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TANZANIA ENVIRONMENTAL THREATS AND OPPORTUNITIES ASSESSMENT

November 2012

This Report was produced for review by the United States Agency for international Development (USAID). It was prepared by the Environmental Threats and Opportunities Assessment Team under contract to the US Department of Agriculture Forest Service – International Programs.

Cover photo: Rice fields in Mkula Village, Kilombero Valley, Morogoro Region. Water from the Udzungwa Mountains National Park is used by the village to irrigate two crops of rice per year. Photo by B. Byers, June 2012.

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AUTHORITY

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This Tanzania Environmental Threats and Opportunities Assessment is made possible by the support of the American People through the United States Agency for International Development (USAID) under the terms of a Participating Agency Partnership Agreement (PAPA) No. AEG-T-00-07-00003-00 between USAID and the USDA Forest Service International Programs. Funds were provided by USAID/Tanzania and facilitated by the USAID Bureau for Africa, Office of Sustainable Development, Economic Growth, Environment and Agriculture Division (AFR/SD/EGEA) under the Biodiversity Analysis and Technical Support (BATS) program. The contents of this report are the sole responsibility of the ETOA Team and do not necessarily reflect the views of USAID or the United States Government (USG).

PREPARED BY

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ABBREVIATIONS AND ACRONYMS

ABCG	Africa Biodiversity Collaborative Group
ADB	African Development Bank
ASDP	Agricultural Sector Development Project
AWF	African Wildlife Foundation
BMU	Beach Management Units
BTC	Belgium Technical Cooperation
CBD	Convention on Biological Diversity
CBNRM	Community-Based Natural Resources Management
CDCS	Country Development Cooperation Strategy
CIA	Central Intelligence Agency
CFR	Code of Federal Regulations
CITES	Convention on International Trade in Endangered Species
COTS	Crown-of-Thorns Starfish
CSO	Civil Society Organizations
DDT	Dichloro-Diphenyl-Trichloroethane
DRG	Democracy, Human Rights, and Governance
EEZ	Exclusive Economic Zone
EIA	Environmental Impact Assessment
ETOA	Environmental Threats and Opportunities Assessment
EU	European Union
FAA	Foreign Assistance Act
FAO	Food and Agriculture Organization of the United Nations
FTF	Feed the Future
GDP	Gross Domestic Product
GIZ	German Agency for International Cooperation
GOT	Government of Tanzania
IGF	Intergovernmental Forum on Mining, Minerals, and Metals
IOTC	Indian Ocean Tuna Commission
IRA	Institute for Resource Assessment
IRS	Indoor Residual Spraying
IUCN	International Union for Conservation of Nature

iWASH	Integrated Water, Sanitation¸ and Hygiene
JECA	Jozani Environmental Conservation Association
JGI	Jane Goodall Institute
LEAT	Lawyers' Environmental Action Team
MACEMP	Marine and Coastal Environmental Management Project
MAFSC	Ministry of Agriculture, Food Security, and Cooperatives
MIKE	Monitoring the Illegal Killing of Elephants
MNRT	Ministry of Natural Resources and Tourism
NAFORMA	National Forest Resource Assessment
NCA	Ngorongoro Conservation Area
NCAA	Ngorongoro Conservation Area Authority
NGO	Non-Governmental Organization
NEMC	National Environmental Management Council
NRM	Natural Resources Management
PA	Protected Area
PES	Payments for Ecosystem Services
PFM	Participatory Forest Management
PHRD	Policy and Human Resources Development (Japan Technical Assistance)
RUBADA	Rufiji Basin Development Authority
SAGCOT	Southern Agricultural Growth Corridor of Tanzania
SRESA	Strategic Regional Environmental and Social Assessment
TANAPA	Tanzania National Parks
TFCG	Tanzania Forest Conservation Group
TCMP	Tanzania Coastal Management Program
TMAA	Tanzania Minerals Audit Agency
TNC	The Nature Conservancy
TNRF	Tanzania Natural Resource Forum
UCRT	Ujamaa Community Resource Trust
UNDP	United Nations Development Program
UNEP	United Nations Environment Program
UNESCO	United Nations Economic, Social and Cultural Organization
UNESCO-MAB	UNESCO Man and Biosphere
UNFCCC	United Nations Framework Convention on Climate Change

UNWTO	World Tourism Organization of the United Nations
URT	United Republic of Tanzania
US	United States
USAID	United States Agency for International Development
USFS-IP	United States Forest Service - International Programs
USG	United States Government
WCMC	World Conservation Monitoring Center
WCS	Wildlife Conservation Society
WCST	Wildlife Conservation Society of Tanzania
WEF	World Economic Forum
WIOMSA	Western Indian Ocean Marine Science Association
WMA	Wildlife Management Area
WUA	Water Users Associations
WWF	World Wildlife Fund

ACKNOWLEDGEMENTS

More than 100 busy people, from the heads of government agencies to farmers in rural villages willingly made time to talk to us and freely shared their knowledge and opinions. The Assessment Team would like to express our deep appreciation to all of them, even though we cannot acknowledge each by name. The Assessment Team received much information and heard many viewpoints from the people we met, and if in any way we have misunderstood them or misrepresented their views, the fault is ours.

We wish to thank Gabriel Batulaine, Mary Hobbs, Gilbert Kajuna, Mikala Lauridsen, Anne Scott and Agathe Sector of USAID-Tanzania, who gave us direction and supported our communication with implementing partners in the field and with other USAID-Tanzania Mission staff. On our field site visits to several of Tanzania's ecosystems, we saw both successes and challenges first-hand, and we would especially like to thank USAID implementing partners, local experts, and stakeholders who assisted us. We also thank USAID-Tanzania and staff from the USAID Economic Growth, Education, and Environment and Africa Bureaus for comments on an earlier draft of this report.

EXECUTIVE SUMMARY

Purpose of the ETOA

The main objectives of this Environmental Threats and Opportunities Assessment (ETOA) were to:

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

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

Methodology

Information for this Environmental Threats and Opportunities Assessment was gathered by a four-person assessment team through review of relevant documents and web-based information; interviews and meetings with representatives of key stakeholder groups; and field site visits. We talked to more than 100 people, including from relevant national government agencies, international and national non-governmental organizations (NGOs), international donors, USAID-Tanzania Mission staff, residents of natural resource-dependent communities, and private sector representatives. Our information also came from site visits to four national parks, two Wildlife Management Area (WMAs), and agricultural and pastoral village lands in the Rufiji River Basin, northern Tanzania, and Zanzibar. We analyzed the content of our interviews to identify the categories of "actions necessary" for biodiversity and forest conservation perceived to be most important. All information gathered by the team was synthesized to identify proposed USAID activities that might threaten biodiversity and forests, to identify opportunities for USAID activities to contribute to the needed actions, and to make recommendations to the Mission.

State of the Environment

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

Threats and Causes

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

- Lack of an integrated framework for natural resources management (NRM) and land use planning
- Conflicting and contradictory laws and policies
- Weak national capacity for Environmental Impact Assessment
- Corruption
- Rapid population growth
- Lack of sustainable livelihood opportunities for poor, rural, small farmers and fishers

Actions Necessary

FAA Sections 118 and 119 call for assessments to identify the "actions necessary" to conserve tropical forests and biological diversity, respectively (see Chapter 7). One source of "actions needed" was a review of documents prepared by the Government of Tanzania, including their Fourth National Report to the Convention on Biological Diversity (2009), and the Strategic Environmental and Social Assessment of the National Irrigation Policy and Master Plan (2011). Our main source of actions needed came from interviews with over 100 key informants, representing a wide range of environmental stakeholders. From those interviews we compiled a list of 153 "actions necessary," some of which were mentioned many times, by different stakeholders. This content analysis allowed the ETOA Team to rank the perceived importance of the many possible needs. Actions needed that were mentioned repeatedly clustered as

"themes"; in fact, 93 of the 153 actions listed by key informants fit into only 12 themes. The major thematic categories of actions needed are to:

- Use Integrated, Harmonized, Multi-Sectoral Approaches
- Improve Land Use Planning
- Improve Environmental Impact Assessment
- Control Poaching and Illegal Harvesting
- Broaden Participation and Decentralize Natural Resources Management (NRM)
- Prevent Corruption
- Develop Mechanisms to Conserve Ecosystem Services
- Improve Woodfuel Efficiency and Find Alternatives
- Improve Climate Information and Maintain Traditional Coping Mechanisms
- Improve Watershed and Water Management
- Stop Forest Conversion to Agriculture
- Control Beach Tourism Development

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

Opportunities for USAID-Tanzania Programs to Contribute to Environmental Conservation

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

Theme: "Need to…."	USAID Program/SO				
	NRM	FTF	DRG	HLTH	EDU
Use Integrated, Harmonized, Multi-Sectoral Approaches	X	X	X	X	X
Improve Land Use Planning	X	X	X		
Improve Environmental Impact Assessment	X	X	X		
Control Poaching and Illegal Harvesting	X	X	X		
Broaden Participation and Decentralize NRM	X	X	X	X	X
Prevent Corruption	X		X		
Develop Mechanisms to Conserve Ecosystem Services	X	X	X	X	
Improve Woodfuel Efficiency and Find Alternatives	X	X		X	
Improve Climate Information and Maintain Traditional Coping Mechanisms	X	X		X	
Improve Watershed and Water Management	X	X	X	X	
Stop Forest Conversion to Agriculture	X	X			
Control Beach Tourism Development	X		X		

Opportunities to Contribute to Integrated, Multi-Sectoral Approaches

The biggest need identified by this ETOA for moving toward sustainable environmental management in Tanzania is integrating the environment and development sectors and mainstreaming biodiversity conservation. Integrated, harmonized, multi-sectoral approaches are needed. The ecosystem-wide, landscape-scale approach used in designing USAID-Tanzania's NRM Program provides a solid conceptual foundation for activities that can address this general "action needed." USAID-Tanzania could make an important contribution to meeting this need if its Feed the Future (FTF) Program is strategically realigned in a way that links it with the NRM Program.

Opportunities to Contribute to Improving Land Use Planning

The opportunity to contribute to meeting this need could also be realized through a closer integration between the USAID-Tanzania NRM, Feed the Future (FTF), and Democracy, Human Rights, and Governance (DRG) Programs. The NRM Program's past support for decentralized wildlife management through support for WMAs is a foundation to build on. Broadening planning to include forest lands, wildlife areas, agricultural lands, and water catchments is needed. Many opportunities exist for linking improved land use planning with themes in the DRG sector, such as parliamentary strengthening, anti-corruption, media development, NGO capacity-building, advocacy, citizen engagement on land use policy, monitoring of government accountability by civil society organizations, and decentralization and devolution.

Opportunities to Contribute to Improving Environmental Impact Assessment Capacity

A significant opportunity to contribute to meeting this need could come through a closer integration of NRM and FTF activities. As with land use planning, many opportunities for linking the improvement of Environmental Impact Assessment (EIA) capacity with DRG activities exist.

Opportunities to Contribute to Controlling Poaching and Illegal Harvesting

Through its support for WMA development, the NRM Program has been contributing to empowering local communities and enabling them to benefit economically from local natural resources. This should contribute to reducing poaching and illegal harvesting.

Opportunities to Contribute to Broadening Participation and Decentralizing NRM

The NRM Program has been contributing to this need through its support for WMA development. Models and "lessons learned" from the WMAs process are needed in other kinds of NRM decentralization, such as participatory forest management, participatory fisheries management, and water users associations. There are obvious linkages with the DRG Program including in rule of law, transparency and anti-corruption, policy and institutional reform, and participation and decentralization. In addition, the ETOA Team believes that there are some potential benefits from linking the Mission's Health and Education Programs with communities

being supported in NRM decentralization, through geographical co-location of Health and Education activities in communities with NRM activities.

Opportunities to Contribute to Controlling Corruption

According to our key informants, corruption is an important contributing factor to poaching and illegal harvesting of all kinds, whether of elephants, rhinos, or high-value timber trees. For this reason, DRG Program activities aimed at anti-corruption and transparency should contribute to controlling poaching and illegal harvesting of high-value species.

Opportunities to Contribute to Developing Mechanisms to Conserve Ecosystem Services

Our key informants proposed that Tanzania needs a national policy to enable Payments for Ecosystem Services (PES), especially for watershed ecosystem services. To establish such a PES policy will require that parliamentarians and policymakers become educated about what ecosystem services are, and about compensation mechanisms to conserve them. This educational process, and the policy development to follow, will require pilot demonstrations and models. USAID-Tanzania has an important opportunity to develop such demonstrations and models, and contribute to policy formation, by making its support for irrigation contingent on linking with watershed-based PES development. Watershed ecosystem services bring important benefits in the agriculture (irrigation), health (water supply for domestic use and sanitation), and energy (hydropower) sectors.

Opportunities to Contribute to Improving Woodfuel Efficiency and Finding Alternatives

All rural communities and most urban areas in Tanzania are highly dependent on wood or charcoal for cooking fuel. The NRM program could continue to support activities to improve woodfuel efficiency and find alternative fuels. FTF activities that may attract people to an area for agriculture-sector jobs should include a component to prevent increasing pressure on local woodfuel resources. Improving cookstove efficiency can play an important role in reducing indoor smoke pollution that is a serious health issue, especially for women and children.

Opportunities to Contribute to Improving Climate Information and Maintain Traditional Coping Mechanisms

Improved climate and hydrological information is needed for integrated, multi-sectoral planning for sustainable development, and a contribution could be made through the NRM, Integrated Water, Sanitation¸ and Hygiene (iWASH), and FTF Programs. Maintaining the climate resilience of human and wildlife populations can be supported through a number of NRM, FTF, and DRG Program activities. Climate information is important in the health sector, as animal and human diseases may respond to climate variability and change.

Opportunities to Contribute to Improving Water Management

Improved water management will be a natural outcome of actions taken to manage natural resources in a more integrated, holistic fashion. Closer integration among USAID-Tanzania's NRM, FTF, and DRG Programs can contribute. Domestic potable water supply and water for sanitation are important benefits of conserving watershed ecosystem services. USAID-Tanzania is designing an integrated water resource management program in Southern Agricultural Growth Corridor of Tanzania (SAGCOT) region.

Opportunities to Contribute to Stopping Forest Conversion to Agriculture

Improved land use planning and more participatory natural resources management could contribute to slowing and stopping the conversion of forest to agriculture. One of the main causes of threats to forest and woodland ecosystems in Tanzania is the expansion of low-yield, "slash and burn" agriculture. A closer integration of the NRM and FTF Programs could expand the use of "conservation agriculture," especially for maize, to increase yields and maintain soil fertility on the same piece of land, thereby reducing the incentive to clear more land.

Opportunities to Contribute to Controlling Beach Tourism Development

Integrated coastal planning and zoning is needed to control the unregulated development of beach hotels, jetties, and other infrastructure. This opportunity for USAID links back to opportunities for supporting improved participation and governance through its DRG Program.

Recommendations

Based on our analysis, the assessment team recommends that USAID-Tanzania support activities in the following ***priority areas*** (see Chapter 9):

Improve Integration of NRM and FTF Activities

In developing a stronger integration between NRM and FTF Program activities, the ETOA Team recommends that USAID-Tanzania:

- Conduct a Programmatic Environmental Assessment for the irrigation component of Tanzania FTF, including watershed-wide environmental flow and water quality impact assessment for the Kilombero Valley Ramsar Site.
- Assess effects of rural roads infrastructure on wildlife movement.
- Improve EIA capacity and practice in all Tanzanian Government ministries and agencies.
- Install hydrological monitoring stations (for flow, nutrients, pesticides, sediments) above and below any irrigation scheme.
- Create a mechanism for long-term monitoring by the relevant River Basin Water Office (e.g., Rufiji, Wami-Ruvu) of water abstraction for irrigation. This independent monitoring capacity should be paid for out of a water fee by water users, and should be

institutionalized to persist for the life of the infrastructure, beyond the life of USAID support.

- Create a mechanism to prevent illegal water diversion by smallholders downstream or adjacent to any irrigation projects. This control of associated expansion of irrigation linked to a given irrigation scheme should be institutionalized to persist for the life of the infrastructure, beyond the life of USAID support.

The ETOA Team recommends that a Programmatic Environmental Assessment of the FTF Program be conducted to assist in strategically realigning it to link with the NRM Program. The Team does not view project-level EIAs at the level of individual proposed irrigation schemes as sufficient. Even if each of the schemes was found to have an acceptable environmental impact, the basin-wide impact of the program as a whole (like that of Southern Agricultural Growth Corridor of Tanzania (SAGCOT) development in general) would not have been assessed and would not necessarily be acceptable. Continuing as proposed with support for the expansion and/or rehabilitation of rice irrigation in the Kilombero Valley would, we believe, contribute to the lack of integrated, multi-sectoral planning that we identified as the most important cause of threats to Tanzania's biodiversity and natural environment. We believe that it would violate the FTF principle of "integrating environmental concerns," and, because of unknown and unpredictable (given current state of hydrological knowledge) negative effects on biodiversity, would violate the spirit and letter of FAA Sections 117 and 119.

The ETOA Team believes that USAID should take advantage of the opportunity afforded by the Ministry of Agriculture, Food Security, and Cooperatives (MAFSC) and the Government of Tanzania's interest in support for rice irrigation to support actions needed to build the capacity for integrated land-use and natural resources management planning throughout the country. Because of the need for such integrated, multi-sectoral planning, USAID should make its support for any rice irrigation rehabilitation or expansion contingent upon building that capacity. Otherwise, USAID would simply be enabling the lack of integrated planning to continue, to the detriment of biodiversity, the natural environment, and the long-term sustainable development of the Tanzanian people. By closely linking NRM and FTF activities, USAID would be modeling what is needed in the Tanzanian Government itself to break down the dysfunctional lack of multi-sectoral integration in planning for the country's development.

By integrating its NRM and FTF Programs more closely, USAID has the opportunity to insist that its support for irrigation expansion is done with the proper hydrological information for adequate science-based decision-making, adequate assessment of competing needs for land and water, adequate integrated planning for biodiversity conservation and development activities, and adequate mitigation mechanisms linked to any rice irrigation. Mitigation mechanisms would involve rice farmers paying a fair price for water through a Payment for Ecosystem Services (PES) mechanism that would compensate the managers of the upstream watershed for a fair share of their management costs.

Support and Expand Participatory, Decentralized NRM

The ETOA Team recommends that USAID-Tanzania continue and expand its support for participatory, decentralized NRM. We recommend that USAID continue to support WMA development, with future support and activities based on the findings of an evaluation of WMA

performance to date, including issues of governance, transparency and accountability, economic viability, benefit sharing, and the effect of WMAs on poaching and illegal activities.

The ETOA Team recognizes that WMAs do not encompass the full range of natural resources that need to be managed at the local level and that can benefit local communities. We therefore recommend that USAID-Tanzania broaden its support for participatory, decentralized NRM to include ecological resources other than wildlife. We believe that lessons learned and knowledge gained from USAID support for WMAs so far can inform progress in Community-Based Natural Resources Management (CBNRM) associated with different types of ecological resources. USAID-Tanzania should:

- Support the sharing of lessons-learned between and among models of decentralized, CBNRM: WMAs, community forest management, participatory fisheries management, Beach Management Units, Water User Associations
- Evaluate private-sector alternative models for supporting land/resource rights and land/resource management planning for pastoralists, agro-pastoralists and hunter-gatherers.

Improve Climate Information and Maintain Traditional Coping Mechanisms

The ETOA Team recommends that USAID-Tanzania contribute to improving climate and hydrological information in Tanzania, and at the same time take actions that help human communities and wildlife populations maintain the resilience mechanisms that allow them to cope with current climate variability. Support for improved climate information is appropriate, because Tanzania lacks high quality weather station records over long enough periods of time to enable robust climate modeling and forecasting.

Wildlife and vegetation in Africa have been coping with, and adapting to, climate variability and change for millions of years, and humans have done so for hundreds of thousands of years. The long-distance seasonal migrations of African ungulates are adaptations to track this natural climate variability. For humans, the traditional mobility of pastoralists, and the diversity of crops among agriculturalists, are the traditional means of cultural adaptation to climate variability.

Helping communities to assess their vulnerability to current climate variability will provide a base from which to assess future vulnerability and develop resilience options. Actions that reduce vulnerability to the current climate (for people or ecosystems) will also reduce vulnerability to future climate changes. Maintaining corridors for seasonal movements of wildlife and pastoralists, to which the NRM Program has been contributing through its support for biodiversity conservation at the landscape scale, is an important mechanism for maintaining resilience in the face of climate variability and change. The FTF Program could contribute to maintaining climate resilience through support for maintaining the agro-biodiversity of traditional crops and genetic diversity of traditional plant and animal varieties. Maintaining and/or restoring natural, seasonal flow levels in rivers (e.g., Mara, Tarangire, Kilombero, Rufiji, Great Ruaha), especially dry season minimal flows, will contribute to climate resilience for ecosystems and people.

1.0 INTRODUCTION

1.1 PURPOSE

Biodiversity conservation is of fundamental importance to USAID, given its mission as a development agency, because, as stated on the USAID website, "Biodiversity is the very foundation for all the Earth's essential goods and services. The air we breathe, water we drink, and the food we eat all depend on the Earth's rich biodiversity." (USAID, Environment, Biodiversity: http://transition.usaid.gov/our_work/environment/biodiversity/index.html)

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

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

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

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

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

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

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

thus identified."

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

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

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

- these analyses help Missions identify opportunities for using funds earmarked by Congress for biodiversity conservation; and,
- These analyses are legal requirements under the Foreign Assistance Act. ,

USAID-Tanzania last conducted an Environmental Threats and Opportunities Assessment in 2004. Since the last assessment, the political and economic situation in Tanzania has changed significantly. USAID-Tanzania is now developing a new Country Development Cooperation Strategy for its programs (2012-2017), and it contracted the ETOA Team through the US Forest Service International Programs Office to conduct this assessment.

The main objectives of the current ETOA were to:

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

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

1.2 METHODS

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

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

- Review of relevant documents, including the previous USAID-Tanzania ETOA of 2004; Tanzania's Fourth National Report to the Convention on Biological Diversity; other Government of Tanzania (GOT) documents; donor project documents; reports in the scientific literature; and web-based reports.
- Interviews and meetings with more than 100 people representing key stakeholder groups (see Annex D, Persons Contacted), including national government agencies, international and national NGOs, private sector representatives, staff of organizations implementing USAID projects, international donors, and USAID-Tanzania Mission staff; and
- Site visits to: 1) the Ruaha National Park and Pawaga-Idodi (Mbomipa) Wildlife Management Area; 2) Udzungwa Mountains National Park; 3) Kilombero River and wetlands near Ifakara; 4) Mkula Village Irrigation Scheme on the edge of Udzungwa Mountains NP; 5) Rufiji Delta at Kibiti and Kikale; 6) Zanzibar; and 7) Tarangire National Park and Burunge Wildlife Management Area.

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

2.0 STATE OF THE ENVIRONMENT

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

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

2.1 BIOPHYSICAL SETTING

Tanzania covers a land area of approximately 945,087 km^2 comprised of land area of 883,749 km^2, (881,289 km^2 mainland and 2,460 km^2 Zanzibar), plus 59,050 km^2 of inland water bodies (URT 2006), and a marine territory of 241,541 km^2 (Pew, 2012), or 20% of the national territory, within its 200-mile Exclusive Economic Zone (EEZ).

