in the Environmental Impact Assessment review process – which is mandated by law & "coaching" or "accompaniment" of communities facing big developments in participating in the EIA review

36) now the need is for "bottom up" support to communities on the ground – not any more "top down" support

37) need the political will to enforce the laws and implement them

38) need higher penalties for poaching

39) need "rule of law" – no one should be above the law, and corruption should not prevent the laws from being enforced uniformly

40) need more public awareness of environmental laws and penalties for violating them

41) need to invest more in human resources and equipment for forestry, wildlife, fisheries, and environmental management

42) need to bring subsistence use of bushmeat into a sustainable management system, not necessarily eliminate it

43) need to develop a/some Mozambican models of CBNRM

44) need to share more benefits with local communities to incentivize CBNRM

45) need sustainable financing mechanisms for protected areas (BIOFUND?)

46) need strong civil society organizations to represent local communities & environmental values

47) need platforms for information sharing & participation in environmental decisions

48) need more sound scientific information for environmental decision-making in some cases

49) need eco-hydrological information for better management of transnational rivers

50) need methodologies for assessing climate change vulnerabilities & strategies for adaptation

51) need a SADC protocol on management of transboundary ecosystems

52) need an updated "Red List" of threatened & endangered species in Moz.

53) need to make charcoal production sustainable through more efficient stoves, alternative sources of biomass for cooking fuel, or access for poor/more households to natural gas for cooking

54) need to develop models of CBNRM tailored to Moz.

55) communities need coaching & "accompaniment" through EIA reviews & other environmental decision processes

56) need careful agro-ecological zoning maps to make it clear that agricultural potential in Mozambique is in fact rather limited

57) Environmental awareness campaigns in rural areas to reduce the rate of habitat loss

58) Strengthening of law enforcement and monitoring to reduce illegal and excessive use of natural resources and to reduce the lack of application of best environmental management practices outlined in EIA reports

59) Strengthening of coordination among government institutions

60) Need to allocate a significant proportion of the fees paid for environmental licenses for strengthening of the capacity of DNAIA to evaluate and monitor EIAs, including training, office equipment and vehicles

61) Strengthening of law enforcement and monitoring to reduce illegal and excessive harvest of natural resources

62) Promote forest plantations in degraded areas to restore forest cover. However, ensure that natural forests are not being replaced by commercial exotic species

63) Need better coordination of MINAG/DNFFB with MINTUR, MICOA, Ministry of Health in efforts to conserve forests and wildlife

64) Improvement of the capacity for law enforcement

65) Need more support in the management of forest reserves, which are under continuous degradation by rural communities

66) Need to improve the capacity of DNTF in monitoring wildlife harvesting quotas through appropriate training and equipment

67) creation of new reserves for specific species (medicinal plants endangered species)

68) need to apply a scientific site selection methodology for choosing areas to convert to commercial forest plantations

69) Need to stop population growth and stabilize population

70) Need to stabilize the agricultural frontier

71) Need an SEA to stop the development of Techobanine Port through integrated coastal zone planning and EIA enforcement

72) Need communication & coordination of relevant ministries/agencies in ICZ planning & management

73) need to educate & inform fishing communities about laws

74) need to develop livelihood alternatives for fishing communities such as aquaculture, mariculture of crabs, offshore semi-industrial fishing

75) need links with Ministry of Defense to strengthen fishery law enforcement, including in EEZ

76) need to increase yields of crops for small farmers through improved varieties & farming practices

77) Need to "fortify" existing national NGOs

78) Need an agricultural extension service that bridge the gap between research (IIAM) and farmers

79) Need to promote "conservation agriculture" that maintains & increases soil fertility on the same plot of land

80) Need to build capacity for effective civil society engagement at community & district level

81) Need fire control & management

82) Need district level enforcement of laws against poaching, fires

83) Need to build effective community governance and NRM from the bottom up, from the grassroots – not top down.

84) Need to bring Mozambique through the demographic transition, stop population growth.

85) Need to eliminate corruption in order to conserve forests, biodiversity, and the environment.

86) Need to stop population from growing

87) Need to shift to "rights based fishing"

88) Need to build capacity for communities to meaningfully engage in NRM

89) Need to build an adequate understanding of rights & responsibilities in communities

90) need to clarify marine tenure and rights issues

91) Need to maintain the ecological linkage between the mainland and the Primeras & Segundas archipelago

92) Need to build capacity in the Mozambican government to take advantage of the opportunity of the oil, gas, and coal "boom" and use it for equitable and sustainable development

93) need to improve agricultural productivity through conservation agriculture & new/improved varieties and crops

94) need to improve fisheries productivity through no-take sanctuaries

95) Need to implement Mozambican laws & policies, which are generally not bad, through local communities.

