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Mozambique Biodiversity and Tropical Forests 118/119 Assessment

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ACRONYMS

DCA	Development Credit Authority
DFID	U.K. Department for International Development
EGAT	Economic Growth Agriculture and Trade
EIA	environmental impact assessment
EU	European Union
FAA	U.S. Foreign Assistance Act
FAO	Food and Agriculture Organization of the United Nations
FSC	Forest Stewardship Council
GDA	Global Development Alliance
GIS	geographic information system
GPS	global positioning system
GRM	Government of the Republic of Mozambique
GSFI	Global Solidarity Fund International
GSTA	Global Sustainable Tourism Alliance
MCC	Millennium Challenge Corporation
MICOA	Ministry for the Coordination of Environmental Affairs
MITUR	Ministry of Tourism
MPD	Ministry of Planning and Development
NGO	nongovernmental organization
NRM	natural resource management
NTFP	non-traditional forest products
PARPA	Action Plan for the Reduction of Absolute Poverty
PEPFAR	President's Emergency Plan for AIDS Relief
SADC	Southern Africa Development Community
TFCA	Trans-frontier Conservation Area
UNDP	United Nations Development Programme
WWF	World Wildlife Fund International

EXECUTIVE SUMMARY

The purpose of this task was to conduct an assessment of (1) the current state of biodiversity and forest conservation in Mozambique, (2) actions needed in Mozambique to conserve tropical forests and biological diversity, and (3) the extent to which the actions proposed for support by USAID/Mozambique meet or could meet the needs identified. This assessment is intended to serve as a tool to assist USAID/Mozambique in better integrating environmental concerns into its proposed programs in the short- and medium-term future. The assessment is also necessary to comply with Sections 118 and 119 of the Foreign Assistance Act of 1961, as amended, as well as critical to informing the Strategic Framework for Foreign Assistance and country strategy guidelines under ADS 201.3.4.11 and ADS 204.5.

An environmental threats and opportunities assessment was completed in Mozambique in December 2002. This report builds on this work, involves a comprehensive analysis of the sector gathered from a review of relevant reports, as well as interviews and field work conducted in Mozambique, and serves as one of the assessments required in preparation of the pilot Country Assistance Strategy. The assessment included a desktop review of available materials, interviews in Maputo, and visits to field sites conducted by a four-person team of two international consultants and two local consultants.

Substantial changes have occurred in Mozambique in the last six years. This report will provide USAID information with which to take stock of its role in conserving biodiversity and forest resources, and to make strategic choices going forward. Targets of opportunity are suggested to fill gaps in funding conservation activities through capitalizing on existing programs, as well as recommendations for moving into areas where USAID has a comparative advantage. We hope this assessment will contribute to USAID's support for environmentally sustainable economic development in Mozambique and the conservation of its rich biological diversity.

Mozambique is rich in natural resources. Out of a total land area of 780,000 km², 620,000 km² are covered with vegetation, of which 87,000 km² are in protected areas (11.1 percent). The country is sparsely populated, with large areas of unutilized land. It has 36 million ha of cultivable land, but only one-tenth is suitable for crop production, of which 12 percent is being used. Mozambique possesses sites of high biodiversity importance, such as the Gorongosa Mountain, the Archipelago of Quirimbas, and the Chimanimani Massif. According to national estimates, the country is home to more than 5,500 plant species, 220 mammals, and 690 birds, many of which are endemic.

Its water availability per capita is close to the average for Africa and the world, but access to water continues to be a problem throughout urban and rural areas. The country is rich in fish resources, but marine-coastal zones suffer from large- and small-scale fishing activities, and vital mangrove habitat is disappearing rapidly. In addition, Pemba Bay is suffering from increasing pollution and salinity due to human activity, while Lake Niassa, which supports unique species and ecosystems, is under threat from fishing and tourism development on the Malawi side.

The country's forestry potential is under-used, although determining the extent of legal and illegal logging due to insufficient data collection and mapping remains a challenge. However, specific data reveal the northern forests of the Niassa Region are under threat from logging and charcoal wood harvesting, while the dense monoculture forest growth of Mozambique's coastal forest ranges are decreasing due to agriculture burning.

There are significant mineral resources, with prospecting for oil, gas, diamonds, and uranium. Export revenue is expected to reach \$500 million by 2010. These activities will increasingly come in to conflict with tourism and conservation.

More than 75 percent of the population of 21 million is engaged in rural agriculture, mainly at the subsistence level. The country's economy continues to rely largely on its natural resource base. Even with rapid rates of urbanization, the subsistence and well-being of most Mozambicans depends on their access to land, water resources, forest products, fisheries, mines, and other natural resources.

The government of the Republic of Mozambique (GRM) is trying to balance its immediate goal of reducing poverty through use of natural resources with longer-term strategies requiring judicious management of resources. Limited domestic funds are leading to heavy reliance on foreign capital, and posing difficult choices. It is essential to make some key choices now, at current levels of resource use, before it is too late. The government of Mozambique is aware of this and has made substantial progress in managing natural resources, especially in the last decade. Peace and macroeconomic stability have provided a platform for increasing the use of its natural resources, contributing to economic growth and poverty alleviation. Framework laws that establish the basic ground rules for the use of resources have been enacted. These have been designed to protect the interests of the poor. However, many of the laws are recent and require time to be absorbed and implemented. Implementing new and complicated institutional arrangements is difficult in terms of required human and financial resources, and initial progress in improving the system of natural resources management in the 1990s has stalled because of slow progress in converting framework legislation into reality.

Mozambique is an essential link to global markets for several landlocked neighboring countries and has substantial growth potential in its economic ties to the industrial heartland of South Africa. These facts underscore how vital the country's successful economic, political, and social transitions are to U.S. national interests of peace, stability, and economic growth throughout southern Africa. As a rapidly growing economy, Mozambique is increasingly a potential market for U.S. exports and investment. To determine the status of the country's biodiversity and forest resources, we examined the threats to these resources and the actions necessary to respond to them. Both threats and actions are detailed in Section 4, and fall into two categories:

- Indirect threats, including poverty and population dynamics, lack of public awareness and consultation, the environment's reduced political leverage, lack of coordination

and harmonization of legislation, lack of capacity to implement biodiversity-related legislation, and lack of funding mechanisms

- Direct threats, including habitat fragmentation and deforestation, food insecurity and subsistence agricultural practices, soil depletion and erosion, pollution and waste disposal, and over-exploitation of coastal and marine resources

Actions to combat these threats range from local solutions (promoting community forestry, establishing community action plans, and strengthening environmental awareness) to national solutions (creating inventories, building the capacity of government resource managers, and improving implementation of the legal framework). Many of these options are being undertaken by international and Mozambican organizations, in part or in specific geographic areas, while others still need to be considered and applied as appropriate.

This assessment also looked at how USAID is addressing threats to biodiversity and forestry resources. USAID has a long history in health, democracy and governance, and in economic growth (agriculture and trade) in Mozambique, and many aspects of its current programming address the threats listed above (at least in part, directly and indirectly). In USAID's current portfolio, five activities directly address biodiversity and forest conservation in Lake Niassa, Pemba Bay, Quirimbas National Park, Gorongosa Park, and Limpopo National Park area. The Northern Arc Tourism Project is the USAID program that most directly addresses needed conservation actions. It addresses almost all of the above-mentioned threats, particularly through its efforts to improve natural resource governance, improve the livelihoods of rural and peri-urban populations, and conserve biodiversity. However, the project works in only a few sites spread across a large area, which limits its impact.

USAID/Mozambique is reaching the end of its strategy for 2006-2010 and developing its new Country Assistance Strategy. This report provides an opportune moment for USAID to examine its contribution and make strategic choices going forward.

After assessing the status of Mozambique's natural resources, the threats they face, and the actions needed to combat these threats, our team offered recommendations that fall into three categories:

- **Short-term quick wins** that relate to ongoing USAID activities include co-locating activities, developing non-timber forest products, supporting Global Solidarity Fund International, building synergies through tourism, tapping in to the Global Sustainable Tourism Alliance (GSTA), expanding the role in Quirimbas, exploring the carbon market in Gorongosa, chairing the Environmental Working Group, improving the harmonization of laws, improving environmental awareness, creating a natural resource management (NRM) Web-based platform, promoting alternative fuel use, and linking NRM and health in areas critical for biodiversity.

- **Medium-term higher-level/greater-impact interventions** that do not necessarily relate to a particular USAID activity, including supporting implementation of the Conservation Policy, supporting community action plans, developing public-private-partnerships with resort developers, and supporting the Tourism Forum and green building codes, the *Primeiras e Segundas* Eco-Region Project, and geomatics.
- **Long-term interventions** that may or may not be within USAID’s ability to implement, but that USAID could influence. These include assisting Mozambique in preparing for a carbon market, promoting certification schemes, supporting coastal spatial planning and regional ecological and environmental planning and integration, and promoting policy harmonization.

USAID/Mozambique’s biodiversity and forestry activities have grown organically, with no comprehensive strategy. This is an opportune moment to develop a more strategic focus to respond to the challenges the country faces in implementing recently developed biodiversity and conservation policies. The country’s environmental framework is largely in place, but there are gaps and overlaps, and inadequate human resources or capital to implement all the needs identified in the Conservation Policy, the Environment Strategy for Sustainable Development, or the Strategic Plan for the Development of Tourism. Mozambique is on the brink of launching large investments in infrastructure, mining, oil, gas, hydroelectric, and tourism, all of which will depend heavily on careful implementation of the above policies and strategies. Therefore, it is a good time for USAID/Mozambique to assist in ensuring these investments do not have irreversible long-term consequences on the biodiversity and forest resources of the country. There are many ways USAID can intervene — from small to large — depending on USAID’s budget, but the highest-priority overall needs for supporting the conservation and sustainable use of natural resources, biodiversity, and tropical forests in Mozambique fall into three overarching themes:

- **Build Capacity in Natural Resources Information.** The team was surprised to find that the information needed for planning and implementing sustainable development strategies — including agriculture, tourism and management of forests and other natural resources — continues to be lacking. This includes a lack of easily available and accessible information and maps of agricultural potential and conservation areas, and information on forest resources and their distribution. USAID/Mozambique could work with appropriate agencies in the government of Mozambique, as well as with other donors, to make better use of existing information on biodiversity, forestry and agricultural in Mozambique, to make this information available to the nongovernmental organization sector and civil society in general, and to develop better information where gaps are identified. The lack of a thorough national forest inventory is holding up the process of delimiting lands and making commercial concessions viable and attractive to private sector investors. USAID/Mozambique could try to move the forest inventory process forward. The national forest inventory should also assess forest land uses and forest condition. The forest inventory needs to be done to form the basis of knowing the extent of illegal logging, as well as how sustainable legal logging is, and where high-conservation value forests lie.

Information about the ecology of fire in forests of various types is essential for developing management plans. Forest inventory information is needed to create the enabling conditions to forge links between communities with forest lands and the private sector, which can invest in sustainable forest management and processing equipment that can add value to wood, creating jobs and earning income. Similarly, a national biodiversity inventory would enable the GRM and communities to evaluate and develop zoning and land-use plans, which are particularly needed in the buffer zones of protected areas (for example, Quirimbas). Better information on natural resources is essential for democratic decision-making, land tenure, national policy and strategy formulation, regional policy harmonization, conservation and development management plans, and developing a carbon market. USAID could work with appropriate agencies in the GRM, as well as with other donors, to make better use of existing information on biodiversity — forestry and agricultural; make this information available to the NGO sector and civil society; and develop better information, where gaps are identified. A biodiversity inventory and a forest inventory would be an excellent first step. Using geomatics may be an efficient and effective tool.

- **Strengthen Environmental Impact Assessments (EIA).** Conservation, tourism, and mining will increasingly come into conflict and there are still grey areas in laws governing the two. Oil companies can exploit the weakness of Mozambican laws, because there are no provisions for development in buffer zones of national parks. The EIA process itself is somewhat flawed, because there is little capacity in-country to write or review EIAs, or audit companies, and sometimes the same technical experts to do all three. The Ministry for the Coordination of Environmental Affairs (MICOA) expressed the need to outsource technical expertise, but no funds are available. Even once EIAs are approved, the enforcement mechanisms are so weak it is nearly impossible to implement some of the progressive laws in place. There is little specific industry knowledge in the country, resulting in weak capacity to perform environmental audits. Implementing existing regulations also requires capital equipment (cars, computers) and information. There is a lack of data at local and national level, as well as the human capacity to manipulate data. This means one cannot do proper zoning or create land use plans, let alone audit and monitor environmental data.

USAID/Mozambique could strengthen the EIA process. This could be done by supporting training in technical skills, professional exchanges, on-the-job training, internships with industry, scholarships, and university degree programs to increase the capacity of expertise in the country. USAID/Mozambique could provide equipment and training in geographic information systems (GIS), to conduct a forest inventory, a national biodiversity inventory, and then a harmonization of all data collected. A coastal zone management plan would be useful to the Ministry of Tourism (MITUR) and MICOA.

The process of consultation with civil society also could be supported. There are a growing number of local environmental advocacies NGOs, but in general,

environmental awareness is still low in the country. Mozambique is undergoing a huge investment spree, with oil and gas exploration, and hydroelectric and resort tourism investments. USAID could at least strengthen the EIA process in areas in which it is working, such as Pemba and Quirimbas where conflicts already exist with the oil/gas industry. This could be through support to environmental advocacy NGOs, environmental education at the community level, and/or capacity building in MITUR and MICOA to enforce EIA procedures.

- **Create Sustainable Financing Mechanisms.** To address inadequate financial resources devoted to conservation and biodiversity protection, several areas of intervention are possible. One is to assist with legal reforms necessary for creation of sustainable financial mechanisms for protected areas. Assistance could be in developing a more transparent system of collection and management of revenue arising out of protected areas, which until now has been channeled to the National Environmental Fund, the National Tourism Fund, and the General State Budget. Creation of a Conservation Investment Fund has been suggested. Assistance could be provided to develop a fiscal framework to legally channel green taxes and donations to protected areas. Assistance also could be in clarifying the overlapping legal instruments for management of protected areas between the Ministry of Agriculture and the Ministry of Tourism (there is confusion over the entity responsible for issuing licenses for development of activities in protected areas). USAID could assist in formulating the norms and procedures for concessions, which has been a roadblock to granting management concessions to private operators. Legal management plans urgently need to be created for transition areas around protected boundaries. Mozambique adhered to the United Nations Framework Convention on Climate Change and its Kyoto Protocol and designated MICOA as the lead authority, but has yet to develop concrete actions for the implementation of the Cleaner Development Mechanism and development of a carbon market. USAID could assist in creating concrete actions for the Cleaner Development Mechanism and the carbon market. USAID/EGAT/NRM has been talking about how to combine Development Credit Authority (DCA) with NRM (conservation and investment funds). USAID could invite DCA and EGAT to assist in designing a DCA project with NRM around carbon credits. Other models of sustainable financing outside the public realm should be examined to enable communities to become shareholders and stewards of NRM. USAID could assist communities in becoming shareholders in resort tourism and boutique tourism through developing public-private-partnerships.

SECTION I. INTRODUCTION

Legal Requirement and Purpose of this Assessment

The purpose of this task was to conduct an assessment of (1) the current state of biodiversity and forest conservation in Mozambique, (2) the actions necessary in Mozambique to conserve tropical forests and biological diversity, and (3) the extent to which the actions proposed for support by USAID/Mozambique meet or could meet the needs thus identified. This assessment is intended to serve as a tool to assist USAID/Mozambique in better integrating environmental concerns into their proposed programs in the short- and medium-term future. The assessment is also necessary to comply with Sections 118 and 119 of the Foreign Assistance Act of 1961, as amended, as well as critical to informing the Strategic Framework for Foreign Assistance and country strategy guidelines under ADS 201.3.4.11 and ADS 204.5.

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Methodology of this Assessment

Mozambique's 118/119 assessment was conducted by a four-person team of two international consultants, Robin Mason of Chemonics International, and Carlos D. Rodríguez-Pedraza from the USDA Forest Service; and two Mozambican consultants, Kemal Vaz of Verdeazul Consultancy Company in Mozambique, and Roberto Zolho of the African Wildlife Foundation in Mozambique. The team worked with its USAID counterpart, Mission Environmental Officer Andrew Hebel.

The assessment was carried out using a threats-based approach, and included a literature review of available materials, more than 30 interviews in Washington, D.C. and Mozambique, and a field-based site visit. Before traveling to the country, the team reviewed background materials available on the Internet and gathered available GIS data. Mr. Rodríguez-Pedraza and Ms. Mason met with a few D.C.-based organizations working on biodiversity/forestry issues in Mozambique. From July 28 through August 7, the team worked with local counterparts to conduct interviews and meet with key

stakeholders, including representatives of the GRM, NGOs, donor organizations, and community-based organizations, USAID project staff, the Millennium Challenge Corporation (MCC), and activity beneficiaries (see Contact Table in Annex A).

The field trip took place in the Lake Niassa, Niassa Reserve, Pemba Bay, and the Quirimbas Archipelago. The lake supports a unique ecosystem, with 700 to 1,000 species of fish found nowhere else in the world, many colorful and beautiful. Lake Malawi-Niassa-Nyasa is widely regarded as the most biologically important lake in the world and is considered under threat from fishing and pollution. The Niassa Reserve is one of the world's largest protected Miombo woodland areas and supports substantial biodiversity. This area is under threat from illegal logging and pressure from local communities. The Quirimbas Archipelago is an important nursing area and source of larvae for the entire eco-region. Pemba Bay is suffering from increasing pollution and salinity due to human activity, especially detrimental agricultural practices. The entire marine coastal zone suffers from large- and small-scale fishing activities. Vital mangrove habitat is disappearing rapidly.

The team chose to conduct its site visit to these areas for the above reasons and because USAID's tourism program is concentrated in this area. This area has the potential to form a tourism corridor linking Lake Niassa, Niassa Reserve through to Pemba and the Quirimbas Archipelago, and could eventually form a trans-border park with Tanzania. This field trip provided valuable insights into the challenges of conserving biodiversity and forest resources in Mozambique, as well as the threats and opportunities presented for conservation, tourism development, and mining.

SECTION II. COUNTRY PROFILE

Mozambique has an abundance of natural resources. Out of a total land area of 780,000 km², 620,000 km² are covered with vegetation, of which 87,000 km² are in protected areas (11.1 percent). The country is sparsely populated, with large areas of unused land. It has 36 million ha of cultivable land, but only one-tenth is suitable for crop production, of which 12 percent is being used. Mozambique possesses sites of high importance to biodiversity, such as the Gorongosa Mountain, the Archipelago of Quirimbas, and the Chimanimani Massif. According to national estimates, Mozambique is home to more than 5,500 plant species, 220 mammals, and 690 birds, many of which are endemic.

Its water availability per capita is close to the average of Africa and the world, but access to water continues to be a problem throughout urban and rural areas. The country is rich in fish resources, but marine-coastal zones suffer from large- and small-scale fishing, and vital mangrove habitat is disappearing rapidly. In addition, Pemba Bay suffers from increasing pollution and salinity due to human activity, while Lake Niassa, which supports unique species and ecosystems, is under threat from fishing and tourism development on the Malawi side.

The country's forestry potential is under-utilized, although determining the extent of legal and illegal logging remains a challenge, due to insufficient data collection and mapping. However, data reveal the northern forests of Niassa region are under threat from logging and charcoal wood harvesting, while the dense monoculture forest growth of Mozambique's coastal forest ranges are decreasing due to agriculture burning.

There are significant mineral resources and prospecting is occurring for oil, gas, diamonds and uranium, with export revenue expected to reach \$500 million by 2010. These activities will increasingly come in to conflict with tourism and conservation.

More than 75 percent of the population of 21 million is engaged in rural agriculture, mainly at the subsistence level. The country's economy continues to rely to a large extent on its natural resource base. Even with rapid rates of urbanization, the subsistence and well-being of most Mozambicans depends on their access to land, water resources, forest products, fisheries, mines, and other natural resources.

The GRM is trying to balance its immediate goal of reducing poverty through use of natural resources with longer-term strategies requiring judicious management of resources. Limited domestic funds are leading to heavy reliance on foreign capital, and posing difficult choices. It is essential to make some key choices now, at current levels of resource utilization, before it is too late. The GRM is aware of this and has made substantial progress in management of natural resources, especially in the last decade. Peace and macroeconomic stability have provided a platform for increasing use of its natural resources, contributing to economic growth and poverty alleviation. Framework laws that establish the basic ground rules for the use of resources have been enacted. These have been designed to protect the interests of the poor. However, many of these laws are recent and require time to be absorbed and implemented. Implementing new and

complicated institutional arrangements is difficult in terms of the required human and financial resources, and initial progress in improving the system of natural resources management in the 1990s has stalled because of slow progress in converting framework legislation into reality.

Physical Environment

Climate and Regional Setting

Mozambique is located on the southeastern coast of Africa, bounded by Tanzania and Rovuma River to the north; by the Mozambique Channel (Indian Ocean) in the east; on the south and southwest by South Africa and Swaziland; and on the west by Zimbabwe, Zambia, and Malawi. The country has a coastline of more than 2,500 km and is generally low-lying, with only 13 percent of the country above 1,000 m. The land ascends in a westward direction from the coast through a coastal lowland that is narrow in the north but broad in the south (44 percent of the total land area), through a sub-plateau zone to an extensive low-lying plateau of moderate height, and finally up to a narrow higher-lying area on the western border. The climate ranges from subtropical in the south to tropical in the center and north. Most of the country receives above 400 mm of rainfall per annum, with the rainy season extending from October to April. The coastal zone receives up to 900 mm of rain per year. The north region is more humid than the south, except in the Upper Zambezi region in Tete, where it is dry and hot. At ranges with more than 2,000 mm of rain, these areas are covered with dense forests.

Climate Change

Rainfall records from the early 1900s to the mid-1990s indicate that rainfall in the East Africa region has decreased since 1968 and has been fluctuating around a lower mean level (United Nations Environment Programme, 1997). The occurrence of droughts in the area has also been steadily increasing. In the latter half of the century (between 1988 and 1992), more than 15 climate events affected the region, compared with fewer than five such events between 1963 and 1967. Tropical cyclones and the El Nino/La Nina phenomenon compound the variability, resulting in extreme floods and droughts, such as the floods of 2000 in the south and 2001 in the center of the country. (Mysterud et al, 2003)¹. Projected effects of climate change for Mozambique are that the average temperatures will increase by 1.8-3.1°C by 2075, rainfall will decline by 5 to 10 percent, and potential evaporation will increase by 9 to 13 percent (Government of Mozambique 1999, Hulme 1996, Ragab & Prudhomme 2002). Severe reductions in streamflow in can be expected because of this (Arnell 1999, Government of Mozambique 1999). There is little published research on the effect of global warming on species-specific studies in southern African ecosystems. However, we can expect global warming to disrupt tight multi-trophic interactions involved in the timing of reproduction and growth (in other

¹ Atle Mysterud, Nils Chr. Stenseth, Nigel G. Yoccoz, Geir Ottersen, and Rolf Langvatn, *The Response of Terrestrial Ecosystems to Climate Variability Associated with the North Atlantic Oscillation*, the American Geophysical Union, 2003.

words, prey-predator relations will change due to changes in the food chain). The impact of climate change must be included in management of parks and other conservation areas. Separating anthropogenic effects from climatic effects on the transitional states of flora and fauna will be a big challenge.

Of special mention is the Famine Early Warning System at the Ministry of Agriculture, supported by USAID and the University of Michigan, which is assisting the country in developing tools and infrastructure to prepare a timely response to long drought spells. The Technical Secretariat for Food Security and Nutrition is another Ministry of Agriculture mechanism to assist the country in establishing the right support to food-insecure regions. It is being supported by the Food and Agriculture Organization of the United Nations (FAO) and the World Food Programme. A more operational institution is the Institute for Management of Natural Disasters, which has the mandate to respond and assist communities every time a natural disaster occurs.

Ecological Regions

Mozambique includes 14 ecological regions, of which seven have global importance: the Agulhas Current, the East African Coast, the Lakes of the Rift Valley, the East African Mangroves, the Forests of the South Rift Valley, East and Central Miombo, and the Savannas of the Zambezi Floodplains. However, to protect all important bio-diverse ecosystems in Mozambique there are two remaining areas to be designated officially for protection: Lake Niassa and the Inselberg Arquipelago in Zambezia Province. These two became part of the agenda of the action plan in the Conservation Policy and Strategy for Implementation.

Protected areas still face many challenges, and some are only protected on paper. Most of these areas are understaffed, underfunded, and without qualified personnel. Because these areas were either neglected during the war or only recently approved, human populations have for many years been living inside park boundaries and freely exploiting their natural resources. (See Section III. Status of Biodiversity for a more robust discussion.)