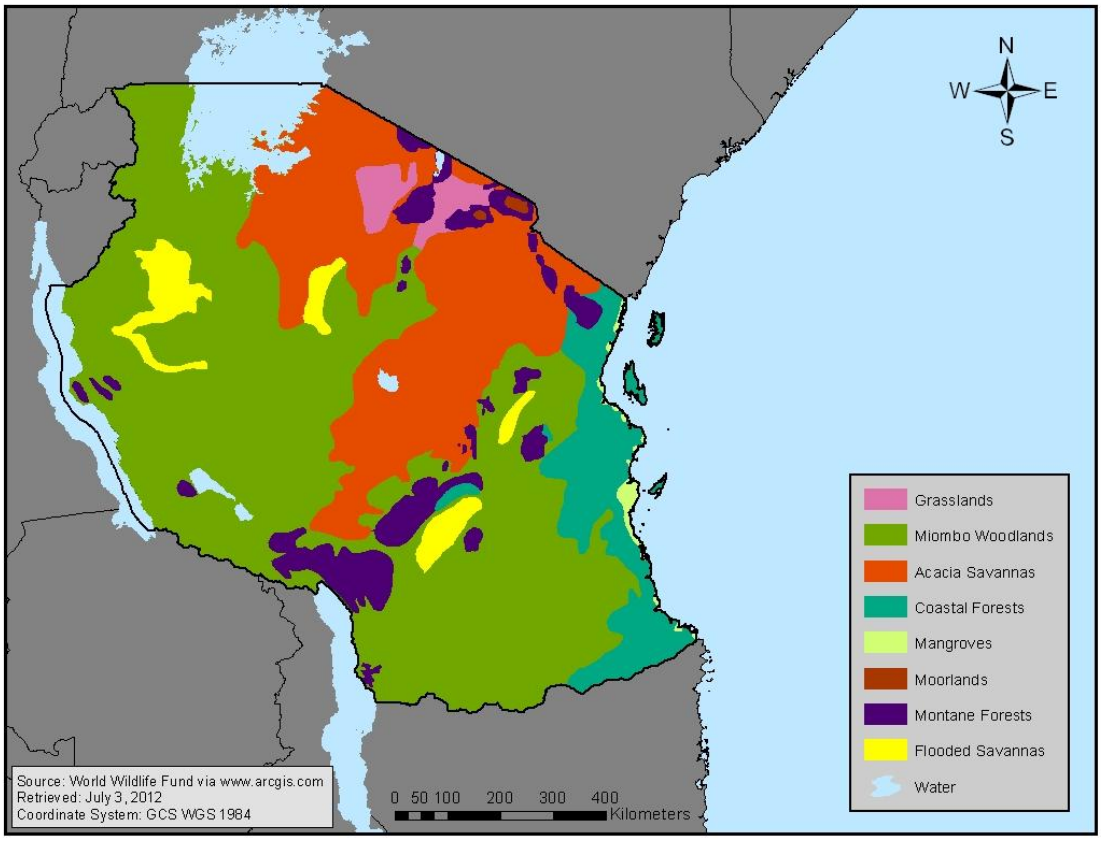
Tanzania's land ecosystems reflect variation in elevation, precipitation, and soils. Annual average rainfall ranges from 200 to 2000 mm, with most of the country receiving less than 1000 mm on average. Rainfall is unimodal in the southern and western parts of the country and bimodal in the northern, eastern, and northern coastal areas. Arid grasslands and savanna ecosystems that receive less than about 400 to 600 mm of rainfall on average extend south from Tanzania's border with Kenya. Semi-arid areas with 500 to 800 mm of precipitation occupy large central and southeastern zones. Plateau zones (800 to 1500 m in elevation) in western and southern Tanzania support miombo woodlands. Highland areas that are generally above 1000 m elevation form a broad ridge that bisects the country along the Eastern Arc Mountains; others follow Tanzania's western borders between Lakes Nyasa, Tanganyika and Victoria and its boundary with Kenya.

The Northern Highlands of Kilimanjaro, Mt. Meru and the Eastern Rift and the Southern Highlands near Mbeya occur on volcanic soils that are generally more fertile than the soils developed from crystalline, granitic soils typical of the eastern Arc Mountains. Sandy, infertile soils are common to the Coastal zone and finer-texture soils are found in Alluvial Plains located near Kilombero, Rufiji, Usangu and Wami. Highly-weathered, low and moderate fertility soils are common to the highlands zone.

2.2 ECOSYSTEMS

2.2.1 Terrestrial Ecosystems

Figure 2.1 Terrestrial Ecosystems of Tanzania



Grassland Savanna, Woodland Savanna, and Bushland

A mosaic of grassland savanna and woodland savanna and bushland plant communities are found in Tanzania's arid and semi-arid northern and northwestern zones, depending upon soil type, rain-shadow effects, and other factors. *Acacia-Commiphora* woodlands and the associated herds of large mammals represent one of Africa's most iconic ecosystems. These ecosystems are key features of World Heritage Sites and Biosphere Reserves at Serengeti National Park and the Ngorongoro Conservation Area where ungulate migrations track cyclical wet and dry seasons. The grass-dominated woodlands are distributed across about 25 million ha of northern and central Tanzania (Mbegu and Mlenge 1984; MNRT, 1997). Loss of tree cover resulting from increased human population and expanding agriculture and pastoralism along with poaching for meat, ivory and rhino horns are significant threats to Tanzania's woodland savannas. Tanzania's grasslands support some of the most spectacular game migrations in the world. The annual migrations of blue wildebeest, plains zebra and Thomson's gazelle between the Serengeti grasslands and the *Acacia-Commiphora* woodlands involve nearly 2 million animals. Tanzania's grassland ecosystems are found in the Serengeti and Ngorongoro crater areas on volcanic and alluvial soils.

Miombo Woodlands

Miombo woodlands cover about 40% of Tanzania's land area (Burgess et al. 2010) and occur in 11 countries in southern Africa (Timberlake and Chidumayo 2011). The Central Zambezian miombo woodlands dominate western Tanzania and the Eastern miombo woodlands are found inland of the coastal zone in the southern half of the country. Miombo forest vegetation is commonly dominated by trees of the legume subfamily Caesalpinioideae (*Julbernardia, Brachystegia, and Isoberlinia)* with a layer of C4 grasses, but these forests include many other tree species. Tree cover ranges from 20% in dry woodlands to nearly 100% in wet miombo woodland. These dry season deciduous forests are adapted to the region's strong seasonal rainfall pattern. Miombo tree species rely on root symbioses with mycorrhizal fungi to scavenge nutrients (especially phosphorus) water in the typically highly-weathered, infertile soils of these ecosystems. Most miombo tree species regenerate from basal sprouts and are adapted to drought, fire, and browsing damage. Miombo woodlands are home to chimpanzees, in the Gombe Stream National Park in western Tanzania, and some of the largest known populations of African elephants and African wild dogs.

The Selous Game Reserve is mainly of dry miombo woodland. The Selous and adjacent Kilombero Valley have, along with Moyowosi, Rukwa Valley, Itigi Thicket, been identified as areas of particular conservation interest for Tanzania's miombo ecoregion (Timberlake and Chidumayo 2011). It has been estimated that 13% of Tanzania's miombo woodlands were degraded or cleared during the 1990s (Burgess et al., 2010).

Coastal Forest

The coast of the Tanzanian mainland and islands of the Zanzibar archipelago support a mixture of cover types with patches of closed-canopy forest embedded within woodland savanna, grassland and wetland areas (Burgess and Clarke, 2000). The natural vegetation of the Zanzibar-Inhambane Coastal Forest mosaic, that extends from Kenya to Mozambique, is comprised of both dry, scrub, *Brachystegia*, forest types as well as riverine, groundwater, and swamp types. Together with the Eastern Arc Mountains this zone is included among the World's top 25 biodiversity hotspots and conservation priority areas.

More than half of the original extent of Tanzania's coastal forests has been degraded or converted (Burgess et al., 2010). The remaining coastal forests are highly fragmented; the majority of the 66 listed forests cover less than 15 km^2 each with some patches as small as 1 km^2 (Burgess et al., 2000).

Montane Ecosystems

The isolated patches of mountain forests support some of Tanzania most species rich forests and areas of extreme conservation concern. The Eastern Arc Mountains are a chain of 13 separate blocks formed on crystalline bedrock that contain some of the highest densities of endemic plant and animal species in the world (Burgess et al., 2007). These forests contain at least 800 endemic vascular plant species. Diverse forests also occur on the volcanic peaks of northern Tanzania, most notably Mt. Kilimanjaro (Hemp 2006), Mt. Meru, and Ngorongoro. Montane forests also occur near Lake Tanganyika and on the Kitulo Plateau (Albertine and Southern Rift forests). Moorlands and afromontane grasslands on Mount Kilimanjaro, Mount Meru, and

Ngorongoro support giant groundsels (*Dendro senecio*), lobelias (*Lobelia sp.*) and a number of Afromontane sunbirds.

It is estimated that more than 70% of the original extent of the Eastern Arc Forests have been cleared and agriculture encroachment, grazing and fire threatens the remaining forests (Burgess et al., 2007). In addition to their importance for biodiversity, montane ecosystems are critical water catchments and most have been designated as catchment forest reserves. Fire and clearing removed about one-third of the forest cover on Kilimanjaro during the past 70 years (Hemp, 2009); loss of these forests is considered a greater threat to sustained stream flow than disappearance of the mountain's ice cap (Hemp, 2005).

Forest Ecosystems: Status and Trends:

According to the Food and Agriculture Organization (FAO), about 334,280 km2, or about 35%, of Tanzania is forested. The FAO estimates that between 1990 and 2010, Tanzania lost an average of about 1% of its forest cover per year, and the rate of deforestation was fairly stable over these two decades (Mongabay, 2012). Tanzania will soon complete the country's first ever comprehensive forest inventory, the National Forest Resources Monitoring and Assessment (NAFORMA) project, which will for the first time establish a scientific baseline for monitoring the status and trends of forests in Tanzania. (FAO, 2012).

Section 2.2.2 Freshwater and Wetland Ecosystems

The freshwater ecosystems of Tanzania include rivers and freshwater lakes, including Lake Victoria, Lake Tanganyika, Lake Nyasa, Lake Rukwa and Lake Chala. Saline lakes, Natron, Manyara, and Eyasi, are found in the Rift Valley. The nine major river basins are shown in Figure 2.2.

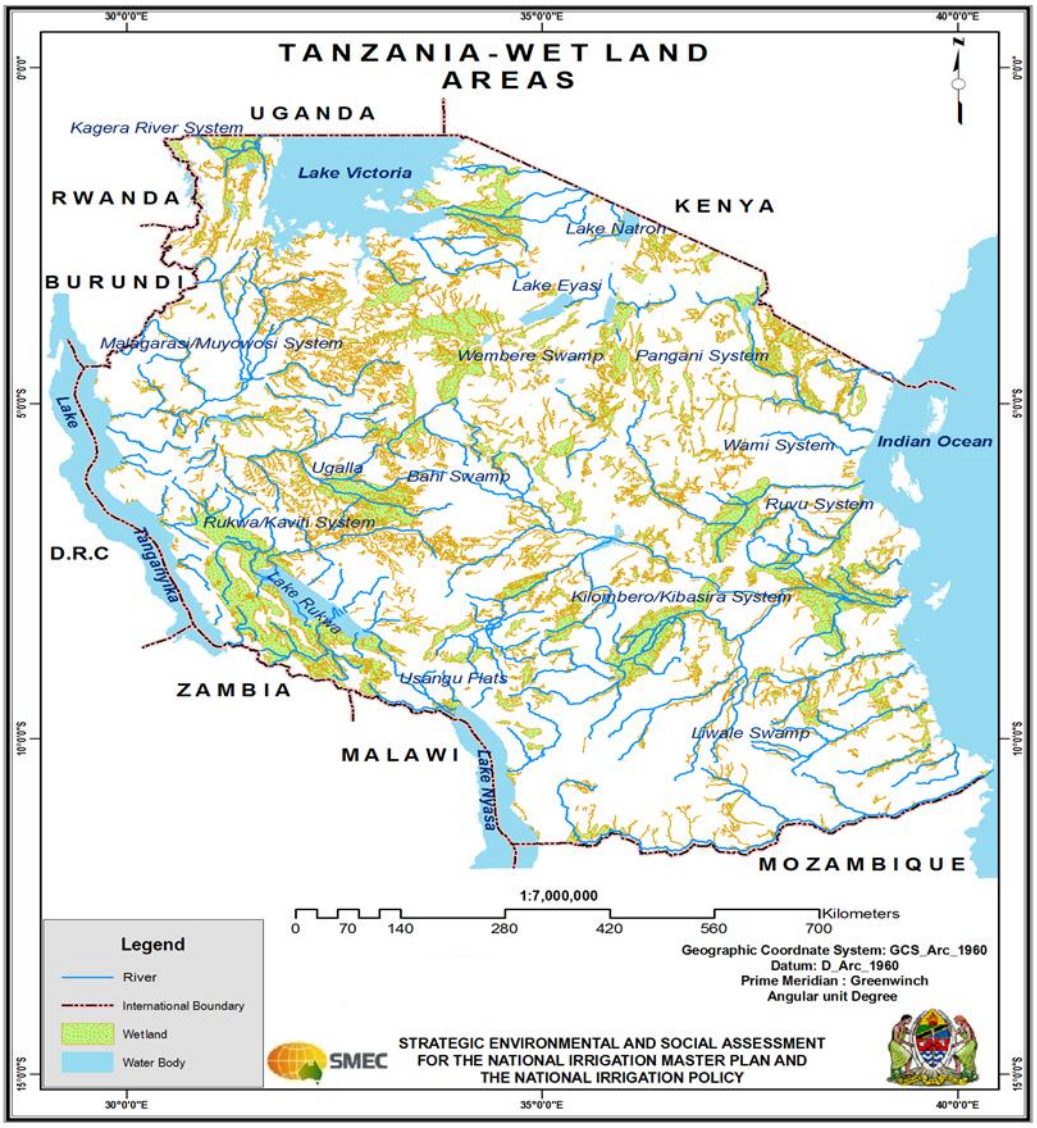
Figure 2.2 River Basins of Tanzania

Tanzania is endowed with a variety of wetland ecosystems (Figure 2.3), four of which have been designated as Wetlands of International Importance under the Ramsar Convention on Wetlands. Marine and coastal wetlands are typically associated with river deltas. The Rufiji Delta is the most extensive and ecologically important of these.

Freshwater and Wetland Ecosystems: Status and Trends

The ecological status and trends of rivers and wetlands in Tanzania was reviewed in the 2011 Strategic Environmental and Social Assessment (SESA) for the National Irrigation Policy and National Irrigation Master Plan. The assessment found that in the past decade or two, the ecological integrity of many river systems and wetlands in Tanzania has decreased, often because the "majority of the irrigation schemes abstract water from seasonal rivers, which are already water stressed." The assessment concluded that most irrigation schemes were planned without adequate attention to maintaining the level of flows and water levels to conserve sensitive freshwater and wetland habitats and species (SMEC, 2011, p. 133).

Figure 2.3 Major Wetlands of Tanzania



Box 2.1: Kilombero Valley Floodplain and Ramsar Site

The Kilombero Valley Floodplain is one of Tanzania's four designated Wetlands of International Importance under the Ramsar Treaty on Wetlands, with an area of about 797,000 ha. "The site is rare and unique because it is an intact natural wetland ecosystem comprising a myriad of rivers, which make up the largest seasonally freshwater lowland floodplain in East Africa. The Kilombero Valley Floodplain is of global, national, regional and local importance in terms of its ecology and biodiversity. The wetland is an important source of nutrients and sediment for downstream areas and the globally important Mafia-Rufiji mangrove, seagrass and coral reef complex. The site is a key feature in the Selous-Kilombero seasonal wildlife migrations. The valley contains almost 75% of the world's population of the wetland dependent Puku antelope *Kobus vardonii.* This antelope is now only found in 18 locations in Africa and its survival, as a species, is dependent on the Kilombero Valley population. Three endemic birds are known: the Kilombero weaver, *Ploceus burnieri,* and two undescribed species of *Cisticola*. In the wet season it is an essential spawning area for many kinds of fish in the Rufiji River system of which two endemic species *Citharinus congicus* and *Alestes stuhlmanni* are dependent on the Kilombero floodplain." (Ramsar, 2012). "The Kilombero Wetlands are an important source of livelihoods for the majority of dwellers in the area. However, currently these wetlands are threatened by ongoing use due to growing demands of the primary users. The study revealed that the current institutional arrangement for the site threaten the sustainability of the wetlands." (Mambo, et al., 2011)

Kilombero River looking across the Valley to the Udzungwa Mountains
Photo: B. Byers, 2012

2.2.3 Coastal and Marine Ecosystems

Coastal and marine ecosystems occupy an area of about 241,500 km2 (Pew http://www.seaaroundus.org/eez/834.aspx), or 20% of Tanzania. The state of these marine ecosystems have been discussed most recently in the 2003 State of the Coast Report (TCMP, 2003), and much of the information in this report needs to be updated, nearly ten years later.

Coral Reefs

Coral reefs are found along about two thirds (600 km) of Tanzania's coast, with the most well-developed reefs around Tanga, Pemba, Unguja, Mafia, Kilwa (Songo Songo Archipelago) and Mtwara. Coral reefs are important ecologically and economically. Besides having high productivity and biodiversity, they are the feeding, breeding, and nursery grounds for a great variety of invertebrates and fish, and thus play a role as keystone ecosystems in the ocean because of their ecological effects that extend far beyond their actual area of coverage. The health or degradation of coral reefs greatly affects surrounding seagrass beds, and mangrove forests, as well as fish, crustaceans, sharks, sea turtles, and marine mammals. Reefs protect coasts from strong wave action and help prevent shoreline erosion. Coral reefs have great economic importance, supporting an estimated 70% of artisanal fisheries in Tanzania, and creating an important tourist attraction.

Coral Reefs: Status and Trends

Coral reef priority areas in Tanzania have been mapped, and natural and anthropogenic threats identified. Marine protected areas have been established to ensure coral reef conservation in some key areas, and the Fisheries Division is responsible for conserving coral reefs as part of the marine environment (Muhando and Ramisha, 2008, p.6).

Monitoring and research shows that live coral cover continues to indicate good coral recovery potential for most reefs in Tanzania. "There have been no significant coral bleaching events since 1998, but crown-of-thorns starfish (COTS) outbreaks have been observed from 2004 to 2006 on most reefs, especially reefs off Zanzibar town and Dar es Salaam. The probable reasons for persistence of COTS outbreaks are a combination of over-fishing of natural predators (pufferfish, triggerfish, humphead wrasses, giant triton), eutrophication (mainly through disposal of raw sewage) and natural events. There has been slow but consistent recovery (especially for *Acropora*) since the 1998 bleaching event on most reefs in Tanzania, especially where populations of COTS have been controlled. Reef fish abundance shows declining trends on reefs near urban centers (Zanzibar and Dar es Salaam), and there have also been significant declines on remote and unprotected reefs. However, reef fish abundance is relatively unchanged in most marine parks and conservation areas as enforcement of existing regulations in the Northern Dar es Salaam Marine Reserves appears to be effective in maintaining fish abundance and size. The same threats to coral reefs remain." (Muthiga, et al., 2008, pp. 97-98)

Mangroves

Mangrove forests are found in all coastal districts of Tanzania. Nine species of mangroves are found in mainland Tanzania and Zanzibar. The largest continuous mangrove forests are in the

districts of Rufiji, Kilwa, Tanga-Muheza, and Mtwara. The Rufiji Delta supports the largest mangrove forest in East Africa. It is one of Tanzania's four Ramsar sites. Like coral reefs, mangrove forests are critical habitats with great ecological and economic value. They are keystone ecosystems because of their high productivity, producing large quantities of organic matter that serve as food for many organisms. This includes species living within the mangrove and also beyond it, since much of the organic matter produced moves to other areas of the marine environment. Mangroves serve as feeding, breeding, and nursery grounds for a great variety of invertebrates and fish, many of which move out into the ocean during their adult stages. Satellite imagery from 1990 and 2000 shows that there has been a small decrease in the overall area of mangrove coverage. In 2000 the area covered by mangroves was approximately 108,000 ha (TCMP, 2003, p. 6). Economically, mangroves are a source of firewood, charcoal, building poles, materials for boat construction, tannin, and traditional medicines. "Rufiji Delta has a total of 53,000 ha of mangrove forests, which is equal to 52% of mangrove forests in the country." (URT, 2009, p. 21)

Mangroves: Status and Trends

According to the 2003 State of the Coast Report, "during past decades, degradation of mangroves occurred in many parts of the country. Besides a decrease in the area coverage of mangroves, there was also considerable decrease in the density, height and canopy cover of the mangroves within the forests." (TCMP, 2003, p, 6). Although Tanzania experienced only a small decrease in the overall mangrove coverage between 1990 and 2000, mangrove ecosystems are being altered by uncontrolled human activities, mainly through overexploitation of mangrove wood for construction and fuel, and from cutting of substantial areas of mangroves for solar saltpans, agriculture and aquaculture (e.g. rice and shrimp ponds), industries, and urban and hotel developments (Muhando and Rumisha, 2008, p. 19).

Open-ocean Pelagic Ecosystems

Tanzania's marine territory of 241,541km2 within its 200-mile Exclusive Economic Zone is an important area for fisheries, but is relatively poorly monitored and managed (Muhando and Rumisha, 2008). Fishing in this zone is dominated by foreign fleets from countries such as France, Spain, China, Taiwan, and Japan. "The level of fishing by these vessels inside the Tanzania Exclusive Economic Zone is unclear as the majority of the foreign fishing fleet [is] fishing illegally… Some of fishing vessels operate legally through a license issued by the Fisheries Departments of both Mainland and Zanzibar. The total number of the licensed foreign vessel is not known but is put at more than 84 vessels in 1998. Tuna catch within Tanzanian EEZ cannot easily be estimated. Some catch statistics exist from estimates from the Indian Ocean Tuna Commission (IOTC).

The EU-SADC Monitoring, Surveillance and Control project has enabled the training of fisheries officers who are now able to monitor what the foreign fishing fleet is doing. As a result, the licensed foreign purse seine and long line fleet that fishes off the coast of Tanzania has been forced to report its catches to the Fisheries Department as part of a Monitoring Control & Surveillance Program." (Muhando and Rumisha, 2008, p. 59) Marine and freshwater fisheries are discussed further in Chapter 3.

2.2.4 Agricultural Ecosystems

Agriculture is the foundation of the Tanzanian economy. It accounts for about half of the national income, three quarters of merchandise exports, is a source of food, and provides employment to about 80% of Tanzanians. Agriculture in Tanzania is dominated by smallholder farmers cultivating farms of less than three hectares, and is mainly rainfed, not irrigated, agriculture. About 70% of Tanzania's crop area is cultivated by hand hoe, 20% by ox plough and 10% by tractor. Food crop production dominates the agriculture economy. Irrigated agriculture in some areas helps to stabilize agricultural production, improve food security, increase farm productivity and income, and produce higher-value crops such as vegetables and flowers.

Maize is the country's main subsistence crop and is grown by more than 50% of Tanzanian farmers and is found in all regions of the country. Most of Tanzania is classified broadly as a 'Maize-Mixed' farming system with areas of root crop-based farming in the southern and northwestern areas. Rice is the second most important staple in Tanzania. Rainfed paddy rice production by small-holders is centered in Mbeya, Morogoro, Mwanza, Shinyanga, and Tabora. Other major food crops include sorghum, millet, wheat, pulses, cassava, potatoes, bananas, plantains, sugar, groundnuts, sesame, coconuts, and soybeans. Much of Tanzania's sorghum and millet are produced in arid and semi-arid agroecological zones. Finger millet is popular in the country's southwestern regions.

Tanzanian agriculture can be classified into ten farming systems, which have developed in response to the country's agro-ecological zones:

- Banana/Coffee/Horticulture system, found in Kagera, Kilimanjaro, Arusha, Kigoma and Mbeya regions; tree crops, intensive land use, volcanic soils with high fertility
- Maize/Legume system, found in Rukwa, Ruvuma, Arusha, Kagera, Shinyanga, Iringa, Mbeya, Kigoma, Tabora, Tanga, Morogoro, Kahama, Biharamulo; shifting cultivation, maize and legumes, beans and groundnuts intercropped, coffee
- Cashew/Coconut/Cassava system, found in coast region, eastern Lindi and Mtwara
- Rice/Sugarcane system, found in alluvial river valleys; rice and sugarcane
- Sorghum/Bulrush Millet/Livestock system, found in Sukumaland, Shinyanga and rural Mwanza; sorghum, millet, maize and cotton, oilseeds, rice
- Tea/Maize/Pyrethrum system, found in Njombe and Mufindi districts in Iringa region; tea, maize, Irish potatoes, beans, wheat, pyrethrum, wattle trees, sunflower
- Cotton/Maize system, found in Mwanza, Shinyanga, Kagera, Mara, Singida, Tabora and Kigoma, Morogoro, Coast, Mbeya, Tanga, Kilimanjaro, and Arusha
- Horticulture-based system, found in Lushoto district, Tanga region, Morogoro region, and Iringa rural in Iringa region; vegetables (cabbages, tomatoes, sweet pepper, cauliflower lettuce and indigenous vegetables), fruits, (pears, apples, plums, passion fruit, avocado), maize, coffee, Irish potatoes, tea, beans
- Wet Rice irrigated system, occupies river valleys and alluvial plains, Kilombero, Wami Valleys, Kilosa, Lower Kilimanjaro, Ulanga, Kyela, Usangu and Rufiji

- Pastoralist and Agro-pastoralist system, found in semi-arid areas, Dodoma, Singida, parts of Mara and Arusha, Chunya districts, Mbeya and Igunga district in Tabora; deep attachment to livestock and simple cropping systems

2.3 SPECIES

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

The flora of Tanzania is extremely diverse, with over 12,700 plant species – a figure comprising more than one-third of the total plant species in Africa (UNEP, 1998). For birds, the most recent estimate by BirdLife International lists 1,128 species. There are more than 300 species of mammals (with around 100 species of bats, and 100 species of rodents), more than 290 species of reptiles, more than 130 amphibian species, and almost 800 species of freshwater invertebrates. The marine environment has more than 7,805 invertebrate species. "The country ranks among the top five African biologically rich countries… (Stuart, et al., 1990).