96) Need a CBNRM "platform" in Moz.

97) Mozambican government needs to make government information of all kinds (laws, regulations, policies, plans, maps, and statistics) freely & easily accessible by citizens & civil society organizations. Mozambique needs a "freedom of information act."

98) Improve capacity to enforce laws

99) Improved institutional coordination &

reduction of the number of departments dealing with the same issues

100) Coordination between conservation area managers & communities; co-management

101) More/better equipment & staff for communication & patrol such as vehicles, radios, more rangers

102) Need to resettle some communities out of Maputo Reserve

103) Improved human resources & capacity

104) Fencing or other methods to reduce human- wildlife conflict

105) Alternatives to wood & charcoal for cooking to reduce forest degradation

106) Management plans for selected species

107) Devolve law enforcement responsibility to the Provincial Government level

108) Develop mechanisms for financial sustainability of protected areas

109) Create a law enforcement unit with MITUR, MINAG, MINT (FIR), MDN, and private sector

110) Increase tourism & associated revenues for management and benefit-sharing with communities

111) Develop livelihood alternatives in poor communities living in/around the park

112) Implement REDD+ programs inside PAs

113) Establish fishing sanctuaries, no-take zones with participation of local communities to restore fish stocks

114) Strict control of migratory fishermen with consent of local communities & park authorities

115) Dissemination of conservation agriculture to increase yields, maintain soil fertility, and stop expansion of fields into forests

Increase enforcement & penalties

116) Behavior-change campaigns in communities to reduced use of burning

117) Behavior-change campaigns to reduce bushmeat hunting

118) Develop techniques for reducing human-wildlife conflict

119) Need change in agricultural practices -- stop shifting cultivation

120) Promote crop diversification, agricultural inputs

121) Land use planning

122) Pressure on government to implement existing legislation

123) Change on agricultural production practices and better connection to the markets

124) Better land use planning

125) Reduce political interference in implementing laws

126) Development of REDD+ markets & benefit-sharing mechanisms

127) Reduce poverty through community development projects, REDD+ Payments for Ecosystem Services, and "inclusive business"

128) A national land use plan & zoning at a scale of 1:20 000

129) Improve agricultural practices & crops yield (e.g. maize, rice, beans).

130) Connect agricultural producers to the market & services suppliers – better market integration

131) Promote forest plantations, with appropriate social, environmental, & economic safeguards

132) Create a center for ecological & silvicultural research on native trees

133) Develop strategy for forest industry modernization

134) Promote forest concessions instead of simple licenses

135) Better forest patrolling (more efficient and less corrupt)

136) Develop REDD+ PES mechanisms

137) National land use plan

138) Improved agricultural practices & better market connections

139) Develop REDD+ PES mechanisms & other community development projects

140) Establish forest plantations

141) National land use plan

142) Improve agricultural practices & better market connections

143) Improved enforcement of laws protecting natural resources & the environment

144) Establish forest plantations

145) Develop REDD+ PES mechanisms

146) Update inventories & maps of flora & fauna in Mozambique to inform conservation planning & management

147) More human & material resources to manage & enforce laws in protected areas

148) Better coordination of all institutions (government, NGO´s)

149) Stop expansion of farms into forests

150) Reduce uncontrolled fires

151) Control unsustainable charcoal production

152) Develop policies and laws that protect & conserve medicinal plants, and access to harvest them sustainably by traditional healers

153) Involve traditional healers, through their organizations & associations, in the management of sacred forests & traditional plant gathering areas

154) More human and material resources for managing forest reserves and enforcing laws

155) Technology for fire monitoring and mapping – satellite? Internet software?

156) Developmnet of “muciro” or other medicinal plants income-generating enterprises, but with sustainable harvesting

157) Stop expansion of agriculture into forests

158) Official designation of Potone Forest as a “sacred forest reserve” by national authorities

159) Reduce uncontrolled fires

160) Harvesting of medicinal plants that is managed & sustainable

161) Nutritional education for local communities to diversify crops & improve diets.

Needs health sector involvement.