Freshwater Resources

Thirty-nine major rivers drain into to the Indian Ocean along Mozambique's 2,700 km coastline. In the north, the Rovuma River forms the border with Tanzania. It is the third-largest river in Mozambique. Six other seasonal rivers discharge along the northern coast in Cabo Delgado and Nampula Provinces. These rivers have low sediment loads and consequently, marine turbidity is low and extensive coral formations occur in the coastal waters of these estuaries. Most of Mozambique's rivers have a torrential regime, with high flows during the rainy season and low flows the rest of the year. Of the 11 major river basins, seven are shared with other countries.

The Zambezi River, the most important in the country, feeds into Lake Cahora Bassa and the dam. The Zambezi Delta covers about 18,000 km². The huge dual impoundments of Kariba and Cahora Bassa are thought to have affected the downstream flooding region and the ecology of the Zambezi Delta. Also, the recent approved GRM projects in the

Upper Zambezi Valley (coal mining, intensive agriculture, two additional hydroelectric impoundments in the Zambezi River, coal-fired electric production in Moatize) will affect the recently proclaimed RAMSAR site in the Marromeu Complex, affecting the flooding regions of the Delta. The Pungue River rises in Zimbabwe and discharges into the Indian Ocean south of Beira, collecting numerous tributaries en route, and constitutes an important river system for conservation purposes of which the Urema River, which flows south through the Gorongosa National Park, services important freshwater ecosystems, birds, and large and small mammals. The Pungue River forms the southern boundary of Gorongosa Park, creating a natural barrier. The Limpopo River, in southern Mozambique, is the country's second-largest river. Flows in the Limpopo River are variable and it is often dry in long sections during the winter. An important tributary is the Elephants River, which, together with Limpopo, constitutes an important contributor for the conservation of Kruger National Park in South Africa and the Great Limpopo Trans-frontier National Park. It is therefore important to monitor carefully all new developments along these river systems.

From a regional perspective, Mozambique has abundant surface water resources (216 km³/year). However, more than 50 percent of the water resource comes as cross-border flow (116 km³/year) and the remainder is generated within the country. Mozambique thus has little control over its supply of freshwater. The Zambezi represents almost 50 percent of the water resource available (106 km³/year), of which 88 km³ comes from outside. Furthermore, all major rivers in the south originate in neighboring countries. Significant water abstractions upstream reduce the availability of water and increase regional water vulnerability. Of the combined natural flow of 11 km³/year only 5 or 6 km³ is expected to be there in 20 years, if existing increases in demand are accounted for (this situation becomes worse if less precipitation in the region as forecast by regional climate models is accounted for).

Natural Vegetation

The main vegetation type in Mozambique is savanna woodland. It covers 70 percent of Mozambique's land area and can broadly be divided into two types: miombo and mopane woodlands. Miombo is the most extensive and covers much of Niassa, Cabo Delgado, Nampula, Zambezia, Sofala, Manica, and Inhambane Provinces. Other important vegetation types include Acacia woodland (found in the southern and central parts of the country), dune forest (which occurs on high dunes along the coast between the southern border and Bazaruto Island), a sub-littoral woodland (found inland from the dune forest in the sub-littoral zone between Ponto do Ouro and Macia), lowland palm savanna (in coastal areas in Nampula, Sofala, and Inhambane Province), vegetation on alluviums in the Zambezi Delta and the lower Limpopo and Nkomati Valleys, and mangroves, which are well-developed in the northern and central sectors of the coast and less so along the southern sector.



The most common vegetation type is Miombo, occupying two-thirds of the territory. Photo taken 2 km west of the Namacula village in the Quissanga district, Cabo Delgado. Photo by Carlos D. Rodríguez-Pedraza.

A new national forest inventory² was recently finished by the National Directorate of Land and Forests. Preliminary data are being slowly released, but digital geo-referenced data of vegetation maps or land use-land change are not available for further research.

Southern Africa's savannas are considered extremely fragile ecosystems, as they arise from a combination of low and often-unreliable rainfall patterns, generally high temperatures and fire regime, and a distinct often-prolonged dry season. In addition, the cycles of drought and relatively good rainfall years encourage periods of boom in which the increased carrying capacity of the savannas becomes gradually more fully exploited, and then bust during the drought years when the carrying capacity is drastically reduced. Natural vegetated areas in Mozambique are exploited for grazing, wildlife management, fuel, and building materials. The conservation status of Mozambique's flora is not well known, but a preliminary estimate indicates that, of the 5,500 plant species recorded for the country, some 247 species in 67 families may be of conservation concern.

² MA/National Directorate of Land and Forestry, 2007. Inventário Florestal Nacional, "Avaliação Integrada de Florestas de Moçambique," National Directorate of Land and Forests, 2008.

Land Use and Agriculture

Agriculture is the main activity of the Mozambican population. About 84 percent of the economically active population works in agriculture, which contributes 30 percent (with considerable decrease every year due to increase from other sectors) of the gross domestic product. Pressure on arable land is considered to be relatively low though, considering the abundance of arable land and the low population density. For the country as a whole, only 12 percent of arable land is cultivated, although that varies considerably between provinces. Cropping rates are reported to be the highest in Gaza (72 percent), but much lower in Niassa and Tete (3 and 7 percent, respectively). Cropping rates for land devoted to shifting agriculture are also reported to be modest —17 percent on average — which is equivalent to a rotation period of about one year in six. Cabo Delgado province is reported to have the highest cropping rate for shifting agriculture in Mozambique, with a rotation period of about one year in four. Food production systems are extensive, with low productivity. In an average year, these systems can supply basic foodstuffs, but the diet would be insufficiently diversified and a significant degree of food insecurity would still occur at the household level (Action Plan for the Reduction of Absolute Poverty {PARPA}, 2001).

Shifting cultivation is an ancient agricultural production system commonly practiced in Mozambique. Shifting cultivation can be sustainable if rotation cycles are sufficiently long so that natural vegetation recovery can take place, but under increasing human population pressures, the cycle is shortened, and can result in soil fertility and crop yield declines. Fire is an essential and integral part of shifting cultivation. Only through burning at the end of the dry season, can the cut trees and slashed brush be converted to ash and incorporated into the soil to sustain crop production. The use of fire in shifting cultivation has only limited possibilities for reduction.



Fire in the Quirimbas National Park 3 km south of Mitambo village, Meluco district, Cabo Delgado.
Photo by Carlos D. Rodríguez-Pedraza.

Burning must be done near to or at the end of the dry season, because only then has the woody material dried enough to give a good, hot burn.

The FAO estimates that 36 million ha of land are arable, but the area cultivated for arable and permanent crops was estimated by the National Forest Inventory at 5.6 million ha. The total land used for cropping and mixed farming systems is projected to remain to be less than 40 percent through 2020. An unknown but significant amount of land is leased to (large) private firms and individuals, and lays fallow. This land thus is generating neither income nor employment. Of this land, 4 to 5 million ha have been estimated to be for biofuel production. If these large tracts of land are put into production, we may expect a large demand for water and water infrastructure. Although in the south this can be a major constraint, the central and northern provinces have better water resources and environmental conditions. Financial returns to investment in irrigation schemes in large-scale commercial farms are significant, but investors will only be attracted if they have secure property rights over the land and irrigation infrastructure.

Domestic livestock estimates differ dramatically over time and for different species. The total stock of cattle is estimated at 1.5 million units. Goats and pigs are estimated to contribute a further 750,000 units. The national cattle herd is expected to grow 8.2 percent from 1997 to 2000. Assuming that this rate continues, (Hughes 2005) estimates the total number of livestock units will increase a further 50 percent by 2010. Following from this, it is estimated that the amount of land required for grazing will increase from 85,000 km² in 2003 (19,000 km² in mixed farming and 66,000 km² in range grazing) to nearly 122,000 km² in 2010 (32,000 km² in mixed farming and 90,000 km² in range grazing respectively). There is some evidence of land degradation as a result of over-use, and this is expected to increase dramatically in grassland areas in certain provinces (e.g. Manica and Tete), especially in the event of a prolonged drought.

Raising agricultural productivity must be one of the key pillars for sustaining economic growth and poverty alleviation. Although development of commercial agriculture will put more pressure on natural resources, it can be alleviated by decreasing agriculture extensification, by using degraded lands and increasing productivity per hectare.

With the cost of fossil fuels increasing, Mozambique is looking to attract investors into production of biofuels, and is facilitating the allocation of land for these large agro-industries. Crops are being tested, and some already under commercial production are sugar cane and sweet sorghum for ethanol, and jatropha, palm, and coconut for bio-diesel. It is expected that most biofuel companies will adhere to best practices, that is, regarding food security, land access and job creation, and land-clearing in already degraded lands.

For Mozambique as a whole, there are ample land resources to cater for prospective increases in rural population and agricultural production in the next 10-15 years. Cropping rates on arable land will remain below 20 percent for the country, while total land used for cropping and mixed farming systems should remain less than 40 percent until 2020. This should mean there is ample scope for providing land for a rapid expansion of medium- and large-scale commercial farming that has not been included within these estimates. There are, however, three important qualifications to this broad conclusion.

- A significant part of the demand for commercial farming focuses on the extensive grazing of cattle and other livestock. Although there should be no difficulty in accommodating demand for grazing on permanent pasture and in mixed farming, development of extensive range grazing should be discouraged in Tete and Manica, as these provinces do not possess ample under-used range grazing areas.
- There is little information on existing stocking rates and land-use patterns set in the context of accessibility and infrastructure provision. Smallholder agriculture is concentrated in areas close to major transport corridors. The same is true for land licensed for commercial farming. Although Manica Province faces the prospect of considerable land pressure in the future, significant areas with good soil quality are

not currently farmed because they are unattractive for small farmers and/or are inaccessible. This reinforces the standard economic point that management of land resources is as much about the development of infrastructure — in particular roads — as it is about legal aspects of land rights and policies.

- A land-use planning tool must be used to establish zoning for what should and should not be used for different economic activities.

Land Distribution

Farm holdings are estimated at 3.2 million (2003 statistic), with an average cultivated area of 1.35 ha per holding. In aggregate, holdings with more than 5 ha of cultivated land account for less than 12 percent of the total area under cultivation. By conventional criteria, the lower threshold for large and medium-sized commercial farms would be at least 50 ha. Such farms account for less than 2 percent of cultivated land. This would signify that large farms are not a threat to small-scale farming. Indeed, the problem is that the commercial farming sector is too small to sustain the ancillary services and employment that would assist with development of more commercial opportunities for small-scale farmers.

Fisheries

The country is rich in fish resources, which are largely commercially exploited. Although the majority of the sector-generated income comes from marine fisheries, inland fisheries are central to the survival of many poor communities, providing an important source of food and income. Within the fisheries context, water resources management can directly affect the resource base and habitat of freshwater fisheries, and indirectly affect marine and coastal zone fisheries by reducing the amount of water reaching the sea.

Exploitation of marine resources by the local industrial fishery sector in Mozambique appears to be sustainable as officially reported. Little variation in total landed catches has been officially reported in the last eight years. These fisheries are controlled mostly by limiting the number of licenses and monitoring landed catches. However, semi-industrial and artisanal fisheries are more difficult to monitor or control, and minimal data are available on total landings or catch rates. From the little available data, it appears that levels of exploitation are excessive in many areas (particularly around the major centers) and stocks are overexploited. Use of illegal fishing methods (such as dynamite, poison, and fine mesh nets, such as mosquito nets) has also contributed to a reduction in fish stocks and habitat (such as coral reefs and seagrasses) (Hoguane et al. 2002).



Mosquito net use in the Niassa Lake, Metangula, Niassa. Photo by Carlos D. Rodríguez-Pedraza.

Illegal, unreported, and unregulated fishing appears to be a growing trend, though by all accounts the magnitude of loss is extremely difficult to assess. A recent U.K. Department for International Development (DFID) study (“Study and Analysis of IUU Fishing in the SADC Region”, May 2008) confirms “data is extremely limited” though it reports sub-Saharan Africa could be losing a \$1 billion/year from illegal fishing. Industrial fishing in Mozambique is mainly operated through joint ventures between the government and foreign companies from Japan and Spain. However, a growing body of anecdotal evidence reveals international trawlers illegally fishing (“Mozambique Seizes (Namibian) Ship over Illegal Fishing...with four tons of shark fin” Reuters, July 19, 2008). As reported by the DFID study, a major concern is that many of these vessels do not meet the standards set by the Indian Ocean Tuna Commission many are not registered with commission and therefore do not report catches, and vessel markings are often inadequate or do not exist at all (some even change their name during port visits making it extremely difficult to monitor them). But again, these incidents are isolated and so far, it is impossible to determine the magnitude of the threat to sustainable fisheries or the loss in value, except by a process of triangulation of information from different sources.

Mining

The mining industry is not well developed, so related environmental matters are not as serious and extensive as in other countries. Despite obvious potential revenue from the activity, the associated costs and benefits may accrue unevenly to different groups. Mining can reinforce poverty directly by damaging the environment on which

subsistence economies depend, by creating new social and economic problems, while communities are often not given the opportunity to participate in discussions on proposed projects. The outcome will often depend on policy and institutional frameworks in place, as well as the government's political commitment to support often dispersed and isolated, less-informed and less-empowered groups.

Problems do exist and there is potential environmental impact associated with any new mining operation. At present, there are a few valid mining concessions within protected areas, and no mineral exploitation is going on in those. However, impact to wildlife and natural vegetation outside of these areas is reported to be a problem. As prospecting and mining activities expand in Mozambique, conflict with conservation is inevitable and will have to be managed carefully. The heavy mineral sand deposits (like similar deposits in other countries) exhibit a high gamma radiation originating from thorium (mainly) and uranium and can expose workers to unacceptably high levels of radiation unless appropriate precautions are taken. A number of factors contribute to the difficulties in reducing negative social and environmental effects in small-scale mining operations, including:

- Artisanal mining projects are generally widely dispersed and often centered in remote areas where the presence of the state is weak or non-existent (e.g. Niassa Province).
- Capital investments are generally too low to ensure implementation of the best technical solutions that can avoid damage to and contamination of the environment.
- The absence of legal security inherent with unlicensed operations.

Insufficient technical knowledge and the lack of support and technical assistance. Mining has served as an economic buffer for many poor rural Mozambicans, and a realistic growth scenario could put export revenue at \$500 million by 2010. For the vast majority, mining is a part-time activity undertaken in parallel with subsistence agriculture, and is an intimate part of rural societies and traditional village structures and their economies.

Population and Economy

Mozambique is one of the poorest countries in the world with a per capita gross domestic product of \$800 (CIA, 2008). About 70 percent of Mozambicans live in absolute poverty, and the unemployment rate is 21 percent (CIA, 2008). The population is 21 million, with a growth rate of 1.8 percent (CIA, 2008). Population dynamics and economic growth are both likely to be affected by HIV/AIDS, for which the adult prevalence rate is 12.2 percent (CIA, 2008). Catholics comprise 24 percent of the population, while Muslims comprise 18 percent. Poverty is common throughout the country, but more so in rural areas; during the past three years floods and drought have worsened the situation.

Mozambique is a large country and population density is relatively low — 25 people per square kilometer. Relatively low population densities are characteristic of the miombo

eco-region, where human populations were traditionally limited by low soil fertility and poor conditions for cattle pastoralism. Population distribution is not uniform in Mozambique, with more than 50 percent concentrated in the north, especially in Nampula and Zambezia Provinces. In the central zone, people are concentrated along the Beira Corridor, and in the south, around Maputo. More than 70 percent live along the coastal area, and about 80 percent live in rural areas.

At independence in 1975, Mozambique was one of the world's poorest countries. A brutal civil war from 1977-1992 exacerbated the situation. In 1987, the government embarked on a series of macroeconomic reforms to stabilize the economy. These steps, combined with donor assistance and with political stability since multi-party elections in 1994, have led to dramatic improvements in the country's growth rate. Inflation was reduced to single digits during the late 1990s, and although it returned to double digits in 2000-2006, in 2007, inflation had slowed to 8 percent, while gross domestic product growth reached 7.5 percent (CIA, 2008). Fiscal reforms, including introduction of a value-added tax and reform of the Customs Service, have improved the government's revenue collection abilities. In spite of these gains, Mozambique remains dependent upon foreign assistance for much of its budget, and most of the population is below the poverty line. Subsistence agriculture continues to employ the vast majority of the country's work force.

A substantial trade imbalance persists, although the opening of the Mozambique Aluminum smelter, the country's largest foreign investment project to date, has increased export earnings. At the end of 2007, and after years of negotiations, the government took over Portugal's majority share of the Cahora Bassa hydroelectricity company. More power is needed for additional investment projects in titanium extraction and processing and garment manufacturing that could further close the import/export gap. Mozambique's once substantial foreign debt has been reduced through forgiveness and rescheduling under the International Monetary Fund's Heavily Indebted Poor Countries and Enhanced Heavily Indebted Poor Countries initiatives, and is now at a manageable level. In July 2007, the MCC signed a compact with Mozambique; the GRM moved rapidly to ratify the compact and propose a plan for funding.

Natural resources supplied by forests and woodlands make a significant contribution to the economy. Rural households earn some income from selling firewood and charcoal, medicinal plants, and other wild products. Forest products are important to livelihood and food security, especially in times of crop failures, floods, droughts, famines, and unemployment. Poverty reduction is the central focus of the GRM's development plan. Mozambique's Poverty Reduction Strategy Paper, known by its Portuguese acronym PARPA, covers 2006-2010. Poverty reduction results were better than anticipated under the first five-year PARPA. Household consumption survey results show a 15.3 percentage-point drop in the incidence of poverty. The number of households in poverty declined from 69.4 percent in a 1996-1997 survey to 54.1 percent in a 2002-2003 survey. The PARPA goal was to reduce the incidence of poverty to 60 percent by 2005 and to 50 percent by 2010, so Mozambique is clearly making progress on this front.

Mozambique's agenda for further policy reform in the near future is ambitious. Included are steps to remove a number of obstacles to private-sector development, such as simplifying the complex regulations and procedures that increase the cost of doing business; relaxing the labor code that limits the formal sector's competitiveness in export industries; modifying the regulatory environment to bring market forces into play in the allocation and trading of urban land and to allow land to be used as collateral; and improving the functioning and integrity of the judicial system.

Mozambique is an essential link to global markets for several landlocked neighboring countries and has substantial growth potential in its economic ties to the industrial heartland of South Africa. These facts underscore how vital the country's successful economic, political, and social transitions are to U.S. national interests of peace, stability, and economic growth throughout southern Africa. As a rapidly growing economy, Mozambique is increasingly a potential market for U.S. exports and investment.

Legal and Institutional Framework Related to Environment

Ministry for Coordination of the Environment

MICOA is the agency responsible for coordinating environmental issues in Mozambique. The agency's Environmental Framework Act (Act 20 of 1997) provides for the participation of local communities, among others, in the development of policy and laws for NRM, management of protected areas, and policing environmental norms and regulations. Provisions in the law reinforce the view that communities in protected areas retain their rights, and can use them to negotiate returns on income generated on what is "still their land", even if these protected areas are re-classified for specific conservation purposes (CTC, 2003). An EIA Act (Decree 45/2004) provides the framework for managing environmental effects of development. The EIA Act requires that all sectoral legislation in Mozambique be revised to conform to the Act. Although on paper, EIA regulations follow internationally accepted processes (screening, scoping, consultation, assessment of impact, review, and monitoring and evaluation), in practice, numerous problems limit the effectiveness of the process. These include inconsistencies in substance and style across ministries and departments on environmental management, because roles and responsibilities and modes of cooperation have not been properly defined. Institutional problems remain, such as:

- A potential conflict of interest, as EIAs are mostly compiled by a consulting company paid by the firm proposing the development activity
- Limited human resources and institutional capacity, especially at the provincial level (where much responsibility for environmental management has been relegated)
- Lack of clarity and overlap of environmental management roles and responsibilities among government sectors
- The absence of a culture of communication, information sharing, and cooperation among institutions
- Planning, operational, and human resource constraints in linking environmental monitoring activities mostly conducted at the provincial level to the national level

- A shortage of technical expertise for evaluating environmental impact in Mozambique
- Absence of legislated environmental standards against which impact can be measured

Many of these problems are thought to stem in large part from the fact that MICOA is defined as a ministry for coordination and is not perceived as having a strong mandate to act. A major issue is that the rate of development in the country is far exceeding the capacity of MICOA to keep up; the workload to review EIAs and grant licenses is far too great. Deficiencies have also been reported in the requirements for public participation, which are not sufficiently prescriptive and do not provide minimum performance standards. The EIA also requires that MICOA regularly inspect and control activities on a particular project, but lack of human and material capacity within the ministry means this is seldom applied.

The constitution entrenches the concept that the state is the paramount owner of the natural resources occurring within its national territory. Land ownership, for example, is vested in the state and no land may be sold, mortgaged, or otherwise encumbered or alienated. This has a strong impact on natural resource management. The constitution requires that the state develop and determine the conditions under which citizens and others may access natural resources for their use and enjoyment. Rights of use and enjoyment may be granted to individuals and collective persons by the government, based on its social purpose, with priority given to direct users and producers.

Since adopting the constitution, the GRM has produced and adopted a wide range of legal instruments that provide protection for natural resources (Mendes *et al.* 1998). These are:

- **The Agrarian Policy.** The aims within this policy were to develop agrarian activities to achieve food security for the country based on sustainable use of natural resources.
- **The Land Policy.** The objective of this policy was to entrench the rights of the population over the land and other natural resources, while promoting investment and sustainable and equitable use of these resources.
- **The Environmental Policy.** This policy ensures environment and natural resources maintain their functional and productive capacity for current and future generations; ensures environment is considered in socioeconomic planning; and integrates global and regional efforts in the search for solutions to environmental problems. The national policy was implemented through two legislative instruments: the National Environmental Management Program and the National Conservation Strategy, within which an institutional and legal framework has been built for most relevant sectors and subsectors of national development.

Mining

Potential environmental impact associated with mining is dealt with separately from impact from other activities, by provisions in the Mining Law (Lei no. 14/2002). Although mining law provisions are good and include a number of important instruments for managing environmental impact (including provisions for environmental impact assessments, environmental management plans, environmental monitoring program, mine closure programs, emergency risk assessment and control programs, and environmental audits), these are not always consistent with those stipulated in the Environmental Law (Lei no 20/97), and hence those adopted by MICOA. Unification of some of these instruments under a broader EIA umbrella will simplify matters and will ensure that issues such as rehabilitation have a greater influence on the design of an operation and the choice of mining methods, which is not always the case under the present system³.

Thus, in terms of the existing legal framework, control over natural resource use is exercised through key sectoral legislation (roads, fisheries, agriculture, forestry, water, and mining), while environmental impact from other sources (e.g. from the transportation, energy sectors and tourism) is controlled through legislation developed under the National Environmental Program, which includes a Framework Environmental Act (1997) and the EIA Regulations.

However, in reality, it is difficult for ministries to mainstream environmental aspects into their sectoral plans. One step in this direction is a new Conservation Policy and Implementation Strategy, which is in draft (Version, June 2008) and in the process of approval. It aims to harmonize laws and sectoral policies among the ministries (MITUR, MA, MICOA, and the Ministry of Public Works and Housing) and establish systems for inter-institutional coordination, mechanisms for the involvement of civil society, strategies for management of parks and reserves, and criteria for new areas of conservation and reclassification of areas of conservation. It also makes recommendations for decentralizing management of conservation areas, and establishes mechanisms for the integration of communities as beneficiaries of conservation areas. In addition, it makes recommendations for clarification of areas of responsibility and coordination between MITUR and the Ministry of Fisheries in marine conservation areas.

Mozambique has made significant progress in undertaking measures that will contribute to the fulfillment of the objectives of the Convention on Biological Diversity. The GRM has approved the National Biodiversity and Action Plan (2003) and a Tourism Strategy (2003). These instruments set out the road map for intervention of stakeholders in biodiversity and sustainable development. Other related laws on biodiversity are the Regulation on Forestry and Wild Life (2002), the Regulation on Environmental Audit (2003), the Regulation on Pesticides (2003), the Regulation on Bio-Medical wastes (2003), the Regulation on Environmental Impact Assessment (2004), and the National Policy on Traditional Medicine (2004). Significant pieces of legislation in progress are an

³ Environmental Regulations for Mining Activities only require a closure plan to be drawn up one year after the start of mining operations.

Integrated Marine and Coastal Diversity Management Plan, Strategies on Wetlands, and an Environmental Strategy for Sustainable Development.

However, despite progressive policies and strategies, challenges for persist, particularly in mobilizing financial resources, accessing technical training, and inter-institutional coordination.