Tanzania's unique biogeography has also endowed it with high levels of endemism – species found only in the country, often within a small range. Eastern Arc Mountain forests are one area of high endemism, with about 100 vertebrates (10 mammals, 20 birds, 38 Amphibians, 29 reptiles) found there and nowhere else. About 1,500 plant species, including some 68 tree species, are known to be endemic to the Eastern Arc Mountains. The Uluguru Mountains alone has about 135 plant species that are confined to that single mountain block while more than 100 endemic species are known to exist in West and East Usambara Mountains and Udzungwa Ranges." (URT, 2009, p. 8) Among Tanzania's 20 species of primates, 4 are endemic, including the Zanzibar red colobus (*Procolobus kirkii*). Of the 290 species of reptiles, 75 are endemic; and two of 34 species of antelopes are endemic (USAID-Tanzania, 2004, pp. 6-7). The Rift Valley Lakes contain an amazing diversity of cichlid fish, many of which are endemic. Lake Nyassa has over 600 fish species, Lake Tanganyika has more than 200 endemic fish, and Lake Victoria around 200 species. Lake Tanganyika has over 470 fish species (described and undescribed), including about 300 cichlids and over 170 non-cichlids. It is the only lake with species-rich lineages of substrate-brooding as well as mouth-brooding cichlids. Lake Tanganyika is exceptional not only for its high level of species richness (animals, plants and protists estimated at over 1,400 species, but also for high levels of endemism exhibited among several taxa. Fish, copepods, ostracods, shrimp, crabs, and molluscs are all represented by high numbers of endemic species. For instance, 74 of 85 species

Zanzibar Red Colobus Photo: C. Rhoades 2012

of ostracods (87%) and 33 of 68 species of copepods (49%) are endemic and contribute significantly to the fish populations and species diversity of Lake Tanganyika.

Threatened and Endangered Species

There are 661 currently globally threatened species recorded in Tanzania (Munishi, 2011). Of those 661 species, 66 are Critically Endangered, 174 are Endangered, 421 are Vulnerable and 347 are endemic to the country. "Tanzania also possesses important populations of species that are globally endangered and threatened. These include black rhinoceros, wild dog, chimpanzee, African elephant, cheetah and wattled crane" (URT, 2009, p. 7).

Saving endangered and threatened species from extinction requires, among other things, that an adequate Environmental Impact Assessment is conducted for infrastructure development projects, as was illustrated by the sad case of the extinction of the Kihansi Spray Toad (*Nectophyrnoides asperginis*). This endemic toad was known only from the Kihansi Falls in Tanzania, where it was formerly abundant. The decline of this species was caused by the construction of a dam upstream of the falls in 2000 for the Lower Kihansi Hydropower Project. This removed 90% of the water flow, which hugely reduced the volume of spray and altered the vegetation. After 2003 the toad population crashed, and in January 2004 only three toads could be found, with just two males heard calling. There have been no records since then, despite surveys, and the species was formally declared extinct in the wild by the IUCN Red List in 2009. The species survives in small numbers in captivity.

Keystone, Umbrella, Landscape, and Flagship Species

Although species richness, or numbers, reflects the evolutionary history of a place, ecologists recognize that some species have a much larger effect on ecosystem structure and function than other species. These species, with the ability to shape the structure and functioning of the ecosystems they inhabit, are known as "keystone" species. Our own species is by far the dominant keystone species on Earth today. In many of Tanzania's ecosystems, especially the savannas and woodlands, elephants were the keystone species. When a keystone species is locally extirpated, ecosystems can change dramatically, often to states from which restoration to the original ecosystem is difficult or impossible. An increase in elephant poaching (see Box 4.2) creates a risk that in some of Tanzania's savannas and woodlands, reduction in elephant populations may lead to bush dominated systems with less grass for grazing wildlife or pastoralist livestock.

2.4 GENETIC DIVERSITY

Genetic diversity has been studied in various Tanzanian species of economic importance, scientific interest, and conservation concern. Species in which intra-specific genetic diversity has been studied include coelacanths, cheetahs, leopards, colobus monkeys, giraffe, impala, eland, and African ebony.

For biodiversity conservation, especially in the face of possible environmental changes such as those likely to occur due to global warming, it is important to conserve the full array of genetic diversity within a species. That will provide the species with the genetic diversity necessary to adapt and evolve, and survive. Conserving genetic diversity within a species requires conserving

populations across the full range of the species, and maintaining corridors for population movement and gene flow among populations to the extent possible.

2.5 AGRICULTURAL BIODIVERSITY

Agricultural biodiversity, or "agro-biodiversity," can be defined as the diversity of cultivated and livestock species and their genetically distinct varieties, as well as wild and semi-domesticated food and medicinal plants. According to Tanzania's Fourth Annual Report to the Convention on Biological Diversity (CBD) (URT, 2009) "The agro-biotic wealth in in Tanzania in general includes 47 recorded plant species that are cultivated in Tanzania, which include; nine cereals (maize, rice, wheat, triticale, sorghum, millets, barley, oats, rye), 11 legumes (groundnuts, soybean, common bean, cow-peas, pigeon peas, green grams, chick peas, bambara nuts, lima beans, etc.), 10 oil crops (groundnuts, sunflower, sesame, soybean, castor, coconut, oil palm, etc.), six roots and tuber crops (cassava, sweet potatoes, round potatoes, yams/cocoyams), four fiber crops (sisal, kenaf, cotton and kapok), three beverage crops (coffee, tea, and cocoa) and four other crops (sugar cane, tobacco, pyrethrum and cashewnut). There are 79 indigenous plant species that produce edible fruits; 48 introduced fruit trees, 37 introduced vegetable crops and 40 indigenous vegetable crops. There are also 109 ornamental plants and 34 species of spices or herbs" (URT, 2009, p. 9). Domesticated animal species in Tanzania include cattle, sheep, goats, pigs, rabbits, horses, donkeys, water buffalo, camels, chickens, ducks and geese, turkeys, and guinea fowl.

Traditional farming and grazing systems have evolved over centuries to meet the challenges and uncertainties associated with climate, soil resources, animal and plant pests and diseases, and other sources of environmental variability. Traditional farming systems often include more species, and greater structural and temporal complexity than "modern" farming systems, which allows them to more fully exploit water, sunlight, and nutrients while minimizing inputs of labor, fertilizer, and water.

Tanzania has a number of well-studied traditional agricultural systems that are existing strategies for resilience to changing conditions. The Chagga homegardens are a farming practice that developed over several centuries on the slopes of Mt Kilimanjaro (Fernandes, et al., 1985; Hemp 2006). The system includes four strata of vegetation (forest trees, banana, coffee, and vegetables) and supports more than 520 vascular plant species and 25 varieties of bananas. The residual overstory trees and diverse assortment of shrubs, lianas and epiphytes of this agro-ecosystem are structurally and functional comparable to intact montane forest. In the southern highlands of Tanzania, the Matengo people have sustained farming on steep slopes for more than a century using a grass fallow rotation with maize, beans, wheat and sweet potatoes (Kato, 2001). Their fallow and residue management practices reduce surface runoff and optimize nutrient and water availability to crops. Tanzanian farmers commonly retain soil-improving trees such as *Acacia albida* (syn. *Faidherbia albida*) and other species within row crop systems (Okorio et al., 1994). Intercropping with coconut, mango and numerous other fruits is practiced in the Coastal Forest Ecoregion and with spice trees on Zanibar. Tanzania's pastoralists are adapted to the temporally and spatially-variable availability of forage and water availability to persist through periods of stress with minimal degradation and famine.

Increased inputs and landscape homogenization apply additional pressure on native biological diversity as agricultural production is intensified (Matson and Vitousek, 2006). Agricultural

systems are an integral, rather than an isolated, part of the environment that both influences and depends upon exchanges with the biodiversity and functioning of surrounding ecosystems. There is growing evidence of the potential to conserve native biodiversity within agricultural landscapes (Clough et al., 2011). The intentional retention and management of trees in conjunction with agricultural crops can create habitat beyond the boundaries of formally-protected land, link separate nature reserves and reduce resource-use pressure on conservation areas. Comparison of species-rich agro-forests and simpler farming systems show the opportunity to couple high agricultural yield and high on-farm biodiversity (Clough et al., 2011). Such findings demonstrate that agricultural productivity can coexist with biodiversity conservation on smallholder lands and reduce pressure on remaining natural forest habitat.

2.6 PROTECTED AREAS AND CONSERVATION PRIORITIES

Tanzania's protected area system is designed to conserve its ecosystems and species. Protected areas include landscapes and seascapes falling in one or several of seven different categories: national parks, forest reserves, game reserves, game controlled areas, wildlife management areas, conservation areas, and the special case of the Ngorongoro Conservation Area (NCA). There are 12 national parks, 540 forest reserves, 28 game reserves, 38 game-controlled areas, and the NCA. More than 25% of Tanzania's land area falls within protected areas of some category. Sritharan and Burgess (2011) state that "In Tanzania, 33% of the land surface is already designated as PAs" (Sritharan and Burgess, 2011, p.67).

National Parks are managed by the Tanzania National Parks (TANAPA), Forest Reserves are managed by the Forest and Beekeeping Division of the Ministry of Natural Resources and Tourism, Game Reserves and Game Controlled Areas are managed by the Wildlife Division under the Ministry of Natural Resources and Tourism, Ngorongoro Conservation Area is managed by the Ngorongoro Conservation Area Authority (NCAA), and Wildlife Management Areas are co-managed by locally formed Community-Based Organizations and the Wildlife Division.

Conservation Areas Designated by International Conventions or Agreements

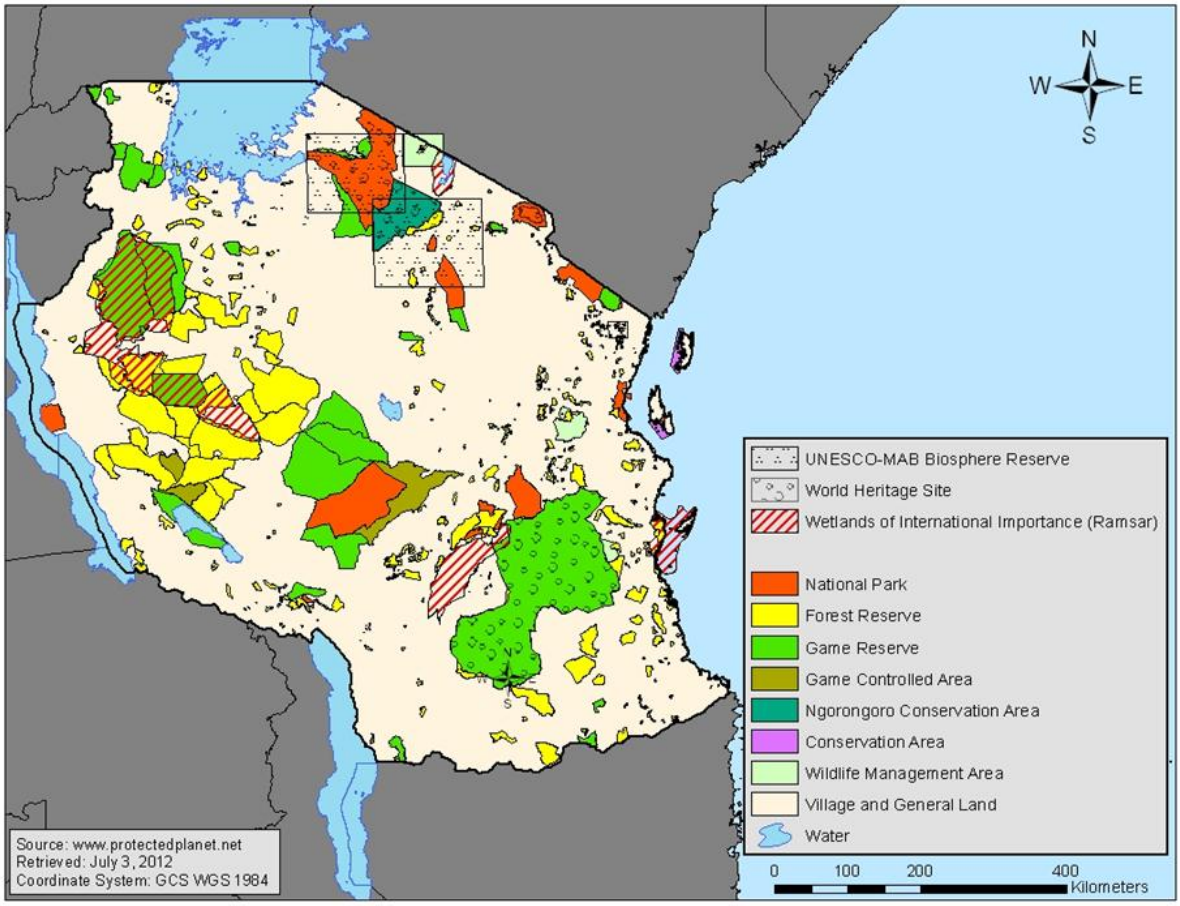
In addition to its national system of protected areas, Tanzania is a party to several international conventions and participates in other international programs that designate areas for conservation focus. Tanzania ratified the Convention Concerning the Protection of the World Cultural and Natural Heritage in 1977, and currently has four UNESCO World Heritage Sites:

- Ngorongoro Conservation Area (1979) (mixed natural and cultural heritage)
- Serengeti National Park (1981) (natural)
- Selous Game Reserve (1982) (natural)
- Kilimanjaro National Park (1987) (natural)

In addition to these, Gombe National Park, Jozani-Chwaka Bay Conservation Area, and the Eastern Arc Mountain Forests have been submitted for inclusion on the Tentative List.

Tanzania also participates in the UNESCO Man and the Biosphere Program, and currently has three MAB Sites: Lake Manyara (1981), Serengeti-Ngorongoro (1981), and East Usambara (2000).

Figure 5.1 Protected Areas of Tanzania



Tanzania is a party to the Convention on Wetlands, and has designated four Ramsar Sites, Wetlands of International Importance, which cover in total an area of 4,868,000 ha:

- Kilombero Valley Floodplain (see Box 2.1),
- Lake Natron Basin,
- Malagarasi-Muyovozi Wetlands, and
- the Rufiji-Mafia-Kilwa Marine Ramsar Site

Conservation Priorities of International NGOs

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

- Tanzania has parts of three of WWF's 36 "Earth's most special places": Coastal East Africa, Miombo Woodlands, and African Rift Lakes. http://wwf.panda.org/what_we_do/where_we_work/
- Tanzanian ecosystems are inhabited by a number of what WWF calls "priority and endangered species," including chimpanzees, elephants, marine turtles, rhinos, and East African cichlids. http://wwf.panda.org/what_we_do/endangered_species/
- Tanzania hosts two of the African Wildlife Foundation's priority conservation landscapes, which they call the Kilimanjaro and Maasai Steppe Heartlands. The African Wildlife Foundation (AWF) also focuses on the conservation of several Tanzanian species, including elephants, carnivores, and rhinos http://www.awf.org/section/wildlife
- Five areas of Tanzania have been designated as "priority landscapes and seascapes" by the Wildlife Conservation Society: Tarangire, Ruaha, the Southern Highlands, Zanzibar Forests, and the Western Indian Ocean. http://www.wcs.org/where-we-work.aspx Like most other large international conservation organizations, the Wildlife Conservation Society (WCS) also supports activities that focus on conservation of selected species such as elephant, lion, cheetah, African wild dog, chimpanzee, and kipunji.
- The Nature Conservancy in Tanzania is currently implementing the Tuungane Project in Western Tanzania, including part of Lake Tanganyika and the greater Mahale ecosystem http://www.nature.org/ourinitiatives/regions/africa/wherewework/tuungane-project.xml
- Parts of two of what Conservation International calls "biodiversity hotspots" are in Tanzania: Coastal Forests of Eastern Africa, and the Eastern Afromontane http://www.conservation.org/where/priority_areas/hotspots/africa/Pages/africa.aspx CI also prioritizes work in the woodlands and savannas of Southern Africa, which they call the "Miombo-Mopane Wilderness" http://www.conservation.org/where/priority_areas/wilderness/Pages/southernafrica.aspx
- BirdLife International has identified 77 Important Bird Areas in Tanzania (Baker and Baker, 2002; Sritharan and Burgess, 2011, p. 67) http://www.birdlife.org/datazone/userfiles/file/IBAs/AfricaCntryPDFs/Tanzania.pdf and http://192.38.112.111/pdf-reprints/Sritharan_AJoE_2011.pdf

Effectiveness of Protected Areas and Conservation Strategies in Tanzania

A number of studies have tried to assess or evaluate the effectiveness of the diverse range of biodiversity conservation approaches and institutions used in Tanzania. For example, one study compared the findings of two recent and seemingly conflicting studies on the effectiveness of conservation protection strategies inTanzania, and evaluated those studies in the context of the literature on the problem of determining protected area performance. (Caro, et al.,2009) The study concluded that "biodiversity value does not end at the park boundary, and that human-dominated lands adjacent to heavily protected areas can still maintain unique and rich assemblies of species for a variety of taxonomic groups. Land management that allows for limited forms of human use is therefore still of significant conservation value for many taxa, particularly those not subject to direct human exploitation." The study calls attention to the fact that conservation strategies should not only focus on large, "charismatic megafauna," because "multi-taxa response patterns to habitat conversion and human-use can be highly variable across taxonomic

groups and remain poorly understood. The proponents of the two polar ends of the people and parks debate – human inclusion or exclusion from the conservation landscape – may be strongly influenced by the choice of taxa [i.e., species] used in evaluation exercises. Protected area assessments should not promote an isolated focus on particular conservation targets [i.e., species] or methods of monitoring and evaluating the effectiveness of conservation strategies." (Caro, et al. 2009, pp. 179-180)

Stoner, et al. (2007), assessed the effectiveness of protection strategies in Tanzania based on a decade of survey data for large herbivores. They compared changes in densities of large herbivores among heavily protected national parks and game reserves, partially protected game-controlled areas, and areas with little or no protection. Comparison of surveys conducted in the late 1980s and early 1990s to surveys in the late 1990s and early 2000s generally showed significant declines in the densities of most large herbivores in that decade in all of the three types of areas. Populations of large herbivores in national parks and game-controlled areas declined less than in areas with no protection.

The effectiveness of a range of protected area governance and management regimes in reducing deforestation in the Eastern Arc Mountains of Tanzania has been studied by Larrosa (2011). This research developed the first deforestation model for the Eastern Arc Mountains, was the first attempt at estimating PA effectiveness for all types of PAs in these mountains, and explored the relationship between PA effectiveness and PA budgets. The study found that there is a large disparity in budgets of different types of protected areas in the Eastern Arc Mountains; forest reserves have inadequate budgets, with some not even being actively managed, whereas national parks and game reserves tend to have better funding and capacity.

An overview of the methodologies that could be used to evaluate the effectiveness of protected areas in Tanzania can be found in "Management Effectiveness Evaluation in Protected Areas." (Leverington, et al., 2008) These methodologies tend to be complex, still at a somewhat academic level, and difficult to apply directly to assess "actions needed" for forest and biodiversity conservation.

3.0 VALUES AND BENEFITS OF BIODIVERSITY

Biodiversity conservation is of fundamental importance to USAID, given its mission as a development agency, because "Biodiversity is the very foundation for all the Earth's essential goods and services. The air we breathe, water we drink, and the food we eat all depend on the Earth's rich biodiversity." http://www.usaid.gov/our_work/environment/biodiversity/ Biological diversity provides social and economic benefits of three distinct kinds: ecosystem products, ecosystem services, and non-material benefits (USAID, 2005a; Byers, 2012). Values of each of these types of benefits of Tanzania's biodiversity are summarized below.

3.1 ECOSYSTEM PRODUCTS

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

Timber

Timber sustains people's livelihoods as a material for building houses, furniture, and boats, and generates revenue for the country. A substantial amount of money is earned by the government from the timber trade. Although we found little data available to quantify this, in FY 2010-2011 the Ministry of Natural Resources and Tourism collected the revenue of 24.7 billion Tanzanian Shillings from forest products, according to the Minister's Budget Speech in 2011.

Building Materials

In most rural areas of Tanzania forests are the main sources of supply materials for construction. For example, a study done in eight villages of Babati district, Manyara region, showed that quantity of building poles used by villagers in four years was estimated at 2,126m^3 and valued at 19 million Tanzanian shillings (Mugarura, 2007).

Firewood and Charcoal

"An estimated 90 percent of Tanzania's energy needs are satisfied through the use of wood fuels." (World Bank, 2009, p. vi) Firewood supplies around 70% of the fuel for cooking in Tanzania, on average: more than 90% in rural areas, more than 30% in most urban areas, and around 10% in Dar es Salaam (World Bank, 2009, p. 4).

Charcoal is the single largest source of household energy in urban areas. Between 2001 and 2007, the proportion of households in Dar es Salaam using charcoal climbed from 47% to 71%. According to the World Bank charcoal study, approximately half of Tanzania's annual consumption of charcoal occurs in Dar es Salaam, amounting to approximately 500,000 tons. The contribution of Tanzania's charcoal sector to employment, rural livelihoods, and the wider economy is estimated to be around US$ 650 million per year, providing income to several hundred thousand people in both urban and rural areas (World Bank, 2009, p. vi).

Bushmeat/Game Meat

Bushmeat is an important source of protein for communities living close to protected areas and is motivated by subsistence, commercial and cultural needs. The price of one kilogram of fresh bushmeat is between US $0.27-0.40 (Mufunda and Roskaft, 2010). With the establishment of WMAs, villagers receive a quota by the Wildlife Division which they utilize to harvest a certain number of animals and sell the meat within the village. The income is used to run the WMA, conduct anti-poaching activities, and support community development projects.

Fisheries

Fish contributes to 27% of the total animal protein consumption in Tanzania. Fishing employs about 150,000 full time artisanal fishermen, and about 2 million other people make their living through various fisheries-related activities including boat building, net mending, fish processing, food vendors, and other petty business. In 2005, the sector contributed about US $324 million to the national economy (FAO, 2007). The country has both marine and fresh water fish resources, and the common species and annual catch are shown below (FAO, 2007):

Annual catch in metric tons

Nile Perch (fresh water)	132,458
Prawns	959
Octopus	1,320
Yellow fin tuna	17,842
Marlin	1,265
Skip jack tuna	972
Big eye tuna	774

The Tanzanian fishing industry is still 95% artisanal, and the majority of the local fishermen still use traditional fishing methods (TCMP 2003, p. 11). Fish resources caught by these fishermen include surface living, species such as the sardine, jack, swordfish, mackerel, kingfish and tuna, and bottom-dwelling or deep water species such as bream, grouper, parrotfish, snapper, and rabbitfish. The Exclusive Economic Zone that extends 200 miles from the coast is so far unexploited by local fishermen because of the lack of suitable vessels to venture into these distant waters. The commercial fishery for prawns is based mostly in the inshore shallow areas around the mangrove-fringed Bagamoyo/Saadani and the Rufiji Delta. Offshore fisheries are a potential resource with high value migratory fish species such as tuna, sailfish, marlin and swordfish. Foreign fishing vessels, many unlicensed and illegal, fish in Tanzania's EEZ. The total annual catch of Tanzania's marine fisheries is around 70,000 tons (TCMP 2003, p. 12).

Honey and Beeswax

Bee keeping is an economic activity contributing significantly to local and national economy of the country. It is estimated that the sector generates about US$ 1.7 million each year from sales of honey and beeswax and employ about 2 million rural people (Mwakatobe and Mlingwa, 2005). Honey is collected mainly from traditional log and bark hives in forested areas, where bees forage for nectar and pollen from a wide variety of native trees and other plants.

Dyes and Fibers

Dyes are extracted from the leaves, bark, or roots of many of the indigenous trees of Tanzania. Dyes are primarily used to color fabrics and fiber materials that are used to make baskets and mats; for decorating the walls of houses and buildings with murals; in wood crafts, for example, painting spoons, carvings, and walking sticks. Indigenous trees are also an important source of fiber for making thread, rope, twine, cloth, and for building materials in rural areas in Tanzania. Adequate information about the ecology and population status of most of these species to determine whether harvesting rates are sustainable does not exist or is not readily available for the vast majority of these species.

Medicines

A large number of indigenous plants are known and used as medicines by traditional healers in Tanzania. Many of these undoubtedly contain compounds that give them their medicinal properties (Fyhrquist, 2007). As for plants used for dyes and fibers, more information about the ecology and population status of plants used in traditional medicine would be needed to determine sustainable levels of harvest for these species.

3.2 ECOSYSTEM SERVICES

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

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

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

The role of species diversity in maintaining ecological processes and functions is not well understood scientifically, and is an active topic of scientific research. However, studies often show a positive relationship between the number of species in an ecosystem and the level and stability of ecological processes. Research in North American grasslands has shown that greater species-level biodiversity provides greater resilience to drought (Tilman and Downing, 1994), an example of how biodiversity is important for maintaining certain ecosystem services, such as controlling soil erosion and maintaining nutrient cycling.