162) Development (by IIAM) of crops & varieties suited to local soils (poor & dry/sandy) plants species variety

162) Increase the number of forest rangers to protect forest

163) Reduce uncontrolled fires

164) Control charcoal production

165) Stop expansion of farms into forest

166) Educate communities about value of forest for medicinal plants & need for forest conservation

167) Involve of traditional leaders & traditional healers in community education & forest management

168) Need to reopen the cashew processing factories to provide employment & income in order to reduce charcoal and firewood exploitation

169) Traditional healers need training in how to run an association

170) Conservation activities need to be integrated & coordinated with other sectors & institutions to provide other services in the village (health, water, education)

171) Need to reduce uncontrolled fires

172) Need to stop expansion of cultivation into forest

173) Need more rangers & equipment to patrol entire forest & enforce laws & agreements

174) Need land use planning, zoning, & demarcation for cultivation vs. conservation as forest

ANNEX I: ACTIONS NEEDED GROUPED BY THEME

Note: Numbers associated with actions needed refer to the uncategorized list given in Annex G, in which actions were listed in sequence as compiled from notes of interviews with key informants.

Theme/Category	Action Needed ("Need/Need to….")
1) Improve Enforcement of Environmental Laws (N = 28)	13) need to enforce forest laws 24) need better enforcement of laws & regulations supposedly protecting protected areas of various kinds 27) need an Endangered Species Law that protects threatened & endangered species in Moz 33) need "Rule of Law" & a justice system that prosecutes environmental violations 37) need the political will to enforce the laws and implement them 40) need more public awareness of environmental laws and penalties for violating them 58) Strengthening of law enforcement and monitoring to reduce illegal and excessive use of natural resources and to reduce the lack of application of best environmental management practices outlined in EIA reports 61) Strengthening of law enforcement and monitoring to reduce illegal and excessive harvest of natural resources 64) Improvement of the capacity for law enforcement 82) Need district level enforcement of laws against poaching, fires 98) Improve capacity to enforce laws 101) More/better equipment & staff for communication & patrol such as vehicles, radios, more rangers 107) Devolve law enforcement responsibility to the Provincial Government level 122) Pressure on government to implement existing legislation 125) Reduce political interference in implementing laws 143) Improved enforcement of laws protecting natural resources & the environment 147) More human & material resources to manage & enforce laws in protected areas 154) More human and material resources for managing forest reserves and enforcing laws

	162) Increase the number of forest rangers to protect forest 173) Need more rangers & equipment to patrol entire forest & enforce laws & agreements + 8) stop illegal & "pirate" fishing by Asian boats 10) stronger law enforcement regarding poaching, esp. for ivory and rhino horn trade 14) need to enforce fishing laws & stop illegal fishing in EEZ 38) need higher penalties for poaching 75) need links with Ministry of Defense to strengthen fishery law enforcement, including in EEZ + 39) need "rule of law" – no one should be above the law, and corruption should not prevent the laws from being enforced uniformly 85) Need to eliminate corruption in order to conserve forests, biodiversity, and the environment. + 60) Need to allocate a significant proportion of the fees paid for environmental licenses for strengthening of the capacity of DNAIA to evaluate and monitor EIAs, including training, office equipment and vehicles
2) Build Capacity of Communities, Civil Society Organizations, & the Media for Meaningful Engagement in Environmental Decision Making (N = 23)	29) need better citizen awareness & understanding of Land Law, land rights & responsibilities 30) need to increase community participation & involvement in resource and land use rights & responsibilities 34) need a strong civil society, a public of citizens (not just NGOs) demanding that government protect their environment & natural resources 35) need better public participation in the Environmental Impact Assessment review process – which is mandated by law & "coaching" or "accompaniment" of communities facing big developments in participating in the EIA review 36) now the need is for "bottom up" support to communities on the ground – not any more "top down" support 46) need strong civil society organizations to represent local communities & environmental values 47) need platforms for information sharing & participation in

	environmental decisions 55) communities need coaching & "accompaniment" through EIA reviews & other environmental decision processes 77) Need to "fortify" existing national NGOs 80) Need to build capacity for effective civil society engagement at community & district level 83) Need to build effective community governance and NRM from the bottom up, from the grassroots – not top down. 88) Need to build capacity for communities to meaningfully engage in NRM 89) Need to build an adequate understanding of rights & responsibilities in communities 95) Need to implement Mozambican laws & policies, which are generally not bad, through local communities. 97) Mozambican government needs to make government information of all kinds (laws, regulations, policies, plans, maps, and statistics) freely & easily accessible by citizens & civil society organizations. Mozambique needs a "freedom of information act." 100) Coordination between conservation area managers & communities; co-management 153) Involve traditional healers, through their organizations & associations, in the management of sacred forests & traditional plant gathering areas 167) Involve of traditional leaders & traditional healers in community education & forest management 169) Traditional healers need training in how to run an association + 43) need to develop a/some Mozambican models of CBNRM 44) need to share more benefits with local communities to incentivize CBNRM 54) need to develop models of CBNRM tailored to Moz. 96) Need a CBNRM "platform" in Moz.