Planning and Decentralisation

Planning and decentralisation is perhaps the most important component in most natural resources legal and institutional frameworks. Two levels of planning are occurring simultaneously in Mozambique — at the national and provincial levels. The main instruments are Five-Year GRM Program Plans, Three-Year Public Investment Plans, and Three-Year Economic and Social Plans. At the provincial level, the GRM has been implementing planning approaches on a pilot basis to improve access of rural communities to basic services. At the district level, the legal framework for planning is still lacking definition.

Of note, MICOA and The Ministry of Planning and Development (MPD) recently developed a legal framework for spatial planning, which was passed into law. Under this law, MICOA retained planning for biophysical aspects and the MPD retained socioeconomic aspects. This process affects the way natural resources will be managed, as it seeks to create appropriate levels of investment juxtaposed with resource conservation. The economic perspective of development will link resource rights and use to economic value, and the biophysical perspective will contribute to establishing territorial zoning. This will link resource rights and use to ecologic potential.

The recently approved Law of the State Local Bodies (2003) sets out the functions, responsibilities and organization of government structure to the level of locality (provincial, district, administrative post, and locality). The law says important decisions are/should be made at the lower level (e.g. district administrators approve land use and territorial plans and identify protected areas, and land reserves). It will take some time before there are adequate resources to implement this law. The decree creates an ambiguous authority regarding the entity that represents the communities. It is also ambiguous about how local authorities will be brought more formally into the public administration system of the state, as it conflicts with private structures created under the Land Law (CTC, 2003).

International Agreements

As a member of the international community, Mozambique ratified the following conventions:

- Vienna Convention for the Protection of the Ozone and the Montreal Convention on Ozone Destroying Substances
- United Nations Basic Convention on Climatic Changes

- United Nations Convention on Biological Diversity
- United Nations Convention on the Right to the Sea
- Convention for the East Africa Coastal and Marine Development, Management and Protection
- Basil Convention on the Control of Across-Border Movement and Elimination of Dangerous Residues
- Bamako Convention on the Prohibition of Importing into Africa Dangerous Waste and Control over Cross-border Movement of Waste in Africa
- United Nations Convention Against Desertification in Countries Severely Affected by Drought and Desertification (especially) in Africa
- Cartagena Protocol on bio-security
- Southern African Programme for Conservation of Biomass
- Adherence to the International Hydrological Organization
- Nairobi Convention for the Coastal and Marine Protection, Management and Development of the East Africa Region
- Protocol on civil responsibility over damages due to pollution by hydrocarbons
- Protocol for the setting up of an international compensation fund for damages caused by pollution by hydrocarbons
- United Nations Convention on the Law of the Sea
- United Nations Framework Convention on Climate Change
- Convention on the International Trade in Endangered Species of Wild Flora and Fauna
- Convention for the Protection of the World Cultural and Natural Heritage
- International Convention on Trade in Endangered Species of Wild Fauna and Flora
- United Nations Convention on the Law of the Sea
- Vienna Convention on Protection of the Ozone Layer
- Montreal Protocol on Substances that Deplete the Ozone Layer
- Convention on the Ban of the Import into Africa and the Control of Transboundary Movements of Hazardous Wastes within Africa
- Convention on Control of Transboundary Movements of Hazardous Wastes, and their Disposals
- Convention on Biological Diversity
- Framework Convention on Climate Change
- Convention to Combat and Drought Desertification
- The Convention on Protection, Management and Development of the Sea Environment and Coastal Zones in the Eastern Africa Region, and related protocols
- The Southern African Development Community Treaty
- Protocol on Shared Watercourse Systems in the Southern Africa Development Community (SADC)
- The Zambezi River Multilateral Agreement
- Organization on the Indian Ocean Marine Affairs Co-operation
- International Maritime Organization

International Cooperation

Mozambique is one of the largest aid recipients in sub-Saharan Africa. Between 2000 and 2004, Mozambique received \$6.3 billion in foreign aid, of which \$5.6 billion was in the form of grants, and the remaining \$0.7 billion in concessionary loans. The share of foreign aid to the nation's total resource requirements has remained substantial. From 60 percent of gross national income in the early 1990s, net foreign financing fell to 25 percent in the second half of the 1990s, and has remained at this level since, with a surge in 2002 due to debt forgiveness. A significant feature is the increase in general budget support within aid flows, rising from 2.7 percent in 2000 to 18.6 percent of total official development assistance in 2004. The U.K. Overseas Development Institute lists 45 projects under the “general environmental protection category” corresponding to a disbursement in 2007 of \$16.5 million in development assistance to the environment, including projects in forestry (Overseas Development Institute, 2008).

European Commission

The cooperation strategy of the European Commission in Mozambique aims to support the country to achieve its action plan (Poverty Reduction Strategy) to decrease the incidence of poverty and promote fast, sustainable and broad-based growth. The new Mozambique-European Commission Country Strategy Paper for 2008-2013 signed in December 2007 has a budget of €22 million. Funding from the 10th European Development Fund will be allocated to:

- **Transportation infrastructures and regional economic integration.** The objective is to alleviate poverty by increasing the access of the poor rural population to public services, markets, and job opportunities, while promoting socioeconomic growth through increased trade and regional integration. The road network, including regional connections, will therefore be expanded and improved.
- **Agriculture and rural development.** Given the population’s dependency on agriculture, improving the performance of this industry has great potential of reducing poverty by increasing food security and income.

The European Commission delegation is also concerned with the forestry subsector. The European Commission recently called for proposals for several countries, including Mozambique. The theme for the proposals is Environment and Sustainable Management of Natural Resources, Including Energy. Actions under this program address the following sub-themes: forests, forest law enforcement, governance and trade, climate change, biodiversity, desertification, and sustainable energy. The European Commission-Mozambique received 22 proposals.

World Bank

Mozambique has been a member of the World Bank since 1984, and the institution has focused on helping the country to reduce poverty and achieve sustainable economic growth on more than 50 projects. The World Bank has actively supported Transboundary

Parks and Integrated Coastal Zone Management. From 2003 to the end of 2007, the bank has transferred to Mozambique \$2.5 billion dollars (including International Development Association disbursements, International Finance Corporation activities, trust funds and International Development Association debt relief), and \$331 million in guarantees issued by the Multilateral Investment Guarantee Agency and the International Bank for Reconstruction and Development. An additional \$1.1 billion has been facilitated through the World Bank in the form of non-International Development Association debt relief.

The World Bank Group Country Partnership Strategy for 2007-2011 sets priorities and activities to support Mozambique's efforts to reduce poverty and promote sustainable economic growth. The strategy is timed to be aligned with the GRM's second poverty reduction support strategy (*Planode Acção para a Redução da Pobreza Absoluta II* or "PARPA II"), and will be guided by three principles: increased accountability and public voice, equitable access to key services, and sustainable and broad-based growth.

The International Finance Committee

The International Finance Committee is creating the enabling environment to facilitate tourism investments in Mozambique. It is working on the regulatory framework and providing technical assistance. The International Finance Committee is implementing a Tourism Investment Anchor Program. The Anchor Project will structure investment in its 3 sites through INATUR, an arm of the Ministry of Tourism tasked with investment promotion. Major investors will take care of the infrastructure and bring in small/medium investors. Some sections will be earmarked for local management/ownership. Developer will also provide technical training, build social structures, and work with the community.

Danish International Development Agency

The Danish International Development Agency's initial project approach has been replaced gradually by a more programmatic one. It provides support within the national strategy for the environment, the PARPA and the Millennium Development Goals. MICOA is the key national partner, but its main support is provided through municipalities, provinces, and districts. Danish support to the environment is provided based on sector-wide programs implemented through national and local institutions. The agency has a budget of 180 million DKK (about \$30 million) for 4.5 years from 2006 to 2010. The main areas of work are:

- **Strengthening MICOA.** Institutional Strengthening of MICOA is designed to improve public environmental management services, centrally and locally, and across sectors. Decentralized environmental administration will be supported.
- **Urban environment in Greater Maputo and seven cities in the north.** Support is for formulation and implementation of environmental strategies in the greater Maputo area, comprising two municipalities and two districts. The focus will be on developing sector strategies for sanitation, drainage, and solid waste management and will consist of capacity development and investment projects that promote

cooperation between districts and municipalities within six potential thematic areas. The Support for Environmental Management in 7 Municipalities extends current support (ending in 2006) through 2009 and expands the coverage from five to seven municipalities. The main objective is to strengthen the urban environmental management services of MICOA's Centre for Sustainable Development of Urban Zones and services of the involved municipal governments and administrations.

- **NRM in Sofala and coastal zone management at provincial and district level.** The Coastal Development Component is being used to consolidate the capacity development of MICOA's Centre for Sustainable Development of Coastal Zones and to develop the capacity of provinces and lower levels for planning and managing sustainable development of coastal areas. The NRM component focuses on issues of communities in conservation areas and their buffer zones. The support is provided to develop the capacity of Sofala provincial and district authorities and to facilitate integrated territorial and district development planning, as well as resolution of "conservation-people" conflicts.

International Conservation Union

The International Conservation Union is a leading international organization in the environmental arena in Mozambique. Its vision is to promote and acknowledge the link between natural resource environmental sustainable management practices with economic development and improved livelihoods. It promotes participatory approaches and equitable sharing of costs and benefits associated with NRM and equitable access to information for adequate decision-making and human and ecosystem well-being partnerships as a way forward in implementation of the program. The union committed R4 million for 2003-2006 and identifies five strategic themes of intervention: unsustainable practices in the use of natural resources by promoting activities in valuation of natural resources, developing national accounts, and internalization of environmental costs; partnerships between the state, private sector, and communities in resource management; capacity building; sustainable livelihoods and NRM in protected and multiple-use areas; and awareness-raising and advocacy.

U.K. Department for International Development

DFID has been providing poverty reduction budget support to the GRM since 1999, and is one of the largest donors to Mozambique, with a total aid program for the U.K. financial year 2007-2008 of £60 million. In the past five years, DFID provided \$430 million (£239 million) of the more than \$6 billion in aid Mozambique has received. DFID also has a large program in health, education, infrastructure, and HIV/AIDS. Alongside these programs, DFID aims to support the voice and capacity of civil society in Mozambique through partnerships in land, accountability, education, and poverty monitoring. DFID financial commitments and plans include budget support through a five-year rolling program, currently £240 million for 2008-2012 in the following areas: human capital and HIV (includes education, access to health services, malaria prevention, rural water, social protection for women); governance and accountability (includes public

financial management, support to civil society); and economic development and infrastructure (includes roads, access/rights to land).

In response to a growing recognition that climate change and development are inextricably linked, the United Kingdom is providing £800 million through the Environmental Transformation Fund and the Strategic Climate Fund. The aim of this joint DFID/U.K. Department for Environment, Food, and Rural Affairs fund, known as the International Environmental Transformation Fund, is to support development and poverty reduction through better environmental management, and help developing countries respond to the realities of climate change.

United Nations Development Programme

The United Nations Development Programme (UNDP) has provided support in building institutional capacity in government and has fostered democratic transitions. However, in both programs, the UNDP and other partners concentrated on central-level skills development and institution-building in a post-conflict context. Now that the enabling environment and national institutions are in place, support to local development through decentralized structures is needed. The second Action Plan for the Reduction of Absolute Poverty (PARPA II) focus on poverty reduction and accelerated growth through decentralization will thus require capacity development at the local level to speed up progress toward achieving the Millennium Development Goals.

The GRM 2006-2009 PARPA II is intended to reduce the incidence of poverty from 54 percent in 2003 to 45 percent in 2009. It differs from the previous one in that its priorities include greater integration of the national economy and an increase in productivity. It focuses attention on district-based development, creation of an environment favorable to growth of the nation's productive sector, improvement of the financial system, measures to help small and medium-size companies to flourish in the formal sector, and development of the internal revenue collection system and methods of allocating budgeted funds. Although the PARPA calls for an increase in internal revenue for 2006-2009 in real terms, the GRM expects to continue to rely on the contribution of its cooperation partners to finance 49 percent of the state budget every year during this period.

Food and Agriculture Organization

The FAO supports implementation of the Forestry and Wildlife Component of the National Program for Agrarian Development, which focuses on local community participation in use, conservation, and benefits generated from natural resource management. Projects include decentralized legal support and capacity building at local level (FAO/Netherlands), National Forest Programme Facility (FAO/Norway), disposal of obsolete pesticides (FAO/JAPAN), support for community forestry and wildlife management, support to Development of a Territorial Planning Policy and New Legislation - Phase II, payment for ecosystem services to support forest conservation and sustainable livelihoods (FAO/World Bank-GEF).

Sweden

The Swedish International Development Cooperation Agency's work revolves around democratization, sustainable economic growth, and social and human development. Much of the support Mozambique receives is paid as budget support using the National Poverty Reduction Strategy as a starting point. Sweden contributed \$48.3 million in budget support to Mozambique in 2007. The agency's NRM budget in 2007 was \$9,467,735. It also has significant investments in health, education, democracy and governance, humanitarian assistance, trade and infrastructure.

The Netherlands

The Netherlands is an influential donor in Mozambique. The Netherlands Country Strategy Program focuses on sector budget support designed to improve sector policy implementation and better service delivery. It is thought this will be required for a considerable period, but once planning and implementation have improved and financial flows are secure, funds can better be provided through general budget support. The priority sectors for support are education, health/HIV/AIDS, and water, while some support also goes to a Natural Resources Management Fund managed by the World Conservation Union. The Netherlands is an average-sized donor, with a budget of \$47 million in 2003 and \$54 million in 2004. Dutch NGOs active in Mozambique include Oxfam NOVIB, HIVOS, SNV, The Netherlands Institute for Multiparty Democracy, The Netherlands Institute for Southern Africa, and The Netherlands Management Cooperation Programme. The Netherlands uses a combination of different venues with an emphasis on general budget and sector support, with the possibility of more direct assistance to government institutions and civil society where needed. In 2006 and 2007, total general budget support was €18 million per year.

The Royal Norwegian Ministry of Financial Affairs

The Royal Norwegian Ministry of Financial Affairs is launching a five-year Biodiversity and Sustainable Tourism Development Cooperation Program. Attention will be given to how development of sustainable and responsible tourism can work in tandem with agriculture, forestry, fisheries, and the energy sector to provide wide stakeholder benefits. Emphasis will be given to habitats of major importance for biological diversity, as well as protected areas threatened by climate change. The ministry may finance geo-tourism mapping because it was so successful and is the right model for Mozambique. This is just in the inception phase.

USAID

The USAID program promotes U.S. interests in Mozambique by addressing regional stability, democracy and human rights, economic prosperity and security, social and environmental issues, and humanitarian needs — all of which align with the GRM's poverty reduction and economic growth strategy. USAID assistance is instrumental in increasing rural household incomes, increasing the potential for labor-intensive exports and improving the enabling environment for private sector-led growth, increasing the use

and quality of basic child and maternal health services, and strengthening the effectiveness of the governance partnership between government and civil society, including anti-corruption efforts. Under the President's Emergency Plan for AIDS Relief (PEPFAR), USAID is working with the Centers for Disease Control and Prevention, Peace Corps, Defense Department, and the State Department to reduce the incidence of HIV/AIDS and provide care and treatment for those affected and infected by the disease. USAID's program is tied to Mozambique's efforts to adhere to Millennium Challenge Account criteria of just governance, investment in people, and economic development. The Justice Department, the Federal Bureau of Investigations, and the State Department are working in partnership with USAID to deliver important anti-corruption assistance.

Millennium Challenge Corporation

The MCC operates within a five-year, \$506.9 million Millennium Challenge Compact to reduce poverty and increase economic growth in Mozambique. The program's goal is to increase the productive capacity of the population in selected districts, with the intended impact of reducing the poverty rate, increasing household income and employment, and reducing chronic malnutrition in the targeted districts. The interventions are designed to foster investment and increase economic opportunities for Mozambicans living in the north. The MCC's main areas of work in Mozambique are in Zambézia, Nampula, and Cabo Delgado, in four areas:

- Water and Sanitation Project (\$203.6 million). Involves water supply and sanitation services in six cities in the provinces of Zambézia, Nampula, and Cabo Delgado; water supply in two mid-sized towns in Nampula and Cabo Delgado; rural water supply services covering 600 water points in Nampula and Cabo Delgado; and capacity building of local institutions and policy development
- Transportation Project (\$176.3 million) to rehabilitate 491 km of key segments of the National Route 1, which forms the backbone of the country's transportation network
- Land Tenure Services Project (\$39.1 million) to establish more efficient and secure access to land by improving the policy framework, upgrading land information systems and services, and helping beneficiaries meet immediate needs for registered land rights and better access to land for investment
- Farmer Income Support Project (\$17.4 million) to reduce the spread of coconut lethal yellowing disease, to improve productivity of coconut products, and to encourage diversification into other cash crops

The Millennium Challenge Account will also do an EIA for the Nacala Dam. The EIA is part of a feasibility study for the proposed raising of the dam height to increase water storage capacity, expanding distribution of water to un-served peri-urban areas, and increasing reliability of water distribution. The Millennium Challenge Account also proposes to do some land and forest mapping, treatment of the lethal yellowing disease

that affects coconut palm plantations, along with improving water supply management systems, and rehabilitation of access roads.



MCC is supporting efforts to reduce the spread of coconut lethal yellowing disease and to improve productivity of coconut products. Quirimba Island.
Photo by Carlos D. Rodríguez-Pedraza.

The Millennium Challenge Account is also providing \$0.5 million to MICOA for the following: 1) augment staff to carry out environmental permitting review and oversight in the four northern provinces,; 2) additional resources such as computers and printers for MICOA headquarters and offices in the four provinces, and 3) training and capacity building opportunities for all MICOA staff throughout the country.

Private Sector

There are major foreign investors in Mozambique prospecting for oil, gas, uranium, heavy sands, coal mining, aluminum, and energy (ARCO, BHP, Mozambique Aluminium, Moma and Chibuto Heavy Sands, Gas Pipeline, *Cabora Bassa Hydroelectrica*, *Mpanda Kua*, and *Vale do Rio Doce*). Major investment in an oil refinery and a cement kiln is planned for Nacala. Major forestry projects are taking place in Niassa Province, and biofuels with intensive agriculture projects exist in almost every province. In the tourism sector, Dubai Resorts and Rani Corporation are developing tourism in Cabo Delgado, Quirimbas, Vilankulos, and Maputo. The Carr Foundation is a prime example of private funds outstripping some donor funding levels for national park development and provides an excellent example of how integrated national park

development can be approached. Coca-Cola is an example of a public-private partnership with the community in conserving watersheds. Other players are local consulting companies with expertise in the environment sector, and these too are beginning to grow in numbers and strength. There are different sizes of consulting firms, some focusing mostly on environmental impact assessments and others on environmental management, training, social impact, community resettlements, and development of private sector initiatives. Two dominate in EIAs — *Impacto* for EIAs on oil and gas, and COWI-Austral for hotels and tourism — but they are increasingly finding competition from smaller or more technical firms such as *Consultec*, *Sal Consultoria*, *Rural Consult*, and *Verde Azul Consult*.

Nongovernmental Organizations

More than 120 local and international NGOs work in Mozambique, including the World Wildlife Fund International (WWF), World Vision, Food For the Hungry, CARE, African Wildlife Foundation, Forum for Threatened Nature, ABIODES, *Livaningo*, and ORAM, which are involved in activities in some aspects of natural resource management. Many work at the grassroots level, with few working on policy dialogue. Increasingly, more local NGOs are working on environment capacity building at the community level, environmental advocacy, and community-based NRM. Some have grown organically around issues; others have become independent of former international NGOs (SNV) and are capable. Environmental advocacy is a growing field for NGOs, especially as donors (International Finance Corporation and UNDP) are beginning to incorporate environment, tourism, and conservation as sectors. This will become increasingly important in a country that is poor and uneducated, as industrial development takes a toll on conservation, and where a voice for environmental rights is almost non-existent.

The majority of local environmental NGOs are in Maputo although some community-based organizations up-country are supported by the better-endowed Maputo-based NGOs. The profile of the Mozambican environmental NGOs is varied. *Centro Terra Viva*, for example, focuses on research and policy advice. It often works for the GRM, particularly MICOA and MITUR at province level, supplying studies, legal advice, and training. *Centro Terra Viva* has also played an active role in the elaboration of PARPA II, having coordinated a group of NGOs engaged in the process. By contrast, *Livaningo* (the first environmental NGO in Mozambique) and *Forum Natureza em Perigo*, among others, play a more activist role by carrying out advocacy campaigns, denouncing environmental misconduct, and challenging government policies threatening conservation and sustainable NRM. *Livaningo*, for example, describes its action as “street fighting”; it has, for example, strongly criticized the government for its apathy about illegal logging, fishing, and settlement of tourism infrastructures on the coast.

SECTION III. STATUS OF BIODIVERSITY AND FORESTRY RESOURCES

As reported in Mozambique's Biodiversity Status and Action Plan, significant progress has been attained in meeting the first and, to some extent, the second objective of the Convention on Biological Diversity. Progress has been made in forestry and wildlife, land management, integrated marine and coastal, environment impact assessment, and bio-safety regulations. Some priority areas such as access to and benefits from resources to communities made slow progress. The highlight was approval of a legal instrument that requires returning 20 percent income from the exploitation of forest and wildlife resources to the local community. An overview of the status of biodiversity and forestry resources is provided below in more detail.

Forests, Savannas, and Woodlands

The National Administration of Lands and Forests of Mozambique carried out a National Forest Inventory in 2005 through 2007 (through the Integrated Project of Agriculture Development). The objective was to evaluate the extension and floristic composition of forest resources. A new land cover map was developed as a result of the inventory.

The area of forest land cover is estimated at 40.1 million ha. Of this, 26.9 million ha are potential areas for wood production and 13.2 million ha are for conservation purposes. According to the recent inventory, Mozambique's land cover is composed of 51 percent forest cover, 19 percent other woody cover, 12 percent grasslands, 15 percent agriculture, and 3 percent other⁴. The most common vegetation type is Miombo, occupying two-thirds of the territory. Other important types of vegetation include savannas, coastal forest (mangrove), and acacia savannas in the south.

Wood resources are used by commercial and artisanal logging operations and as an energy source by rural and urban populations. In terms of timber production for logging purposes, forests are reported to have the potential to produce 500,000 m³/year of sustainable logging. However, much of the forest area is composed of low-increment forest land with low density of commercial species. The net result is that the potential sustainable harvest per hectare is only 0.025 m³ per annum. A consequence, and a recent ban on the export of first-class species of round wood (i.e. unprocessed logs), national total wood output is only 127,000 m³/year today (about 25 percent of estimated sustainable potential). Overall production of timber has also declined by 15 percent since 1998, principally because of the export of first-class round wood, which has always accounted for a large proportion of total output. Round wood accounts for 73 percent of this (93,000 m³), sawn wood for 24 percent (30,000 m³), and posts, plywood, and veneer for the rest (3 percent). Most of this wood production comes from forest concession areas in Sofala, Zambézia, and Cabo Delgado provinces. Only a small proportion is exported, and generates \$30 million annually.

⁴ The publication shows 13 percent. This must be a typo, because the total with that figure is 110 percent.

The deforestation rate in Mozambique is estimated at 219,000 ha per year, based on the Forest Resources Assessment model of FAO (FRA, 1990). The mean annual deforestation rate is 0.58 percent. The rate of deforestation varies among the Mozambican provinces. Inhambane Province shows the lowest deforestation rate of 11,000 ha/year, while Nampula Province has the highest rate, of 33,000 ha/year. However, these rates were not calculated using remote-sensing techniques and cannot be verified. Manica Province shows more accurate rates of deforestation, because they were calculated using Landsat TM images from 1990 and 2004. The province shows a deforestation rate of 348,330 ha/year, or 0.81 percent during a period of 14 years (National Forest Inventory, 2005-2007) — not a significant rate.

The primary causes for deforestation in Mozambique are the use of firewood as a source of energy, logging and timber, and the use of fire to clear agricultural areas and for hunting. Although deforestation rates are still low compared with the global average, the increase in is worrisome. In addition, Mozambique lacks a reliable forest inventory using accurate methodology (e.g. remote sensing, GIS, forest inventory analysis).



Scarred land. Result of using fire to clear agricultural areas and for hunting. Photo taken 6 km north of Calange village in the Sanga district, Niassa.