Watershed and Hydrological Services

The natural ecosystems of Tanzania's mountains and highlands protect the watersheds of the country and influence the quality, quantity, and flow regimes of water in the rivers. These effects depend on factors such as slopes, amount of precipitation, evapotranspiration from different kinds of forest vegetation, and other physical factors.

Water is an essential renewable natural resource, and one that has no substitute. It is, therefore, extremely difficult to value if only standard "market" economic methods of valuation are used. The value of water used for a given purpose will depend on the opportunity cost of not using it. In some cases, as with drinking water, this is essentially infinite, since life depends on water. In many other cases, however, we decide how much water to use based on its price and accessibility.

Water resources are critical to Tanzania's economy; water is critical to agricultural sector performance; piped water systems provide input into industrial production and support the workforce in urban areas; water in rivers and reservoirs generate over half of the country's grid electricity through hydropower works; and water flows through ecosystems support wildlife and the tourism sector. With renewable water resources estimated at around 2,300 m3 per person per year, Tanzania is currently not classified as water scarce, but due to projected population growth it is expected to be so by 2015 (Noel, 2011).

Carbon sequestration

Forests remove carbon from the atmosphere and store it in their biomass. This has obvious economic value if it mitigates costs predicted to result from CO2-induced global climate change. Global markets to value and trade this sequestered carbon are developing slowly. These markets currently are mainly voluntary, but more regulated markets under a post-Kyoto United Nations Framework Convention on Climate Change (UNFCCC) "architecture" are expected.

Carbon stocks in different forest types differ depending on the vegetation type, structure and extent. Based on area coverage and vegetation structure the total carbon stock in national government Forest Reserves is estimated at around 1,041 million tons, in Game Reserves at around 149 million tons, and in National Parks about 60 million tons. Carbon stocks on General Land is estimated to be 481 million tons, and in Village Land (local authority) Forest Reserves to be about 60 million tons (Munishi and Shear, 2004; Munishi et al., 2007; The Katoomba Group, 2009).

3.3 NON-MATERIAL BENEFITS OF ECOSYSTEMS

Besides providing direct material benefits to humans in the form of ecosystem products, and indirect material benefits in terms of ecosystem services, natural ecosystems and species also provide a range of non-material benefits that are important to human well-being and development. These include historical, cultural, spiritual, recreational, educational, and scientific benefits (USAID, 2005a).

Nature-Based Tourism

International tourism in Tanzania grew 11.1 between 2009 and 2010, and generated US $1.3 billion in revenues, according to the UN World Tourism Organization (UNWTO, 2011). "Although we cannot accurately determine the degree to which tourism is directly dependent on biodiversity, we can assume with confidence that in many hotspot countries, such as Australia, Belize, Brazil, Costa Rica, Kenya, Madagascar, Mexico, South Africa, and Tanzania, a significant proportion of tourism's Gross Domestic Product (GDP) contribution can be directly linked to attractions and destinations in biodiversity hotspots, where biodiversity itself represents the primary tourism attraction." (Christ, et al. 2003, p. 17)

The Tanzania Tourism Report's 2008 International Visitor's Exit Survey (MNRT, 2008) did not ask about the purpose of a tourist's visit in enough detail to determine exactly whether the purpose was nature-based tourism (wildlife viewing and photography, birding, snorkeling and diving, etc.) However, national parks and conservation areas, especially on the "Northern Circuit," are among the most common destinations. "Since the first comprehensive survey on the tourism sector which was conducted in 2001, it has been established that majority of the visitors came for leisure and holiday. The large number of holidaymakers is partly explained by the existence of unique tourist attractions; such as the National Parks, Ngorongoro Conservation area, Mt. Kilimanjaro and Zanzibar Islands." (MNRT 2008, p. 12)

In 2009, Tanzania ranked #3 in the world (after the US and Brazil) in tourism competitiveness driven by nature-based tourism: "The top three countries in the natural resources pillar span three continents: the United States, Brazil, and Tanzania. These countries each have several World Heritage natural sites, much protected land area, and rich fauna as measured by the total known species living in them. Within the table we see that Australia is ranked 4th, also offering rich natural resources to visitors. These countries have the great fortune to be endowed with such inherent attractions for tourists interested in nature tourism." (WEF 2009, p. 10)

Science and Education

The richness of Tanzania's biodiversity at all levels – ecosystems, species, endemic species, and populations – has made it world-famous for scientific studies in ecology and evolution. This rich biodiversity is also a natural classroom and laboratory for learning and training of students of ecology, evolution, and conservation biology.

Spiritual Values

A number of studies have shown that areas of forest are protected for their spiritual significance. Eight sacred groves of the Ugunda chieftaincy of the Wanyamwezi in central Tanzania representing burial sites that varied from 6–300 years old were inventoried to compare woody species richness and taxonomic diversity with those of forest plots in a state managed Forest Reserve. Although they occupied a relatively small area the sacred groves had greater woody species richness and taxonomic diversity than the state managed Forest Reserve. Some of the woody species were absent in the forest plots, also suggesting that groves served as a refuge for some species (Mgumia and Oba, 2003). In the North Pare Mountains, part of the Eastern Arc, a total of 920 traditionally protected forests have been found in sample areas in the Handeni District and Mwanga Districts. The protected forests range from 0.125 to 200 ha. In many areas

these are the last remaining natural forests (Mwihomeke, et al., 1998). Because the Eastern Arc Mountains are a global biodiversity "hotspot," these sacred forests may have a very important role in biodiversity conservation.

4.0 THREATS AND CAUSES

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

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

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

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

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

4.1 HABITAT LOSS AND DEGRADATION

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

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

Ecosystem	Threats	Causes
Terrestrial		
Montane Forests (Eastern Arc, Mt. Kilimanjaro, Mt. Meru, Albertine Rift Mountains	Loss, fragmentation, & degradation from: • Agricultural expansion (mainly subsistence smallholders, "slash and burn") • Firewood cutting & collection • Bushmeat snaring and hunting	• Use of agricultural practices that do not maintain soil fertility • Lack of sustainable fuel wood and charcoal, and of alternative cooking fuels • Inadequate land use planning and agreements • Low capacity to monitor and enforce laws and regulations
Coastal Forests	Loss, fragmentation, & degradation from: • Agricultural expansion (subsistence smallholders , and large-scale commercial) • Illegal logging, charcoaling, firewood collection • Bushmeat snaring and hunting • Mining and/or hydrocarbon exploration and development	• Use of agricultural practices that do not maintain soil fertility • Lack of sustainable fuel wood and charcoal, and of alternative cooking fuels • Inadequate land use planning and agreements • Unclear, insecure, and/or overlapping land and resource tenure • Low capacity to monitor and enforce laws and regulations
Acacia Savanna	• Conversion to agriculture (rainfed & irrigated) • Blockage or degradation of movement corridors and wet/dry season migration routes by roads, fencing, mining, and/or agricultural development • Poaching of elephant (a keystone, umbrella, and landscape species) • Loss of river flows (e.g. Mara, Tarangire) from reduction & poor management of mountain forests, & upstream water abstraction • Climate change	• Inadequate land use planning and agreements • Unclear, insecure, and/or overlapping land and resource tenure • Low capacity to monitor and enforce land and wildlife laws and regulations • Inadequate resources for anti-poaching control

Miombo Woodland	• Agricultural expansion (mainly subsistence smallholders, "slash and burn") • Blockage or degradation of movement corridors and wet/dry season migration routes by roads, fencing, mining and/or agricultural development • Firewood cutting & collection • Charcoal production • Poaching of elephant (a keystone, umbrella, and landscape species) • Inadequate resources for anti-poaching control	• Use of agricultural practices that do not maintain soil fertility • Lack of sustainable fuel wood and charcoal, and of alternative cooking fuels • Inadequate land use planning and agreements • Low capacity to monitor and enforce laws and regulations • Unclear, insecure, and/or overlapping land and resource tenure
Alpine Moorlands	• Global climate change (alpine warming & vegetation zonation shifts)	• Global economy based on unsustainable fossil fuel energy
Freshwater		
Wetlands (Zambezian Flooded Savannas)	• Reduced inflows • Conversion to agricultural uses (farms, pastures)	• Upstream water abstraction & forest degradation in upstream watersheds • Inadequate land use planning and agreements • Poor Environmental Impact Assessment capacity • Low capacity to monitor and enforce land, water laws and regulations
Rivers	• Reduced flow & changes in seasonal flow regimes • Loss of riparian vegetation from agriculture, grazing	• Upstream water abstraction & forest degradation in upstream watersheds • Inadequate land use planning and agreements • Poor Environmental Impact Assessment capacity • Low capacity to monitor and enforce land, water laws and regulations
Lakes	• Invasive species (e.g. water hyacinth, Nile perch, tilapia) • Soda ash production in saline lakes (e.g., Lake Natron)	• Misinformed policies of introducing non-native species • Poor Environmental Impact Assessment capacity • Lack of invasive species monitoring and control strategy

Marine		
Coral Reefs	• Overfishing of keystone reef species • Destructive fishing practices (e.g., dynamite, poison, small-mesh nets, beach seining) • Sedimentation and nutrient-loading pollution from onshore activities • Coral bleaching & damage from global climate change (warming & ocean acidification)	• Undefined/poorly defined marine resource tenure • Marine resource management agencies lack enforcement systems & capacity (boats, fuel, patrol staff) • Upstream agricultural practices cause soil erosion to rivers • Lack of sewage treatment from urban areas and tourism infrastructure • Climate change from unsustainable global fossil fuel economy
Mangroves	• Cutting – both legal but unmanaged and illegal cutting • Expansion of rice cultivation in less saline mangrove areas • Pesticides that kill invertebrates and fish	• Management agencies lack enforcement systems and capacity • Inadequate land use planning and agreements • Low capacity to monitor and enforce land, water laws and regulations
Seagrass Beds	• Physical degradation from beach seining and bottom trawling for shrimp/prawns	• Marine resource management agencies lack enforcement systems & capacity (boats, fuel, patrol staff)
Beaches & Dunes	• Habitat degradation from beach hotel development • Sand mining for construction	• Insecure land tenure for traditional coastal communities & irregular/extra-legal land allocation • Inadequate land use planning and agreements • Poor Environmental Impact Assessment capacity
Near-shore Marine	• Overharvesting of valuable species and by-catch • Use of harmful fishing gear (e.g. beach seines, small-mesh nets) and practices (e.g. dynamite fishing)	• Undefined/poorly defined marine resource tenure • Marine resource management agencies lack enforcement systems & capacity (boats, fuel, patrol staff)
Pelagic/Offshore Marine	• Overharvesting of tunas & other commercially valuable species	• Unmanaged/unregulated commercial fishing by foreign fleets • Marine resource management agencies lack enforcement systems & capacity (boats, fuel, patrol staff)

Irrigation system dam at Mkula Village at boundary of Udzungwa Mountains National Park
Photo: B. Byers 2012

Serengeti Road

The proposal to pave the current road through Serengeti National Park and make it more suitable for long-distance trucks and other traffic, is a specific example of the more general cause of ecosystem loss or degradation listed in the table above as "Blockage or degradation of movement corridors and wet/dry season migration routes by roads, fencing, mining, and/or agricultural development." The Tanzanian Government had been considering plans to pave a two-lane highway across Serengeti National Park to connect Lake Victoria with coastal ports, and perhaps fence the road to prevent vehicle-wildlife collisions. The Government announced that for the time being the road will remain gravel, and be managed mainly for tourism and administrative purposes. An alternative route for a major trade highway that would run to the south of the park is being considered. (Black, 2011)

Uranium Mining in Selous

The proposed uranium mine at the southern edge of the Selous Game Reserve, in an area which conservation organizations think of as the "Selous-Niassa Corridor" for transboundary wildlife movement between Tanzania and Mozambique, is a specific example of the more general cause of ecosystem loss or degradation listed in the table above as "Blockage or degradation of movement corridors and wet/dry season migration routes by roads, fencing, mining, and/or agricultural development."

"The Tanzanian government diligently lobbied the UNESCO World Heritage Committee to change the boundaries of the iconic game reserve, allowing the Mkuju River Uranium Project (owned by Russian ARMZ and Canadian Uranium One) to their desired location - a wildlife corridor between Tanzania and Mozambique. What's been described by the WHC as a "minor boundary change", the o.8% border alteration of the reserve will exclude 200 sq km of previously protected land. The decision by the WHC stands in contradiction to their 2011 statement that "mining activities would be incompatible with the status of Selous Game Reserve as a World Heritage site." (McKee, 2012) Tanzania's legal and institutional structure for dealing with the environmental effects of mining in general is discussed in Chapter 5.

In an interview, Dr. Rolf Baldus, an expert on the Selous, was asked: "What will be the impact of the mining for the reserve?" He replied: "I cannot answer this question, as Tanzania has not provided an Environmental Impact Analysis (EIA). It is a good Tanzanian tradition that public investments and projects with major ecological consequences are either not subjected to EIAs at all or the EIAs provided are sub-standard and of unacceptable quality. Mostly they seem to have been written just in order to justify the Government decision. The recently planned Serengeti highway was such an example." (Baldus, 2011)

Soda Ash Factory at Lake Natron

The proposal for what is essentially mining development at one of Tanzania's saline Rift Valley Lakes, is an example of a more general cause of habitat loss and degradation through mining development. "Lake Natron is the most important breeding site for Lesser Flamingos in the world. East Africa has between 1.5-2.5 million (three-quarters of global population) pink flamingos and most them are hatched at Lake Natron. Tata Chemicals Industries put forward the initial proposal to construct a soda ash plant at the Lake in 2006, but withdrew in May 2008 following concerns over negative impacts on flamingo breeding, local livelihoods and the environment. However, the Government of Tanzania through the National Development Corporation maintains a keen interest." (BirdLife International, 2012) A review for the Tanzania Natural Resources Forum (Baker, 2011) discusses the important of an adequate EIA, and the role of the National Environmental Management Council (NEMC) in controlling this type of development process in Tanzania.

Root Causes or "Drivers"

The deep, long-term root causes or "drivers" of the threats listed in Table 4.1 include:

- Lack of an integrated legal, policy, and institutional framework for natural resources management (NRM) and land use planning that brings together sectoral actors (e.g. ministries) and forces communication and compromise, thus minimizing or preventing contradictory and conflicting sectoral actions
- Conflicting and contradictory laws, policies, and actions by sectoral institutional actors – not surprising given the lack of a national framework for integrating them
- Lack of national capacity for Environmental Impact Assessment.
- Corruption: The Transparency International Corruption Perceptions Index in 2011 gave Tanzania a score of 3.0 out of 10, with 10 being "low corruption." http://cpi.transparency.org/cpi2011/results/ One of our key informants said that Tanzania suffers from a "corruption syndrome." No matter how strong a framework of

environmental protection laws and policies a country has, corruption can cause them to be by-passed or ignored.

- Population growth: Recent estimates of the population growth rate in Tanzania range from around 2% per year to almost 3% per year, leading to a population doubling time of between 23 and 35 years. Population growth, combined with real development needs and aspirations, puts additional pressure on already scarce natural resources.
- Lack of sustainable livelihood opportunities for poor, rural, small farmers and fishers: "Tanzania is one of the world's poorest economies in terms of per capita income," with a Gross Domestic Product (GDP) per person of US$1,500 in 2011 (CIA World Factbook, 2012)

4.2 OVEREXPLOITATION OF HIGH-VALUE SPECIES

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

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

Species	Threats	Causes
Elephant	• Illegal hunting for international (mainly Asian) ivory market	• Low capacity to monitor and enforce wildlife laws and regulations
Black Rhino	• Illegal hunting for international (Middle East & Asian) rhino horn market	• Low capacity to monitor and enforce wildlife laws and regulations
High-value Timber Species (e.g. *Afzelia spp*, *Pterocarpus spp*. (kiaat), *Diospyros mespiliformis* (jackalberry)	• Illegal cutting for domestic and international timber markets	• Low capacity to monitor and enforce forest laws and regulations
Prawns (Metapenaeus monocerus, Penaeus indicus, P. monodon)	• Unregulated fishing, some illegal • Lack of sustainable management	• Low capacity to monitor and enforce fishing laws and regulations
Pelagic Fish (yellowfin tuna, marlín, skipjack tuna, big eye tuna)	• Illegal, and some legal but unregulated deep-sea fishing, mainly by foreign fleets • Lack of sustainable management	• Low capacity to monitor and enforce fishing laws and regulations

Big bull with big ivory, Tarangire National Park Photo: B. Byers 2012

Upsurge in Elephant Poaching

According to a report from CITES, the Convention on International Trade in Endangered Species, published in June 2012, elephant poaching levels are the worst in a decade and recorded ivory seizures are at their highest levels since 1989. China and Thailand are the two primary destinations for illegal ivory consignments exported from Africa according to the seizure data. Seizures of large ivory consignments in Malaysia, the Philippines and Viet Nam since 2009, were believed to be in transit to China and Thailand. Most of the ivory smuggling containers leave the African continent through Indian Ocean seaports in East African countries, primarily Kenya and the United Republic of Tanzania. These findings are matched by data on poaching levels in Africa from the CITES Monitoring the Illegal Killing of Elephants (MIKE) Program. MIKE has documented a steady increase in levels of elephant poaching across the continent since 2005, with the levels in 2011 being the highest since monitoring began in 2002. Poaching levels are increasing in all countries where African elephants occur, and may be leading to dramatic declines in some populations, but particularly in Central African countries, where poaching levels are highest. The MIKE analysis shows poaching to be highest where human livelihoods are most insecure and where governance and law enforcement are weakest. It also suggests that poaching is driven by demand for ivory in East Asia. (UNEP-WCMC, 2012).

A U.S. Senate Foreign Relations Committee Hearing on 24 May 2012, focused on “Ivory and Insecurity: The Global Implications of Poaching in Africa.” (US Senate Foreign Relations Committee, 2012)

Bushmeat

According to a report released by the Udzungwa Ecological Monitoring Center, "Uzungwa Scarp Forest Reserve in Crisis. An urgent call to protect one of Tanzania's most important forests" (Conservation International, 2011; Rovero, et al., 2010), populations of several species in southern Tanzania are suffering alarming declines due in part to bushmeat hunting. Small forest antelopes such as the duikers are declining in many forests, and bushmeat hunting is one cause. A study on bushmeat hunting in the Udzungwa forests by Martin Nielsen of the University of Copenhagen found from interviews with people living in the villages bordering the reserve that bushmeat hunting is common. Scientists and conservation organizations associated with the report are calling for urgent action to halt bushmeat hunting in the reserve, upgrade the Uzungwa Scarp Forest Reserve to Nature Reserve status, and improve management of the reserve. The report recommends more investment in forest protection, and in community development projects and conservation awareness in forest-adjacent communities.

Another recent research study of bushmeat harvesting in the Serengeti (Mfunda and Roskoft, 2010) found that "High-levels of bushmeat hunting threaten wildlife populations and extinction of some species." Data on bushmeat hunting were collected through 477 household interviews in ten villages surrounding Serengeti National Park. In Western Serengeti hunting was an important economic activity, taking place inside the national park and game reserves, and occasionally on village lands. A majority of people depended on bushmeat as a source of protein, and a few people relied on it for income. In the eastern Serengeti hunting took place mainly on village lands. The authors propose that strengthening and widening the coverage of community based conservation outreach programs, opening doors for sustainable use, widening the scope of benefit sharing to address household livelihoods, strengthening law enforcement, and redefining the Serengeti ecosystem in order to bring bushmeat harvesting under control.

A study of the "Conservation and livelihood implications of wild meat use in refugee situations in north-western Tanzania" (Jambiya, et al., 2007, p. 3) concluded that "The implications of unsustainable wild meat exploitation for wildlife management and

livelihoods in the refugee hosting areas of north-west Tanzania are rarely acknowledged by all the relevant stakeholders. This study takes a focused look at wild meat use in refugee situations in north-western Tanzania, associated impacts, driving forces, and the

appropriateness of some of the management interventions taken to date. The study outlines why enforcement of wildlife laws and regulations cannot address the drivers

of unsustainable wild meat use in these, and other, refugee hosting areas. The study goes on to justify how positive incentives, whether via equitable market frameworks for wild meat or through provision of alternative sources of protein or livelihoods, may better reconcile refugee needs, local development imperatives and wildlife management objectives."

Root Causes or "Drivers"

The long-term root causes or "drivers" of the threats listed in Table 4.2 include:

- International demand and markets (esp. China) for illegal wildlife and timber products

- Corruption – the high prices paid for products from some high-value species (e.g ivory, rhino horn, tuna) is generally thought to motivate illegality and lack of enforcement of laws through bribes and payoffs to authorities[
- Lack of competitive sources of income in rural areas, which is generally thought to motivate local people to harvest local natural resources without authorization (mainly for domestic use) and make them more susceptible to bribes and payoffs from commercial poachers of high-value species

4.3 INVASIVE SPECIES

Invasive alien species are a threat to ecosystem integrity and native species in some ecosystems of Tanzania. In fact, the country has the undesirable distinction of providing an example of one of the most ecologically-damaging deliberate introductions of a non-native species in the world. The Nile Perch *(Lates niloticus*), native to Africa but not to Lake Victoria, was introduced into the lake 1950s to start a fishery, but as a top predator it fed on Lake Victoria's native cichlids, many of them endemic to the lake. It is attributed with causing the extinction or depletion of several hundred native cichlid species. The IUCN's Invasive Species Specialist Group considers *Lates niloticus* one of the world's 100 worst invasive species.

The water hyacinth (*Eichhornia crassipes*), native to South America, was first reported on Lake Victoria in 1989 and quickly spread, until about ten years later tens of thousands of hectares of the water surface were covered by the plants. This ecological invasion disrupted fishing, transportation, and posed a further threat to the endangered cichlid fish fauna of the lake. Beginning in 1995, two species of weevils, *Neochetina bruchi* and *Neochetina eichhorniae*, which feed on water hyacinth, were introduced into the lake as biological control agents. By 2005, the water hyacinth invasion had been dramatically reduced (Wilson, et al., 2007). Heavy rains in late 2006 raised water levels and swept nutrients into the lake, and the area covered by water hyacinth again expanded dramatically, and the problem continues to defy an easy solution.

On Zanzibar, the Indian House Crow (*Corvus splendens*) provides an example of the consequences of an invasive species on native biodiversity: one of the island's most striking features is the extremely high density of crows and the notable lack of native songbirds. Crow predation on reptiles and amphibians, and damage to crops and poultry, is substantial. The Indian House Crow was introduced to the island in the 1890s and was recognized as a pest as early as 1917. A number of failed eradiation attempts show the risk of prematurely terminating control efforts. Zanzibar's current population of more than 1 million crows rebounded after a 1990s eradication project was discontinued after exterminating 80 percent of the crow population. A recent study of the ecological and economic impact of Indian House Crows in Zanzibar (Mwinyi and Said, 2009), stated that "Based on the previous eradiation attempted methods it should be obvious that use of Chemical DRC 1339 or

Indian House Crows, Zanzibar
Photo: C. Rhoades 2012

Starlicide is recommended…for long lasting eradication results. …much care should be taken in administration of the chemical with general public awareness."

A number of invasive weedy plants are becoming established in the rangelands of northern Tanzania, including in the Serengeti and Ngorongoro ecosystem. The Mexican prickly poppy, *Argemone Mexicana*, and *Datura stramonium*, called Jimson weed or datura, are two aggressive and toxic invasive plants from North America, have been documented there (Hoeck, 2010). *Parthenium hysterophorus*, also called whitetop, is another alien invasive plant that is causing concern in Tanzania (PAMS Foundation, 2012). A "crowd-sourced" monitoring and mapping project is tracking the spread of this species (https://partheniumafrica.crowdmap.com/). *Lantana camara*, considered to be one of the world's most aggressive invasive plants, is said to be widespread in Tanzania (BioNET-EAFRINET, 2011).

A more comprehensive list of invasive alien species in Tanzania, as well as a list of some of the actions being undertaken to control them, can be found in the CBD Report Tanzania's Action on Invasive Alien Species (CBD, no date).