3) Stop Forest Conversion to Agriculture & Stabilize the Agricultural Frontier (N = 20)	9) control location & level of charcoal production to interrupt the forest degradation cycle that begins with charcoal production and ends with farming on cleared forest land 28) need land use planning that both protects biodiversity & environment, and allows development (per Land Law) 57) Environmental awareness campaigns in rural areas to reduce the rate of habitat loss 70) Need to stabilize the agricultural frontier 76) need to increase yields of crops for small farmers through improved varieties & farming practices 78) Need an agricultural extension service that bridge the gap between research (IIAM) and farmers 79) Need to promote "conservation agriculture" that maintains & increases soil fertility on the same plot of land 93) need to improve agricultural productivity through conservation agriculture & new/improved varieties and crops 115) Dissemination of conservation agriculture to increase yields, maintain soil fertility, and stop expansion of fields into forests 119) Need change in agricultural practices -- stop shifting cultivation 120) Promote crop diversification, agricultural inputs 123) Change on agricultural production practices and better connection to the markets 129) Improve agricultural practices & crops yield (e.g. maize, rice, beans). 138) Improved agricultural practices & better market connections 142) Improve agricultural practices & better market connections 149) Stop expansion of farms into forests 157) Stop expansion of agriculture into forests 162) Development (by IIAM) of crops & varieties suited to local soils (poor & dry/sandy) plants species variety 165) Stop expansion of farms into forest 172) Need to stop expansion of cultivation into forest

4) Improve Land Use & Coastal Zone Planning (N = 14)	1) coastal zone planning; need a new coastal zone plan 2) an SEA for the entire coast of Moz 11) need adequate land-use planning to steer large-scale ag. development, including for biofuels, into appropriate zones 16) need better ecological information to feed into coastal zone planning to steer oil & gas, tourism, transportation infrastructure development away from sensitive, critical habitats 17) science-based coastal zoning & planning 56) need careful agro-ecological zoning maps to make it clear that agricultural potential in Mozambique is in fact rather limited 71) Need an SEA to stop the development of Techobanine Port through integrated coastal zone planning and EIA enforcement 91) Need to maintain the ecological linkage between the mainland and the Primeras & Segundas archipelago 121) Land use planning 124) Better land use planning 128) A national land use plan & zoning at a scale of 1:20 000 137) National land use plan 141) National land use plan 174) Need land use planning, zoning, & demarcation for cultivation vs. conservation as forest
5) Coordinate and Harmonize Actions of Relevant Ministries & Agencies & Develop a Functional Institutional Structure for Sustainable Environmental Management (N = 13)	3) some responsible ministry to do appropriate planning (MPD? MICOA?) 4) ecological & environmental information to enable planning & harmonization of policies of various sectors 5) improved human resources & capacity in MICOA and/or other ministry env. staff 19) need to reorganize and develop a functional institutional structure or framework for sustainable env. management (MICOA is not working) 31) need to reorganize the "institutional management framework" for biodiversity, forestry, environment (MICOA not working) 32) need a mechanism or institutional structure to integrate & coordinate environmental issues in development process 59) Strengthening of coordination among government institutions 63) Need better coordination of MINAG/DNFFB with MINTUR, MICOA, Ministry of Health in efforts to conserve forests and