Wood consumption for fuel in Mozambique is estimated at 31,278,000 m³ per annum (Broadhead et al., 2001). This is nearly 250 times that consumed by logging operations, although other more conservative values indicate an average yearly consumption of 18 million to 20 million m³. Fuel wood consumption in Mozambique is reported to be the highest in the Southern African Development Community. It is the most important source

of domestic energy in the country (accounting for 85 percent of household energy requirements) due to poor access to other forms of energy and poverty. Miombo, mopane, and acacia woodlands are the major sources of energy in major cities. Even in larger urban areas such as Beira, where electricity and gas are available, 50 percent of inhabitants use charcoal for cooking (Serra and Zolho, 2003). Forests around the main urban centers of Maputo, Beira, and Nampula are reported to have been severely degraded by firewood harvesting (Milington and Townsend, 1989; Cuco, 1996).

According to the United Nations Environment Programme, more than one-third of the country is affected by fire each year. NASA's Earth Observatory recorded an especially large number of fires in August 2006. The widespread nature of the fires suggests they may have been intentionally set. Population growth in Mozambique has drastically intensified the need for agricultural land as well as for forestry and wildlife products, thus putting increased pressure on limited resources. Fires have become a primary means of clearing land for cultivation.

Recent studies on the forestry sector in Mozambique (Fath, 2002; Chitará, 2003; Bila & Salmi, 2003; and Siteo Bila and Macqueen, 2003) have shown that despite regulations, logging has been carried out with minimal reforestation and poor ecologically oriented management practices. As a result of this, many think that in spite of the low production statistics, current rates of logging are not sustainable.

Non-wood Forest Products

The natural ecosystem of a forest contributes to all aspects of local communities' livelihoods — land for agriculture, leaf litter as natural fertilizer, building materials, medicine, fuel wood, wild food, grazing, and household commodities. It is also a source of essential services, such as traditional medicine, eco-tourism, control of erosion, maintenance of soil fertility, and hydrological cycles. Much of the forests are also a source of cultural symbols and sacred sites. Therefore, it is important to recognize the services forests can provide.

The use of natural resources in livelihood strategies is not limited to agriculture and the full-time cultivation of land. Other natural resources are collected, processed, and/or marketed by many families, either as a predominant activity or as part of a diversified portfolio of livelihood strategies designed to spread and minimize specific risks. These include resources such as bush meat, honey, clay, roots and tubers, medicinal plants, building materials, thatching grass, firewood, and production of charcoal and salt.

Forests, in particular, provide a range of resources central to peoples' livelihoods. The majority of the population remains in settlements dispersed throughout forests. This is in marked contrast to other African countries, where colonial policy was to relocate people from the forests to roadside communities. The effect in Mozambique is that a much higher percentage of the population lives in isolated forest communities that are directly dependent on access to surrounding forest resources and the health of forest ecosystems for survival. The most important use of non-wood products derived from forests are development of eco-tourism and hunting concessions; bush meat; basket- and mat-

making; beer, spirits, and traditional drinks; carpentry; and medicinal herbs and roots. Most important traditional and modern medicines are derived from wild plants, animals, fungi, and bacteria. Medicinal plants are used by an 80 percent of the population and the importance of traditional healers is increasingly recognized. Natural resources also play a major part in coping strategies that people adopt during times of crisis or shocks.

Ecosystem Services, Natural Resource Conservation, and Property Rights

Prospects for economic sustainability for ecosystems are good, particularly for non-consumptive use of land and forest resources, as they do little or no damage to wildlife resources. Mozambique has already some examples (Tchuma Chato, Chipande Chetu, and Niassa Game Reserve) where income from tourism based on community and private game reserves can contribute more than timber production or other consumptive use of the land. If well-managed, forests can be seen as an ecosystems' based development strategy to be used more often in the future — where wood harvesting does not represent its major source of income. Ecosystems provide a range of valuable environmental services, such as water services, biodiversity conservation, and carbon sequestration.

However, these services are often lost when markets are not developed or when property rights are vested in the state. The concept of payment for environmental services is a promising solution to this problem, which has drawn significant interest in the last few years. However, putting theory into practice is not an easy task. The first step is focused on creation of markets for water functions, but also includes efforts to establish market mechanisms for functions to conserve biodiversity and carbon sequestration. Property rights over resources have to be clearly defined for a long-term perspective (more than three to four generations at least, to create incentives to invest in natural resources and get the benefits).

Protected Areas

There was an increase in percentage of the national territory under protected area from 11.4 percent in 1992 to 15 percent in 2007. New conservation areas were created, namely Quirimbas National Park and Limpopo National Park. New areas of importance for biodiversity have also been identified. There has also been significant improvement in management of existing ex-situ conservation infrastructure, particularly in plant and animal gene banks and botanic gardens. This is a sign of the importance the country attaches to the integrated conservation strategy approach.

Mozambique has six categories of protected areas, covering 147,345 km² which represents 18 percent of the total country's surface area (See Exhibit 1).

Exhibit 1. Mozambique's Protected Area System (*Serviços de Veterinária and IIAM*)

Designation	Number	Surface Area (km ²)	Percent of Country
National parks	6	37,476	4.68
National reserves	6	47,700	5.95
Game controlled areas	2	2,700	0.34
Hunting areas	12	50,017	6.24
Forest reserves	26	9,452	1.18
Zones of use and of historic and cultural value	0	0	0
Total		147,345	18.38

Although most protected areas were established before independence in 1975, only the Gorongosa National Park had a sufficient level of administration and infrastructure to receive tourists; the others did not have management structures or tourist facilities before 1975.

Three new protected areas (Limpopo, Quirimbas National Park, and Chimanimani Game Reserve) were established between 2001 and 2002. Limpopo and Chimanimani have been converted into Trans-frontier Conservation Areas (TFCAs) through establishment of links with conservation areas in neighboring countries (South Africa and Zimbabwe). Two more protected areas (Lake Niassa and *Ilhas Primeiras e Segundas*) have been proposed and preparatory work is at an advanced stage.

Three more TFCAs are planned: the Niassa-Cabo Delgado TFCA (linking terrestrial and marine conservation areas with others in Tanzania and possibly Malawi), the Zimoza TFCA (linking a community natural resource management area in northwest Mozambique with conservation areas in Zimbabwe and Zambia), and the Libombo TFCA (linking conservation areas in Mozambique and South Africa).

These TFCAs, as described in the country biodiversity and tourism strategies, are large, defined areas that include core protected areas and multiple-use (“interstitial”) areas where the primary management objective is to promote environmentally sustainable development compatible with the TFCA’s conservation goals. There is a strong focus on including local communities and other stakeholders, and sustainable use of the natural resources by communities, particularly through sustainable tourism, as required by Mozambique’s Biodiversity Strategy and Action Plan. Much of the richest and best-preserved biodiversity and natural habitat in Mozambique (and southern Africa in general) is in areas adjacent to national borders, in many cases contiguous with terrestrial and/or marine protected areas and well-established nature tourism sites in neighboring countries. Preservation of habitats and ecological links, such as migration corridors and watercourses, on both sides of the border provides a unique opportunity to protect large, intact ecosystems that span a wide range of altitudes and climatic zones. The TFCAs are important for wildlife conservation and tourism development in Mozambique, as they include large natural areas of natural vegetation and represent important global biodiversity resources.

The conservation areas (and indeed the different zones of the TFCAs) offer varying levels of protection to fauna and flora within their boundaries, as prescribed by the Forestry and Wildlife Law. National parks (and the core protected areas of the TFCAs) offer total protection to all flora, fauna, landscapes, and geology within their boundaries. No hunting or livestock rearing, natural resource exploitation, land modification, or alien species are permitted in these areas. Natural reserves provide total protection for specified plant and animal species and/or ecosystems, while other resources may be exploited within norms established by a management plan. Areas of historic and cultural value (communal use zones) are set aside for forests with religious interest, and sites of historical and cultural use. Resource use in these areas is only permitted in accordance with customary practices and norms of communities. Multiple-use (or buffer) zones are typically established around protected areas. Resource use in these areas is permitted in accordance with an established management plan.

Recently (2004) the Marrromeu Complex in the Zambezi River Delta where the Marrromeu Game Reserve and four hunting areas are located was proclaimed a Ramsar Site under the convention and a Wetland of International Importance. This is the only wetland area protected in the country.

A major challenge in management of protected areas in Mozambique is involvement of the resident communities. All protected areas and TFCAs have been occupied by local communities since the civil war or were re-occupied soon afterwards, when significant numbers of refugees returned from neighboring countries.

Protected area management in Mozambique falls under two government institutions. The Ministry of Tourism for all National Parks, Reserves and Hunting Areas and the Ministry of Agriculture for Forest Reserves. Protected Areas can also be proclaimed under the Historical and Cultural Heritage Law (Ministry of Education) and under the Fisheries Law (Marine Reserves).

To alleviate the shortage of financial resources for management of protected areas, the government has embarked on a co-management and co-financing model with the private sector and/or foundations such as with the Niassa Game Reserve, the Gorongosa National Park, Maputo National Reserve, and the Banhine National Park. However, most protected areas do not receive enough financing to be self-sufficient and all are struggling to maintain basic functions, except for the Gorongosa National Park.

Most forest reserves have no management structures, although there are ideas to hand them over to community management or transform them into tourist destinations.

A number of areas of outstanding ecosystem, biological and/or scenic value have been identified in Mozambique and are considered to warrant special attention (SMEC International, 2001). They are:

- **The Gorongosa Mountain - Rift Valley Complex.** Once considered an important world spot with the largest concentration of biodiversity per unit area (Tinley, 1995). This area encompasses the isolated massif of Gorongosa Mountain and the southern-most section of the African Rift Valley. The mountain supports montane forests and heath grasslands on its summits. Several endemic and near-endemic plants and animals occur within the mountain's habitats. The Rift Valley in Mozambique is a floodplain ecosystem composed of variety of wetlands habitats. The diversity of habitats in the Rift Valley makes it one of the finest wildlife grazing ecosystems in Africa. The southern portion is protected within the Gorongosa National Park.
- **The Cheringoma Plateau** comprises tropical forests containing a mixture of local endemics with equatorial and southern African flora. The forest on the plateau contains several commercially important hardwood species.
- **The Zambezi Delta Grasslands and Swamps** cover about 18,000 km². The delta is of great socio-economic and cultural value. Marromeu Buffalo Reserve in the southern portion of the delta. The Zambezi Delta represents an important wetland for resident and migratory bird species. In 2004, the Marromeu Complex became the first Ramsar site in Mozambique. It includes more than 680,000 ha of dry forest and woodland savanna, floodplain grassland, deep-water swamp, coastal dunes, and mangrove forest. It supports a great diversity and abundance of wildlife, including Cape buffalo, waterbuck, sable antelope, Lichtenstein's hartebeest, Burchell's zebra, and African elephant.
- **The Great Inselberg Archipelago.** This series of habitats occurs south of the Lurio River, occupying a rectangular area of 500 km by 160 km. This Inselberg Archipelago presents a remarkable landscape of tall granite core remnants in a savanna plain. Several of the montane areas have high biodiversity moist forests.



Inselberg. Photo taken 3 km NW of Muquiriqui village in the Lalaua District, Nampula.
Photo by Carlos D. Rodríguez-Pedraza.

- **The Chimanimani Massif,** although relatively small in area, is characterized by an exceptionally high diversity of habitats and species. The massif supports a rich endemic flora. Endemic fauna are two frogs and one reptile. Large mammals are well-represented in the area and include buffalo, eland, and sable. More than 160 bird species have been recorded in the Chimanimani Massif, some of

which are endemic to the Afro-montane regions of eastern Africa. There are well-preserved rock paintings throughout the area depicting all local and lowland big game of the region.

- **The Maputaland Centre of Endemism** (26,734 km²) is defined as that part of southern Mozambique and northeastern Natal. It is bounded in the north by the Inkomati-Limpopo River, in the west by the western foothills of the Libombos, in the south by the St. Lucia estuary, and in the east by the Indian Ocean. It contains extensive wetland areas. The flora consists of 2,000 to 3,000 species, of which at least 168 species/infraspecific taxa are endemic/near-endemic to the center. Of the more than 472 species of birds in the area, 47 subspecies are endemic/near-endemic.
- **Coastal Barrier Lakes.** A characteristic feature of the *Ponta do Ouro to Bazaruto* coast is the extensive system of coastal lakes behind the dunes. The coastal lakes provide habitat for many bird species. Besides their importance biologically, these coastal systems have a high scenic value. A proposal has been developed to declare the Maputaland Wetlands (between *Ponta do Ouro* and *Inhaca* island) a Natural World Heritage Site.
- **Pebane Evergreen Coastal Forests.** The Evergreen Coastal Forests in northern coastal Zambezia Province are of high biological importance. A new (and possibly endemic) tree species was discovered in these forests in 1998. A rich and diverse reptile fauna occurs in the coastal forests of Pebane. In 1998, two reptile species were discovered — a snake and a dwarf day gecko — both endemic to the area.

Coastal and Marine Systems

Mozambique has the longest coastal line in the eastern African region, extending from the Rovuma River mouth to *Ponta D'Ouro* about 2,700 km. It encompasses ecosystems such as coastal wetlands of international significance, mangrove forests, coastal dunes, intertidal mud flats, seagrass beds, coral reef, open water, and island habitats that are home to a rich and diverse assemblage of plant and animal species. This region has also the highest population density, with about 35 percent of the total population living in and depending on coastal natural resources for their livelihoods.

The WWF through its Coastal and Marine Program has a special interest in the eastern African coastal and marine region and has conceptualized and proposed concrete conservation actions (WWF, 2005).

The Mozambican coastal line falls under three WWF coastal and marine sub-eco-regions. The Coral Coast Sub-region, where coral reefs are the predominant ecosystem, encompasses coastal and marine areas between the Rovuma River mouth and *Ilha de Mozambique*. The Swamp Coastal Region includes areas south of *Ilha de Mozambique* to Save River and incorporates important sub-tidal and mangrove habitats of the Zambezi River Delta and its offshore banks — a productive fisheries area, especially for shrimp. The Parabolic Dunes Sub-region extends from the Save River to *Ponta D'Ouro* and is

characterized by coastal lakes, inland pools, sandy shore, and parabolic dunes and is a center of endemism in Mozambique.

Along the Mozambican coastal area, nine biodiversity conservation priority areas covering 66,800 km² have been identified for their contribution to flora and fauna species diversity, as breeding grounds for migratory avifauna and several aquatic species, including humpback whales, dugongs, and sea turtles, and for their extensive coral reefs. These centers of biodiversity are the Mtwara-Quirimba, the Nacala-Mossiril, *Ilhas Primeiras e Segundas*, Zambezi River Delta System, Sofala Bay, Bazaruto Archipelago, Inhambane Bay, Inharrime Complex, and Maputo Bay-Machangulo Complex.

Protected areas established in these centers of biodiversity are the Quirimbas National Park (Mtwara-Quirimbas), the Marromeu National Reserve and Zambezi River Delta Ramsar Site (Zambezi River Delta System), the Bazaruto National Park (Bazaruto Archipelago), and the Maputo Elephant National Reserve (Maputo Bay-Machangulo Complex). Although other protected areas have been proposed for the *Ilhas Primeiras e Segundas*, four other centers of biodiversity remain unprotected.

Major threats to these ecosystems include unsustainable exploitation of mangrove forests for charcoal and firewood; expansion of aquaculture infra-structures in mangrove forests and mud flats; oil, gas, and mineral prospecting; damming of major water courses that maintain the ecological balance of mangrove areas and coastal wetlands; unsustainable methods of fishing and overfishing; pollution from agriculture practices upstream; and ill-planned tourism facilities. For example, Pemba Bay suffers from increasing pollution and salinity due to detrimental agricultural practices, and Lake Niassa is under threat from fishing and pollution.

In terms of fisheries, the industry is dominated by the Sofala Bank industrial shrimp fishery, and there are no real opportunities for other fisheries to match its profitability and scale in the near future — rent is estimated at \$10-30 million annually, exports at \$70 million annually, and license fees at \$5 million. Artisanal and subsistence fisheries are also of crucial importance in terms of economic buffer and employment opportunities. Although the majority of sector-generated income is from the marine fisheries sector, inland fisheries are central to survival of many of the country's poorest populations, providing an important source of food and income. Within the fisheries context, water resource management can directly affect the resource base and habitat of freshwater fisheries, and indirectly affect marine and coastal zone fisheries by reducing the amount of water reaching the sea.

The Fisheries Law of 1990 defines the general administrative environment for management and regulation of fisheries in Mozambique. Various regulatory provisions enacting this legislation have been developed, with the most recent published in December 2003. Thus far, these deal only with marine fisheries. The 2003 regulations provide a comprehensive list of definitions applicable to the fisheries sector that could also apply to inland fisheries. The fisheries sector, in relation to marine fisheries, is defined by artisanal, semi-industrial, and industrial fishers. The law also focuses on aquaculture, industrial processing, and public administration. It lacks, however, the

recognition of community rights to fishing resources or participation on management decisions regarding the resource. It is oriented toward establishment of strong conservation orientation and includes the resting periods, areas of forbidden or limited access, maximum quotas of exploration, type of technology, and respect for the international regulations on protected species.



Fisher boat in the water front of the Pemba Beach Hotel. Photo by Carlos D. Rodríguez-Pedraza.

As a downstream riparian country with a significant number of major rivers with high variability of water flows and limited infrastructure for water management, Mozambique is vulnerable to events outside its control, as illustrated by the floods in 2000, because in most international rivers, flows are generated outside the national territory. This vulnerability is exacerbated by the difficulty of building water infrastructure, and the low efficiency and poor state of maintenance of existing infrastructure. In addition, much of the rural population has no access to water for basic needs and is exposed to severe risks because of local droughts.

Threatened Species

The conservation status of Mozambique's biodiversity resources is mostly unknown, partly due to the lack of a national biodiversity inventory, the lack of systematic monitoring of species, and the fact that the little information that is available is scarce and disperse. About 900 species have been recorded for southern Africa, of which 581 have been recorded in Mozambique. There are a number of near-endemic and restricted range

species, mostly associated with isolated montane habitats such as Gorongosa, Chimanimani, Chiperone, and Namuli Mountains.

The botanical resources of the country are rich, with 6,000 species of higher plants, of which 5,500 species have been recorded and classified. Among these, 250 species are endemic and 46 are threatened (Micoa, 1996).

A total of 222 mammal species has been recorded as threatened since 1970, of which one (the white-bellied red squirrel) is confined to Namuli Mountain. It is considered the only pure endemic species. Others, such as the Blue Niassa Wildebeest, Burchell's bohmi Zebra, and Johnson's Impala are sub-species and are confined to the north. Although mammal species diversity is high, populations of these species, especially the larger mammals, have been significantly reduced inside and outside of protected areas, due to lack of enforcement during the armed conflict (1981-1992). Gorongosa National Park and Marromeu Reserve suffered massive declines in large mammals such as elephant, buffalo, and waterbuck. Niassa Reserve in northern Mozambique was less affected by the armed conflict, and is the only protected area that still supports significant populations of large mammals such as elephant, buffalo, sable antelope, greater kudu, and leopard.

At the national level, several large mammal species are thought to be extinct or on the verge of extinction. These include the black and white rhino, giraffe, roan antelope, tsessebe, the mountain reedbuck, and the African wild dog. Seven other species, including the African hunting dog, Selinda veld rat, woodland mouse, and chequered elephant shrew, are threatened.

The freshwater and marine wetlands of Mozambique are important sites for migratory and resident aquatic bird species. One of the most important wetland sites in Mozambique is the Zambezi Delta, where more than 50 species of aquatic birds have been recorded. The delta supports numerous vulnerable and threatened bird species of global concern. The conservation status of the birds of Mozambique is under consideration, but a preliminary estimate indicates that at least 24 bird species are of conservation concern. Out of 900 bird species recorded in southern Africa, 581 are found in Mozambique. Although there are species considered near-endemic or with a restricted range, little conclusive information is available on endemism and conservation status.

Only fish species in Lake Malawi-Niassa and in major river systems such as the Zambezi, Limpopo, Pungue, and Nkomati have been documented. The lower Zambezi has by far the greatest fish biodiversity of any river system, while Lake Malawi-Niassa has the most diverse fish fauna of any lake in the world, with an estimated 800-plus fish species, most of which are endemic. The conservation status of fish species in Mozambique is not known. About 1782 species of fish have been recorded, of which approximately 800 are freshwater represented in Lake Niassa.

There are 167 species of amphibians and 79 species of reptiles, but both of these figures are considered underestimated. The reptile group includes five species of sea turtle. There are three terrestrial endemic reptile species; six (including the sea turtles) are considered

threatened. Twenty-eight amphibian species are considered endemic, but there is no information on their conservation status.

Preliminary data show more than 150 species of coral in the marine habitats, but little or no information exists on their conservation status.

Insects are considered the second most numerous group after plants, with 3,074 species, of which only one is considered endemic, but there is no information on their status.

Exhibit 2. Major Species with Their Endemism and Conservation Status

Type of Species	Total Number	Endemic	Number of Threatened
Higher Plants	5,500	250	46
Mammals	222	1	7
Birds	581	No information	16
Reptiles	167	3	6
Amphibians	79	28	No information
Fish		No information	No information
insect	3,074	1	No information

Source: MICOA- 1st CBD Country Report, 1997.

SECTION IV. THREATS AND ACTIONS NEEDED TO CONSERVE BIODIVERSITY AND TROPICAL FORESTS

The capacity of ecosystems to provide services is determined by many natural and human-induced factors that cause changes in an ecosystem. Direct drivers have a direct influence on ecosystem services, whereas indirect drivers operate often by altering one or more direct drivers. The main traditional indirect drivers are population dynamics, poverty, and technology development and adoption. Direct drivers include greenhouse gas emissions, air pollution, and climate change. The cause-effect relationships in ecological functions are complex and at times difficult to establish.

In general, indicators suggest Mozambique is rich in natural resources, but that these are not all adequately protected or managed. Mozambique has an abundance of natural forests, containing the fourth-largest forest area in southern Africa (40 million ha in 2004). Rates of deforestation are modest, according to the little information that exists, although these rates are accelerating. Fauna and flora diversity across all major species are high and in line with regional averages, while the numbers of threatened and endangered species in each group are mostly low. Mozambique has increased significantly the area of protected land, and marine parks are now being proposed.

Biodiversity loss in Mozambique can be broadly linked to several indirect threats: poverty and population dynamics, little public awareness/constituency and consultation around environmental rights, environment's reduced political leverage, lack of coordination and harmonization of legislation, insufficient capacity to implement biodiversity-related legislation, and absence of funding mechanisms to support conservation. All of these factors lead to immediate direct threats, such as habitat fragmentation and deforestation, food insecurity and subsistence agricultural practices, soil depletion and erosion, pollution and waste disposal, and overexploitation of coastal and marine resources. Each threat is discussed below, followed by actions that can mitigate the threats. These actions were not conceptualized for any particular organization, but instead could be implemented by a variety of actors, including the GRM, NGOs, international donors, research institutions, or community-based organizations. Recommendations for USAID follow in the subsequent section.

Indirect Threats

Poverty and Population Dynamics

More than half of the Mozambican population lies below the national poverty line and ranks 168 out of 177 in the UNDP's Human Development Index. This is the lowest in southern African. In 2003, 47 percent of the population was undernourished and only 36 percent had access to an improved water source. A majority of people in Mozambique depend directly on natural resources for their livelihoods. As population increases, so does demand and competition for resources, including arable land, forest products, coastal resources, and water. Subsistence agriculture continues to absorb 80 percent of the workforce and 93 percent of rural labor. Population pressure in coastal areas is more

significant than in any other region, because coastal areas contain some of the most biologically diverse and ecologically important ecosystems. This pressure and corresponding demand for fuel wood, construction poles, and arable land along the coast is a major threat to mangroves, which are being cleared at a steady rate. Mangroves and other dune vegetation species provide important ecosystems services and natural coastal erosion control (further discussed under coastal resources).

Mozambique has the third-largest population in southern Africa (out of nine surveyed countries), but only the fifth-highest population density in the region. Population density is below average for sub-Saharan Africa, but the rate of urbanization is higher than the regional average and well above that for sub-Saharan Africa as a whole. More than 80 percent of the population works in agriculture, livestock, fishery, forestry, or mining. There is a lack of arable land and limited access to financial, and technical resources are needed to improve production. This has resulted in widespread agriculture extensification. Demographics can put pressure on land, forests, non-forest resources, wildlife, and fish and marine resources as people venture into (often illegal) activities to guarantee their livelihood.

ACTION

- Promote economic growth strategies, raise education levels (especially for women) and technical standards, and promote industries that require low-skilled labor. Consider family planning-awareness activities in development initiatives.
- Incorporate demographics into economic development and job creation initiatives.
- Use and management of natural resources such as forests and wildlife makes a major contribution to rural livelihoods in Mozambique. Therefore, natural resource management should always be considered an integral part of rural agriculture.
- Implement coastal planning, as coastal land and resources are the most susceptible to population pressures.
- Provide access to financial and technical resources needed to improve agricultural production.
- Promote responsible⁵ tourism as an engine of sustainable economic and social growth. The tourism industry's potential to generate foreign exchange earnings, attract international investment, increase tax revenue, and create new jobs has served as an incentive for developing countries.