Root Causes or "Drivers"

The long-term root causes or "drivers" of the threats caused by invasive species include:

- Misinformed decisions in the past to deliberately introduce non-native species
- Lack of invasive species monitoring and control strategies
- Difficulty of control and eradication once populations of invasive species become established

4.4 POLLUTION

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

In the Rufiji Delta, unregulated rice cultivation is taking place in less-saline areas within the mangroves, and according to the Mangrove Program Manager, DDT, meant for indoor residual spraying (IRS) for malaria mosquitoes, is being illegally used by rice farmers to kill crabs, which damage the rice (Zacharia Kitale, personal communication, 15 June, 2012). DDT has widespread and long-term ecological effects on many species. USAID Tanzania is not using DDT in its IRS programs. However, according to the President's Malaria Initiative website "The World Health Organization (WHO) has approved 12 insecticides it considers effective and safe for use in IRS, including DDT. The choice of insecticide depends on its registration status in country, the housing construction (e.g., mud, brick, or wood), the duration of the malaria transmission season, and susceptibility of local *Anopheles* mosquitoes to the insecticide." (PMI, 2012)

4.5 CLIMATE CHANGE

Climate change is a potential threat of unknown magnitude, which may accentuate other direct threats already discussed above, especially habitat loss, degradation, and fragmentation, and the threat from invasive species. "Climate change influences the other threats, it doesn't act directly," said Stefano Qolli, Head Warden of Ruaha National Park (S. Quolli, personal communication, 11 June 2012).

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

Ocean acidification, a potential effect of the increasing level of CO2 in the atmosphere that is causing global warming, may have significant ecological effects on coral reefs and other marine ecosystems.

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

In a recent study conducted for the WWF Coastal East Africa Initiative by the Climate System Analysis Group of the University of Cape Town found that "The challenge therefore is to project the likely impacts of climate change at the regional scale while being fully cognisant of the large uncertainties and often relatively poor understanding of regional climate variability." (WWF 2012, p. 49) A general conclusion of their analysis is that the climate data record for Tanzania is so poor that it is currently impossible to make climate projections or predictions that are statistically robust, and that a network of reliable observing stations is needed, and data from them for about 20-30 years, in order to provide a sound basis for climate change projections on a regional or local spatial scale: "One of the most obvious and apparent gaps in the analysis is that of observed data. All three countries have a severe lack of quality, long period, observed station records. Tanzania and Mozambique in particular have very poor coverage of station data. Kenya has a higher coverage but suffers from poor data quality and inconsistent coverage that is common across Africa. The limitations imposed by the lack of observed station data are important. Poor data quality as well as short observed time periods precludes drawing robust conclusions from such datasets." (WWF, 2012, p. 96) The ABCG Review (ABCG, 2011) echoes the need for more climate data, and for alternatives to deterministic modeling for thinking about climate change adaptation.

Not all conservation NGOs are so skeptical about the value of climate change models, downscaling, and projections, however. In contrast, The Nature Conservancy (TNC) is already making down-scaled climate predictions in their Western Tanzania Program, working with communities in and around Mahale National Park (Gray, no date). "Future climate forecasts indicate that the region's forests, woodlands, rivers, and Lake Tanganyika will be impacted by increasing temperatures and more sporadic, intense and unpredictable rainstorms…Annual temperatures are projected to continue to increase 1-2°C over the next 50 years and up to 4°C by 2100. In addition, although annual precipitation may not vary, changes in the frequency, intensity and predictability of rainfall are expected, leading to wet seasons becoming wetter and dry seasons becoming drier. Despite some seasonal increases in precipitation, western Tanzania will become more arid, due to increased evapotranspiration. Predictions are that decreased water availability will lead to a 10-20% decline in agricultural productivity, with small scale farmers disproportionately affected." (TNC, 2012)

The uncertainty associated with assessing the magnitude of the threat to biodiversity, forests, and the human environment posed by climate change creates the need for certain kinds of actions, and opens up certain kinds of opportunities for USAID and other donors, we believe. Our views on these matters will be presented in later chapters of this ETOA report.

Weather station at Ruaha National Park Headquarters
Photo: B. Byers 2012

5.0 LAWS, POLICIES, AND GOVERNMENT INSTITUTIONS

Laws, policies, and government institutions that play a role in biodiversity conservation, forest management, and environmental protection in Tanzania are briefly summarized below.

The ETOA Team did not gather the kind of information that would enable us to evaluate the effectiveness of these laws, policies, and institutions. The question of the effectiveness of protected areas was discussed in Section 2.7, where we concluded that complex evaluation methodologies are needed to provide the information to say anything meaningful – and actionable – about such effectiveness. The same is true for evaluations of the effectiveness of the wider range of laws, policies, and institutions reviewed here. In Section 5.6 we do, however, reflect on some of the significant institutional issues that present challenges to effective management of biodiversity and forests in Tanzania, and present some illustrative examples.

5.1 LAWS AND POLICIES

The United Republic of Tanzania (URT) is formed from the union of two countries, Tanganyika and Zanzibar. There are two legislatures in the country, the Parliament of the United Republic and House of Representatives. According to the Tanzania constitution of 1977, legislative power in relation to all Union Matters and also in relation to all other matters concerning Mainland Tanzania is vested in the Parliament, while for all non-Union Matters concerning Zanzibar, legislative power is vested in the House of Representatives. Zanzibar is an independent state within the URT. Laws, policies, and government institutions in Zanzibar are presented in Annex I.

Laws and policies on forests and wildlife management in Tanzania date back to colonial times, when German and British administrations enacted laws and policies to control hunting and conserve forests. The first protected areas in the country were created in the colonial era. After independence, the government generally adopted the colonial legislation and amended it according to the emerging needs.

Environmental Management Act No. 20 of 2004

The National Environmental Management Act No. 20 of 2004 (which replaced the National Environment Management Act of 1983) provides for a legal and institutional framework for sustainable management of the environment. The 1983 Act established the National Environmental Management Council (NEMC), which has a mandate to undertake enforcement, compliance, review and monitoring of environmental impacts assessments, conduct environmental research, disseminate environmental information, and facilitate public participation in environmental decision–making. In spite of the efforts demonstrated by NEMC, due to the lack of sectoral integration and harmonization, inadequate capacity, and financial constraints, implementation and enforcement of the Act has not yet been achieved.

National Parks Act Cap 282

The Act provided for the establishment, control and management of national parks in the country. Section 3 empowers the President, with the consent of the National Assembly, to declare any area of land to be a national park. This has led to the establishment of a number of

national parks in the country, but the "top down" conservation approach has caused conflicts between park authorities and resident or adjacent communities.

Wildlife (Conservation and Management) Act No. 5 of 2009

The Act replaced the earlier Wildlife Conservation Act, and provides for conservation, management, protection, and sustainable utilisation of wildlife and wildlife products. Section 22 of this Act emphasises the importance of wildlife corridors to connect protected areas, and sustainable management of buffer zones by involving local communities and other stakeholders. Section 31 provides for establishment of Wildlife Management Areas (WMAs) and benefit sharing. By establishing a WMA, a community can realize direct financial benefits from wildlife resources. The process to initiate a WMA is cumbersome, and building the capacity of of the required Community Based Organisations (CBOs) and Authorised Associations (AAs) remains the main challenge for effective WMAs.

The Ngorogoro Conservation Area Act Cap 284 (R.E. 2002)

The Act empowers the Ngorongoro Conservation Area (NCA) Authority to make rules controlling and restricting entry into, and residence within, the NCA. The NCA Authority faces a continual challenge to control grazing, settlement, and cultivation.

Forest Act – Cap 323 (R.E 2002)

The Forest Act emphasizes the importance of stakeholder involvement, and defines procedures for establishing Village Forest Reserves, Joint Forest Management, and Private Forest Reserves. The Act has enabled forest conservation and development, but the biggest challenge is lack of adequate alternative sources of cooking fuel.

Fisheries Act, Cap 279 (R.E 2002)

The Fisheries Act strictly regulates all aspects of fishing, but lack of capacity has prevented the provisions of the Act from being well implemented and enforced.

Marine Parks and Reserve Act, 1994

This Act provides for the establishment, management, and monitoring of marine parks and reserves. Marine parks may be established by the Minister after consultation with the relevant local government authorities and resolution of Parliament. The Act emphasizes the importance of involving the local communities (Part V section 7). It has brought changes in marine resources management and conservation, although its implementation and enforcement is challenged by poor inter-sectoral coordination and pressure on marine resources from expansion of economic activities.

The Water Resources Management Act, 2009

The Water Resources Management Act provides institutional and legal framework for sustainable management and development of water resources. It outlines principles for water

resources management, and calls for participation of stakeholders and the general public in implementation of the National Water Policy. Section 22 of the Act empowers the Minister to establish Basin Water Boards, and section 81-83 authorises the Basin Water Boards to approve and register Water Users Associations. However, successful implementation requires a multi-sectoral approach and leveraging of resources so that catchment areas and water sources are well protected for sustainable, multiple uses of water.

The Village Land Act No 5, 1999

The Village Land Act provided that all land in Tanzania is public land vested in the president as the trustee on behalf of all citizens (Section 3b). It empowers Village Councils to manage all village land but not to allocate land or grant a customary right of occupancy without approval of the Village Assembly. The Act requires the Village Council to adhere to the principle of sustainable development in the management of village land, and sustainable use of land, natural resources, and the environment in and contiguous to the village and village land. Lack of resources to develop and implement village land use plans, combined with corruption, are major challenges to implementation of the Act.

The Land Act No 4, 1999

An Act provides for the basic law in relation to land other than the village land, the management of land, settlement of disputes and related matters. Section 26 of this Act gives the Commissioner mandate to determine applications for the right of occupancy. The Act recognises the importance of natural resources conservation and the environment as specified in Section 6, subsection (1) where there is a provision for Reserve Land which include Forests, National Parks, Ngorongoro Conservation Area, Wildlife Conservation and the Marine Parks and Reserves.

Mining Act No. 14, 2010

The Mining Act regulates all aspects of mineral prospecting, mining, and processing. To control the environmental impacts of mining, this Act calls for any mining to comply with the Environmental Management Act. Section 95 (1) (c) stipulates that mining is not allowed in protected area except with the written consent of the relevant protected area – although this implies that mining can take place with the consent of the respective authority. The Act does not deal effectively with artisanal mining, which is extensive. The Act also is not clear on the issue of responsibility for reclamation and restoration of mined lands.

Local Government District Authorities Act No 7 of 1982 & Local Government Urban Authorities Act No 8 of 1982.

According to the Local Government (District Authorities) Act of 1982 and Local Government (Urban Authorities) Act of 1982 and their amendments, the village, district and urban authorities are responsible for planning, financing and implementing development programs within their areas of jurisdiction. They are obligated to protect and properly utilize the environment for sustainable development. The Act also empowers the local authorities to make by-laws, which are applicable in their areas of jurisdiction. In practice, however, local governments are unable to

make important decisions independently because many legal provisions make the local government dependent on the Central Government.

National Environment Policy, 1997

National Environment Policy provides the framework for making fundamental changes that are needed to bring environmental considerations at the level of decision making in Tanzania. It calls for sectoral and cross-sectoral policy analysis in order to achieve compatibility among sectors (section 17). The policy recognises the importance of integrated management and protection of watersheds through the institution of appropriate user-fees that reflect the full value of water resources. This Policy may therefore provide a foundation for watershed-based Payment for Ecosystem Services mechanisms.

Wildlife Policy, 1998

The Wildlife Policy aimed at developing, managing and conserving wildlife and wetlands resources. The main goal is to involve the broader section of the society in wildlife management particularly the rural communities and the private sector. The policy sets the stage for the establishment of Wildlife Management Areas (WMAs) under the Wildlife Act of 2009.

National Water Policy, 2002

The National Water Policy of 2002 replaced that of 1991. The main objective of the Policy was to develop a comprehensive legal and institutional framework for sustainable water management. The policy does not mention the issue of Payments for Ecosystem Services.

National Livestock Policy, 2006

The National Livestock Policy replaced that of 1997 following redefinition of sector goals to commercialise the industry and stimulate its development while conserving the environment. The Policy is not clear on the issue of pastoralists, however.

Kilimo Kwanza (Agriculture First), 2011

Kilimo Kwanza is an economic program that seeks to make agriculture the engine of economic development. Expanding mechanization of farming, and irrigation development are important components of this initiative.

5.2 INSTITUTIONS

National-Level Institutions

Ministry of Natural Resources and Tourism (MNRT)

The MNRT plays a key role in conserving forests and biodiversity in Tanzania. Its functions are assigned to four technical divisions: Wildlife; Forestry and Beekeeping; Tourism, and Antiquities. The **Wildlife Division** is charged with the sustainable management of Tanzania's

wildlife resources and their associated habitats for the equitable use, benefit, welfare and enjoyment of the generations of Tanzanians and the world at large. Key functions of the Wildlife Division include administration and regulation of wildlife and wetlands laws, and implementation of management plans for wildlife protected areas and Ramsar sites. The Wildlife Division is the focal point for implementing international conventions related to conservation of wildlife and wetlands. The **Forestry and Beekeeping Division** is responsible for the formulation of forest policy and legislation, as well as overseeing their implementation. The Division also facilitates capacity building, monitoring and evaluation of activities at Regional and District government levels. The **Tanzania Forest Service (TFS)** is an Executive Agency under the MNRT, recently established to take over some of the operational roles and functions of the Forestry and Beekeeping Division. The **Tourism Division** implements the National Tourism Policy, promoting tourism that is culturally and socially acceptable, ecologically friendly, environmentally sustainable, and economically viable for the benefit of the national economy. **Ngorongoro Conservation Area Authority (NCAA)** is also an agency of the MNRT. NCAA was created by the Ngorongoro Conservation Area Ordinance of 1959 to oversee and ensure multiple land use and conserve and develop the natural resources of the NCA.

Tanzania National Parks (TANAPA)

TANAPA was established in 1959 to manage Tanzania's National Parks for human benefit and enjoyment in a way that will leave them unimpaired for future generations.

The Ministry of Water (MW)

The Ministry of Water has the mandate of overall management and development of water resources for social and economic development, and to enhance sustainable irrigation development. The **Water Resources Division** is responsible for quantitative and qualitative assessment and monitoring of water resources. It also collects hydrologic and water use data, develops hydro-geologic maps, issues water use permits, and inspects existing water abstractions systems. It is also responsible for water resources planning and research, regulation, enforcement and environmental issues associated with water resources. **Water Basins** were established to manage water resources in an integrated and comprehensive manner with each of Tanzania's nine river hydrologic basins. Water Basin Offices are under the Ministry of Water, but the Basin Water Boards are autonomous bodies.

Ministry of Agriculture Food Security and Cooperatives (MAFSC)

The objective of MAFSC is to deliver quality agricultural and cooperative services, provide a conducive environment to stakeholders, build capacity of local Government Authorities and facilitate the private sector to contribute effectively to sustainable agricultural production, productivity and cooperative development. Main responsibilities of MAFSC are formulating, coordinating, monitoring and evaluating the implementation of relevant policies in the agricultural sector and monitoring crop regulating institution; collaborate with the private sector, local government and other service providers to provide relevant technical service in research, extension, irrigation, plant protection, crop promotion, land use, mechanization, agricultural inputs, information services and cooperative development. The **Rufiji Basin Development Authority (RUBADA)**, currently under the MAFSC, is responsible for promoting economic

development in the agriculture, energy, fisheries, forestry, tourism, mining, industry, and transportation in the Rufiji River Basin.

National Environment Management Council (NEMC)

NEMC was formed when the National Environment Management Act of 1983 was enacted. It supervises provisions of the current Environmental Management Act, including ensuring compliance with national environmental quality standards, reviewing Environmental Impact Assessments (EIA), and conducting environmental monitoring and auditing of projects and facilities.

Ministry of Energy and Minerals, Tanzania Minerals Audit Agency (TMAA)

The TMAA was established "to facilitate maximization of Government revenue from the mining industry through effective monitoring and auditing of mining operations and ensuring sound environmental management in the mining areas". The Agency is supposed to conduct financial and environmental audits, and also monitor the quality and quantity of minerals produced and exported in order to maximize benefits to the Government from the mining industry (TMAA, 2012a).

Tanzania is a member of the United Nations Intergovernmental Forum on Mining, Minerals, and Metals (IGF) (Chevalier, no date). Tanzania, through the TMAA, has drafted a plan to comply with IGF Mining Policy Framework Reporting. The IGF requires "… mining entities to submit Environmental Impacts Statements (EIS) and Environmental Management Plans (EMP)." In Tanzania, the Environmental Management Act, 2004 requires "the applicant of a mineral right to undertake Environmental and Social Impacts Assessment (ESIA) before approval of respective mining project," and requires "the Minister responsible for Environment to ensure that conservation of biological diversity is attained by project proponents." The IGC Mining Policy Framework also recommends that the Government of Tanzania "Require mining entities to conduct environmental monitoring on biodiversity and publish reports that are readily accessible to the public." (TMAA, 2012 b)

Community-Level Natural Resource Management Institutions

Wildlife Management Areas (WMAs), authorized under the Wildlife Conservation Act of 2009, are areas established for community based wildlife conservation outside of core protected areas, on village land that is used by local community members. Protected areas in Tanzania, as everywhere, are often not large enough to encompass wildlife migrations, and seasonally-migrating wildlife move onto community lands, often leading to human-wildlife conflict. In 1998, the Government of Tanzania, with support from USAID, other donors, and conservation NGOs, began to develop a Tanzanian version of the Community Based Natural Resource Management (CBNRM) approach in wildlife management that had earlier taken hold in Southern Africa. This approach aims to decentralize wildlife management on village lands to local communities in Wildlife Management Areas (WMAs). Starting in 2004, the development of 16 WMAs has been supported by USAID, with others being added later. As of 2012, 17 WMAs have been granted "administrative authority," or user rights, to wildlife in their areas. The intention of the WMA approach has been for it to be a highly participorty, "community-led

process" that would strengthen local-level governance and generate tangible social, economic and financial benefits for communities from wildlife management. The process of developing an enabling WMA policy framework at the national level has been "long and cumbersome," according to USAID-Tanzania. When some other donors pulled back from funding this process, USAID continued, and for many years USAID has been the main donor supporting WMA policy development and implementation.

Since 2007, significant progress has been made in policy reform and the development of key regulations, including revisions of the Wildlife Policy (2007), adoption of the Wildlife Conservation Act (2009), and adoption of revised Wildlife Management Areas Regulations (2012). The Government of Tanzania has adopted WMAs as a countrywide policy initiative, and administrative structures have been established at both the community and national levels. Revenues from private investors have significantly increased in some of the WMAs, providing communities with financial resources to improve the welfare of their communities and invest in protecting their natural resources.

The Government of Tanzania has developed a draft implementation strategy to support the scaling up of WMAs. Seventeen WMAs currently have "user rights," and 17 are at various stages of development on the path to gaining such authority. However, according to USAID-Tanzania, "WMAs have received much attention without clear evidence on whether this kind of CBNRM model is really effective in bringing benefits to both humans and wildlife. As the interest among donors and the Government grows in supporting this kind of approach, it is important to better understand what the successes and challenges are to determine whether this is the right approach to continue supporting and what is still needed to create a sustainable approach for both communities and their natural resources."

In 2007, USAID contracted the Institute for Resource Assessment to conduct an evaluation of WMAs. Findings included (IRA, 2007, pp. iv-v):

- WMAs are, in general, viable economic and conservation enterprises based on wildlife living outside of protected areas.
- The long and cumbersome process of establishing WMAs discourages communities because of the cost and bureaucratic complexity, and requires significant external support for successful establishment. The capital-intensive nature of activities like land use planning, natural resource management zoning, numerous consultative meetings in WMAs with many villages, and patrols make implementation of the WMA concept difficult without donor support.
- The recent history of conflict over land taken from villages for national parks and game reserves has contributed to resistance to the establishment of WMAs in some areas.
- Even after WMAs attain "administrative authority" status and have use rights to wildlife, some do not have strategic and business plans to manage the WMAs and run or oversee wildlife-based enterprises.
- Weak governance and low levels of transparency and accountability is common in many local level institutions, both community-based organizations and village councils, hindering the development of WMAs.

- In villages with rich wildlife resources there are often strong sentiments against WMAs, sometimes fostered by individual investors and/or conflicting interests of NGOs.
- Benefit sharing between the Wildlife Division and the local WMA communities, and between WMA villages with different land areas, is still not well defined, and this sometimes creates conflicts.
- Limiting WMAs only to wildlife management leaves out other ecological resources such as forests, water, fish, and minerals, which could also contribute to village-level development.
- Lack of integrated development policies and legislation at the national level has led to uncertainties and conflicts related to other natural resources found in WMAs.
- WMAs all have different ecological, cultural, social, and economic contexts and conditions, so each requires a different approach to planning and development.

In a study of two WMAs, Sungusia (2010) found that 66% of the residents surveyed supported the WMA, some because they were receiving actual benefits such as employment, but many because of future anticipated benefits. He found that the majority of those who supported the WMA did so with the condition that some issues need to be addressed, including crop damage from wildlife and benefit sharing.

Pawaga Idodi (Mbomipa) Wildlife Management Area
Photo: B. Byers 2012

Water Users Associations (WUAs) are another type of community-based natural resource management institution, established under the Water Act, through which local water users acquire and operate water permits; collect water user fees on behalf of the basin water board;

manage, distribute and conserve water; resolve conflicts between members of the associations related to the joint use of a water resource; and related issues. **Beach Management Units (BMUs)** are the foundation of fisheries co-management and are community-based organizations that bring together everyone involved in fisheries at a fishing beach – boat owners, boat crew, traders, processors, boat builders and repairers, net repairers, and others -- to work with government and other stakeholders in managing fisheries resources and improving the livelihoods of the community members.

5.3 LAND TENURE

According to the National Land Policy (1997) and Land Act of 1999 all land in Tanzania is public land and vested in the president as trustee for all the citizens of Tanzania. For management purposes, there are three categories of land in the country: General Land, Village Land, and Reserved Land. **Reserved Land** is land set aside as protected areas for wildlife, forests, and marine and coastal protection. The different types of Reserved Land are managed according to the laws and purposes for their designation. **Village Land** includes all land inside the boundaries of registered villages. Village Councils and Village Assemblies have the authority to manage these lands. **General Land** is land which is neither Reserved Land nor Village Land.

One type of land may be transferred to another category should the need arise, and the Land Act gives the procedure for the process of transfer. Transfer of lands between use categories may be a threat to biodiversity, forests, and the environment in general if not done under an integrated framework of land use planning, which is currently lacking. For example, according to USAID's Property Rights and Resource Governance Country Profile for Tanzania (USAID, 2011d) "Central government officials issuing mining licenses are often unaware of current land uses and existing mining permits, and large mining operations have been granted rights to land on which there are conflicting agricultural, conservation and artisanal mining interests."

5.4 TREATIES

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

Table 5.1 Tanzania's Membership in International Conventions

Treaty or Convention Name	Ratification Date
Convention Concerning the Protection of the World Cultural and Natural Heritage	1977
Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES)	1979
United Nations Convention on the Law of the Sea	1985
Montreal Protocol - Harmful chemicals to the ozone layer	1993
Basel Convention - Controlling transboundary movements of hazardous wastes and their disposal	1993
United Nations Framework Convention on Climate Change	1996
Convention on Biological Diversity (CBD); Cartagena Protocol	1996
United Nations Convention to Combat Desertification	1996
Bonn Convention - Convention on Migratory Wild Animal Species	1999

Treaty or Convention Name	Ratification Date
Africa-Eurasian Migratory Waterbird Agreement	1999
Convention on Wetlands -- Ramsar Convention	2000
Rotterdam Convention - Regulation of international trade for harmful chemicals and insecticides	2002
The International Treaty on Plant Genetic Resources for Food and Agriculture	2004
Stockholm Convention - Protecting human health and the environment from persistent organic pollutants	2004

5.5 INSTITUTIONAL ISSUES

Although the ETOA Team did not gather the kind of information that would enable us to evaluate the effectiveness of these laws, policies, and institutions, we here reflect on some of the significant institutional issues that present challenges to effective management of biodiversity and forests in Tanzania, and present some illustrative examples.

The major institutional problems in biodiversity and forest conservation in Tanzania include poor coordination among government institutions responsible for natural resources management and conservation, and lack of transparency in execution of laws and regulations. Lack of sectoral coordination has led to conflicting policies and actions. Inadequate implementation and enforcement of legally-established planning process and regulations enables corrupt practices to take place in the various natural resource management sectors.

According to peoples' views aired on radio and television, in July, 2012, lack of effective coordination among relevant ministries and management agencies is currently the major problem undermining sustainable natural resources management in Tanzania. Constant change of leadership, susceptibility to corruption among government staff, and lack of accountability by some of government officials has affected the performance of the sector. (Leader-Williams, et al., 2009) According to radio and television stories aired during the parliamentary session from June to August, 2012, poor performance of the sector, particularly the Wildlife Department, has attracted a lot of speculation from the public and many other stakeholders, including local communities and international organizations. "The natural resources sector is one of many which provide ready opportunities for the personal accumulation of wealth, especially by corrupt officers…." (Walsh, 2000. p. 12)

One example is the process used by two mining companies, Mantra Tanzania Limited and Uranium Resources, to gain access to parts of the Selous Game Reserve. According to local communities, Tanzania Game Frontiers, a hunting safari company, had a contract for a hunting concession with the Government of Tanzania that was due to expire in 2009. The area had been gazetted as a WMA and the Community Based Organization accorded Authorised Association (AA) status, so any new contract was supposed to be signed between the company and the AA. Apparently, however, the hunting concession for TGF was extended to 2012, and this situation has invited speculation about corrupt arrangements or deals that reward individuals rather than local communities (Selous-Niassa Wildlife Protection Corridor Project, 2010). The Selous issue was also raised by Opposition Party members in the Parliament Session of June-August, 2012.