	wildlife 72) Need communication & coordination of relevant ministries/agencies in ICZ planning & management 99) Improved institutional coordination & reduction of the number of departments dealing with the same issues 109) Create a law enforcement unit with MITUR, MINAG, MINT (FIR), MDN, and private sector 148) Better coordination of all institutions (government, NGO´s) 170) Conservation activities need to be integrated & coordinated with other sectors & institutions to provide other services in the village (health, water, education)
6) Develop Livelihood & Economic Alternatives/Opportunities to Destructive Practices (N = 13)	20) inventory of status of medicinal plants & conservation plans for overharvested or threatened species 42) need to bring subsistence use of bushmeat into a sustainable management system, not necessarily eliminate it 110) Increase tourism & associated revenues for management and benefit-sharing with communities 111) Develop livelihood alternatives in poor communities living in/around the park 112) Implement REDD+ programs inside PAs 126) Development of REDD+ markets & benefit-sharing mechanisms 127) Reduce poverty through community development projects, REDD+ Payments for Ecosystem Services, and "inclusive business" 136) Develop REDD+ PES mechanisms 139) Develop REDD+ PES mechanisms & other community development projects 145) Develop REDD+ PES mechanisms 152) Develop policies and laws that protect & conserve medicinal plants, and access to harvest them sustainably by traditional healers 156) Developmnet of "muciro" or other medicinal plants income-generating enterprises, but with sustainable harvesting 160) Harvesting of medicinal plants that is managed & sustainable + 23) need to study, understand, and determine role & value of

	mangroves in coastal protection from cyclones, etc
7) Sustainably Manage Artisanal (and Other) Fisheries (N = 9)	7) reduce shrimp fishing effort on Sofala Bank 15) need international public pressure on China & other Asian nations to stop importing shark fins 73) need to educate & inform fishing communities about laws 74) need to develop livelihood alternatives for fishing communities such as aquaculture, mariculture of crabs, offshore semi-industrial fishing 87) Need to shift to "rights based fishing" 90) need to clarify marine tenure and rights issues 94) need to improve fisheries productivity through no-take sanctuaries 113) Establish fishing sanctuaries, no-take zones with participation of local communities to restore fish stocks 114) Strict control of migratory fishermen with consent of local communities & park authorities
8) Improve Woodfuel Efficiency and Find Alternatives to Wood and Charcoal (N = 6)	12) need fuel-efficient stoves to reduce woodfuel & charcoal demand 53) need to make charcoal production sustainable through more efficient stoves, alternative sources of biomass for cooking fuel, or access for poor/more households to natural gas for cooking 105) Alternatives to wood & charcoal for cooking to reduce forest degradation 151) Control unsustainable charcoal production 164) Control charcoal production 168) Need to reopen the cashew processing factories to provide employment & income in order to reduce charcoal and firewood exploitation
Other (information, behavior-change, fire control, human-wildlife conflict, financial sustainability of PAs, (N = 48)	6) better environmental donor communication & coordination 18) need funding for basic science, not only applied 21) pharmacological studies of traditional medicinal plants to identify active compounds 22) management strategies to reduce human-wildlife (elephant) conflict in e.g. Querimbas 25) need to update the Red List (of endangered species) for Moz 26) need studies of CITES Appendix II species (trade allowed) to prove (or not) the healthy status of wild populations

	41) need to invest more in human resources and equipment for forestry, wildlife, fisheries, and environmental management 45) need sustainable financing mechanisms for protected areas (BIOFUND?) 48) need more sound scientific information for environmental decision-making in some cases 49) need eco-hydrological information for better management of transnational rivers 50) need methodologies for assessing climate change vulnerabilities & strategies for adaptation 51) need a SADC protocol on management of transboundary ecosystems 52) need an updated "Red List" of threatened & endangered species in Moz. 62) Promote forest plantations in degraded areas to restore forest cover. However, ensure that natural forests are not being replaced by commercial exotic species 65) Need more support in the management of forest reserves, which are under continuous degradation by rural communities 66) Need to improve the capacity of DNTF in monitoring wildlife harvesting quotas through appropriate training and equipment 67) creation of new reserves for specific species (medicinal plants endangered species) 68) need to apply a scientific site selection methodology for choosing areas to convert to commercial forest plantations 69) Need to stop population growth and stabilize population 81) Need fire control & management 84) Need to bring Mozambique through the demographic transition, stop population growth. 86) Need to stop population from growing 92) Need to build capacity in the Mozambican government to take advantage of the opportunity of the oil, gas, and coal "boom" and use it for equitable and sustainable development 102) Need to resettle some communities out of Maputo Reserve 103) Improved human resources & capacity 104) Fencing or other methods to reduce human- wildlife conflict 106) Management plans for selected species