⁵ In recent years, tourism's role in poverty alleviation has been slowly recognized among development agencies. Pro-poor tourism development strategies are geared toward generating net benefits for the poor. Many studies have shown that a pro-poor tourism strategy can provide economic gain; employment; opportunities for small-and medium-sized enterprises; infrastructure such as improved access to potable water, communications, roads, and improved health and education services; protection of natural and cultural resources; and opportunities and capacity for the poor to improve their livelihoods.

- Mozambique’s model of tourism should be carefully planned so as not to default to a sun-and-sand destination, which often excludes communities and can easily be undersold by competitive destinations. The government should explore the geo-tourism model, with a mixture of scientific, academic, volunteer, educational travel, boutique hotels, and flagship anchor investors with records of corporate social responsibility.

Lack of Public Awareness and Consultation

Although Mozambique has enacted significant legislation to include participation of civil society and communities, and processes for public consultation, there continues to be a lack of debate and consultation. This is true across the board regarding rights, roles, and responsibilities of government and civil society in implementing the existing environmental legal framework. Mechanisms for policy dialogue and coordination on environmental issues are still weak and the capacity to carry out stakeholder consultation is not adequate. In most cases, there is not enough public awareness regarding environmental legislation (excluding the land law and regulations, which was widely discussed by the donor community). Some of this is due to low levels of education, and complex laws and regulations that need a degree of sophistication to decipher. Another is the fact that MICOA is responsible for environmental education and dissemination, but it does not have the financial or human resource capacity to carry out its mandate. The lack of public awareness on environmental issues is thought to be partly related to the detachment of the population from the land.



Park rangers in Metangula, Niassa. Photo by Carlos D. Rodríguez-Pedraza.

ACTION

The conservation of biodiversity requires a supportive enabling environment of government policies and laws. Laws and policies enable citizen participation in environmental decision-making. Decentralizing the management of ecological resources can ensure access and secure rights of indigenous communities to natural resources. Providing safe avenues for debate and transparent channels for dispute resolution increase the ability to make sound decisions about tradeoffs between infrastructure and development and conservation and livelihoods. Recommendations are:

- Strengthen the legislation process (drafting, consultation, awareness)
- Strengthen the rule of law, increase transparency and accountability in government, and reduce corruption through improving public participation and awareness
- Engage the GRM, civil society, and NGO sectors in conservation education programs
- Increase the capacity of MICOA to carry out environmental education and dissemination
- Promote decentralization and information dissemination
- Improve public access to information
- Provide networking opportunities via the Web or phone
- Cross-message with other sectors in agriculture and health in workshops
- Promote community participation through map-making activities, such as “green map” tools

Environment’s Reduced Political Leverage

Environmental issues and conservation needs compete weakly in the priority agenda. The PARPA and Economic and Social Plans are considered general and weak in terms of prioritizing environmental policies. Funding of the sector is still below that recommended by the World Bank in similar countries. Although in some sectors environmental and social guidelines have been drafted (mostly imposed by bilateral and multilateral donors), no major penalties are applied in contractual agreements between public sector works and contractors. Also, sustainable development units created in each sector for environmental issues and social aspects are understaffed and poorly trained to perform their mandates. Environmental “conditions” are still perceived as a hindrance to economic development, and investment decisions are made with little consideration of environmental regulation (often repeated in verbal conversations).

MICOA is a coordination agency, not an implementation agency, and only has the mandate to coordinate environmental action carried out by other sectoral ministries. The perception is that MICOA experiences serious difficulties in performing this coordinating role effectively. Part of the problem is that the mechanisms for coordination are not spelled out. Another problem is that MICOA has little political leverage over other sectoral ministries and hence, limited scope for influencing sector policies. This limited influencing capacity is exacerbated by the fact that MICOA is poorly endowed in terms of human and financial resources.

The National Council for Sustainable Development still does not have a strong presence in environment policy debate or sectoral coordination despite reporting directly to the prime minister's office and consisting of a cross-section of ministers. The council is chaired by MICOA and has the potential to influence policy debate, but so far has not promoted dialogue on important environmental issues during preparation of sector policies (according to one document the team read).

ACTION

- Engage the Environmental Working Group and other related groups in early debate and leverage important environmental aspects into GRM planning tools (PARPA, Poverty Reduction Planning Paper, PG)
- Develop coordination guidelines and procedures for MICOA
- Learn lessons from the Ministry of Planning and Development, or the Cabinet of the prime minister, both of which have developed more successful models of coordination
- Assist MICOA in engaging more directly with development and approval of sectoral environmental guidelines and environmental audits
- Clarify mandates and functions between ministries
- Promote regional and inter-sectoral harmonization
- Provide capacity building on core environmental functions (regulation enforcement, supervision, and monitoring)

Lack of Coordination and Harmonization of Legislation

There is a lack of harmonization of legislation at national and regional levels. Inter-sectoral coordination barely exists within Mozambique, let alone within SADC. For example, there is a lack of clarity on mandates and functions and coordination between MICOA and other ministries like MITUR, MA, MPD, Ministry of Industry and Energy, Ministry of Mineral Resources, and Ministry of Science and Technology. The transition of protected areas to MITUR was ruled by decree, although previously these same areas

were given to MA. Protected areas now fall under MITUR; yet, marine reserves (e.g. Bazaruto National Park, Quirimbas National Park) may have to be designated and coordinated by the Ministry of Fisheries. So far, no marine parks have been established, due to obvious conflicts (parks are no-take zones, so they would preclude any exploitation of resources). No integrated plans exist for protection of endangered marine species (such as the dugong, sharks, holoturia). The fact that nature conservation is under the Ministry of Tourism is inherently problematic. According to some views, MITUR has been unclear about its NRM objectives vs. its tourism development initiatives. It is a frequent practice, for example, for tourism businesses to get an environment license after construction (e.g. the luxurious Indigo Bay Island Resort, in the Bazaruto Archipelago).

Sectors with environmental units do not link institutionally with MICOA at central and provincial levels. MICOA has little knowledge about these units and how they operate. Duplication of work and lack of coordination is a result. There is a need to clarify who is responsible for licensing activities in protected areas (MITUR, MICOA, MA, and Fisheries). There is a similar lack of clarity about which ministry is responsible for auditing activities and collecting taxes and penalties on non-conformities. There is no regulation for implementation of the Cleaner Development Mechanism toward carbon credits (MICOA is leading this process).

ACTION

- Develop permit procedures to license development initiatives, taking current legislation into account and integrating active sectors
- Promote regional harmonization and inter-sectoral harmonization
- Clarify mandates and functions and coordination between MICOA and other ministries, like MITUR, MA, MPD, Ministry of Industry and Energy, Ministry of Mineral Resources, and Ministry of Science and Technology
- Promote environmental policy dialogue across government agencies (cross-sector approach)
- Provide capacity building in core environmental functions (regulation enforcement, supervision, and monitoring)
- Produce integrated plans for the protection of endangered marine species (such as the dugong, sharks, holoturia) and endorse and fund these plans at the national level

Lack of Capacity to Implement Biodiversity-Related Legislation

Initial progress in improving the system of NRM in the 1990s has stalled because of the slow conversion of framework legislation into reality. There are major gaps between framework laws and regulations and their implementation. Natural resources have unique features in terms of abundance, regeneration, access, and potential uses, and government

policies must be adapted to each. For land, forestry, and fisheries, for example, the main problem is one of enforcement of property rights. Significant amounts of land, forest, and minor fish species are under-used or under-exploited, while some major fish species and many aquifers are nearly exhausted. The goals of recent institutional and legislative reforms are mostly admirable, but their delivery is still falling short of what is needed.

Significant problems with implementation of the existing policy framework are due to the lack of means and incentives to enforce regulation and policy and, particularly, the weakness of government agencies mandated with coordination of environmental action. Legislation on EIAs, for example, is reportedly comprehensive and well crafted. But its operationalization is weak, due to the lack of financial and technical resources to review EIAs, or monitor environmental impact mitigation plans. More importantly, there continues to be a conflict of interest between economic development and environment protection objectives. For example, although EIA legislation requires EIAs to be produced for any tourism development project, many tourism development concessions are granted without an EIA (Bazaruto and *Ponta do Ouro* are well-known examples) (ODI, 2008). There is a perpetual lack of human resources, finances, hardware/capital assets, and/or technical means to respond effectively to review EIAs, enforce environmental legislation, carry out audits, or monitor important environmental conditions, all of which are necessary for threshold decision-making.

A substantial number of studies and reports on individual natural resources — particularly on land, forestry, fisheries, and to a lesser extent on water — have been produced in Mozambique. Nonetheless, major knowledge gaps remain, as well as the capacity to manipulate data for economic and political use. Studies on NRM that set out to provide a common framework are missing. The lack of adequate human, technical, and financial resources severely constrains the capacity to implement and audit environmental management plans, enforce biodiversity related legislation, gather basic NRM information, or perform any function needed for protecting biodiversity and conservation.

ACTION

Provide capacity building for

- Data interpretation
- NRM data collection
- Data use and analysis
- Conducting environmental impact studies, assessments, and environmental management plans and audits
- Enforcement of biodiversity related legislation
- Improvement of environmental and biodiversity tax and tariff collection
- Transparency of revenue collection and its use
- Development of systems with clear processes with other agencies, timelines, transparency, and communication

Lack of Funding Mechanisms

Protected areas largely exist on paper, with little financial resources to cover recurring costs, such as human resources to staff the parks or training to improve the technical capacity to manage parks. There are no funding mechanisms to support protection and conservation outside of public funds and donor investments.

There are three sources of funding for public sector activities in the environment in Mozambique. These are un-earmarked funding allocated through the budget negotiation process and originating from ordinary government revenue and general budget support provided by development partners earmarked revenue generated by environmental management activities, and earmarked funding provided by development partners. There are also sources of revenue generated by environmental and natural resource management activities. These are referred to as internally generated revenue and are earmarked for environmental management interventions. The main sources of such revenue identified by this study are fees from concessions (such as forests, mineral resources, and fisheries), fees from environmental licenses, and fees from registration of consultants qualified to carry out EIAs.

These revenue sources have not been adequate and a significant proportion of funding for the environment is provided by development partners. Data suggest that donor funding to MICOA has decreased in the past three years. There are no funding mechanisms devoted to conservation and biodiversity protection, and public funds do not generate significant revenue to support existing protected areas or areas of conservation.

ACTION

Decentralization needs to continue, coupled with appropriate technical support and policies. This can provide new sources of income from local ecological resources to meet local development needs, and give local governments and leaders experience in managing funds accountably and transparently.

- Develop a more transparent system of collection and management of revenue
- Create a Conservation Trust Fund
- Develop a fiscal framework for protected areas
- Develop cross-sector synergies, such as working with the Ministry of Mines and mining companies for mutual benefits
- Develop the carbon market and the Cleaner Development Mechanism
- Conduct a search for creative sustainable financial mechanisms for protected areas in other regions, such as South Africa
- Develop public-private-partnerships
- Employ professional fundraisers
- Increase publicity for parks and conservation areas to develop a more robust group of stakeholders, locally and internationally

Direct Threats

Habitat Fragmentation and Deforestation

Habitat fragmentation and deforestation are resulting from conversion of natural forests to cropland, over-exploitation of forests, sophisticated illegal wood procurement for exportation, slash-and-burn practices, water pollution and sedimentation, uncontrolled removal of vegetation, use of firewood as a source of energy, charcoal production, and uncontrolled bush fires.



Logging activities close to the Quirimbas National Park. Photo by Carlos D. Rodríguez-Pedraza.

Deforestation is a problem in Mozambique. It precludes more sustainable use of forest resources, and damages the environment, the economy, and the future welfare of Mozambicans. It is estimated that every year, Mozambique loses 45,000 to 120,000 ha of forest. The rate of deforestation varies among the provinces, but Nampula Province has the highest rate, at 33,000 ha/year. Not enough information exists on deforestation rates, but it is clear that it is taking place at an increasingly rapid rate. Fires and other activities contributing to deforestation have a major impact on ecosystem fragmentation, which in itself may cause serious changes in biological diversity.



Please place caption here

Mozambique is in the process of stopping all simple concessions and prioritizing commercial companies that are able to approve a management plan, so companies have to reforest all areas that have been cropped. So far, many provinces continue with licensing simple concessions, which do not have management obligations. Of those companies with an approved management plan, only a few are audited. However, a more acute biodiversity threat is clearing of vegetation for energy use. Uncontrolled fires are also a major driver of vegetation removal and exacerbation of the desertification process. Seven out of 10 provinces are listed by MICOA as partially affected by drought and desertification. The most indicated causes are removal of vegetation and heavy precipitation.

ACTION

- Support efforts to detect and evaluate forest cover and forestry dynamics (remote sensing, photo interpretation, mapping global positioning system [GPS] and GIS).
- Conduct a forest resource inventory to assist the country in establishing yearly deforestation rates and major vectors of deforestation.

- Promote renewable resources and plantations of fast-growing trees for fuel purposes (e.g. USAID project in Dominican Republic) or low-scale ethanol production for household energy.
- Promote biofuels in degraded lands and for household consumption.
- Given the importance of charcoal and wood for household cooking, efforts should be made to improve the efficiency of stoves and kilns to conserve wood. Development projects could also experiment with small-scale cooking applications such as anaerobic digesters or solar driers/cookers. Furthermore, they could facilitate conversations among Mozambicans in which they consider the use of “green charcoal” made from vegetal wastes or the use of alternative fuels (such as jatropha or other crops that can be made into biofuels).
- Undertake comprehensive conservation and land-use planning.
- Ensure law enforcement of protected areas.
- Promote reforestation activities inside and outside of classified, private, and community forests. These activities can be supported by clarifying legal definitions of different types of forests (and the activities permitted within them), supporting nursery activities, and undertaking direct reforestation.
- Create value chains for wood products — for home and commercial use — to allow resource managers to track forestry activities and manage/plan future use.
- Promote a certification process in the forest sector (e.g. Forest Stewardship Council [FSC]-certified plantations).
- Coordinate with the agri-business sector (including biofuels) to reduce the pressure on land by use of subsistence farming practices near parks and conservation areas.
- Support long-term ecological research (e.g. by establishing permanent parcels in important forest tracts to forecast forest growth, and forest sustainable cutting rates).
- Support enforcement of the forestry and wildlife legal framework in all provinces.

Food Insecurity and Subsistence Agricultural Practices

Food is obviously one of the most important services provided to society by terrestrial and aquatic ecosystems. High levels of food insecurity are prevalent in certain parts of the country. In spite of abundance of arable land in Mozambique (the FAO estimates 36 million ha) only 4.9 million is cultivated, 75 percent of which is estimated to be used for shifting (slash-and-burn) subsistence agriculture. These production systems are highly consumptive, soil depleting, and contribute to erosion.

Food insecurity leads people to hunt illegally and use subsistence agricultural practices such as slash-and-burn, which contribute to the decline of many species and their habitats. Demographic pressure and the lack of other survival activities for the rural population can only accelerate the pressure on available protein-rich foods (such as bush meat) and confine even more the rangeland putting many wild species in threat. Traditional cultivation of tropical soils results in losses in soil through erosion and oxidation of surface organic matter, unless farmers use management practices as a means of replenishing the soil pool. Tropical deforestation and traditional cultivation together contribute to greenhouse emissions and deplete more than 60 percent of soil nutrients. Soil depletion leads to a decline in soil quality and, in the long term, to ecologically unsustainable agriculture.

Extensive livestock grazing is also common among subsistence farmers, but is also relatively unproductive and wasteful of land resources. Changes in land through conversion of forest and grasslands to agricultural use have contributed substantially to the increase in atmospheric CO² concentrations in past centuries. Declining crop yields, depletion of soil nutrients, and reduced carbon stores in soils are considered a major threat to food security in southern Africa.

ACTION

Support expansion of commercial farming operations, including out-grower schemes and farmer's associations. More focus should be on expanding the more capital-intensive forms of land use, which are aimed at production for the market. (It is noteworthy that the GRM has established promotion and development of a strong and dynamic commercial agricultural sector as one of its development goals for 2006-2009.)

- Promote investments in infrastructure, particularly roads, railways and ports, schools and health care.
- Promote efficient water use and water conservation practices to improve agriculture productivity.
- Promote biodiversity-friendly agricultural practices and create incentives for good conservation agriculture practices.
- Shifting cultivation is an ancient agricultural production system that is commonly practiced today in Mozambique. Shifting cultivation can be sustainable if rotation cycles are sufficiently long so that natural vegetation recovery can take place, but under increasing human population pressures, the cycle is shortened, and can result in soil fertility and crop yield declines.
- Fire is an essential and integral part of shifting cultivation. Only through burning at the end of the dry season, can the cut trees and slashed brush be converted to ash and incorporated into the soil to sustain crop production. The use of fire in shifting cultivation has only limited possibilities for reduction. Burning must be done near to

or at the end of the dry season because only then has the woody material dried enough to give a good, hot burn.

Soil Depletion and Erosion

Soil erosion is perhaps the major direct environmental threat to biodiversity in Mozambique. Soil erosion takes different forms, including water erosion, wind erosion, physical compaction, salinization, and various forms of chemical degradation. In Mozambique, considerable erosion is due to extreme events like wind storms and heavy precipitation on unprotected surfaces. Erosion of land surfaces often increase sediment loads of rivers and streams, and can interfere with certain important habitats, and navigation and water supply associated with these waters. Soil erosion is also an important cause of degradation of agricultural land. Therefore, the overall capability of soil ecosystems to control erosion is viewed as a key regulating ecosystem service. In sub-Saharan Africa, the area under high risk of water erosion will approximately double between 1995 and 2050 because of a net increase in flashy precipitation (and extreme events), widespread replacement of natural vegetation, and expansion of agriculture onto terrain susceptible to water erosion.

Poor land-use practices, which include deforestation of coastal as well as inland areas, are the main contributors to sedimentation of the coastal and marine environments of Mozambique.



Agriculture activities near Metangula. Photo by Carlos D. Rodríguez-Pedraza

ACTION

Promote good land-use practices such as:

- Conservation agriculture
- No till in slopes
- Respect for buffer zones (in rivers and other sensitive areas)
- Careful use of fertilizers and pesticides
- Promote the protection of sensitive areas with use of natural processes and vegetation
- Mitigate and remediate all degraded areas, starting with those more sensitive or with greater erosion rates
- Consider the carrying capacity of pastoral agro-ecosystems to avoid over-exploitation of vegetation cover

Pollution and Waste Disposal

Most agricultural activities take place along or close to the main river alluvial soils. Rivers are the main pathways through which agrochemicals enter the coastal and marine environments. Agricultural chemicals and fertilizers and pesticides are reported to be widely used in farms across the border (RSA, Swaziland), particularly on sugarcane plantations and other intensively produced crops. Water samples collected from the mouths of the Monapo, *Pungoé Maputo* and Incomati Rivers have tested positive for pesticides residues, including DDT, lindane, and hexachlorobenzene.



Agriculture activities too close to river banks 3.6 km NW of Roma village, Majune district, Niassa. Photo by Carlos D. Rodríguez-Pedraza.

Mining

The most significant effects associated with medium- to large-scale mining are loss of productive land and/or assets of small-scale farmers and an increase in water consumption and contamination of surface and groundwater. Extensive erosion and silting of rivers is reportedly associated with small-scale mining in some areas. Mining operations often require larger quantities of water for mineral extraction and processing, much of which is contaminated with silt, heavy metals, and process chemicals (including acid, arsenic, cyanide, and mercury) during the mining process. Small-scale mining operations, however, are more wasteful in their use of water and seldom have the resources or technology to decontaminate their processed water. In the mining sector, a key challenge is how to bring small-scale activities into the formal sector.



Illegal mining activities inside the Quirimbas National Park. Photo by Carlos D. Rodríguez-Pedraza.

Along the Mozambican coastline, industrial activities are mainly concentrated in the Maputo/Matola and Beira areas, but prospecting for uranium, oil, diamonds, gas is beginning to occur in prime tourist areas and areas of high conservation value (for e.g. Quirimbas Archipelago, Pemba). Few industries treat their effluents, which are discharged directly into canals, rivers, and coastal waters. Many of these contain toxic chemical and heavy metals. Analysis of water quality samples from rivers entering Maputo Bay have tested positive for heavy metals, particularly lead, in a number of localities. These include the Port of Maputo, the mouths of Matola and Maputo Rivers, and Nacala Bay.

Tourism

Tourism is a source of pollution and ecological degradation (such as coastal dunes and coastal vegetation). It is also associated with a loss of esthetics, degradation of historical and cultural sites, and can potentially lead to growth of the sex trade and HIV/AIDS. Tourism in Mozambique is promoted under an environmental framework that “ensures tourism and the environment are mutually supportive and prioritize biodiversity sustainability, including natural heritage.” A conflict exists within MITUR, as it functions as the custodian of the biodiversity status of the country, through its Directorate of Conservation Areas, while it is the main promoter of tourism development. All protected areas (excluding protected forest land) are under the coordination of MITUR, which creates a conflict between the need to protect and the impetus to develop tourism infrastructure.

ACTION

- Inspect and audit all major activities susceptible to polluting the soil, surface and ground water, and the atmosphere.
- Support inspection and use of inputs in agriculture practices (introduce practices to improve judicious use of fertilizers and pesticides).
- Promote organic farming and markets for organic produce.
- Support enforcement of EIA legislation specific to mining, such as promoting recycling and filtering of water used in mining and providing containment of mining tailings.
- Promote corporate social/environmental responsibility values (marketing, regulations, and the “right thing to do”) through public-private-partnerships.
- Support public consultation and stakeholder workshops to discuss implications of mining activities.
- Provide capacity building of local environmental NGOs to strengthen civil society.
- Similar to the above, to mitigate potential negative effects of tourism, it is critically important that the government, civil society, NGOs, and donors engage with the major resort development companies to ensure tourism benefits the people and its negative impact is mitigated. Furthermore, transparent practices by the government will help local and international actors to monitor activities to ensure they are being undertaken responsibly. The advantages of corporate social/environmental responsibility (marketing, regulations, and the “right thing to do”) should be promoted through public-private-partnerships and engagement with stakeholders, communities, and donors.

- Develop community action plans, and support development and implementation of these action plans by partnering with developers and interfacing with communities through NGOs.
- Support drafting of tourism environmental guidelines and auditing of environmental management plans, mostly for infrastructure located in sensitive areas, like national parks and other protected areas, and coastal dunes. However, to ensure tourism's sustainability, the GRM must ensure adequate protection of its key natural assets (wildlife, beaches, coral reefs) and must not allow these assets to be degraded through irresponsible or uncontrolled growth in the tourism and other sectors (mining, fishing, agriculture).
- In protected areas, tourism should be minimally developed to leave the least footprint possible to ensure ecosystems are being protected.
- Assist municipalities, mostly those in sensitive zones, in promoting a sustainable way to dispose of waste.
- Promote recycling and recycling education programs.
- Promote placement of trashcans.
- Promote green building codes.

Overexploitation of Coastal and Marine Resources

The principal threats to the future sustainability of fisheries in Mozambique are reported to include: unlicensed fishing, in particular by foreign tuna and shark and high sea vessels; encroachment on fishing grounds/zones reserved for semi-industrial and artisanal fisheries by industrial fishing vessels; encroachment into shallow water shrimp fishing grounds/zones by unlicensed or unauthorized vessels; deficiencies in recording and reporting of catches in the official logbooks; difficulties in controlling artisanal fisheries distributed along the entire coastal line and in fresh water lakes and rivers; difficulties in controlling recreational and sport fisheries and protecting endangered species, like shark, dugong, and mangroves; an incomplete legal framework for co-management of fisheries.

ACTION

Mangroves cover about 400,000 ha, of which 215,000 ha is still relatively well preserved. Major mangrove degradation has occurred near Maputo and Beira, as well as in the Zambezi Delta. Mangroves are important breeding areas and nursery grounds for fish and crustaceans (such as shrimp) caught in offshore fisheries. They are one of the most threatened types of ecosystems in the world, and are always a high priority for protection.