Another example is the long-standing conflict in Loliondo over land tenure and natural resource uses. Adjacent to the Serengeti National Park and also one of the prime grazing areas for

pastoralists in the region, the Loliondo area is highly contested. According to Village Land Act No. 5 of 1999, all land in Loliondo Division is classified as Village Land. However, there is spatial overlap of Village Lands and a Game Controlled Area (GCA), which since 1992 has been leased to the Ortello Business Corporation, a big-game safari hunting company based in the United Arab Emirates. Prior to 2009, the fact that it was a GCA had no bearing on land use or management. However, the 2009 Wildlife Conservation Act prohibits farming and livestock grazing in GCAs, potentially taking away the rights of local pastoral communities in favor of foreign hunting operators. This situation has created deep-seated conflict between the Government and local pastoralists (TNRF, 2011, p. 3).

To improve performance of some of the agencies managing natural resources, the Government of Tanzania has decided to make some major changes in the sector, including a review of institutional structures and systems and changes of some key staff (Juma Mgoo, Executive Director, Tanzania Forest Service, personal communication, May, 2012). Examples of such changes include the establishment of the Tanzania Forest Service (TFS), and the current plans to establish the Tanzania Wildlife Authority (TAWA). The aim of such institutional changes is to increase efficiency and effectiveness by reducing bureaucracy and creating mechanisms for returning revenues from natural resources to the institutions that manage them.

6.0 NGO AND DONOR PROGRAMS AND ACTIVITIES

We present below a brief review of NGO, donor, and private sector programs and activities. As for Tanzanian laws, policies, and institutions, the ETOA Team did not have the methodologies or information that would allow it to evaluate the effectiveness of these organizations and their activities in a realistic way, and we did not attempt to do so.

6.1 NON-GOVERNMENTAL ORGANIZATIONS

NGOs, both international and national, bring the voice of civil society to issues of biodiversity conservation and sustainable environmental management in Tanzania. They conduct research, implement programs, educate citizens and decision-makers, and advocate their views. Priorities of the large international conservation NGOs that work in Tanzania, including priority areas of geographic focus, were discussed in Section 2.7. Readers can refer to Annex E for more information on the priorities and activities of both the international NGOs and a partial list of national-level NGOs.

6.2 DONORS

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

7.0 ACTIONS NEEDED TO CONSERVE BIODIVERSITY, FORESTS, AND ENVIRONMENT

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

7.1 ACTIONS NEEDED AS IDENTIFIED BY THE GOVERNMENT OF TANZANIA

The Analysis Team took as our starting point Tanzania's own official view of what actions they consider necessary to conserve biodiversity in the country. In seeking to understand this view, the Team first reviewed Tanzania's *Fourth National Report to the Convention on Biological Diversity*, released in 2009. Box 7.1 summarizes the "actions necessary" implied in that report.

CBD 4th National Report, 2009 [selected actions needed]

Need to:

- Develop and strengthen sectoral and cross-sectoral institutional co-ordination for harmonization and mainstreaming of biodiversity concerns in planning and management (p.44)
- Improve community standard of living through equitable sharing of income generated from the sustainable utilization of biodiversity resources (p.44)
- Establish and promote research and development programs with a view to building the capacity to efficiently conserve and sustainable use the biodiversity resources
- Ensure fragile ecosystems such as dry lands, mountainous and wetland ecosystems have specific and well-tailored development programs
- Adopt community participation approaches at all levels of planning, development and management of biological diversity (p. 45)
- Integrate biodiversity conservation in national economic planning (p.48)
- Establish Environmental Impact Assessment guidelines for aquatic biodiversity
- Assess biodiversity base potential in marine and freshwaters of Tanzania to govern exploitation and avoid depletion of stocks
- Prevent and control illegal fishing practice through inspectorate services/surveillance
- Improve land use planning in coastal areas
- Increase attention on environmental impacts in proposed development projects (pp. 49-50)
- Strengthen the capacity of local communities to administer and manage PAs (WMAs, community forests, etc.)
- Recognize the user rights of local communities and empower them to manage and conserve natural resources (p. 50)

Other Tanzanian Government documents also give "actions necessary" on more specific, focused topics. One example is the Strategic Environmental and Social Assessment (SESA) for the

National Irrigation Master Plan (NIMP) and the National Irrigation Policy (NIP), completed in 2011 (SMEC, 2011,pp. 194-195) The SESA found needs to:

- Conduct EIAs for all developments and adhere to the EIA recommendations;
- Promote and ensure Integrated Water Resources Management;
- Conduct Environmental Flows Assessments and allocations;
- Conduct stream flow monitoring;
- Promote water saving technologies;
- Promote drought resistance crops;
- Conduct environmental flow assessments in all rivers and wetlands;
- Assess the response of aquatic biodiversity to flow regimes;
- Undertake detailed ecological surveys to identify ecologically sensitive areas, viable wildlife corridors, and prepare biodiversity monitoring plans for each irrigation scheme.

We also reviewed the National Adapation Program of Action (NAPA), prepared by the Government of Tanzania in 2007, to look for "actions needed" that might be relevant to biodiversity and forest conservation contained in that document. A main objective of the NAPA was "To identify and develop immediate and urgent NAPA activities to adapt to climate change and climate variability." (URT 2007, p. 2) A list of 14 kinds of activities were given highest priority: Need/need to:

1) [increase] water efficiency in crop production, [develop] irrigation to boost production, and conserve water in all areas

2) [develop] alternative farming systems and water harvesting

3) develop alternative water storage programs and technology for communities

4) [develop] community based catchments conservation and management programs

5) explore and invest in alternative clean energy sources e.g. Wind, Solar, bio-diesel, etc. to compensate for lost hydro potential

6) [promote] cogeneration in the industry sector for lost hydro potential

7) [develop] afforestation programs in degraded lands using more adaptive and fast growing tree species

8) Develop community forest fire prevention plans and programs

9) Establish and Strengthen community awareness programs on preventable major health hazards

10) Implement sustainable tourism activities in the coastal areas and relocation of vulnerable communities from low-lying areas.

11) Enhance wildlife extension services and assistance to rural communities in managing

wildlife resources

12) [promote] water harvesting and recycling

13) Construct artificial structures, e.g., sea walls, artificially placing sand on the beaches and coastal drain beach management system

14) Establish good land tenure system and facilitate sustainable human settlements

Any actions recommended in the NAPA that call for improved water management and water conservation should have positive effects on aquatic ecosystems and biodiversity. Actions 11 and 14 above also should help conserve biodiversity and forests.

7.2 ACTIONS NEEDED ACCORDING TO KEY INFORMANTS

The Assessment Team gathered information about "actions necessary" to conserve biodiversity and tropical forests from the diverse sources described in the Introduction to this report. From our interviews and meetings with over 100 key informants, ranging from the heads of government agencies to village representatives in Wildlife Management Areas (see Annex D: Persons Contacted), we compiled a list of 153 "actions necessary" as stated by this wide range of environmental "stakeholders" (see Annex E). These actions needed for biodiversity, forest, and environmental conservation are those actions that remove or reduce the social, political, and economic causes of the threats to biodiversity that were discussed in Chapter 4.

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

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

Actions needed that were mentioned repeatedly clustered as "themes"; in fact, 93 of the 153 actions listed by key informants fit into only 12 themes. These themes and their rankings by frequency are listed in Table 7.1.

Table 7.2: Actions Necessary from Key Informant Interviews

Theme: "Need to…."	# of times mentioned
Use Integrated, Harmonized, Multi-Sectoral Approaches	17
Improve Land Use Planning	11
Improve Environmental Impact Assessment	8
Control Poaching and Illegal Harvesting	8
Broaden Participation and Decentralize NRM	8
Prevent Corruption	7
Develop Mechanisms to Conserve Ecosystem Services	7
Improve Woodfuel Efficiency and Find Alternatives	6
Improve Climate Information and Maintain Traditional Coping Mechanisms	6
Improve Watershed and Water Management	5
Stop Forest Conversion to Agriculture	5
Control Beach Tourism Development	5
Total	93/153

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

Use Integrated, Multi-Sectoral Approaches

Our key informants emphasized the need for a multi-sectoral approach that involves the agriculture, water, energy, fisheries, wildlife, livestock, forestry, environment, and local government sectors." They stated that a major cause of threats to biodiversity is uncoordinated and conflicting policies of sectoral institutions, and described "Kilimo Kwanza" is a good example of this cause of threats to the environment. A multi-sectoral political dialogue among relevant ministries is needed, they said, to bring about "legal harmonization" of currently contradictory laws governing natural resources and land, and create more integrated approaches to development and conservation. Integrated River Basin Management Plans are needed for all river basins in Tanzania, and Integrated Coastal Zone Management Plans needed for all coastal areas.

Improve Land Use and Coastal Zone Planning

Integrated land use and coastal zone spatial planning is needed at all scales, from national to local, to prevent conflicting land and resource uses, and optimize societal benefits from ecosystems. Such planning is needed to prevent the expansion of agriculture and grazing in protected areas, to maintain corridors for the movement of wildlife and pastoralists, to protect natural vegetation water catchments, and to maintain a mix of coastal zone ecosystem services and other benefits. Resolving land and resource tenure issues is necessary for effective land and coastal resources planning.

Improve Environmental Impact Assessment

According to our key informants, the capacity and processes for conducting EIAs in Tanzania is very weak, as is government oversight of these assessments. They emphasized the need to develop adequate national EIA capacity and authority. EIAs were seen to be particularly

important for irrigation projects, extractive industries (e.g., mining, gas, oil), coastal tourism infrastructure, and proposed hydropower dam development (e.g. Stigler's Gorge). An independent authority is needed in Zanzibar (like NEMC on mainland) to monitor compliance with environmental policies and EIA recommendations, they said.

Control Poaching and Illegal Harvesting

Another theme emphasized by our key informants was the need to control poaching of all kinds: poaching related to international trade in illegal wildlife products (e.g., ivory, rhino horn), of high-value tree species (e.g., ebony, rosewood), and of animals of many kinds for bushmeat. Controlling illegal fishing by unlicensed foreign fishing boats within the Tanzanian EEZ is needed, as well controlling illegal nearshore fishing (including dynamite fishing and use of illegal gear). Illegal mangrove harvesting, centered in the Rufiji Delta, was also mentioned. The key to controlling poaching of all kinds is reforming anti-poaching policies and law enforcement, our key informants said. And, since poaching is driven by corruption at all levels, preventing corruption (see below) is linked to controlling illegal harvesting.

Broaden Participation and Decentralize NRM

Our key informants emphasized the need to broaden the participation of all stakeholders in NRM and conservation. Civil society pressure is needed to advocate and lobby for sustainable NRM and decentralized CBNRM, and national-level government agencies need to consult local residents and stakeholders, and not make top-down decisions. A real devolution of power to communities – "bottom up" conservation – is needed. Broad participation and decentralization is needed not only for wildlife management (WMAs), but also in fisheries, forest, and water management. Long-term support from donors and NGOs is needed to build the capacity of local institutions to manage and conserve local natural resources.

Prevent Corruption

Many key informants emphasized the link between what one called "corruption syndrome" in Tanzania, and the range of illegal activities that threaten biodiversity. Preventing corruption will require continued improvements in governance, including in transparency, fairness, and law enforcement. Donors and NGOs can provide support to improve governance at all levels.

Develop Mechanisms to Conserve Ecosystem Services

The concept of ecosystem services is just beginning to catch on in Tanzania, and there is a need to educate policymakers about ecosystem services and compensation mechanisms to conserve them. A national policy framework is needed, and pilot schemes and models will be needed to test and refine the policies. An integrated, multi-sectoral policy framework for conservation of ecosystem services is needed, since these services are diverse. Forest-water linkages were often mentioned by our informants. According to one, the Tanzania Forest Service needs to "push" the issue of paying to conserve catchment forests, including to develop Payments for Ecosystem Services mechanisms so that water users pay something for the conservation and management of the forests in the catchments where the water comes from. Managing catchment forests to protect groundwater recharge was also emphasized.

Improve Woodfuel Efficiency and Find Alternatives

Because the country's heavy reliance on firewood and charcoal is a major cause of forest degradation, our informants emphasized the need to increase efficiency or find alternatives to wood-based fuels for cooking. Government agencies, NGOs, and donors need to promote more efficient stoves and alternative sources of cooking fuel. However, one of our informants pointed out that charcoal was a widely used form of potentially renewable energy, and should be treated as an opportunity for low-emissions development through the use of more efficient charcoal-making kilns and more efficient stoves.

Improve Climate Information and Maintain Traditional Coping Mechanisms

Many of our informants pointed out the need for a much better network of meteorological data stations, and more and better information to be able to model and forecast climate change. Analyses of climate vulnerability and risk throughout Tanzania are needed. Several informants felt this need for analysis of vulnerability was greatest for the coastal zone. Educating policy-makers and citizens about climate change and adaptation strategies is needed. Helping communities to maintain traditional mechanisms of coping with climate variability, such as maintaining the mobility of traditional pastoralists and the agro-biodiversity of traditional crops, is needed. Protecting ecological corridors for seasonal migrations of wildlife and to enable gradual range shifts of all species is needed.

Improve Watershed and Water Management

Our informants emphasized the need to improve hydrological information throughout the country, and to use this information to develop Integrated River Basin Management Plans for all of the catchments in Tanzania. Hydrological studies are needed to bring water demand in line with supply, to determine ecological flow requirements, and to be able to forecast the effects of climate change. Capacity to monitor and enforce water user permits is weak and needs improvement. Studies and monitoring of groundwater recharge and saline intrusion are needed in the coastal zone, and especially Zanzibar.

Stop Forest Conversion to Agriculture

Our informants emphasized the need for land use planning to stop agricultural expansion, and improved farming practices that will maintain soil fertility without the need for "slash and burn" farming. Government agencies, NGOs, and donors need to develop and promote "conservation agriculture," including use of cover crops, agroforestry, and other soil and soil fertility conservation techniques to intensify smallholder farming (e.g. maize) and improve yields. This will reduce incentives for "slash and burn" expansion of fields into forest and woodland.

Control Beach Tourism Development

Controlling the currently uncontrolled development of beach hotels along the Zanzibar coast and elsewhere in Tanzania was a need identified by many informants. Integrated coastal zone management plans need to be developed for all coastal areas, implemented, and enforced.

Nesting beaches used by sea turtles need to be protected, and lighting at existing beach hotels that threatens nesting turtles should be modified.

Although approximately 60% of the list of 153 actions needed (see Annex H) mentioned by our informants could be clustered into one or another of the twelve themes above, the other 40% were much more diverse, and in some cases more specific and targeted either to a particular geographic area (e.g., Zanzibar, Selous) or topic (e.g., sea turtle nesting, pesticides). The following list gives a flavor for some of the diversity of the other actions needed that could not easily be clustered into thematic categories. Need/need to:

- review and update the National Forest Policy, based on the results of the NAFORMA
- support the Nature Reserve Units in Eastern Arc mountains, which have received much less investment than other PAs
- bring near shore fisheries into a managed system – now they are an unmanaged commons
- private sector initiatives (lodge owners) to support local communities, rather than WMAs where central government takes a big cut
- work on linkages between conservation and population control, maternal and child health, and reproductive health, given the rapid population growth in Tanzania that will eventually undermine conservation efforts anywhere unless population growth is slowed and stopped)
- eradicate the Indian House Crow from Zanzibar
- create a single deep sea fisheries management authority for the United Republic of Tanzania (URT), unifying separate authorities for the mainland and Zanzibar
- improve communication of scientific findings to policy makers

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

8.0 CONTRIBUTION OF PROPOSED USAID-TANZANIA PROGRAMS

8.1 USAID CONTEXT

USAID Policy Framework 2011- 2015

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

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

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

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

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

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

- Promote gender equality and female empowerment
- Apply science, technology, and innovation strategically
- Apply selectivity and focus
- Measure and evaluate impact

- Build in sustainability from the start
- Apply integrated approaches to development
- Leverage "solution holders" and partner strategically

USAID Forward

USAID Forward (USAID 2011a, pp. 32-36; USAID 2011b) is a package of institutional reforms aimed at:

- Rebuilding policy capacity
- Restoring budget management
- Strengthening monitoring and evaluation
- Leading on innovation
- Supporting capabilities in science and technology
- Building the capacity of local institutions
- Attracting and retaining talent

Several of these USAID Forward reforms have clear linkages with "actions needed" to conserve Tanzania's biodiversity, forests, and natural environment, especially strengthening monitoring and evaluation, leading on innovation, supporting capabilities in science and technology, and building the capacity of local institutions.

USAID Climate Change and Development Strategy

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

1) Invest in policy reforms

2) Engage at multiple levels

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

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

5) Leverage private sector investments to the maximum extent possible

6) Partner and coordinate with other donors

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

8) Promote conflict sensitive programming

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

10) Value ecosystem services

Principle 10, "value ecosystem services," provides a strong linkage between biodiversity and forest conservation and sustainable management, because as discussed earlier, biodiversity is the

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

USAID 2011 Project Design Guidance

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

8.2 OVERVIEW OF USAID-TANZANIA PROGRAMS

Natural Resources Management

Because Natural Resources Management (NRM) is one of USAID-Tanzania's Strategic Objectives (SO 13), it makes directly relevant contributions to meeting some of the actions necessary for conserving biodiversity and tropical forests in Tanzania. The NRM Program takes an ecosystem/landscape scale approach: "Resources, habitats, people, climate and development are inter-related. Our approach is therefore at a broader, landscape scale so these linkages and relationships can be taken into account" (USAID-Tanzania, 2012).

USAID-Tanzania's current NRM Program works in five "targeted landscapes":

- Maasai Steppe Landscape (Arusha, Manyara Regions, north-central Tanzania)
- Coastal Ecosystem (Tanga, Pwani Regions, north to central coastal Tanzania)
- Gombe - Masitu – Ugalla Landscape (Kigoma, Katavi, Tabora Regions, western Tanzania)
- Wami-Ruvu and Rufiji River Basins (Iringa, Morogoro Regions, south-central Tanzania)
- Wildlife Management Areas (nationwide)

Funding levels for the NRM Program were approximately $18 million in FY 2009, $17.1 million in FY 2010, and $14.5 million in FY 2011, representing a mix of Biodiversity, Water, and Financial Crisis Initiative (FY 2009, 2010), and Global Climate Change (GCC) Adaptation (FY 2010, 2011) funding.

Integrated Water, Sanitation & Hygiene (iWASH) Project

According to information available online, this ongoing project (2010-2013) has as its goal to "support sustainable, market-driven water supply, sanitation, and hygiene services to improve health and increase economic resiliency of the poor in targeted rural areas and small towns within an integrated water resource management framework" (Winrock International, 2012).

The iWASH Project's primary objectives are to:

- Increase sustainable access to water supply by poor rural and small town dwellers in targeted geographic regions
- Increase sustainable access to sanitation and hygiene services by poor rural and small town dwellers in targeted geographic regions
- Increase the number and capacity of private sector entrepreneurs/businesses providing WSH services in targeted rural/small town areas
- Increase access to sustainable financing for communities and entrepreneurs engaged in water supply, sanitation, or hygiene activities in targeted rural/small town areas
- Increase sustainable management of watersheds and water resources quantity and quality.

Targeted geographic areas mentioned above are Wami-Ruvu and Rufiji River Basins.

Feed the Future

The U.S. Government's Tanzania Feed the Future Program (USG, 2011) is led by USAID-Tanzania, and will concentrate on four categories of support:

- Strengthening rice, maize, and horticulture value chains
- Nutrition, especially for children under five and pregnant women
- Agricultural support services and capacity building, including research and development and financial services
- The enabling policy environment

"FTF Tanzania aims to increase the quantity (25 percent for rice, 10 percent for maize and 20 percent for horticulture) and quality of food supply in the country and hence improve overall food availability and utilization. FTF will increase yields of target crops by at least 50 percent (rice from 2 to 3-4tons/ha, maize from 1.5 to 2.5 tons/ha) through dissemination and adoption by farmers of improved farm technologies and agronomic practices such as use of improved seeds and fertilizer. Irrigated agriculture will be promoted to improve productivity and to mitigate the impacts of climate change. The target is to increase the area under irrigation in Tanzania by 15.5 percent, from 306,000 ha to 353,000 ha, through development of smallholder irrigation schemes in Morogoro and Zanzibar" (USG, 2011, p. 17). For maize, FTF Tanzania will concentrate efforts to improve maize productivity in the Kiteto District in Manyara Region and Kongwa District in Dodoma Region (USG, 2011, pp. 24-25).

FTF Tanzania also has a "Rural Roads Infrastructure Component," which by 2015, aims to upgrade 3,000 km of rural roads to facilitate linkage of irrigation schemes with markets, according to the FTF Tanzania Strategy (USG, 2011, p. 33).

Democracy, Human Rights, and Governance (DRG)

USAID-Tanzania's Democracy, Human Rights, and Governance (DRG) Program, "Supporting Accountability to Tanzania Citizens," is outlined in the April, 2012, Project Approval Document, which was provided to the ETOA Team by the Mission (USAID DRG-Tanzania, 2012). The program summary states that it is "… a three- pronged, sector based intervention to improve accountability and oversight of public resources through increased citizen participation. The program will achieve greater citizen engagement in service delivery, and strengthened linkages

between government Institutions of Accountability (IoA) and civil society organizations (CSO). This approach will bridge gaps in CSO's and citizens' understanding of their rights, and their ability to advocate for those rights. The program will catalyze change in governance as CSOs improve their connection with citizens, and as more citizens take advantage of the opportunity to understand their individual rights and what role they play in the democratic process. By 2014, USAID-Tanzania will help achieve, in targeted geographic zones and selected sectors, a more accountable, inclusive decision-making process for public resource management, where civic participation in public affairs is normalized. Tanzanians' informed and active participation in local governance will help set the stage for the 2015 presidential and parliamentary elections. More importantly, efforts to foster greater citizen engagement are expected to model and incentivize behaviors that can be replicated broadly. Such efforts are critical to creating demand for increased transparency and ultimately, improvements in national-level government accountability."

"The program's three-pronged technical approach includes a grant-making mechanism to local CSOs and four government to government funding mechanisms linked by a third capacity building project. Under Prong One, USAID will directly engage CSOs involved in the sectors which USAID-Tanzania is already targeting—health, food security, natural resource management (NRM), and education—through direct grants that will support these CSOs in advocacy, issue-based networking, and social accountability monitoring. These activities will align with the focus regions of USAID's Global Health Initiative (GHI), Feed the Future (FtF), NRM, and Education Programs, namely Dodoma, Iringa, Morogoro, Zanzibar, and Mtwara" (USAID DRG-Tanzania, 2012, p. 7).

Education

The Mission's Education Program focuses on "low performing regions" and builds on prior USAID education activities in these regions. The program will initially focus education support primarily in Mtwara in mainland Tanzania, and Unguja and Pemba Islands in Zanzibar. (USAID-Tanzania, no date, p. 6).

Health

U.S. development assistance in the health sector is by far the largest component of USG assistance, approximately 80% of funding (Trina Betts, USAID/AFR Tanzania Desk Officer, personal communication, 29 May 2012). "There is no single summary document for USAID-Tanzania health program. There is a "Tanzania Global Health Initiative Strategy," and while it primarily describes what USAID-Tanzania does in the health arena, it also includes all other USG agencies (e.g. CDC and DoD) under one giant health umbrella... this umbrella encompasses PEPFAR, PMI, maternal/child health, tuberculosis, nutrition, family planning, and "health systems strengthening" (i.e. the business end of the health system)." (Andrew Rebold, USAID-Tanzania Deputy Health Team Leader, personal communication, in email of 3 July 2012).

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

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

Table 8.3: Actions Needed and Potential Contribution of USAID-Tanzania Programs

Theme: "Need to…."	**USAID Program/SO**				
	NRM	**FTF**	**DRG**	**HLTH**	**EDU**
Use Integrated, Harmonized, Multi-Sectoral Approaches	X	X	X	X	X
Improve Land Use Planning	X	X	X		
Improve Environmental Impact Assessment	X	X	X		
Control Poaching and Illegal Harvesting	X	X	X		
Broaden Participation and Decentralize NRM	X	X	X	X	X
Prevent Corruption	X		X		
Develop Mechanisms to Conserve Ecosystem Services	X	X	X	X	
Improve Woodfuel Efficiency and Find Alternatives	X	X		X	
Improve Climate Information and Maintain Traditional Coping Mechanisms	X	X		X	
Improve Watershed and Water Management	X	X	X	X	
Stop Forest Conversion to Agriculture	X	X			
Control Beach Tourism Development	X		X		

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

Opportunities to Contribute to Integrated, Multi-Sectoral Approaches

The most commonly expressed need identified by this ETOA for moving toward sustainable environmental management in Tanzania is integrating the environment and development sectors and mainstreaming biodiversity conservation. The ecosystem-wide, landscape-scale approach used in designing USAID-Tanzania's NRM Program provides a solid conceptual foundation for activities that can address this general "action needed." One way that USAID-Tanzania could make an important contribution to meeting this need would be to realign its NRM and FTF programs so that they are more strategically linked.