	108) Develop mechanisms for financial sustainability of protected areas 116) Behavior-change campaigns in communities to reduced use of burning 117) Behavior-change campaigns to reduce bushmeat hunting 118) Develop techniques for reducing human-wildlife conflict 130) Connect agricultural producers to the market & services suppliers – better market integration 131) Promote forest plantations, with appropriate social, environmental, & economic safeguards 132) Create a center for ecological & silvicultural research on native trees 133) Develop strategy for forest industry modernization 134) Promote forest concessions instead of simple licenses 135) Better forest patrolling (more efficient and less corrupt) 140) Establish forest plantations 144) Establish forest plantations 146) Update inventories & maps of flora & fauna in Mozambique to inform conservation planning & management 150) Reduce uncontrolled fires 155) Technology for fire monitoring and mapping – satellite? Internet software? 158) Official designation of Potone Forest as a "sacred forest reserve" by national authorities 159) Reduce uncontrolled fires 161) Nutritional education for local communities to diversify crops & improve diets. Needs health sector involvement. 163) Reduce uncontrolled fires 166) Educate communities about value of forest for medicinal plants & need for forest conservation 171) Need to reduce uncontrolled fires
Total	**174/174**

ANNEX J: NATIONAL PARKS, NATIONAL RESERVES, FOREST AND INTEGRAL RESERVES

National Parks

Name	Province	Year of creation	Area(Km2)	Objective
Quirimbas NP	Cabo Delgado	2002	7.500	Terrestrial, coastal and marine ecosystems and associated wildlife
Limpopo NP	Gaza	2001	10000	Diversity of ecosystems, habitats and associated fauna
Banhine NP	Gaza	1973	7000*	Semi-arid ecosystems and associated fauna
Zinave NP	Inhambane	1973	5000*	Semi-arid ecosystems and associated wildlife
Bazaruto Archipelago NP	Inhambane	1971	1600	Large marine fauna species: dugongs, marine turtles
Gorongosa NP	Sofala	1960	5370	Diversity of ecosystems, habitats and associated fauna

* there are proposal for reviewing the boundaries to exclude areas heavily affected by human activities and include areas with high conservation value that are currently outside protected area boundaries

National Reserves

Name	Location/province	Year of creation	Area(Km2)	Objective
Lake Nyassa Partial Reserve	Niassa	2011	478	Wetlands and associated fauna, including endemic fish species
Ponta de Ouro Marine Partial Reserve	Maputo	2009	678	Marine turtles, coral reefs
Chimanimani NR	Manica	2000	7500	Afromontane forest rich in flora diversity and endemism and associated fauna

Pomene NR	Inhambane	1964	200	Wetlands and mangrove
Niassa NR	Niassa	1964	42200	Miombo woodland and associated fauna
Gile NR	Zambézia	1960	2100	Initially the protection of rhinoceros, but currently broadened to protect the biodiversity of the miombo woodland
Marromeu NR	Sofala	1960	1500	Initially the protection of buffalo, but currently the protection of the broad wetland ecosystem
Maputo NR	Maputo	1960	700	Initially elephant, but currently broadened to protect the Maputaland area rich in species diversity and endemism

Forest and Integral Reserves

Name	Province	Year of creation	Area(hectare)	Species of forest protected
Licuáti FR	Maputo	1943	5 300	*Afzelia quanzensis*
Bobole IR	Maputo	1945	1 300	*Raphia australis*
Chirindzene RI	Gaza		150	Sacred forest
Inhamitanga FR	Sofala	1957	1 600	*Milettia stuhlmannii*
Nhapakwé FR	Sofala	1955	17 000	Diversity rich forest
Mucheve FR	Sofala	1957	9 000	*Pterocarpus angolensis*
Moribane FR	Manica	1957	5 300	Afromontane humid forest
Zomba FR	Manica	1957	3 100	Humid forest
Maronga FR	Manica	1957	8 300	
Derre FR	Zambézia	1957	170 000	*Pterocarpus angolensis*
Baixo Pinda FR	Nampula	1957	19 600	*Androstachys johnsonii*
Matibane FR	Nampula	1957	4 200	*Androstachys johnsonii*
Mecuburi FR	Nampula	1957	195 400	Miombo woodland and gallery forest

M´palwe FR	Nampula	1957	5 100	Miombo woodland
Ribawe FR	Nampula	1957	5 200	Miombo woodland

U.S. Agency for International Development
1300 Pennsylvania Avenue, NW
Washington, DC 20523
Tel: (202) 712-0000
Fax: (202) 216-3524
www.usaid.gov