- Help the GRM develop a comprehensive vision for its coastal zone

- Establish a network of protected areas that incorporate high-priority coastal sites
- Develop a mangrove protection plan, support programs to reforest mangroves
- Promote use of other vegetation types for fencing, construction, and fuel use by local communities
- Work with coastal communities to identify and implement selected strategic activities to improve sustainable use of the resources in these sites and buffer zones
- Improve and support implementation of rest periods (VEDA) on a regional and local basis, where other income activities (mainly for subsistence farmers) can guarantee food security during no-fishing periods
- Improve and support satellite monitoring of fishing vessels along the Mozambican coast
- Support initiatives to fund specific projects targeting conservation of endangered species
- Support environmental awareness campaigns to reduce coastal mangrove destruction

SECTION V. USAID/MOZAMBIQUE PROGRAM

Actions necessary to combat the threats identified above range from local solutions (promoting community forestry and community action plans and strengthening environmental awareness) to national solutions (creating inventories, building capacity of government resource managers, and improving implementation of the legal framework). Many of these options are being undertaken by international and Mozambican organizations, in part or in specific geographic areas, while others still need to be considered and applied as appropriate.

This assessment looked at how USAID is addressing threats to biodiversity and forestry resources. USAID has a long history working in health, democracy and governance, and in economic growth (agriculture and trade) in Mozambique, and many aspects of its current programming address the threats listed above (at least in part, indirectly). In USAID's current portfolio, five activities directly address biodiversity and forest conservation in Lake Niassa, Pemba Bay, Quirimbas National Park (through the Global Conservation Program), Gorongosa Park, and Limpopo National Park. The Northern Arc Tourism Project is the USAID program that most directly addresses needed conservation actions. It addresses almost all the above-mentioned threats, particularly through its efforts to improve natural resource governance, improve the livelihoods of rural populations, and conserve biodiversity. However, these contributions have been limited in scope and have been programmed through seizing targets of opportunities rather than via a strategy to respond to conservation and biodiversity threats.

The last biodiversity assessment report was in 2002 and substantial changes have occurred in Mozambique in the last six years. USAID/Mozambique is embarking on its new Country Assistance Strategy, to follow its last strategy, which was for 2006-2010. This report provides an opportune moment for USAID to examine its contribution and make strategic choices to address threats by capitalizing on existing programs and pursuing areas where USAID has a comparative advantage.

USAID's Current Programs That Address Threats to Conservation

Direct Contributions to Threats to Conservation

There are a number of areas where conservation is critical, from forestry and biodiversity standpoints in which USAID/Mozambique has focused its activities. The Strategy Statement 2006-2010 stated: "USAID's biodiversity activities in Mozambique are working to conserve and protect forests, coastal areas, and threatened wild species by supporting alternative livelihoods, sustainable forest management, collection of wild germplasm and cultivation of wild crop species, community-managed conservation areas, and eco-tourism. USAID has a tourism component under its Trade and Investment SO and a number of public-private alliances to deliver this assistance. While these tourism activities are not traditional or typical biodiversity activities, they are the most effective mechanism for promoting biodiversity and tropical forestry conservation in Mozambique...these include: capacity building in tourism, forestry, floriculture, essential

oils, technical assistance and financing, business linkages, identification of industry specific constraints, and business training.”

The current geographic area for the mission’s natural resource management (NRM) activities are in northern Mozambique and in Sofala and Gaza: From Strategy Statement 2006: “USAID’s biodiversity activities aim to conserve the a) terrestrial ecosystems near Limpopo National Park and Lake Niassa, b) aquatic ecosystems of the Quirimbas National Reserve and Lake Niassa, and c) tropical forests in the central and northern parts of Mozambique. Activities include the creation of new conservation areas and of buffer zones around existing conservation areas.” The criteria for the geographic areas were focused on the most populated areas to get the most results for the smallest investment. However, these areas are also under threat from logging and charcoal wood harvesting (Niassa), degradation of mangrove ecosystems (Zambezia), and agricultural extensification in Mozambique’s only montane forest (Gorongosa).

Although USAID/Mozambique has accomplished some of the objectives in its 2006 strategy, it has yet to claim results in the collection of germplasm or wild crop species, and it has only indirectly supported activities in the forestry sector (as stated in meetings at USAID), or to the team’s knowledge started any conservation activities in the aquatic ecosystems of the Quirimbas National Reserve. It has done some work on Ibo Island, the most famous of the Quirimbas Islands, on renovation of infrastructure, and plans to support management of coastal mangroves in that area. The bulk of USAID/Mozambique’s biodiversity earmark has gone to four grants: The World Wildlife Foundation, the Carr Foundation, Nathan Associates, and the African Wildlife Federation. It should be noted that USAID/Mozambique provides indirect support to centrally funded programs from USAID/Washington to fund NRM activities in Quirimbas Archipelago and a public-private-partnership in forestry in Niassa. By USAID/Mozambique admission, probably none of these programs would have been carried out if it were not for the biodiversity earmark mandated by Congress. A description of these programs and how they contribute to conservation follows:



USAID/Mozambique renovation of infrastructure on Ibo Island, the most famous of the Quirimbas Islands.
Photo by Carlos D. Rodríguez-Pedraza.

USAID’s Northern Mozambique Tourism Project in Cabo Delgado, Nampula, and Niassa has made significant contributions to biodiversity and forest conservation. This is a \$5.3 million project with Economic Growth funds. The purpose is to a) improve promotion of a northern Mozambique tourism product, to attract more tourists to the region; b) increase investment in the tourism sector to effectively accommodate and benefit from an expansion of the tourism industry; and c) preserve key environmental assets on which northern Mozambique is based. USAID’s efforts to date have been to lay the groundwork for establishing a marine reserve on Lake Niassa and establishing a public-private-partnership to set up a Pemba Bay Conservancy to manage the use of the bay. This includes setting up the legal framework, including forming an association of stakeholders (shrimp farmers, port authority, tourism industry) producing zoning laws and management plans. The WWF identified the area as an endangered coastal region containing numerous endangered species, such as the dugong and the sea turtle. Indicators collected include number of hectares under conservation management and number of people with increased economic benefits derived from sustainable natural resource management and conservation as a result of U.S. government assistance. The intent of the program is to conserve this biologically important region by demonstrating that ecologically responsible tourism can promote economic growth and job creation while improving the environment.



USAID tourism program in Ibo Island, Cabo Delgado. Photo by Carlos D. Rodríguez-Pedraza.

The Pemba Bay is geographically part of the Quirimbas Archipelago, which consists of 32 coral islands stretching from Pemba (the capital of Cabo Delgado Province) to the Rovuma River, which forms the natural frontier between Tanzania and Mozambique. It occupies a total combined area of 7,500 km² and stretches over 110 km of coastline. The area has little development and is one of the most biologically diverse coastal areas remaining in southern Africa. The Pemba Bay Conservancy is expected to be legally incorporated in fiscal year 2007. Although the mission does not have an explicit forestry component to its biodiversity program, Quirimbas National Park contains many old-growth forests. The southernmost 11 of these islands and a vast expanse of mainland forest are included in Quirimbas National Park. Additionally, the anti-pollution work that will be part of the mandate of the Pemba Bay Conservancy will require the proper management of old-growth forested areas that make up the Pemba Bay watershed area.



Pro-poor tourism development strategies are geared toward generating net benefits for the poor. Pemba Beach Hotel.
Photo by Carlos D. Rodríguez-Pedraza. pg

The Niassa Reserve is one of the largest protected Miombo forest ecosystems in the world, with a surface of 42,200 km². The Niassa Reserve is the largest conservation area of Mozambique and it contains by far the greatest concentration of wildlife in the country. Although the mission has not directly supported activities in the Niassa Reserve, a regional USAID project (RCSA/Botswana to Fauna and Flora International) supporting conservation in the reserve was implemented in 2003-2004.

Although USAID's role has been small, it has been funding development of a management plan that directly contributes to the conservation of this area.

Niassa Forestry: USAID/Washington had a centrally funded Global Development Alliance grant in 2007 with the Global Solidarity Fund International (GSFIO in Niassa.

This GSFI is the investment arm of the Church of Sweden and had four components: commercial forestry, conservation, community woodlots, and restoration of degraded lands. The investments fund social services — for every hectare commercialized, one hectare is set aside for conservation. Community education was conducted on topics such as organic fertilizers and green manure, so the limited parcels of arable land could be successfully farmed for a longer period to increase agricultural intensification on existing lands (thereby decreasing the rate of deforestation). Additionally, community education was conducted on fuel-efficient cooking systems, and technical assistance was provided

for establishment of community woodlots to respond to the population's growing fuel needs.

Lake Niassa: USAID funds a Global Development Alliance (GDA) program with the WWF (lead) and Coca-Cola for establishment of a national lacustrine reserve on Lake Niassa. The total program is \$1.5 million, of which \$600,000 is from Coca-Cola, \$300,000 from the WWF, and \$600,000 from USAID (FY2007 funds). The activity involves creating a reserve area on Lake Niassa that will protect its unique ecosystem, including the world's only surviving freshwater corals, more than 1,000 species of fish (800 of which are endemic to the Lake), and rich bird life.

The creation of a national park on Lake Niassa and the hinterland of the lake will encourage investment in the area, as the regulatory framework that established the park will address some of the major constraints relating to land ownership. In addition, the WWF has started defining the area, is undertaking some preliminary studies, and has a successful record of similar work in the Quirimbas National Park in Cabo Delgado.

The proposed area of the park would cover Lake Niassa and shoreline from Metangula to the Cobwe area, with wildlife areas totaling 100,000+ hectares in the remote northern and central areas of Lago District (avoiding gold-mining areas near Lipilichi Town). Terrestrial areas will be either be the reserve proper or a buffer zone, depending on community and stakeholder negotiations.



Eco-lodge development in Niassa Lake near Metangula. Photo by Carlos D. Rodríguez-Pedraza.

Gorongosa National Park and Mount Gorongosa. The Gorongosa Mountain contains some of the last remaining intact forests in Mozambique. Through the public-private-partnership with the Carr Foundation, USAID has been helping re-establish Gorongosa Park as one of Africa's premier eco-tourism destinations. The Carr Foundation Global Development Alliance is a public-private-partnership to rehabilitate the Gorongosa National Park to increase the wildlife population in the park, and includes community development around the buffer zone. It is an ambitious integrated development project and so far has generated a lot of excitement within the country, with the highest level of government support. Greg Carr has pledged \$40 million during 30 years and USAID's \$1 million is matched by \$5 million from the Carr Foundation. The total projected budget is at least \$160 plus million. The project contains every conceivable component. It can be billed as an NRM/biodiversity project, but has potentially infrastructure, democracy and governance aspects, health, HIV/AIDS, education, and economic growth. Technoserve's project with USAID funding includes commercial agriculture, forestry, and alternative incomes for communities in the buffer zone of Gorongosa Park.

The Great Limpopo Trans-frontier Conservation Area, resulting from a recent internationally agreed land-use plan, brings together South Africa's Kruger National Park; Zimbabwe's Gonarezhou National Park, and Mozambique's Limpopo National Park, and extends support to Banhine, and Zinave National Parks, and surrounding lands. The core area involved is 3,577,144 ha (35,771 km²) with the broader matrix covering 100,000 km². USAID's grant to the African Wildlife Foundation has supported development of a community-managed reserve in the Limpopo Park area, assisting the community in obtaining title to the land, and working with the community and local authorities on a management plan for the community reserve. The foundation designed a management plan and a business plan and assisted the community in demarcating land and zoning an area for the community to manage as a game park. However, this project has encountered numerous problems. Concessions were sold to a sugar cane plantation, resulting in abandoning the project and moving project material and funds to Banhine National Park, which is a demarcated area for conservation.

Indirect Contributions to Biodiversity Conservation

In addition to the above, USAID has also made indirect contributions to biodiversity and forest conservation through its Economic Growth, Democracy and Governance, and Health initiatives in the following manner:

Democracy and Governance. The links between governance, democracy, and biodiversity conservation are mutually reinforcing. There are four essential elements of effective democratic governance to consider in biodiversity conservation programs: participation, decentralization, information advocacy, and policy law. With secure rights and access to land and other resources, local communities can more effectively partner in conservation and development programs. Improvements in public access to information about biodiversity, natural resources, and the environment allow people to more effectively manage and plan for a sustainable future. A suitable enabling environment, in the form of relevant environmental legislation, appropriate reforms, and accountable and transparent mechanisms for policymaking is necessary to ensure resources are managed

sustainably over time. USAID's Municipal Governance and Anti-Corruption activities contribute indirectly to conservation (or list threat) through their focus on decentralization, assisting communities in participating in decision-making, satellite mapping to inform land tenure, and improving the transparency and responsiveness of government in municipalities.

Economic Growth (Rural Income Growth) activities contribute indirectly to (above threats) by: increasing agricultural productivity, promoting policy reform, improving natural resource management (for example a fire protection plan was done in Gorongosa), reforestation of commercial plantations, extending and improving value chains, and providing rural finance. These activities reduce the pressure on parks and reserves and fragile lands. Extinction of plant species can limit opportunities for deriving beneficial pharmaceutical compounds or expanding food crop alternatives. Support for marketing and export for sustainably harvested non-timber products can provide an incentive for conservation and an opportunity to diversify income-generating activities. Intensifying agriculture, improving yields, and expanding networks can reduce the extension marginal, shifting cultivation into forest and woodland areas, and can increase opportunities for sustainable natural resource-based enterprises in rural communities (e.g. crafts, carpentry, beekeeping, nature tourism, and non-traditional forest products.)

Economic Growth/Trade activities indirectly contribute to improving the potential for conservation investments and natural resource management through its activities in reducing red tape and trade barriers, dispute resolution, labor liberalization, infrastructure regulation, and trade capacity building.

As already discussed above, USAID's conservation partners such as WWF and the African Wildlife Foundation are working with local communities to more effectively participate in resource management and decision-making in the Limpopo and Niassa regions. USAID's support has enabled communities to undertake participatory zoning processes and develop resource management plans and specific resource use regulations that they can self-monitor and enforce. WWF is strengthening advocacy skills of communities to participate in conservation and development planning at local and national levels.

Health (HIV/AIDs and Maternal Child Health and Malaria) activities contribute indirectly to (threats) biodiversity and natural systems that are inextricably linked to human populations. A healthy environment can provide the clean and safe food, water, medicines, and energy that people need to live healthy lives. Effectively functioning ecosystems filter harmful pollutants out of air, water, and soil. A diversity of plant and animal life provides more options for meeting food security and nutrition needs of near and distant human populations. Increasing human populations coupled with poor development planning can put an enormous strain on biodiversity and natural resources. People struggling with poor health and nutrition are often not effective agents for conservation. Local capacity to sustainably manage biodiversity can be decimated by illness and death caused by diseases like HIV/AIDS. For all these reasons, an integrated approach to human population, health, and environment is advisable to achieve

biodiversity conservation objectives. Clearly, USAID/Mozambique has not addressed all these complex and interrelated issues, nor should it be expected to. But by combining the Health activities, USAID/Mozambique has taken a step forward. Given the primary importance health, fertility, and population issues tend to play in the lives of humans, particularly the poor, these dimensions of biodiversity conservation may provide credible entry points for working with relevant communities and other partners. By addressing issues in an integrated way, there is often a greater potential for engendering broad buy-in for a complementary suite of conservation and human development goals.

Changes Ahead in USAID Programming

USAID/Mozambique is clearly in transition, with key staff positions empty or newly filled, a new Country Assistance Strategy in development, elections in Mozambique in 2009, and elections in the United States in 2008, with resulting uncertainties about budget levels and earmarks. The Millennium Challenge Account's presence and a huge increase in PEPFAR funding also dictate USAID's ability to diversify.

USAID/Mozambique programs to date have been largely stove-piped and USAID is considering ways to integrate teams and get crosscutting synergy. With MCC's presence and the need to maintain high levels of transparency and reduce corruption, USAID/Mozambique is considering requesting an increase in funds for Democracy and Governance. USAID/Mozambique is not requesting an increase in Biodiversity funds, but intends to straight-line levels from last year, and maintain the focus on tourism activities. USAID/Mozambique is considering merging Rural Income and Trade teams to become more efficient, policy-oriented, and cross-sectoral. Economic Growth may increase its agri-business focus, but its budget will be cut in half. USAID/Mozambique has expressed an interest in entering the forestry sector, though this is still in the early stages in thinking and would require negotiating sectors with other donors. PEPFAR and HIV/AIDS will continue to be 90 percent of USAID/Mozambique's program (with a focus on prevention, mother-to-child transmission.)

SECTION VI. RECOMMENDATIONS FOR USAID/MOZAMBIQUE

USAID/Mozambique has supported conservation throughout its portfolio indirectly and has directly addressed threats to biodiversity and forest conservation in Lake Niassa, Pemba Bay, Quirimbas National Park, Gorongosa Park, and the Limpopo National Park. However, it could do more by targeting environmental threats and opportunities in Mozambique, and by developing a more strategic focus on activities in biodiversity and forest conservation. The following recommendations are offered in order: short term/quick-wins that relate to ongoing activities, medium-term higher-level/greater-impact interventions that do not necessarily relate to a particular USAID activity, and long-term interventions that may or may not be within USAID's ability to implement, but which USAID could influence. We conclude with three themes that ran through many of the recommendations and should be highlighted as over-arching recommendations.

Short-Term/Quick Wins

USAID/Mozambique could at minimum consider making more explicit links to biodiversity and conservation throughout its Rural Income, Trade, Democracy and Governance, and Health programs in the following manner:

Rural Income Team Recommendations. Co-locate program activities with biodiversity sites, develop NTFPs, support certification schemes, use Regulation 216 as an opportunity, and support GSFI.

Activities with the potential to affect rural populations could target areas of high conservation value, especially those surrounding protected areas. For example, the team understands there is a new design for an integrated health, agriculture, and HIV/AIDS activity. USAID could co-locate program activities at sites important to biodiversity and forest conservation. USAID could assist communities in developing NTFPs and medicinal plants for local use and export, providing technical assistance in sustainable harvest. Economic generation activities could support conformance to international market standards (for example Forest Stewardship Council) that require specific environmental practices. Programs could recognize the crosscutting nature of environmental issues, and look for activities that can meet explicit goals and have positive secondary effects on the environment (such as clean water activities with ecosystem protection, and workshops incorporating environmental components). The environmental review process required by Regulation 216 could be used as an opportunity to ensure that the conservation of biodiversity and forests are routinely included in programming decisions. The Rural Income team could extend its support (in-kind) to the Global Solidarity Fund International in Niassa, and if possible provide direct support, as this has the potential for becoming a highly leveraged GDA. GSFI has a long-term commitment in Mozambique and has long-standing programs in forestry. The GSFI could grow in to a more robust program associated with carbon emissions and sustainable financing through partnerships with other NGOs in the area.

Business and Trade Team Recommendations. Build synergies through tourism, explicitly link to biodiversity conservation, tap in to GSTA, explore carbon market, and chair the Environmental Working Group. USAID/Mozambique could take a more strategic look at its biodiversity activities to build synergies through tourism between health, agriculture, democracy and governance, and trade. Tourism is first or second in foreign direct investment in Mozambique and is where USAID is using its biodiversity earmark. It would be logical for USAID to continue its investment in this sector. It could, however, consider augmenting its role in this sector and explicitly linking it to biodiversity conservation. Tourism is inherently cross-sectoral, and this team thinks it could be the forum for uniting the activities and aligning the programs more closely. To contribute to the biodiversity earmark, however, USAID would have to refocus the program to have a biodiversity objective, activities would have to be identified on the basis of threats to biodiversity, and site-based activities must positively affect biodiversity in biologically significant areas. For relatively low or no cost, USAID could:

Tap into the GSTA. USAID/EGAT's Global Sustainable Tourism Alliance (GSTA) would be a logical starting point to find new partners and new expertise through the wide consortium it offers. USAID could tap in to EGAT's GSTA to design a tourism strategy that would incorporate lessons learned from all over the world. The GSTA is composed of eight partners, including consulting companies, professional tourism associations, the private sector, and academia.

Disseminate geo-tourism map and scale-up the stewardship council. Under the Nathan Project, geo-tourism mapping was carried out in Nampula, Niassa, and Cabo Delgado. This is a participatory activity to "map cultural and geographic hotspots" to protect local resources and integrate local knowledge. The final version of this useful tool has yet to be produced. This geo-tourism map could be produced and disseminated. ("Green maps" are a similar model and the standard for the world, should USAID want to compare these models in case of scaling up.) As part of this process, a geo-tourism stewardship council was formed in the three northern provinces and is in limbo. This council could be revitalized by finding local champions in other provinces (such as the Carr Foundation) that can scale it up to a national level. This would form the basis for protected area management systems, and community development. USAID could access the GSTA consortium to assist in this process.

Expand role in Quirimbas through links with other donors. USAID should continue its activities in Lake Niassa, Pemba, and Quirimbas and look for links with other donor activities and regional programs. The French Development Agency has been the key source of funding for the Quirimbas National Park for the past four years, with WWF as its implementing agency. The project covers establishment of infrastructure within the park, purchase of equipment, training of rangers, biodiversity protection and conservation, and funding of community projects directed at improving the livelihoods of nearly 55,000 inhabitants within the park. USAID's centrally funded Global Conservation Program has been providing support to local communities in the park in partnership with the WWF, to address fish stock decline, including planning and establishing fish sanctuaries. In addition, the Mozambican Navy, the U.S. government,

and WWF partnered to respond to illegal fishing by industrial fleets by rehabilitating patrol boats and improving enforcement of regulations in marine protected areas. Some of these boats are permanently based in Quirimbas and assist local communities in managing their fisheries resources. The draft Conservation Policy calls for the elevation of Quirimbas from national park to reserve, with a zone of protection covering land and marine resources and requiring a new management plan and study of the status of conservation of this area. USAID could take a more proactive role in Quirimbas and could assist in developing the new management plan and analysis of the biodiversity status of the conservation area.



Small village near the coast in Pemba where tourism development is been proposed.
Photo by Carlos D. Rodríguez-Pedraza.

Explore carbon market in Gorongosa. USAID should continue funding activities in Gorongosa Park, but augment its role on Gorongosa Mountain to protect the intact forest. USAID could scale up the activity in terms of community-based forest management and look for opportunities to prepare communities for the carbon market through “avoided deforestation”. More detail on the carbon market is provided below.

USAID could offer to chair the Environmental Working Group. Tourism investments are in rural areas by definition in Mozambique. The government is not able to provide roads, water, sewage, and basic infrastructure for tourism to take place. The Tourism Strategy calls for resort development corporations to build the infrastructure needed, but

this may price small investors out of the market except in cities. This type of tourism is generally considered “enclave tourism” with few spin-off effects. USAID could play a pivotal heavyweight role in ensuring this is the right model for Mozambique and that small, medium, and boutique hotels can compete, that communities are not marginalized, and that conservation goals continue to be met or exceeded. USAID could offer to chair the Environmental Working Group and help elevate the status of environment as a cross-sector theme that deserves budgetary allocation aligned with policy prioritization.

Democracy and Governance Team. Harmonize conservation laws, improve environmental advocacy, improve community access to resources, and create a platform for NRM information. USAID could seek more direct links to harmonize conservation laws, improve environmental advocacy, environmental awareness, and community access to resources. The draft Conservation Policy calls for delegation of authority to district level of parks and reserves under 1,000 ha. This will entail creating management plans, training, and capacity building at all levels. USAID could work with local NGOs to operationalize devolution of authority to the community level. Local NGOs may need capacity building and USAID could do institutional strengthening of local NGOs. The devolution of authority over natural resources such as forests, grazing lands, or wildlife to local communities or regional or local governments, can empower these groups. Assist this process in supporting decentralization policies and implementation at the community level. There is a Law for Communities that says that communities must get 20 percent of levies on tourism fees, petrol, wildlife trophies, and timber. In reality, this is not working well — some communities have received as little as \$50 for the year, while the highest has been \$11,000. Transaction costs are high, some committees are not representative of the community, there is corruption, and fees are so low that communities don’t care. USAID could support capacity building in communities to access and manage conservation funds through ongoing activities in association formation, legalization, and dispute resolution.

Under Democracy and Governance, for little or no cost, USAID could also:

Synthesize lessons learned in land use and land tenure. Land tenure continues to be a threat to biodiversity and USAID has a comparative advantage in this area. USAID could conduct a synthesis of experience and lessons learned on local governance options and processes for forestry and conservation in the context of decentralization of NRM and land tenure reform, drawing lessons from other African countries through knowledge resources such as FRAME (http://www.frameweb.org/ev_en.php) and Nature Wealth and Power (http://www.usaid.gov/our_work/agriculture/landmanagement/pubs/nature_wealth_power_fy2004.pdf). This could be done through the Center for Development Information and Evaluation, FRAME, EGAT, or a regional mechanism.