The ETOA Team also believes that there is an excellent opportunity to contribute to meeting this overarching "action needed" through closer linkages with the Mission's DRG Program. The DRG strategy states that "USAID-Tanzania will help achieve, in targeted geographic zones and selected sectors, a more accountable, inclusive decision-making process for public resource management, where civic participation in public affairs is normalized." The land, water, agriculture, and biodiversity conservation "sectors" are desperately lacking the kind of "accountable, inclusive decision-making process of public resource management" mentioned in the strategy.

Opportunities to Contribute to Improving Land Use Planning

The opportunity to contribute to meeting this need could also be realized through a closer integration between the USAID-Tanzania NRM, FTF, and DRG Programs. The NRM Program's past support for decentralized wildlife management through WMAs is a foundation to build on. The need for sectorally-integrated land use planning, especially at the local level, was mentioned many times by our key informants. Broadening planning to include forest lands, wildlife areas, agricultural lands, and water catchments is needed. Many opportunities exist for linking improved land use planning with themes in the DRG sector, such as parliamentary strengthening, anti-corruption, media development, NGO capacity-building, advocacy, citizen engagement on land use policy, monitoring of government accountability by civil society organizations, and decentralization and devolution.

Opportunities to Contribute to Improving Environmental Impact Assessment Capacity

A significant opportunity to contribute to meeting this need could come through a closer integration of NRM and FTF activities. USAID-Tanzania provided the ETOA Team with "feasibility studies" from the MAFSC for two of the proposed FTF irrigation rehabilitation and expansion schemes. We reviewed those, and it is our judgment that the environmental and social impact assessment components of those feasibility studies are superficial and inadequate. In our recommendations, below, we discuss this issue further and present it as an opportunity for EIA capacity-building in the relevant Tanzanian Government agencies. As with land use planning, many opportunities for linking the improvement of EIA capacity with DRG activities exist.

Opportunities to Contribute to Controlling Poaching and Illegal Harvesting

Through its support for WMA development, the NRM Program has been contributing to empowering local communities and enabling them to benefit economically from local natural resources. This should contribute to reducing poaching and illegal harvesting. The FTF Rural Roads Infrastructure component should be structured so that harvesting of bushmeat by road-building crews can be prevented. This has proven to be a common problem elsewhere in Africa (P. Coppollilo, personal communication). According to one of our key informants, corruption is the root cause of poaching and illegal harvesting of all kinds, whether elephants, rhinos, or high-value timber trees. For this reason, DRG Program activities aimed at anti-corruption and transparency should contribute to controlling poaching and illegal harvesting of high-value species.

Opportunities to Contribute to Broadening Participation and Decentralizing NRM

Through its support for WMA development, the NRM Program has been contributing to meeting this need. Much remains to be done to support the WMA process. Models and "lessons learned" from the WMAs process are needed in other kinds of NRM decentralization, such as participatory forest management, participatory fisheries management, and water users associations, and vice versa. In addition, models for linking communities with natural resources

more directly with the private sector to allow them to retain a larger share of the benefits from their local resources are needed. There are obvious linkages with the DRG Program, in terms of broadening participation and linking citizens with government institutions responsible for managing ecological resources such as wildlife, fish, forests, and water. WMAs and other CBNRM institutions, citizen engagement and advocacy, and government accountability need to be improved. These needs fit well within USAID-Tanzania's DRG strategy. In addition, the ETOA Team believes that there are some potential benefits from linking the Mission's Health and Education Programs with communities being supported in NRM decentralization. Geographical co-location of Health activities in communities with NRM activities should be considered – such as HIV/AIDS, anti-malaria, maternal and child health, family planning and reproductive health, and nutrition programs (Oglethorpe, et al., 2008). Opportunities for geographical co-location of Education activities in communities with NRM activities should also be explored.

Opportunities to Contribute to Controlling Corruption

The opportunity to link controlling poaching and illegal harvesting of high-value species with DRG Program anti-corruption activities was discussed above. This kind of intervention in turn could contribute to DRG by establishing precedents in anti-corruption efforts and providing a model for engagement between local citizens and local officials in preventing corruption.

Opportunities to Contribute to Developing Mechanisms to Conserve Ecosystem Services

Our key informants proposed that Tanzania needs a national policy to enable Payments for Ecosystem Services (PES), especially for watershed ecosystem services. To establish such a PES policy will require that parliamentarians and policymakers become educated about what ecosystem services are, and about compensation mechanisms to conserve them. This educational process, and the policy development to follow, will require pilot demonstrations and models. USAID-Tanzania has an important opportunity to develop such demonstrations and models, and contribute to policy formation, by making its support for irrigation contingent on linking with watershed-based PES development. Watershed ecosystem services bring important benefits in the agriculture (irrigation), health (water supply for domestic use and sanitation), and energy (hydropower) sectors.

Opportunities to Contribute to Improving Woodfuel Efficiency and Finding Alternatives

All rural communities and most urban areas in Tanzania are highly dependent on wood or charcoal for cooking fuel. FTF activities that may attract people to an area for agriculture-sector jobs should include a component to prevent increasing pressure on local woodfuel resources. Improving cookstove efficiency can play an important role in reducing indoor smoke pollution that is a serious health issue, especially for women and children.

Opportunities to Contribute to Improving Climate Information and Maintain Traditional Coping Mechanisms

Improved climate and hydrological information is needed for integrated, multi-sectoral planning for sustainable development, and a contribution could be made through the NRM, iWASH, and FTF Programs. Maintaining the climate resilience of human and wildlife populations can be supported through a number of NRM, FTF, and DRG Program activities. Climate information is important in the health sector, as animal and human diseases may respond to climate variability and change.

Opportunities to Contribute to Improving Water Management

Improved water management will be a natural outcome of actions taken to manage natural resources in a more integrated, holistic fashion, as discussed above. Closer integration among USAID-Tanzania's NRM, FTF, and DRG Programs can contribute. Domestic potable water supply, and water for sanitation, are important benefits of watershed ecosystem services, discussed above. USAID-Tanzania is designing an integrated water resource management program in Southern Agricultural Growth Corridor of Tanzania (SAGCOT) region.

Opportunities to Contribute to Stopping Forest Conversion to Agriculture

Improved land use planning and more participatory natural resources management could contribute to slowing and stopping the conversion of forest to agriculture. One of the main causes of threats to forest and woodland ecosystems in Tanzania is the expansion of low-yield, "slash and burn" agriculture. A closer integration of the NRM and FTF Programs could expand the use of "conservation agriculture," especially for maize, to increase yields and maintain soil fertility on the same piece of land, thereby reducing the incentive to clear more land.

Opportunities to Contribute to Controlling Beach Tourism Development

Integrated coastal planning and zoning is needed to control the unregulated development of beach hotels, jetties, and other infrastructure. This opportunity for USAID links back to opportunities for supporting improved participation and governance through its DRG Program.

9.0 RECOMMENDATIONS

Based on our analysis, the assessment team recommends that USAID-Tanzania support activities in the following ***priority areas***. In one sense, these recommended priority areas are clusters of the thematic categories of "actions needed" identified in Chapter 7 and in Table 8.1.

1) Improve the integration of NRM and FTF activities to:

- Promote integrated, multi-sectoral approaches
- Improve land use planning
- Improve EIA capacity
- Develop PES policies and mechanisms
- Improve woodfuel efficiency and alternatives
- Improve watershed and water management

2) Continue and expand support for participatory, decentralized NRM to:

- Improve land use planning
- Control poaching and illegal harvesting
- Broaden participation and decentralize NRM
- Prevent corruption
- Maintain traditional mechanisms for coping with climate variability

3) Improve climate information and maintain traditional coping mechanisms to:

- Use integrated, harmonized, multi-sectoral approaches
- Improve land use planning
- Broaden participation and decentralize NRM
- Improve watershed and water management

Each of these three recommended priority areas is discussed in more detail below.

Improve Integration of NRM and FTF Activities

The Tanzania Feed the Future Strategy appears to be based on "an agriculture-based economic growth model in Tanzania," being promoted within the Tanzanian Government by the Ministry of Agriculture, Food Security, and Cooperatives (MAFSC), which describes Tanzania as "…a sleeping agricultural giant" and "a country abundant in land, water resources" (USG, 2011, p. 8). The FTF Tanzania Strategy states that "… vast opportunities for rice development exist in the country because of the availability of land (21 million ha) suitable for rice. Adequate water resources (both surface and aquifer) provide the necessary inputs for irrigation in the target areas." (USG, 2011, p. 23)

The Feed the Future Program approach is based on a number of principles, one of which states that "Environmental degradation can affect the sustainability of investments in agricultural development and food security, impede long-term economic growth, and adversely affect livelihoods and well-being. Feed the Future strategies for food security are designed not only to accelerate agriculture-led growth and reduce undernutrition, but also to encourage sustainable and equitable management of land, water, fisheries, and other resources. Poor land use and

agricultural practices are common factors that increase the vulnerability of developing countries to global threats such as water scarcity and pandemic disease. ***Feed the Future integrates environmental concerns into our investments and builds the capacity of partner countries to take advantage of opportunities in effective resource management and proactive adaptation to environmental challenges.***" [emphasis added] (Feed the Future, 2012)

The Tanzania FTF Strategy recognizes that "Unchecked and ill-planned agricultural expansion is one of the most severe threats to Tanzania's natural resource base… Agricultural expansion using existing techniques carries environmental costs as forests and wildlife areas are encroached on, as increasingly marginal land comes into cultivation, and as fish stocks are depleted" (USG, 2011, p. 14).

The recommendation to improve the integration of natural resources management and agriculture is in line with the USAID 2011-2015 Policy Framework, because one if it's seven "operational principles" is: "Apply integrated approaches to development" (USAID, 2011a, p. iv). USAID's 2011 Project Design Guidance calls for a mandatory "Sustainability Analysis," in addition to the mandatory "Environmental Analysis" that this ETOA represents (USAID, 2011c, p. 15). The Sustainability Analysis is supposed to analyze "institutional capacity," among other sustainability issues. We recommend that USAID Tanzania conducts such an analysis to better understand the capacity of the Government of Tanzania to carry out integrated approaches to development before designing projects in which Tanzanian Government agencies (e.g., MAFSC) are partners.

In developing a stronger integration between NRM and FTF Program activities, the ETOA Team recommends that USAID-Tanzania:

- Conduct a Programmatic Environmental Assessment for the irrigation component of Tanzania FTF, including watershed-wide environmental flow and water quality impact assessment for the Kilombero Valley Ramsar Site. Flow analysis should consider seasonal and long-term, climate-related sources of variability.
- Assess effects of rural roads infrastructure on wildlife movement (Coppollilo, 2006).
- Improve EIA capacity and practice in all Tanzanian Government ministries and agencies.
- Install hydrological monitoring stations above and below any irrigation scheme. Water quality parameters (nutrients, pesticides, sediment load) should also monitored.
- Create a mechanism for long-term monitoring by the relevant River Basin Water Board (e.g., Rufiji, Wami-Ruvu) of water abstraction for irrigation. This independent monitoring capacity should be paid for out of a water fee by water users, and should be institutionalized to persist for the life of the infrastructure, beyond the life of USAID support.
- Create a mechanism to prevent illegal water diversion by smallholders downstream or adjacent to any irrigation projects (Coppollilo, et al., 2008). Such water "poaching" reduces return flows, and if not prevented, designed levels of water use will be inaccurate. This control of associated expansion of irrigation linked to a given irrigation scheme should be institutionalized to persist for the life of the infrastructure, beyond the life of USAID support.

- In any irrigation scheme supported by USAID, if beneficiary communities are dependent on nearby forests for fuelwood and charcoal, work with relevant agencies (e.g. Tanzania Forest Service, TANAPA, research and training institutions) responsible for forest/watershed management to control fuelwood harvesting, and to improve efficiency of cookstoves in beneficiary communities. (Otherwise population increase caused by irrigation development may have unintended consequence of increasing forest or woodland degradation.) Many of USAID-Tanzania's implementing partners have experience in promoting more efficient cookstoves.

USAID's proposed support of the expansion and/or rehabilitation of irrigated rice production in the SAGCOT region appears to the ETOA Team to be based on the sectoral view of "agriculture-based economic growth" currently being promoted by the Ministry of Agriculture (MAFSC) and the "Kilimo Kwaza" ("Agriculture First") Initiative from the Office of the President. This view sees Tanzania as "a country abundant in land, water resources" (USG, 2011, p. 8), where "… vast opportunities for rice development exist…" (USG, 2011, p. 23). In developing an FTF strategy that embraces the MAFSC, Kilimo Kwanza approach, USAID may have missed some opportunities to support more sectorally-integrated development.

The ETOA Team believes that the view that Tanzania is "a country abundant in land [and] water resources," and with "vast opportunities for rice development," is not supported by available evidence, whereas, according to USAID Project Design Guidance, "Project design should be informed by evidence, supported by analytical rigor…" (USAID, 2011c, p. 2). Evidence gathered by the ETOA Team that contradicts the view that land and water is abundant in the SAGCOT region includes the following:

1) In a meeting with staff of the Rufiji Basin Water Office, the Ministry of Water and Irrigation agency responsible for allocating water for all uses throughout the Basin, we were told that "Demand [for water] is higher than supply," that "Some rivers are overused because of irrigation," and that "Sometimes the government asks us to save water for the environment, other times other government agencies build big infrastructure projects for irrigation, and cut these environmental flows."

2) Several key informants, from government agencies as well as conservation NGOs, suggested that Kilimo Kwanza and SAGCOT development are causes of threats to biodiversity, forests, wetlands, and integrated water resources management in Tanzania, because they represent the usual kind of uncoordinated, narrowly-sectoral, policies.

3) The Strategic Environmental and Social Assessment that was conducted in 2011 for the National Irrigation Master Plan and National Irrigation Policy had a number of recommendations (SMEC, 2011, p. 194) including:

- Conduct EIA for all developments and adhere to the EIA recommendations;
- Promote and ensure Integrated Water Resources Management;
- Conduct Environmental Flows Assessment and allocation;
- Conduct stream flow monitoring;
- Enhance early warning and disaster preparedness;
- Promote water saving technologies; and

- Promote drought resistance crops.

These recommendations have yet to be implemented.

4) The general manager of a private rice farm in the Kilombero Valley provided information on water needs for rice irrigation: "As a rule of thumb you require 1 cubic meter per second for 1,000 ha of irrigated rice." When told of the proposed size of the proposed Mpanga-Ngalimila Irrigation Scheme in the Kilombero Valley, with a proposed area of 31,500 ha, he said "The amount of water removed to do this would leave the Kilombero River bone dry in the dry season (31cubic meters per second assuming high efficiency pressurized irrigation system) – flood irrigation is about 45% efficient so you would need more than this. Generally the soils in Kilombero are sandy loams or sandy clay loams with high infiltration rates which are not suitable for flood irrigation."

5) According to the Director of Planning and Investment at the Rufiji Basin Development Authority, RUBADA, speaking about the entire Rufiji Basin, "You don't know who is there, what all is going on in the Basin. It's just total confusion."

6) "The government is injecting a lot of support to Kilimo Kwanza, and you wonder how this is being guided," according to a respected senior forestry expert at a conservation NGO.

7) According to a staff member at a conservation NGO, "The opportunity for rice development is only feasible and sustainable if it focuses more on improvements of irrigation systems and improving farming techniques. I would say at this point that intensive study should be carried out prior to expansions so that rice contributes to food security of the country but also minimises adverse impacts to other sectors."

In response to the question "Are water flows in the areas proposed for irrigation development by USAID-Tanzania FTF sufficient to meet the irrigation needs?" the answer seems to be that it is impossible to answer that question at the present time because the hydrological data that would be needed to answer the question do not exist or are inadequate.

The ETOA Team was told during a meeting at USAID-Tanzania that "the government" had asked USAID for assistance with development of rice irrigation. We found, however, that there is no single, consistent "Government of Tanzania" point-of-view on how best to allocate and manage land and water resources. Although the MAFSC is promoting Kilimo Kwanza, many people we talked to in the MNRT and Ministry of Water and Irrigation view its ideology of "Agriculture First" as a threat to integrated, balanced, multi-sectoral, sustainable development in Tanzania. In this situation, there is a danger that the views of one sector within the national government will prevail, to the detriment of integrated planning for the good of the country as a whole.

We found that not all in the Government of Tanzania share USAID's official view that biodiversity is the foundation for all sustainable development. Some believe, as we heard from the head of the RUBADA, that "We can't jeopardize our development for conservation!"

Continuing as proposed with support for the expansion and/or rehabilitation of rice irrigation in the Kilombero Valley would, we believe, contribute to the lack of integrated, multi-sectoral planning that we identified as the most important cause of threats to Tanzania's biodiversity and natural environment. We believe that it would violate the FTF principle of "integrating environmental concerns" that was quoted earlier, and, because of unknown and unpredictable

(given the current state of hydrological knowledge) negative effects on biodiversity, would violate the spirit and letter of FAA Sections 117 and 119.

By integrating its NRM and FTF Programs more closely, USAID has the opportunity to insist that its support for irrigation expansion is done with the proper hydrological information for adequate science-based decision-making, adequate assessment of competing needs for land and water, adequate integrated planning for biodiversity conservation and development activities, and adequate mitigation mechanisms linked to any rice irrigation. Mitigation mechanisms would involve rice farmers paying a fair price for water through a Payment for Ecosystem Services (PES) mechanism that would compensate the managers of the upstream watershed for a fair share of their management costs.

The ETOA Team believes that USAID should take advantage of the opportunity afforded by the Government of Tanzania's interest in support for rice irrigation to support actions needed to build the capacity for integrated land-use and natural resources management planning throughout the country. Because of the need for such integrated, multi-sectoral planning, USAID should make its support for any rice irrigation rehabilitation or expansion contingent upon building that capacity. Otherwise, USAID would simply be enabling the lack of integrated planning to continue, to the detriment of biodiversity, the natural environment, and the long-term sustainable development of the Tanzanian people. By closely linking NRM and FTF activities, USAID would be modeling what is needed in the Tanzanian Government itself to break down the dysfunctional lack of multi-sectoral integration in planning for the country's development.

USAID-Tanzania provided the ETOA Team with "feasibility studies" from the MAFSC for two of the proposed FTF irrigation rehabilitation and expansion schemes. By far the largest of the proposed irrigation development projects is the Mpanga-Ngalimila irrigation project in the Kilombero Valley, with a proposed area of 31,500 ha. According to the MAFSC feasibility study, "Findings from the rapid environmental and social impact assessment indicate that, introduction of irrigation and drainage activities in the study area will have minimal impacts on the physical, natural and socio-economic environments in Kilombero valley. Notable impacts include gain of agricultural land, possible increase in water-borne diseases and possible soil and water pollution as a result of increase in agrochemical use. ***According to these preliminary findings, the proposed mitigation measures will improve environmental conditions in the study area and allow for sustainable utilization of land and water resources in the area.***" [emphasis added] In this case, and that of the proposed Mgugwe Irrigation Scheme, the ETOA Team found that the Environmental and Social Impact Assessment components of those feasibility studies are completely inadequate. This basically confirms our finding that one of the most important "actions needed" to protect Tanzania's environment is the need to greatly improve EIA capacity. This capacity-building will not come about if USAID-Tanzania, through a contractor, simply conducts a Strategic Environmental Assessment, Programmatic Environmental Assessment, or separate Environmental Assessments for the proposed irrigation schemes in Morogoro and Zanzibar. What is needed is a mechanism for building long-term capacity within the Tanzanian Government and private sector to conduct adequate EIAs to protect the country's environment and natural resources.

The ETOA Team recommends that a Programmatic Environmental Assessment of the FTF Program be conducted to assist in strategically realigning it to link with the NRM Program. The Team does not view project-level EIAs at the level of individual proposed irrigation schemes as sufficient. Even if each of the schemes was found to have an acceptable environmental impact,

the basin-wide impact of the program as a whole (like that of SAGCOT development in general) would not have been assessed and would not necessarily be acceptable.

The NRM Program's ecosystem, landscape-scale approach could benefit from a small conceptual reorientation that considers water as a key factor that integrates ecosystems. Using a "watershed" approach to planning may help to integrate tourism, agriculture, energy, health, and other development sectors, and highlight the need for careful planning to avoid actions that may benefit one water-using sector, but harm another. The lesson of the Usangu Wetlands, donor-funded development of rice irrigation schemes, and the drying up of the Great Ruaha River should be taken as a "lesson learned." (Coppillilo, et al., 2008). USAID-Tanzania would not want to replicate that environmental disaster through its support for rice irrigation in the Kilombero Valley.

In any rice development, USAID could impose a "no net increase in water use" criterion. Conservation agriculture practices for rice should improve yields while either not increasing, or decreasing, the amount of water abstracted from streams, rivers, and groundwater aquifers through better water, nutrient, and pest control practices, combined perhaps with more water-efficient varieties. Furthermore, a "no net change in water quality" criterion would safeguard human health and aquatic and riparian biodiversity and would also avoid drastic reductions in streamflow.

Developing a closer integration of the NRM and FTF Programs also suggests an opportunity to put more emphasis on the maize value chain. One of the main causes of threats to forest and woodland ecosystems in Tanzania is the expansion of low-yield, "slash and burn" agriculture. There is an opportunity, through transferring knowledge of "conservation agriculture" for maize, to increase yields and maintain soil fertility on the same piece of land, thereby reducing the incentive to clear more land (Agriculture Green Growth, 2012). Because most maize is rain fed, the risks to biodiversity associated with irrigation do not exist. USAID-Tanzania could contribute to the need to stabilize the agricultural "frontier" through support for conservation agriculture for maize.

In addition to linking USAID-Tanzania's FTF and NRM Programs, the ETOA Team believes that there is also an excellent opportunity to link with the DRG Program. Opportunities for linkage with DRG include the areas of parliamentary strengthening, anti-corruption, free and open media, NGO capacity and advocacy, and decentralization and devolution.

One key informant suggested that the development of larger agricultural enterprises on the highest potential land for irrigation may push smallholder farmers onto marginal uplands, causing further forest loss and degradation in upstream watersheds, and ultimately jeopardizing downstream water resources. "The big problem is the lack of small-scale farmers' voices in Kilimo Kwanza and SAGCOT," according to one of our key informants.

Support and Expand Participatory, Decentralized NRM

The ETOA Team recommends that USAID-Tanzania take advantage of opportunities in five of the 12 thematic categories of "actions needed" to continue and expand its support for participatory, decentralized NRM. The five categories of actions needed that we believe can be synergistically combined are to:

- Improve land use planning
- Control poaching and illegal harvesting -- related mainly to corruption, although for subsistence bushmeat hunting not so much
- Broaden participation and decentralize NRM
- Prevent corruption – needs to link local and national level – need transparency from all levels, and demand for transparency from all levels to the other levels, and a means of "enforcing" transparency
- Maintain traditional mechanisms for coping with climate variability

Land use planning at national and regional scales is needed to create the enabling environment for effective land use planning at smaller spatial scales, including the village level. Land use planning, like any other kind of public planning, requires adequate participatory institutions, respect for rights to land and resources, rule of law, and other issues with which USAID-Tanzania's DRG Program should be concerned. Integrated land use planning is needed to avoid user conflicts and to prevent unintended negative consequences of one kind of sectoral development on other sectors.

Pastoralism and NRM

Issues of pastoralism and sustainable natural resources management and conservation deserve special attention in any consideration of participatory, decentralized NRM in Tanzania. In spite of many policies and strategies to involve communities in natural resources management, pastoralists have remained a marginalized group. For decades pastoralists have been experiencing a prolonged crisis with a number of causes, including loss of grazing land to competing uses, including for agriculture and for wildlife conservation (Mung'ong'o & Mwamfupe 2003). Combined with population growth in pastoral communities, this has led some pastoral groups to move outside of their traditional areas, putting them in conflict with the established residents and land uses in some areas that traditionally had few livestock, such as Mbeya, Iringa, Morogoro, Rukwa and the Coastal region. The Tanzanian Government has promoted the "modernization" of pastoral and agro-pastoral livelihoods, with one goal being to reduce conflicts between incompatible land uses, and between farming and herding communities. A number of factors, including the inadequate inclusion of key stakeholders in the formulation of laws and policies, have so far prevented these laws and policies from achieving their goals (TNRF, 2006).