Create a platform for natural resource information needs. Citizens and the organizations of civil society that represent them cannot effectively participate, advocate their positions, or exert their influence on government without access to relevant information. Easy access to information and media that can communicate this

information broadly to citizens and civil society are necessary to make government accountable and transparent. Strengthening the advocacy, communications, and monitoring capacities of legitimate civil society organizations ensures a foundation for informed discussion about relevant conservation and environmental issues. Use USAID/AFR's Frame/ CK2C Knowledge Management activity to create a platform for Web-based communities to share NRM knowledge.

Health Team. Create links between biodiversity, health, and HIV/AIDS; promote alternative fuels; promote NTFPs; and co-locate activities. With the increase in funding of PEPFAR, USAID should seize the opportunity to create links between biodiversity and HIV/AIDS. In many cases, win-win opportunities for human health, population, and biodiversity may exist. For example, restoration of intact upstream forests may ensure potable water supplies for downstream users. The promotion of alternative sources of fuel to replace wood consumption may decrease the occurrence of human respiratory problems. USAID could work with local NGOs in developing renewable resources. Reforestation may reduce the spread of malaria by limiting standing water sources that serve as breeding grounds for mosquitoes. Support for integrated community development and conservation in more remote areas may help relieve the pressure of urban migration, while population programs focused on urban areas may influence the demand for consumption of natural resources. Yet, for any of these interventions to be sustainable, the benefits of biodiversity need to be understood and felt by people. It is important that such mutual benefits are recognized as explicitly tied to program activities. USAID could provide technical assistance to communities to improve management of natural resources such as the sustainable harvesting of NTFPs, which improves health and food security. Link NRM and family planning activities in areas critical for biodiversity conservation. Work with communities to better understand the links between family planning, nutrition, disease, water sanitation, unsustainable agriculture, and deforestation. Through an integrated approach with explicit conservation and health objectives, the practice of slash-and-burn, a leading threat to intact habitats for biodiversity, can be decreased.

Medium-Term

Medium-term recommendations are higher-level/greater-impact interventions that do not necessarily relate to a particular USAID activity.

Support implementation of the draft Conservation Policy. Tourism a key sector described as the engine of growth for Mozambique, and yet MITUR is also the steward of conservation. There is inherent conflict in developing conservation sites for tourism. USAID could play a heavyweight role in ensuring conservation priorities are elevated above short-term tourism development gains. Many areas with greatest tourism potential are in some of the poorest provinces, where agricultural potential is lowest, and where conservation-based tourism is one of the few potential sources of income. The World Economic Forum ranked Mozambique 119 out of 124 in tourism competitiveness (behind Tanzania, Gambia, and Zambia). Among the reasons for this low ranking are the prevalence of malaria, poor quality of human resources, and the low level of development of its underlying natural and cultural resources (MPD, 2008). USAID could significantly

expand the tourism program to be crosscutting, with a focus on implementing the draft Conservation Policy and Strategy of Implementation. USAID could choose from a wide menu of activities called for within the Conservation Strategy such as: watershed management, coastal zone management, sustainable forestry, developing land use and management plans, supporting community rights and access, improving transparency and corruption, strengthening EIA legislation (for example, developing EIA guidelines for tourism and protected areas), harmonizing laws and legislation, increasing sustainable financing, improving health, and combating HIV/AIDS.

The beauty of this is that tourism and the new conservation policy encompass many elements of Democracy and Governance, Economic Growth, Health, and HIV/AIDS and could be integrated with any number of activities USAID plans in these sectors. Conservation Policy calls for reclassification of national reserves, upgrading of the status of Quirimbas, delegation of authority to districts, inter-sectoral and institutional coordination, public consultation, cooperation with agri-business, creation of FSC forestry plantations, capacity building of communities to manage resources, improving models of privatization, strengthening financial systems, and improving community access to non-timber forest products. It also calls for actions USAID could cherry-pick such as: conduct an independent evaluation of the management of the Niassa Reserve, the Gorongosa Park and trans-frontier parks (for best practices) to institutionalize nationally; establishment of an autonomous inter-ministerial unit to coordinate and consolidate human and financial resources for management of all conservation areas; delegation of management to newly created administrative councils; establishment of a Conservation Fund; strengthening EIA regulations for oil; developing coastal zone regulations/criteria for sustainable use in zones of influence; implementation of various conventions; and exploring the potential for carbon markets.

Support Community Action Plans. USAID could work with major tourism developers to ensure conservation of bio-diverse and natural forests are not adversely affected. USAID should play a pivotal role in ensuring conservation objectives are met by assisting tourism corporations in developing and implementing required community action plans. This could be done through creating community links to provide alternative income sources that will alleviate pressure on natural habitats. USAID could be the interface between resort developers and communities, working through local NGOs. The GRM is geared toward high-end/high-value/low-impact tourism, using conservation as the draw. The International Finance Corporation is looking for a partner to monitor and manage the pro-poor elements of its Tourism Anchor Projects. One holding company has already pledged \$20 million to build 40 units. WWF is talking to a U.S. company coming at the invitation of the International Finance Corporation about investing in Quirimbas. USAID could seek to develop a public-private-partnership with resort developers (such as Rani Corporation or Dubai World Conservation Africa — a holding company proposing to invest in tourism in Mozambique) to ensure community links are made and conservation objectives are met.

USAID could further support the Tourism Forum and the Hoteliers Association. The Tourism Forum consists of 10 representatives in the industry (hotels, restaurants, travel agents) to help the government formulate policies, such as green standards for

hotels, building codes, to be competitive with regional standards. The Hoteliers Association represents the southern region, but there are plans to enlarge it to represent all of Mozambique. There is a plan to expand the Hoteliers Association into a Federation of Hoteliers so each province is represented, before the end of the year. Nathan is assisting in setting up private-sector tourism hotel associations that can create “clusters of production.” USAID could support the Tourism Forum and the Hoteliers Association through the Confederation of Business Associations of Mozambique and take it nationwide.

Support the *Primeiras e Segundas* Eco-Region Project. Mozambique has nine of the 21 WWF high-priority areas within east Africa’s eco-regions, thus warrants special attention. WWF has a large eco-region (east African) project that includes Kenya, Tanzania and Mozambique. The *Primeiras e Segundas* Marine Park (proposed, still awaiting authorization) will be the biggest Marine Park in Africa at 17,000 km². It is being proposed as a community-owned reserve, and five communities have applied for ownership rights. A mining company has formed an association and is partnering with WWF and communities. It reportedly has established a fund for community projects.

This area is so large it needs to be managed as an integrated park/multi-use/buffer zone with tourism, creation of small and medium enterprises, helping communities manage community forests, adding value to products (certified nuts/prawns), and conserving and maintaining a marine park. Gile Reserve is nearby and the International Finance Corporation has made this one of its Anchor Projects. CARE is working almost exclusively on foundation grant money. WWF reports this project is underfunded (pledges from TNC, CI and UNF for initial funding), yet it is an important biodiversity hotspot. USAID has not expressed interest because it is not a quick win, but if biodiversity funding were to increase, USAID could consider playing a role in the project, and partnering with local NGOs.

Support geomatics. Geomatics is a term for the combined use of mapping technologies. It includes tools and techniques used in land surveying, remote sensing, GIS, global navigation satellite systems (GPS, GLONASS, GALILEO, COMPASS), and related forms of earth-mapping. These tools and techniques are important when dealing with the environment. Applications include natural resource monitoring and development, coastal zone management and mapping, archaeological excavation and survey for GIS applications, and land use management.

Several NGOs, private voluntary organizations, and government ministries in Mozambique are using these tools, but are limited by lack of funds, little knowledge of the use of software and hardware, and the high cost of satellite imagery and high-definition aerial surveys. Still, and especially in territories as big as Mozambique, these tools are the preferred method to quantify forest resources.

Deforestation rates in Mozambique for example, were calculated based on the FAO Forest Resources Assessment model, except for Manica Province, which was calculated using remote sensing techniques. Mozambique needs to develop a more accurate

vegetation cover map for the country. This information is critical for subsequent development, conservation, and land-use planning strategies. USAID could support geomatics mapping to provide critical information for conservation and land-use planning. Action might include:

- Assessment work to analyze hardware and software capabilities, assess data availability, outline and scope needs and knowledge level of local partners, and identify needs for technical assistance
- Promote a Mozambican geospatial network to share resources for coordinating geo-referenced data
- Support a satellite imagery and geo-reference data clearinghouse for Mozambique
- Explore Moderate Resolution Imaging Spectroradiometer use and data for Mozambique, early warning on logging activities, rapid response system for fire monitoring, burn area mapping, crop monitoring, flood mapping, and air quality monitoring
- Establish GPS reference stations for high-accuracy GPS mapping work
- Teaching assistance in geomatics, such as high-accuracy mapping GPS for GIS and environmental work, GIS, watershed management, photo interpretation, and remote sensing.
- Forest inventory analysis (because the inventory is geo-referenced, it serves as ancillary data for remote sensing work)

Long-Term

Long-term recommendations may or may not be within USAID's ability to implement, but which USAID could influence.

Assist Mozambique in developing its carbon market. According to a Winrock study (Winrock, 1999) land-use and forest management practices can be grouped into three categories based on how they are viewed in curbing the rate of increase in atmospheric CO². These categories are management for carbon emission avoidance, carbon sequestration, and carbon substitution. Mitigating carbon emissions can lead to more success in controlling deforestation and making agriculture more sustainable. Land-use and forestry projects for mitigating greenhouse gas emissions can provide the financing to meet multiple environmental and development objectives. For example, averting deforestation conserves biodiversity, protects habitat for species, and conserves soil and water resources. Protection of soil and water reduce siltation, in turn can protect fisheries. Carbon offset projects can provide funds to expand national parks, develop community enterprises such as eco-tourism and commercialization of non-timber forest products, provide agricultural extension, and improve health care. Projects designed to sequester

carbon, such as afforestation and agro-forestry, may provide many of the same environmental co-benefits as for emission-avoidance projects.

MICOA is the focal point for the Climate Change Convention and is developing a concept paper for ministerial approval. Once approved, USAID could provide assistance in identifying zones, conducting a nationwide forest inventory, promoting forest certification standards, performing feasibility studies, producing inventories of carbon pools, and developing baselines, from which the carbon pools then must be monitored. A first step would be to access EGAT's Forestry Team to assist USAID/Mozambique in designing this activity. USAID/EGAT/Forestry Team can assist USAID missions in conducting baseline carbon inventories and studies to determine how to gear up for carbon market trading. USAID/Mozambique could assist communities in obtaining carbon credits (through avoided deforestation) that can be sold/traded on the international market. Developing baselines to be prepared for the eventual carbon market could be done in advance of the policy and is in any case, much-needed information in the country. Promoting independently audited forest certification standards is also a good role for USAID.

Support coastal spatial planning and management. Damage to coral reefs has been widespread along the east African coast, and the region is a major oil tanker route and suffers from oil pollution throughout the coastal zone. According to some studies by WWF, illegal trawlers are said to be wiping out marine life in the Indian Ocean. These trawlers are said to be from China, Taiwan, and/or Korea and are using long lines to catch sharks, possibly for the lucrative shark fin market in Asia. Foreign, illegal, trawlers are often sighted along the Mozambican coast. Although controlling this is a role for the GRM, USAID could assist in promoting environmental awareness campaigns, strengthening civil society organizations (local environmental NGOs), and could even set up a local hot line for vessels to be reported.

USAID/Mozambique could work with WWF and The World Conservation Union, and use WWF's map of priority areas for biodiversity conservation in Mozambique's coastal and marine zone to identify coastal areas of special interest. USAID could help support development of integrated coastal spatial management plans for all areas of special interest, especially areas of tourism development. Spatial plans were being developed jointly by the Ministry of Planning and Development and MICOA at the district level, but this is said to have run out of funds. Community-level participation should be part of the planning process so that any coastal tourism development has a direct impact on rural poverty alleviation through creating local jobs and increasing local incomes. USAID could support participatory mapping as a first step in spatial planning using "green maps" or the geo-tourism model.

Support for regional ecological and environmental planning and integration. USAID/Mozambique could contribute to and support regional ecological and environmental planning and integration. Transboundary protected areas, such as the Great Limpopo Conservation Area, are only one part of transboundary issues. Others include the important issue of transnational rivers and water management. The entire miombo

eco-region is a giant hydrological system of interconnected watersheds. Because of this, for example, maintaining miombo woodland cover in Zambia and Zimbabwe is of critical concern for Mozambique's sustainable development; without it, the severity and frequency of floods in Mozambique will increase, and the sustainability of dams such as Cahora Bassa is threatened. SADC cooperation and harmonization with regional protocols are necessary to create the regional enabling environment required for sustainable economic development.

As part of this, **USAID should promote policy harmonization.** USAID could focus on contributing to policy harmonization across ministries, as well as consistency in southern Africa. This was repeated in almost every meeting at every ministry. Laws and regulations have been developed, but there are overlaps and confusions and investors are stymied at times by the lack of information or lack of clarity at all levels — national, provincial, and district. The first step to policy harmonization is often collecting information and data to make policies relevant. Information and data collection and manipulation are extremely weak. USAID could assist in promoting harmonization of standards and regulations by developing a stronger base of NRM information from which policies can be debated.

For example, a SADC Regional Biodiversity Strategy was recently released, which provides a framework for cooperation on biodiversity issues that transcend national boundaries. It is premised on the fact that the state of the environment, including biodiversity, is a major determinant of the growth and development of the region and affects the lives of its citizens. It is against this background that Mozambique's Biodiversity Strategy and Conservation Policy should be implemented. USAID/Botswana is looking at developing a new regional biodiversity and water program. Several donors mentioned the need to initiate a cross-border activity with Tanzania (such as doing a Marine Park Analysis). WWF is working on designating the Lake Niassa/Nyasa/Malawi as a Ramsar Site, and USAID/Mozambique could assist in developing a joint management strategy for the lake by Malawi, Mozambique, and Tanzania.

SECTION VII. OVERALL RECOMMENDATIONS

USAID/Mozambique’s biodiversity and forestry activities have grown organically, with no comprehensive strategy. This is an opportune moment to develop a more strategic focus to respond to the challenges the country faces in implementing recently developed biodiversity and conservation policies. The country’s environmental framework is largely in place, but there are gaps and overlaps, and inadequate human resources or capital to implement all the needs identified in the Conservation Policy, the Environment Strategy for Sustainable Development, or the Strategic Plan for the Development of Tourism. Mozambique is on the brink of launching large investments in infrastructure, mining, oil, gas, hydroelectric, and tourism, all of which will depend heavily on careful implementation of the above policies and strategies. Therefore, it is a key time for USAID/Mozambique to assist in ensuring these investments do not have irreversible long-term consequences on the biodiversity and forest resources of the country. There are many ways USAID can intervene, from small to large, depending on its budget, but the highest-priority overall needs for supporting the conservation and sustainable use of natural resources, biodiversity, and tropical forests in Mozambique fall into three categories.

Build Capacity in Natural Resource Information

Information needed for planning and implementing sustainable development strategies — including agriculture, tourism, and management of forests and other natural resources — continues to be weak. This includes a lack of easily available and accessible information and maps of agricultural potential, conservation areas, and information on forest resources and their distribution. USAID/Mozambique could work with appropriate agencies in the GRM and with other donors to make better use of existing information on biodiversity, forestry, and agriculture, make this information available to the NGO sector and civil society, and develop better information where gaps are identified. The lack of a thorough national forest inventory is holding up the process of delimiting lands and making commercial concessions viable and attractive to private sector investors. USAID/Mozambique could try to move the forest inventory process forward. The national forest inventory should also assess forest land uses and forest conditions. The forest inventory needs to be done to form the basis of knowing the extent of illegal logging, as well as how sustainable legal logging is, and where high-conservation value forests lie. Information about the ecology of fire in forests of various types is essential for development of management plans. Forest inventory information is needed to create the enabling conditions to forge links between communities with forest lands and the private sector, which can invest in sustainable forest management and in processing equipment that can add value to wood, creating jobs and earning income. Similarly, a national biodiversity inventory would enable the GRM and communities to evaluate and develop zoning and land-use plans particularly needed in the buffer zones of protected areas (for example, Quirimbas). Better information on natural resources is essential for democratic decision-making, land tenure, national policy and strategy formulation, regional policy harmonization, conservation and development management plans, and developing a carbon market. USAID could work with appropriate agencies in the GRM, as well as

with other donors, to make better use of existing information on biodiversity, forestry, and agriculture; make this information available to the NGO sector and civil society; and develop better information where gaps are identified. A biodiversity inventory and a forest inventory would be an excellent first step. Using geomatics may be an efficient and effective tool.

Strengthen EIA

Conservation and tourism and mining are increasingly going to come into conflict and there are still grey areas in laws governing them. Oil companies can exploit the weakness of Mozambican laws; for example there are no provisions for development in buffer zones of national parks. The EIA process itself is somewhat flawed because there is little capacity in-country to write or review EIAs or audit companies, and sometimes the same technical experts do all three. MICOA expressed the need to outsource technical expertise, but there are no funds for this. Even once EIAs are approved, enforcement mechanisms are so weak it is nearly impossible to implement some of the progressive laws in place. There is little specific industry knowledge in the country, resulting in weak capacity to perform environmental audits. Implementing existing regulations also requires capital equipment (cars, computers) and information. There is a lack of data at local and national level, as well as human capacity to manipulate data. This means one can't do proper zoning or land-use plans, let alone audit and monitor environmental data. USAID/Mozambique could strengthen the EIA process. This could be done by supporting training in technical skills, professional exchanges, on-the-job training, or internships with industry, scholarships, and university degree programs to increase the expertise in the country. USAID/Mozambique could provide equipment and training in GIS, to conduct a forest inventory, a national biodiversity inventory, and harmonization of the data collected at different levels. A coastal zone management plan would be useful to MITUR and MICOA.

As well, the process of consultation with civil society could be supported. There are a growing number of local environmental advocacy NGOs, but in general, environmental awareness is still low in the country. Mozambique is undergoing a huge investment spree with oil and gas exploration, hydroelectric, and resort tourism investments. USAID could at the least strengthen the EIA process in areas in which they are working, such as Pemba and Quirimbas, where conflicts already exist with the oil/gas industry. This could be through support to environmental advocacy NGOs, environmental education at the community level, and/or capacity building in MITUR and MICOA to enforce EIA procedures.

Create Sustainable Financing Mechanisms

To address inadequate financial resources devoted to conservation and biodiversity protection several areas of intervention are possible. One is to assist with legal reforms necessary for the creation of sustainable financial mechanisms for protected areas in Mozambique. Assistance could be in developing a more transparent system of collection and management of revenue from protected areas, which has been channeled to the National Environmental Fund, the National Tourism Fund, and the general state budget.

Creation of a Conservation Investment Fund has been suggested. Assistance could be provided to develop a fiscal framework to legally channel green taxes and donations to protected areas. Assistance could be in clarifying the overlapping legal instruments for management of protected areas between the Ministry of Agriculture and the Ministry of Tourism (there is confusion over the responsible entity for the issuance of special licenses for development of activities in protected areas.) USAID could assist in formulating norms and procedures for concessions, which have been a roadblock to granting management concessions to private operators. Legal management plans urgently need to be created for transition areas around protected boundaries. Mozambique adhered to the United Nations Framework Convention on Climate Change and its Kyoto Protocol and designated MICOA as the lead authority, but has yet to develop concrete actions for implementation of the Cleaner Development Mechanism and development of a carbon market. USAID could assist in creating concrete actions for the Cleaner Development Mechanism and the carbon market. USAID/EGAT/NRM has been talking about how to combine Development Credit Authority with NRM (conservation and investment funds). USAID could invite DCA and EGAT to assist in designing a DCA project with NRM around carbon credits. Other models of sustainable financing outside the public realm should be examined to enable communities to become shareholders and stewards of NRM. USAID could assist communities in becoming shareholders in resort and boutique tourism through developing public-private-partnerships.

SECTION VIII. BIBLIOGRAPHY

- African Development Bank. Mozambique 2006-2009 Country Strategy Paper, April 2006. http://www.afdb.org/pls/portal/docs/PAGE/ADB_ADMIN_PG/DOCUMENTS/OPERATIONSINFORMATION/CSP_percent2006-09_percent20MOZ_percent20FINAL.PDF
- Asian Development Bank. Tourism for Pro-Poor and Sustainable Growth. Economic Analysis of Tourism Projects, January 2007.
- CIA. Mozambique, The World Fact Book 2008. <https://www.cia.gov/library/publications/the-world-factbook/print/mz.html>
- Fast Company. Special Report: China in Africa, Part 2, Mozambique. Issue 126, June 2008. <http://www.fastcompany.com/magazine/126/mozambique-a-chain-saw-for-every-tree.html>
- MICOA. *Estrategia Ambiental para o Desenvolvimento Sustentavel de Mocambique*, July 2007.
- MICOA. Mozambique's Third Report to the Convention on Biological Diversity, September 2006. <http://www.cbd.int/countries/?country=mz>
- MICOA. National Biodiversity Strategy and Action Plan Provincial Briefings, March 2004.
- MICOA. Mozambique's Strategy and Action Plan for the Conservation of Biological Diversity in Mozambique July 2003. <http://www.cbd.int/doc/world/mz/mz-nbsap-v2-en.pdf> and <http://mail.google.com/mail/?ui=2&ik=25838ac46e&attid=0.1&disp=vah&view=att&th=11b10cf0f78f56e6>
- Micoa. First National Report on the Conservation of Biological Diversity in Mozambique, 1997.
- MITUR. Mozambique's Conservation Policy and Strategy of Implementation, June 2008.
- Ministry of Planning and Development/Mozambique. January 2008. The Contribution of Tourism in Mozambique, Past and Present. Discussion Papers, No. 57E.
- Nathan Associates. Draft, Sustainable Financing of Protected Areas in Mozambique, October 2007.
- Overseas Development Institute. Environmental Institutions, Public Expenditures and the Role for Development Partners: Mozambique Case Study, February 2008.
- Parker, V. Atlas of the birds of central Mozambique, Avian Demographic Unit, 2005.
- SADC Regional Biodiversity Strategy (<http://www.sabsp.org/strategy/index.html>)
- Smithers, R.H.N. and Tello, J.L.P.L. Check List and Atlas of the Mammals of Mozambique. Museum Memoir, Number 8, 1970.
- Winrock International. Land Use and Forestry Carbon Off-Set Projects, paper prepared for USAID Environment Officer's Training Workshop, July 1999.
- World Bank. Country Assistance Strategy Progress Report, February 2006. http://www-wds.worldbank.org/external/default/WDSContentServer/WDSP/IB/2006/05/16/000090341_20060516104127/Rendered/PDF/35319.pdf
- Draft country program document for Mozambique (2007-2009). Executive Board of the United Nations Development Programme and of the United Nations Population Fund. April 20, 2006. Annual session 2006. 12-23 June 2006, Geneva

Action Plan for the Reduction of Absolute Poverty. 2006-2009 (PARPA II). Final Version Approved by the Council of Ministers on May 2, 2006. GRM.
<http://www.undp.org/mz/en/mozambique/parpa>
USAID/Mozambique Annual Report FY 2005, June 16, 2005.
http://pdf.usaid.gov/pdf_docs/PDACD871.pdf

Web Sites Consulted

WWF: www.worldwildlife.org/bsp/
USAID Africa Bureau Office of Sustainable Development: www.usaid.gov/locations/sub-saharan_africa
ENCAP: www.encapafrica.org
FRAME: www.frameweb.org
CBD: www.cbd.int/countries/?country=mz
UNEP: na.unep.net/atlas/AfricaAtlas/AtlasDownload/Africa_Atlas_English_Chapter_3c.pdf
Gorongosa National Park: www.gorongosa.net/file/318/biodiversity_percent20report.pdf
www.rainforest.mangabay.com
Africa Data Dissemination Service: earlywarning.usgs.gov/adds/
World Database on Protected Areas: sea.unep-wcmc.org/wdbpa/
Biodiversity Hotspots - Maputaland – Overview:
www.biodiversityhotspots.org/xp/hotspots/maputaland/Pages/default.aspx
Environment at a Glance 2004 Mozambique
siteresources.worldbank.org/INTEEI/Data/20858369/Mozambique.pdf
FAO representation in Mozambique and Swaziland:
www.fao.org/world/mozambique/forestryintro.htm
Forest Stewardship Council: www.fsc.org/
Mozambique Deforestation Rates and Related Forestry Figures:
rainforests.mongabay.com/deforestation/2000/Mozambique.htm
Mozambique Environmental Profile: rainforests.mongabay.com/20mozambique.htm
ODAmoz: www.odamoz.org.mz/reports/rpt_downloads.asp
Parks, Reserves, and Other Protected Areas in Mozambique:
www.parks.it/world/MZ/Eindex.html
Peace Parks Foundation - Dynamic GIS Map:
www.peaceparks.org/gis.php?mid=485&pid=149&m=1_3_1_2
Instituto Nacional de Estatística de Mozambique: www.ine.gov.mz/
United Nations Development Programme Mozambique: www.undp.org/mz/
U.K. Department for International Development:
www.dfid.gov.uk/countries/africa/mozambique.asp
European Commission Directorate General for Development:
http://ec.europa.eu/development/index_en.cfm
Ministry of Foreign Affairs of Denmark: <http://www.ambmaputo.um.dk/en/menu/DevelopmentAssistance/SectorProgramme/Environment>
The International Union for Conservation of Nature : <http://cms.iucn.org/about/index.cfm>
The European Commission delegation: www.delmoz.ec.europa.eu/en/index.htm
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http://www.sida.se/sida/jsp/sida.jsp?d=115&language=en_US

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ANNEX B. TEAM BIOGRAPHIES

Robin Mason is an international development specialist with more than 18 years of experience implementing projects in the public and private sector in Latin America, Asia, Europe, and Africa. She has extensive professional experience in private sector development, tourism, and environment, from project design to implementation and management. Professional roles have included team leader for USAID, mission environmental officer in Mozambique, monitoring and evaluation specialist in Central America, conservation and development specialist in Brazil, and a Peace Corps volunteer in Southeast Asia. She recently forged and led a worldwide public-private-partnership in forestry for USAID's Global Development Alliance Office, working with the private sector to adopt corporate environmental leadership policies.

Carlos D. Rodríguez-Pedraza is an ecologist for the USDA Forest Service International Institute of Tropical Forestry in San Juan, Puerto Rico. He holds a M.S. from the University of Puerto Rico. He provides inter- and intra-agency geospatial information products, and related technical services and expertise to FS in Puerto Rico, the Caribbean, and Latin America. Products include digital geographic information and associated metadata, technical services, technology assessment and transfer, training, user support, GPS applications, and geospatial data activities. He has extensive research work and technical assistance work in Brazil, Mexico, Nicaragua, Costa Rica, and the Caribbean. His skills include global positioning system, geographic information systems, computers, photography, photo interpretation, remote sensing, and surveying. He speaks Spanish, English, and Portuguese.

Kemal Vaz is a Mozambican eco-hydrologist and director of Verde Azul Consult Lda, a Mozambican consulting company. He has been working in the field of environmental management in Mozambique and southern Africa. He has coordinated various multidisciplinary teams with recent work on the management plan of the Bazaruto Arquipelago National Park, environmental and social impact specialist for UNDP/Millennium Challenge Account, country environmental profile for Mozambique, and monitoring consultant for environmental and safety aspects of the Zambezi Bridge. He is pursuing his Ph.D. at the University of Virginia department of environmental sciences and is a lecturer and faculty member at University Eduardo Mondlane, faculty of agronomy and forestry in Maputo.

Roberto Zolho is a Mozambican wildlife and protected area manager. He has had a long career in wildlife and protected area management that began with a post in the National Directorate for Wildlife/Ministry of Agriculture, Mozambique in 1981. He has been involved with establishment of the Limpopo Trans-frontier Conservation Area; rehabilitation, development, and management of the Gorongosa National Park; formulation of wildlife policies; and research in the wildlife dynamics; and has studied the impact of wild fires in the regeneration of forest species.

ANNEX C. SCOPE OF WORK

Scope of Work

118/119 Biodiversity and Tropical Forest Assessment USAID/Mozambique

I. Purpose and Objective

The purpose of this task is to conduct an assessment of: (1) the current state of biodiversity and forest conservation in Mozambique, (2) the actions necessary in Mozambique to conserve tropical forests and biological diversity, and (3) the extent to which the actions proposed for support by USAID/Mozambique meet or could meet the needs thus identified. This assessment is intended to serve as a planning tool to assist USAID/Mozambique in better integrating environmental concerns into their proposed programs in the short- and medium-term future. The assessment is also necessary for the purposes of complying with sections 118 and 119 of the Foreign Assistance Act of 1961, as amended, as well as critical to informing the Strategic Framework for Foreign Assistance and country strategy guidelines under ADS 201.3.4.11 and ADS 204.5. An environmental threats and opportunities assessment was completed in Mozambique in December 2002. The current assignment will 1) build on this work 2) involve a comprehensive analysis of the sector, gathered from a review of relevant reports as well as interviews and field work conducted in Mozambique and 3) serve as one of the required assessments in preparation of the pilot Country Assistance Strategy. The assessment will include a desktop review of available materials, interviews in Maputo, and visits to field sites conducted by a three-four person team including two international consultants and one-two local Mozambique consultants.

II. Background

Located in East Africa, Mozambique covers about 784,000 km². The country is bordered on the east by the Indian Ocean and Mozambique Channel and on the west by Tanzania, Zambia, Zimbabwe, Malawi and South Africa. Mozambique is one of the poorest countries in the world. More than 80 percent of the population of 21 million people (2007 estimate) is engaged in rural agriculture, mainly at the subsistence level. Soils in Mozambique are generally old and nutrient-poor, and precipitation is strongly seasonal, with high variability from year to year.⁶

About 25 rivers flow through Mozambique to the Indian Ocean. The Zambezi River is the largest of these, cutting across central Mozambique. Lake Niassa (also called Lake Malawi) forms the northwest border of Mozambique. Coastal plains cover about 40 percent of the country, especially in the south and along the coast. Plateau areas in the north and west cover roughly 30 percent of Mozambique. The remaining area of the country consists of highlands (25 percent) and mountain areas (4 percent).

Mozambique has six main ecosystems —1) forests, 2) shrub lands, savanna and grasslands, 3) cropland and natural vegetation mosaic, 4) wetlands and water bodies 5)

⁶ [USAID/Mozambique FAA 118/119 Environmental Analysis](#) – 2002.pdf (2MB), pg. 10

sparse and barren vegetation and 6) urban areas. Less than a quarter of Mozambique's total land area is made up of forests: 7.5 percent of tropical forests and 6.6 percent of sparse trees and parklands.⁷

According to the satellite images of the 1994 National Inventory on Forest, about 62 million ha (78 percent of National territory) of different forest and density types were registered. But, from this number, only about 19 million hectares are eligible for timber production and commercial volume is estimated at 22 m³. Nevertheless, forest degradation was estimated at 4.27 percent.

Due to the growing national population and a lack of survival means, forestry activities have increased pressure on forest lands and at present, the rate may be much higher. The northern forests of the Niassa region, for example, are under threat from logging and charcoal wood harvesting while the dense monoculture forest growth of Mozambique's coastal forest ranges are decreasing due to agriculture-burning. Mount Gorongosa, which support the region's only montane forest, is also under threat from agricultural burning. Poverty still remains the major cause of natural resource degradation, in particular biodiversity.

Mozambique possesses sites of high importance in regard to biodiversity such as the Gorongosa Mountains, the Great Inselberg Archipelago of Quirimbas in Northern Mozambique, and the Chimanimani Massif. According to national estimates, Mozambique is home to around 5,500 plants, 581 birds, and 205 mammals. Most of the important traditional and modern medicines are derived from wild plants, animals, fungi and bacteria. Medicinal plants are used by an estimated 80 percent of the population and the importance of the role of traditional healers is increasingly recognized.⁸ The country's bio-diversity is under threat from habit loss throughout the country. Marine-coastal zones suffer from large and small scale fishing activities and vital mangrove habitat is disappearing rapidly. In addition, Pemba Bay is suffering from increasing pollution and salinity due to human activity, especially detrimental agricultural practices while Lake Niassa, which supports unique species and ecosystems, is under threat from fishing and pollution.

Mozambique's protected area system consists of 39 conservation areas: national parks (4) game reserves, (5) controlled hunting areas (13) and forest reserves (17) covering a total area of 72,500 km² or 11.4 percent of the land area.⁹ The country is a signatory of CITES (Convention on the International Trade in Endangered Species) and the CBD (Convention on Biological Diversity). Mozambique is also party to a number of other international agreements, including Climate Change-Kyoto Protocol, Desertification, Hazardous Wastes, Law of the Sea, Ozone Layer Protection, and Ship Pollution agreements.

⁷ Earthtrends: http://earthtrends.wri.org/pdf_library/country_profiles/for_cou_508.pdf

⁸ Convention on Biological Diversity; <http://www.cbd.int/countries/profile.shtml?country=mz#status>

⁹ National Biodiversity Strategy Action Plan: <http://www.cbd.int/doc/world/mz/mz-nbsap-01-en.pdf>

III. General Task

Under the direction of a team leader, the assessment team will evaluate biodiversity and tropical forest concerns in Mozambique. The focus of all activities taken under this assignment is three fold: 1) Assess the conservation status of biodiversity and forests in Mozambique; 2) identify actions necessary to better conserve biodiversity and tropical forests; and 3) describe how and to what extent actions proposed by USAID in the country operational plan meets, or could meet, the biodiversity and tropical forest needs thus identified.

IV. Specific Tasks

The assessment team shall perform the following activities:

A) Data Collection:

- a. Prior to departure, meet or phone the Bureau Environmental Advisor, other Bureau for Africa technical staff, and other Washington, DC-based organizations to gather relevant information on regional programs and agency environmental regulations.
- b. Obtain, review and analyze existing documentation on biodiversity conservation (and tropical forest conservation) in Mozambique, such as that prepared by government agencies, bilateral donors, and national and international NGOs. Available online materials will be gathered prior to the country visit.
- c. Meet with USAID/Mozambique to get an understanding of the Mission's ongoing sectoral assessments, program goals and objectives under its proposed strategy. The Mission also may provide the team with advice and protocol on approaching USAID partners and host country organizations with respect to this assignment. The team will discuss organizations to be contacted and any planned site visits with the Mission and coordinate as required.
- d. Meet with and gather information from relevant ministries and agencies, donor organizations, international NGOs, and other organizations that are involved in forest and biodiversity conservation or other crosscutting issues, or are implementing noteworthy projects.
- e. Conduct at least one priority site visit, TBD, to supplement the understanding gained from interviews, literature, and other second-hand sources. *For example, a trip to an accessible area of "biological importance".*

- #### B) Analysis: Summarize the status of biodiversity and tropical forests in Mozambique. Summarize the social, economic, institutional, legal, and policy context for their use and conservation, including actions currently being taken by government, other donors, NGOs, and the private sector. Identify the key direct and indirect threats to biodiversity and tropical forests. Identify the actions necessary to conserve and sustainably manage natural resources, biodiversity and tropical forests in Mozambique based on an analysis of country donor and NGO responses currently in place to meet these needs. Prepare a report on the status of biodiversity conservation efforts in Mozambique and implications for USAID or other donor programming that shall define the actions necessary for conservation.

- C) Report: Prepare a report describing the analysis and conclusions. This report shall clearly meet the legal requirement of the U.S. Foreign Assistance Act (FAA) Sec. 118 and 119. An illustrative outline for the report is provided below:
- a. Introduction, describing the purpose of the analysis and methods used in conducting it, including the timing of the analysis in relation to the timing of USAID strategy development.
 - b. An overview of the social, economic, legislative, and political context for sustainable natural resources management and the conservation of biodiversity and forests in Mozambique.
 - c. An overview of the status of tropical forests and terrestrial and marine biodiversity in Mozambique, including ecosystem diversity, species diversity, threatened & endangered species, genetic diversity, agricultural biodiversity, ecosystem services, and protected areas. Economic importance and potential values of biodiversity will also be included.
 - d. A summary of government, NGO, and donor programs and activities that contribute to conservation and sustainable natural resources management, including a brief assessment of their effectiveness, strengths, and weaknesses.
 - e. An assessment of the threats to tropical forests and biodiversity, including direct threats and indirect threats or root causes of the direct threats.
 - f. Programmatic actions necessary to conserve biodiversity and forests in Mozambique.
 - g. An assessment of how USAID Mozambique's program currently addresses the key threats to biodiversity and forest conservation, including how activities can be modified to more effectively address these issues for future planning.
 - h. All references used and cited in the report, including web URLs.
 - i. Appendices will include: the SOW for the analysis, biographical sketches of analysis team members, a list of persons contacted and their institutional affiliation, and other background or supporting material as needed, including maps and photographs. Copies of key document, relevant maps and images, and copies of photographs obtained during the assessment should also be appended in a CD ROM with electronic versions of all written materials.

V. Deliverables

The primary deliverable under this task order is the above referenced report with an assessment of: (1) the status of biodiversity and forest conservation in Mozambique; (2) the actions necessary in Mozambique to conserve tropical forests and biological diversity, and (3) the extent to which the actions proposed for support by the Agency meet the needs thus identified in the Assessment.

There shall be four deliverables under this activity:

1. Preliminary Work Plan and Schedule: The Contractor shall provide USAID with a work plan and schedule prior to traveling to Mozambique.

2. In-Country Mission Exit Briefings: The team shall meet with USAID/Mozambique to provide them with a brief of the report findings. The exit brief shall be accompanied by a short written summary of initial key findings and recommendations.
3. Draft Report: The Contractor shall submit a draft report to the Environment Office o/a August 15th (based on timing of assessment). The draft report shall follow the generic outline discussed above, as refined during the course of the contract in consultation with USAID.
4. Final Report: The final report is due no later than two weeks after receiving USAID/Mozambique comments on the first draft report, (o/a August 29th). The Contractor will furnish electronic file versions of all submissions (first draft and final report) in English o/a September 5th.

VI. Logistics and Methodology

AFR/SD Biodiversity Analysis and Technical Support (BATS), through Chemonics International, will cover the technical assistance and associated expenses of one-two international consultant and one-two local consultants. US Forest Service – International Programs will cover the technical assistance and associated expenses of one international consultant. The USAID/Mozambique mission to provide nomination for local consultant(s) to Chemonics.

A three-four person team with the following composition and expertise is desirable to conduct this analysis:

International Technical Assistance from Chemonics (1 person): One Environment and Natural Resource Management Specialists with prior natural resource experience in Africa and knowledge of the USAID Strategic Planning process related to Tropical Forestry and Biodiversity (FAA Sections 118 and 119).

Specialists will also have knowledge of and be responsible for providing information related to protected areas, USAID economic growth and natural resource management activities biodiversity conservation, and the policy and legal frameworks governing environmental management in Mozambique.

One of the two specialists will serve as the team leader. The team leader will also be responsible for ensuring that all deliverables are handed in on time and that team members are aware of their particular responsibilities with respect to preparation, in country activities, and making contributions to deliverables.

Estimated LOE for International Technical Assistance includes: 5 days for preparatory work, 11 workdays in Mozambique, 7 days for follow-up and report writing, and 4 days for travel. *Total LOE: 27 days*

International Technical Assistance from US Forest Service International Program (1 person): This team member will be an Environment and Natural Resource Management (ENRM) Specialist with prior natural resource experience in Africa. S/he will also have

knowledge of and be responsible for reporting on Mozambique's vegetation ecology, tropical forest threats and root causes, forestry industries, protected areas management, land-use planning, and opportunities to mitigate threats. S/he will also report on forestry institutions, including policies, laws, and regulatory issues that relate to forestry and biodiversity conservation in Mozambique.

Estimated LOE for International Technical Assistance includes: 2 days for preparatory work, 11 workdays in Mozambique, 3 days for follow-up and report writing, and 3 days for travel. *Total LOE: 19 days.*

Local Technical and Administrative Assistance (1 -2 persons): Senior Level Environmental Specialist with demonstrated experience in/knowledge of Mozambique protected areas, terrestrial and aquatic ecosystems -- in particular the policy and legal frameworks governing environmental management in Mozambique, the analysis of relevant policies, biodiversity threats, opportunities, tourism and extractive industries. The local technical specialist has good contacts within Mozambique government agencies, NGOs, international donors, and private sector preferred. S/he will arrange meetings with government ministries, local NGOs and other relevant organizations as requested and will be able to assist with logistical support for the assessment.

Estimated LOE for Local Technical Assistance includes: 2 days for preparatory work, 11 workdays in Mozambique, and 2 days for follow-up and report writing. *Total LOE: 15 days per person.*

VII. Duration of Assignment

Meetings, phone calls, and preparatory research will take place in June prior to departure for Mozambique. Field work in Mozambique will take place o/a July 28 – August 8h.

VIII. Supporting Documentation

Tropical forestry and biodiversity (FAA 118 and 119) analyses: lessons learned and best practices from recent USAID experience. (655 KB) Associates in Rural Development, Inc. (ARD); USAID. EGAT. Office of Environment and Natural Resources. Sep 2005. 74 p. PN-ADE-195

Best practices for biodiversity and tropical forest assessments (508 KB) Chemonics International Inc.; USAID. EGAT. Office of Agriculture. Apr 2005. 28 p. PN-ADE-673

ANNEX D. FOREST COVER AND LAND USE

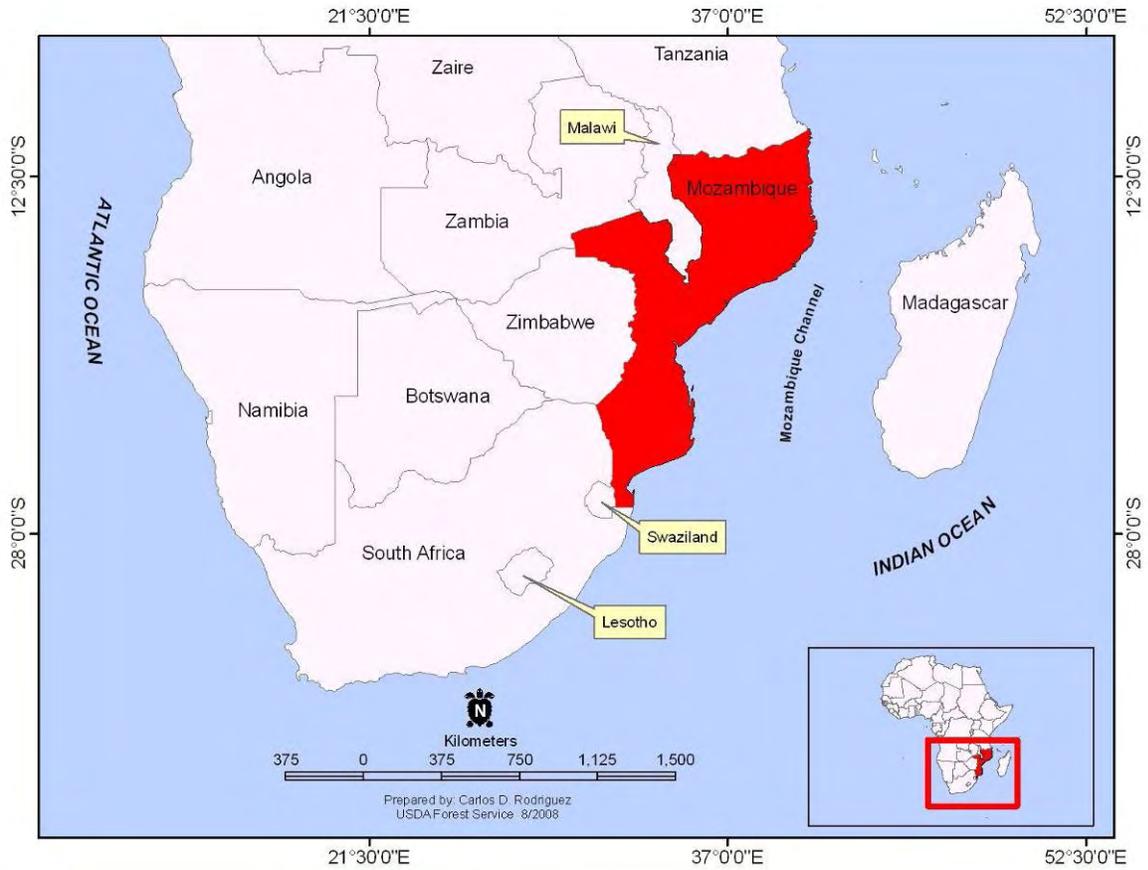
The National Administration of Lands and Forests in Mozambique through the Integrated Project of Agriculture Development carried out a National Forest Inventory from 2005 through 2007. The main objective was to evaluate the extension and floristic composition of the country forest resources. A new land cover map was developed as a result of the inventory.

Land Cover Type	Area (percent)
Forest	51
Other woody cover	19
Grasslands	12
Agriculture	15
Other	3

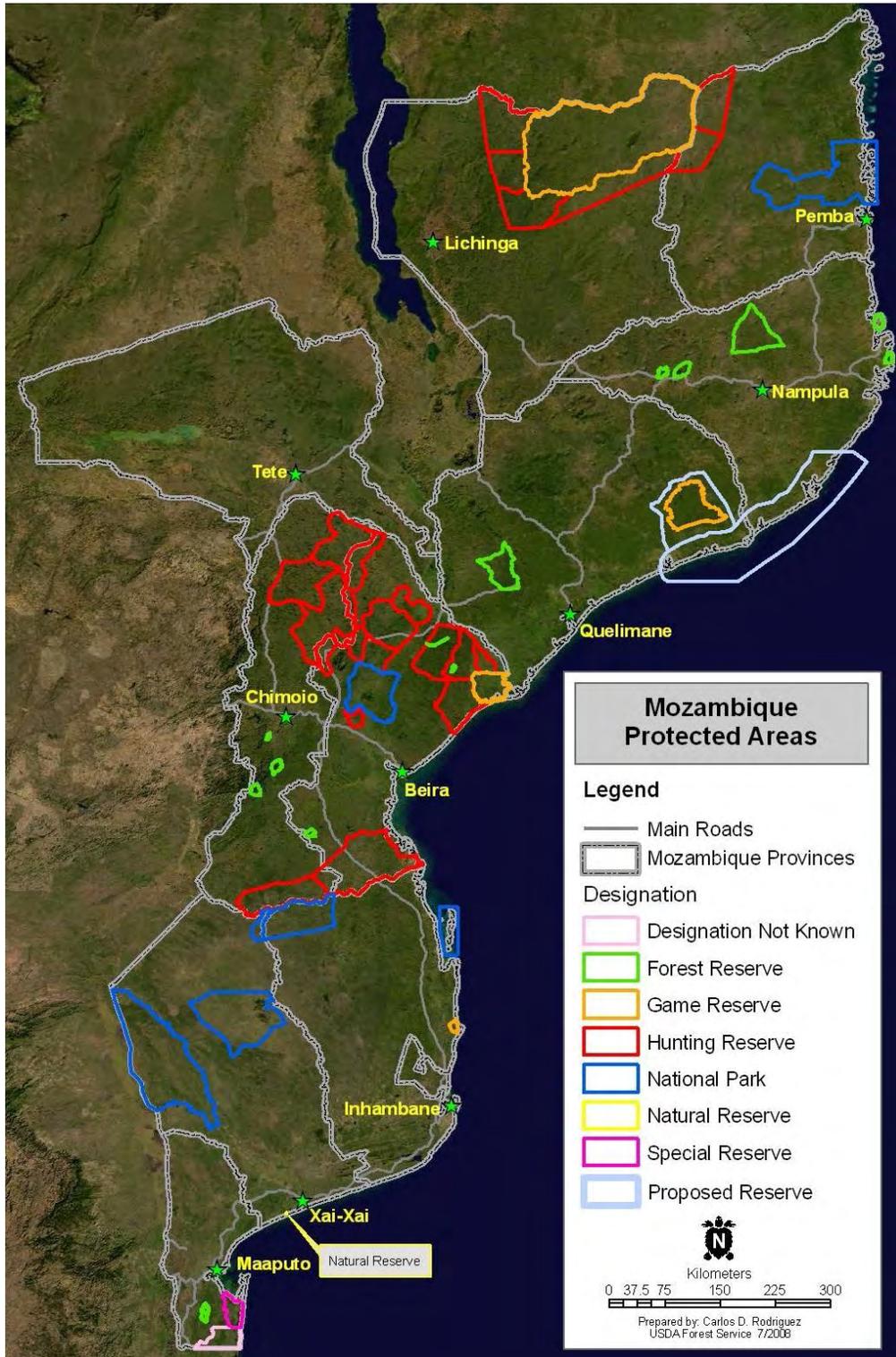
The area of forest land cover is estimated in 40.1 million ha. Of this, 26.9 million ha are potential areas for wood production and 13.2 million ha are for conservation purposes.

Province	Area (km ²)
Cabo Delgado	4,800
Gaza	3,900
Inhambane	2,250
Manica	3,250
Maputo	700
Nampula	2,700
Niassa	9,400
Sofala	3,200
Tete	4,100
Zambezia	5,100

ANNEX E. MOZAMBIQUE GENERAL LOCATION MAP



ANNEX F. PROTECTED AREAS MAP



ANNEX G. FIELD TRIP MAPS