Some effects of the failure to stabilize and maintain sustainable pastoral economies include:

- **Overgrazing** of areas because livestock are restricted to more limited grazing areas than in the past. This problem is exacerbated by prolonged drought, which has hit most areas in Kilosa and Mvomero districts in Morogoro region, for example (Mung'ong'o & Mwamfupe, 2003).
- **Deforestation and forest degradation** by some pastoralist groups that have recently moved into the woodlands of southern Tanzania, cutting trees to open the woodland for livestock grazing, as well as for agriculture in the case of agro-pastoralist communities.
- **Soil compaction and increased salinity of water points** because of concentration of livestock in smaller areas (Mung'ong'o & Mwamfupe, 2003).

- **Increased transmission of animal diseases:** Livestock grazing in the vicinity of the wildlife populations can increase disease transmission between livestock and wildlife, and vice versa. While some diseases can be controlled in livestock through treatment and immunization, this is difficult or impossible for wildlife. Drought can increase competition between livestock and wildlife for pasture and water, increasing the chance for disease transmission.
- **Increased use of fire**: Pastoralists traditionally use fire to stimulate regeneration of pasture and decrease levels of ticks and other livestock pests and parasites.
- **Human-wildlife conflicts:** Pastoralists traditionally respond to attacks on their livestock by killing wild carnivores such as lions and leopards. There have been reports of retaliation killing of lions because of livestock depredation in the areas that formerly had no such cases (Kissui, 2008). Recent killings of large carnivores are linked with the presence of immigrant pastoralists in districts such as Rufiji, Sumbawanga, and Ulanga, among others (S. Mtoka, Tanzania Widlife Research Institute (TAWIRI), personal communication).

The solution to pastoralist problems would seem to be integrated land use planning, conducted with full and true participation of all stakeholders, including pastoralists, and sustainable development that includes pastoralists, and doesn't marginalize them. Land and resource tenure issues need to be resolved through better participation and governance. We recommend that USAID Tanzania consider supporting – perhaps with involvement of other donors – an assessment or study of pastoral issues in Tanzania in order to assist the Government of Tanzania to develop a pastoral strategy that does not marginalize these groups, but respects their rights and identifies their roles in sustainable NRM in Tanzania.

Wildlife Management Areas

USAID has been investing in the process of WMA development in Tanzania since 1998, and has achieved some significant successes. Key achievements and results to date (Kajuna, 2012):

- 14 WMAs were gazetted by 2009 with total land area of about 22,000 km2
- 19 other areas, involving around 175 villages, are in earlier stages of WMA development;
- an Authorized Association Consortium has been formed and registered, with the aim of coordinating communications among WMAs and advocating for them.

The ETOA Team visited the Pawaga-Idodi (Mbomipa) and Burunge Wildlife Management Areas. We talked to stakeholders in both WMAs, and in each case heard a spectrum of views ranging from highly positive to highly negative. The existence of such divergent, polarized views about both of these WMAs suggests that a thorough evaluation is needed before USAID makes further investments in this model. The ETOA Team understands that USAID-Tanzania is currently procuring the services of a contractor to evaluate the performance of WMAs to date.

Because of its history of investment, USAID has a "comparative advantage" compared to other donors in this aspect of CBNRM. Therefore, the ETOA Team recommends that USAID continue to support WMA development, with activities informed by the results of the evaluation of WMA performance so far, including governance, transparency and accountability, economic viability, benefit sharing, and the effect of WMAs on poaching and illegal activities.

In terms of maintaining traditional mechanisms for coping with climate variability, WMAs are supposed to help in maintaining migrations of wildlife outside of parks. However, human-wildlife conflicts, and/or pastoralist-agriculturalist conflicts, can be created unless land use planning leads to compatible mixes of activities, or zoning to separate incompatible activities into different geographic areas. Again, land use planning is a key need.

The ETOA Team recognizes that WMAs do not encompass the full range of natural resources that need to be managed at the local level and that can benefit local communities. We therefore recommend that USAID-Tanzania broaden its support for participatory, decentralized NRM to include ecological resources other than wildlife. We believe that lessons learned and knowledge gained from USAID support for WMAs so far can inform progress in CBNRM associated with different types of ecological resources. USAID should:

- Transfer lessons-learned between and among models of decentralized, CBNRM: WMAs, community forest management, participatory fisheries management, Beach Management Units, Water User Associations
- Evaluate private-sector alternative models (e.g., Nelson, 2008; UCRT, 2010) for supporting land/resource rights and land/resource management planning for pastoralists, agro-pastoralists and hunter-gatherers.

Controlling poaching and illegal harvesting is also an issue that should link USAID-Tanzania's NRM and DRG Program. Poaching for high-value products such as ivory, rhino horn, and exotic woods is interwoven with the problem of pervasive corruption. Corruption is not such a strong driver of subsistence bushmeat hunting, which may even be sustainable in some areas, although it may be considered illegal. To prevent corruption, a demand for transparency and accountability from all levels to all other levels – that is, from local to national – needs to be developed.

Improve Climate Information and Maintain Traditional Coping Mechanisms

The ETOA Team recommends that USAID-Tanzania contribute to improving climate and hydrological information in Tanzania, and at the same time take actions that help human communities and wildlife populations maintain the resilience mechanisms that allow them to cope with current climate variability. Understanding the possible effects of climate change on livelihoods and ecosystem services will help in the development of strategies for maintaining resilience.

The Tanzania FTF Strategy (USG, 2011, p. 33) lists a number of "expected outcomes" that would contribute to improving climate information, including improved climate and weather forecasting from the Tanzania Meteorological Agency, improved understanding of climate variability and change at finer geographic scales, and increased local capacity for multi-disciplinary research to create decision support tools. Support for improved climate information is appropriate, because Tanzania lacks high quality weather station records over long enough periods of time to enable robust climate modeling (WWF, 2012, p. 96).

Wildlife in Africa have been coping with, and adapting to, climate variability and change for millions of years, and humans have done so for hundreds of thousands of years. The long-distance seasonal migrations of African ungulates are adaptations to track this natural climate variability. For humans, the traditional mobility of pastoralists, and the diversity of crops among

agriculturalists, are the traditional means of cultural adaptation to climate variability. "Before looking to the future climate projections it is necessary to assess current vulnerability to climate variability. Knowing one's vulnerability to climate variability will provide a base from which to assess future vulnerability and hence adaptation options." (WWF, 2012, p. 80) The first question to ask is "Am I vulnerable to the current climate?" The answer, in almost all cases in Africa, is "yes" – so a rational, "no regrets" course of action is to reduce vulnerability to the current climate before worrying about possible future climate change, the prediction of which is highly uncertain given current information. "Understanding current [climate] vulnerability is an appropriate starting point for the preparation of an adaptation strategy." (UKCIP, 2009, p. 5). Actions that reduce vulnerability to the current climate (for people or ecosystems) will also reduce vulnerability to future climate changes.

Maintaining corridors for seasonal movements of wildlife and pastoralists, to which the NRM Program has been contributing through its support for biodiversity conservation at the landscape scale, is an important mechanism for maintaining resilience in the face of climate variability and change. The FTF Program could also contribute to maintaining climate resilience through support for maintaining the agro-biodiversity of traditional crops and genetic diversity of traditional plant and animal varieties.

Maintaining and/or restoring natural, seasonal flow levels in rivers (e.g., Mara, Tarangire, Kilombero, Rufiji, Great Ruaha) – especially dry season minimal flows – will contribute to climate resilience for ecosystems and people.

USAID can contribute to climate change adaptation and resilience in Tanzania through our first recommendation, to improve the integration of the Mission's NRM and FTF programs. This would support a key principle of the USAID Climate Change and Development Policy, to emphasize "valuing ecosystem services." Many ecosystem services benefit agriculture, including hydrological services in watersheds, nutrient cycling, pollination, and pest control. Most of these ecosystem services, which are the result of processes occurring in biodiverse natural ecosystems, are currently treated as economic externalities by farmers. More integrated USAID NRM and Agriculture Programs could support steps to create mechanisms to adequately value ecosystem services and internalize the costs of conserving them into agricultural production costs.

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ANNEX B: ETOA STATEMENT OF WORK (SOW)

SOW for Environmental Threats and Opportunities Assessment for USAID-Tanzania - 2012

I. Purpose

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

II. Background

A. Policies Governing Environmental Procedures

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

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

Section 119 of the FAA relates to Endangered Species. It states that "*the preservation of animal and plant species through the regulation of the hunting and trade in endangered species, through limitations on the pollution of natural ecosystems and through the protection of wildlife habitats should be an important objective of the United States development assistance"* (FAA, Sec. 119 (a)). Furthermore it states, *"Each country development strategy statement or other country plan prepared by the Agency for International Development shall include an analysis of (1) the actions necessary in that country to conserve biological diversity and (2) the extent to which the actions proposed for support by the Agency meet the needs thus identified*" (FAA, Sec. 119(d)).

B. Strategic Planning Process

The last ETOA was conducted in 2004 and USAID-Tanzania is currently in the process of developing a new CDCS. Incorporation of environmental threats and opportunities into USAID-Tanzania's strategic planning process will help to ensure compliance with the above regulations as well as ensure that activities are conducted in an environmentally sound manner. In addition, the ETOA will inform strategic objectives on how to better address and integrate critical environmental issues that affect and/or are affected by their programs to enhance results across

the Mission's strategy. This is especially important in the context of a rapidly changing programmatic environment within USAID-Tanzania but also within the Agency. Tanzania has been selected as a performance management focus country with many new initiatives being implemented including the Global Health Initiative, Feed the Future, Global Climate Change and Partnership for Growth. In addition, the USAID Forward reform agenda brings additional complexity to questions of capacity and effectiveness of USAID programming to conserve and mitigate impacts to biodiversity and tropical forests. To address the expanded scope in programs and priorities, the assessment will examine potential challenges and opportunities for innovative, integrated strategic approaches to address global climate change, food security, water governance and global health issues in the context of procurement reform initiatives.

Adding to this are new developments in Tanzania that threaten the environment while at the same time offer real economic growth potential such as the discovery of uranium in the Selous Game Reserve and the discovery of major natural gas reserves off the southern coast of Tanzania as well as substantial expansion of agriculture in the Southern Agricultural Growth Corridor. These will be important issues to consider in the ETOA.

III. Statement of Work

Assess and summarize the needs for biodiversity and tropical forestry conservation in Tanzania based on key threats and analyze country, donor and NGO responses to meet these needs. Prepare a report on the status of biodiversity, tropical forestry and conservation efforts in Tanzania and potential implications for USAID or other donor programming and environmental monitoring which shall define the actions necessary for conservation.

A. Tasks

The tasks embodied in this SOW will include:

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

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

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

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

v. **Actions Needed and Opportunities to Conserve Biodiversity and Forests:** An understanding of actions that must be taken to maintain biodiversity, tropical forests

and ensure sustainable environmental management given the documentation and analysis of threats and identification of opportunities and entry points to program and implement the needs.

vi. **Linkages to USAID Strategy and Programs**: A description of the extent to which the existing programs and potential new activities meet (or do not meet) those necessary actions for conservation (sec. 118(e)/119(d) mandatory analysis), including analysis of new initiatives, USAID Forward and procurement reforms; this should also include recommendations to mitigate the impacts of proposed activities, including how to better integrate environmental management across USAID-Tanzania's strategic objectives.

B. Approach

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

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

ii. Gather and get acquainted with existing background information on Tanzania, such as the country's natural resources, geographical, ecological and biological specificities, current status of the environment and biodiversity, institutional organization at both national and statutory levels, key stakeholders and donors in environment and natural resource management, legislation related to the environment and biodiversity, and other relevant information required for the country assessment.

iii. Meet or speak with key stakeholders or managers at the World Bank, US Department of Interior, USFWS, and U.S.-based NGOs including World Wildlife Fund, African Wildlife Foundations, Jane Goodall Institute, and other organizations involved in biodiversity conservation in Tanzania or relevant regional efforts.

C. In Country Field Objectives/Tasks

Field a team to conduct an overview and general analysis of the country's environment and its current status. Upon arriving in Tanzania the team will:

i. Meet with USAID-Tanzania to get a solid understanding of Mission program goals and objectives and its vision going forward; perspectives of this assignment and specific interests for the team, including advice and protocol on approaching USAID partners and host country organizations with respect to this assignment. The team shall be aware of sensitivities related to an assessment exercise (i.e., the potential for raising expectations, and the need to be clear about the purpose of the assessment) and respect Mission guidance. The team will discuss organizations to be contacted and any planned site visits with the Mission and coordinate as required. USAID-Tanzania will facilitate meetings with other USAID Strategic Objective teams.

ii. Hold meetings with development partners, NGOs, relevant government agencies, and other organizations that are knowledgeable about biodiversity and tropical forestry conservation or are implementing noteworthy projects and gather information locally.

Included in this will be a stakeholder's workshop to get a more informed view of things on the ground and inform partners about the ETOA process.

iii. Conduct no more than three priority site visits, which would supplement understanding of USAID's program, or of biodiversity issues that arise in interviews and literature or would confirm information in previous assessments. The sites for the field visit will be determined by the team during the assessment in consultation with USAID.

IV. Timing

The ETOA will be carried out to inform the final USAID-Tanzania CDCS process to be developed in the fall of 2012 and, therefore, should be completed no later than July 2012.

V. Illustrative Level of Effort

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

VI. Relationships and Responsibilities

The Contractor shall report to the USAID-Tanzania Mission Environmental Officer and the Natural Resources Officer. The Contractor will be responsible for identifying and obtaining the majority of the reference materials needed for this study with only minimal interventions on the part of USAID-Tanzania.

VII. Deliverables

There shall be four deliverables under this contract:

i) Preliminary Work Plan and Schedule: The Contractor shall provide USAID with a work plan and schedule within seven days of contract inception. The work plan and schedule shall also contain a list of those individuals and agencies that are to be interviewed, and a list of reports, evaluations, etc., to be reviewed.

ii) Draft Report: The Contractor shall submit a draft report to the Natural Resources Office no later than eight weeks from the start of the contract. The draft report shall follow the outline provided in the SOW, as refined during the course of the contract in consultation with USAID. The report shall not exceed 60 pages, in English, excluding suitable annexes and pertinent figures (maps, institutional charts, tables) and references. Among the expected appendices is a briefly annotated bibliography of the most important current reference materials related to the topic and a contact list for each of the organizations discussed in the report.

iii) Final Report: The final report is due no later than two weeks after receiving USAID-Tanzania's comments on the first draft report.

iv) In-Country Mission Exit Briefings: The team shall meet with USAID-Tanzania to provide them with a brief on the report findings. The exit brief shall be accompanied by a two-page written summary of key findings and recommendations. The Contractor will furnish both electronic file versions of all submissions (first draft and final report) and five copies in English, including one photocopy ready version of the final report.

ANNEX C: BIOGRAPHICAL SKETCHES OF THE ETOA TEAM

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

Social Scientist – Zakiya M. Aloyce is a Social Scientist currently working with Wildlife Conservation Society of Tanzania (WCST) as a Community-Based Natural Resources Management (CBNRM) Technical Advisor for the Selous-Niassa Wildlife Protection Corridor Project. Zakiya holds B.A. and M.A. Degrees in Rural Sociology, and has worked with various national and international organizations including the Local Government Service Commission, Small Industries Organization, AGENDA *for Environment and Responsible Development*, Africare, Worldwide Fund for Nature and United Nations Development Program. She has a wide range of experience in integrated conservation and development programs, community-based natural resources management, socio-economic surveys, and social impact assessment, and has facilitated various community conservation programs in different parts of Tanzania mainland and Zanzibar.

Natural Resources Management Specialist – P.K.T. Munishi is a forest ecologist and professor in the Faculty of Forestry and Nature Conservation at Sokoine University of Agriculture in Morogoro, Tanzania. He worked as a District Forest Officer in the Mbeya Region in the Southern Highlands of Tanzania from 1981-1989, after completing his Diploma in Forestry from the Forestry Training Institute, Arusha. He had the responsibility of managing different types of forests and forest ecosystems, environmental extension and education, and planning and managing rural forestry and environmental conservation projects. After a Master's Degree in Environmental Management from Duke University, he obtained a Ph.D. in Forest Resources Management from North Carolina State University in 2001. His Ph.D. research was entitled "The Eastern Arc Mountain Forests of Tanzania: Their Role in Biodiversity, Water Resource Conservation and Net Contribution to Atmospheric Carbon." In addition to teaching, Professor Munishi has been involved in more than ten research projects involving natural resources ecology and management, wetlands biodiversity and livelihoods, forest carbon assessment and monitoring, climate change adaptation strategies, biodiversity measuring and monitoring, and small-holder forestry.

Forest Hydrologist – Charles Rhoades has been a watershed researcher with the U.S. Forest Service, Rocky Mountain Research Station, in Fort Collins, Colorado since 2003. Dr. Rhoades

studies the biogeochemical processes that regulate delivery of clean water and that sustain productive soils and forests. His current research addresses various aspects of the biogeochemistry of subalpine watersheds with specific attention to the nutrient cycling linkages between upland, riparian, and aquatic ecosystems, and the biogeochemical influences of mountain pine beetle, wildfire and forest operations. His previous nutrient cycling work involved managed and pristine tropical, temperate, alpine and arctic ecosystems. He has conducted and published agroforestry research about the Andes (Ecuador), Africa (Malawi), and the southeastern US (Georgia), and has taught agroforestry and agroecology courses in Central and South America (Belize, Ecuador).

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

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ANNEX E: SUMMARY OF NGO PROGRAMS

International NGOs

NGO	Tanzania Focus Areas
African Wildlife Foundation (AWF)	works in two ecological landscapes it calls "heartlands": the transboundary Kilimanjaro Heartland and Masaai Steppe Heartland
World Wide Fund for Nature (WWF)	works with various partners including government, NGO and communities to conserve marine, forest and fresh water ecosystems. The priority areas are Kwale East Usambara, Udzungwa Land scape, Rufiji-Mafia-Kilwa and Matumbi Hill Sea and land scape, Great Ruvuma land scape and Mtwara-Quirimbas complex
Wildlife Conservation Society (WCS)	works in Zanzibar as well as in Iringa, Mbeya and Arusha regions. They work in collaboration with government and other NGOs in addressing issues of climate change, natural resources governance, education and awareness, capacity building, WMAs, Ecological research and monitoring by using GIS and remote sensing, control of Indian House crow and alternative livelihoods activities.
Jane Goodall Institute (JGI)	works in western Tanzania to reduce human population pressures and protect chimpanzees and their forest habitat. JGI applies the community-centered conservation approach, developed through the implementation of the Lake Tanganyika Catchment, Reforestation and Education (TACARE) in 1994. The model has been expanded from Gombe National Park to larger and more pristine chimpanzee habitat to the south.
Western Indian Ocean Marine Science Association (WIOMSA)	a regional professional, non-governmental, non-profit, membership organization, registered in Zanzibar, Tanzania. The organization is dedicated to promote the educational, scientific and technological development of all aspects of marine sciences throughout the region of Western Indian Ocean, with a view toward sustaining the use and conservation of its marine resources.
International Union for Conservation of Nature (IUCN)	works on various themes in Tanzania, including participatory dialogues, Forest Law Enforcement and Governance, and endangered species

NGO	Tanzania Focus Areas
Africare	supports government initiatives in addressing social and development issue, as well as natural resources management. For the past ten years Africare has been involved in facilitating establishment of Wildlife Management Area (WMA) in Ugalla Landscape in Tabora and Rukwa regions.
Care	has programs in different parts of the country and has supported various conservation projects in Zanzibar and Eastern Arc Mountains. CARE has also been a pioneer in Village Community Conservation Banks (VICOBA) and initiation of dialogue on Payment for Ecosystem Services (PES).

National NGOs

NGO	Focus Area
Lawyers' Environmental Action Team (LEAT)	LEAT is the local NGO that aims at ensuring sound natural resource management and environmental protection in Tanzania. It is also involved in issues related to the establishment of an enabling policy environment for civil society, including civil liberties and human rights. LEAT carries out policy research, advocacy, and selected public interest litigation.
Wildlife Conservation Society of Tanzania (WCST)	WCST is the national NGO partner to BirdLife International. Its mission is to conserve fauna and flora of Tanzania for the sake of mankind. WCST works with various partners in conducting research on biodiversity facilitate community based natural resources management, education and awareness.
Tanzania Forest Conservation Group (TFCG)	TFCG mission of conserving and restoring the biodiversity of globally important forests in Tanzania for the benefit of the present and future generations. Coastal and Eastern Arc Mountain forests are their areas of focus where they work closely with many partners including local communities, government, development partners, private sector, research institutions and other civil society organizations and networks.

NGO	Focus Area
Tanzania Natural Resource Forum (TNRF)	TNRF aims to bring improved natural resources governance. Its mission is to bring about improved natural resource governance by being a demand-driven network of members and partners that helps people to bridge the gap between: People's local natural resource management needs and practices; and National natural resource management priorities, policies, laws and programs. TNRF's key activities include information gathering and dissemination to reach the remote rural communities, lobbying and advocacy for collective action and adaptive management increasing the flow of information.
Jozani Environmental Conservation Association (JECA)	JECA is a registered community based organization, working with local communities in nine villages/Shehia surrounding Jozani-Chwaka Bay National Park. The mission is to involve communities in natural resources management so as to adapt with climate change. Key activities of the organization include involvement of the community in conservation of natural resources in the Jozani Chwaka bay area; education and awareness on the wise use of natural resources; rehabilitation of degraded mangrove forest and other ecosystem; facilitate and support provision of alternative sources of livelihoods; and represent members of Shehia and conservation committees, in discussions and negotiations with other institutions and stakeholders.

ANNEX F: SUMMARY OF DONOR PROGRAMS

Donor	Focus Areas/Notes
African Development Bank (ADB)	Ongoing projects: Governance and Economic Competitiveness Support Program (GECSP); ISP for Good Governance II; Rural Water Supply and Sanitation; Tanzania Road Sector Support Project; Zanzibar Water and Sanitation Project, and others
Belgium Technical Cooperation (BTC)	Supports Local Government Reform and decentralization, and Natural Resources Management: Belgium supports existing Tanzanian initiatives in which environmental conservation is prioritised alongside economic development. BTC works to improve planning and management of resources through projects such as the Beekeeping Support project in Kigoma region. BTC has worked extensively in the Kilombero Valley
DANIDA	Supported Participatory Forest Management initiative in recent past; also Impacts of Climate Change on Water Resources and Agriculture and Adaptation Strategies in Tanzania (CLIVET), a recently completed research project
DFID	Is funding the Agriculture Green Growth Program in SAGCOT, to develop environmentally sound and sustainable alternatives to other industrial agriculture initiatives
GIZ	working on priority themes of Health and HIV/AIDS prevention, safe and environmentally-sustainable drinking water supply and sanitation, and support for local governance processes (decentralisation); funded the Selous Conservation Program, now ended, for many years
Japan Policy and Human Resources Development (PHRD) Technical Assistance	Proposed grant would support the World Bank Agricultural Sector Development Project (ASDP) with to scale up rice production activities in irrigation schemes supported through ASDP

Donor	Focus Areas/Notes
NORAD (Norwegian Aid Agency)	Funding the Agriculture Green Growth Program in SAGCOT, to develop environmentally sound and sustainable alternatives to other industrial agriculture initiatives (see DFID above). Norway supports Tanzania's efforts to reduce deforestation and forest degradation; Tanzania is a pilot country in the UN-REDD Program and a member of the World Bank's Forest Carbon Partnership Facility (FCPF). Anti-corruption efforts are a central part of Norway's support. Funds the Climate Change Impact, Adaptation, and Mitigation Program (CCIAM), the main coordinator for which is Sokoine University of Agriculture
SIDA (Sweden)	Energy is a priority theme for SIDA. Sweden has previously supported the expansion of hydropower and is now working to provide electricity to the rural areas as a contribution to both a higher standard of living and a reduction in carbon-dioxide emissions.
FINNIDA (Finland)	Environment and sustainable development are central to FINNIDA's aid: energy; agriculture and rural development; forestry; water and sanitation; and environment and climate. Funds significant part of the program for coastal forests in the East Usambaras and Mtwara Region; and the National Forest Resource Assessment (NAFORMA), to map and assess the forest resources and carbon stocks in the country's forests. Has also supported activities related to participatory forest management (PFM)
UNDP	Tanzania: Strengthening the Protected Area Network in Southern Tanzania: Improving the Effectiveness of National Parks in Addressing Threats to Biodiversity. http://www.thegef.org/gef/sites/thegef.org/files/documents/document/Council%20document_10.pdf Under the Environment and Energy practice area, support will be provided to deliver key outputs: (a) accelerate the access to energy such as renewable energy, including photovoltiac initiatives, through the Global Environment Facility; (b) increase sustainable use of biomass (including wood and charcoal); (c) integrate environmental concerns into development policies and plans; (d) reduce the dependence of the poor on natural resources for their livelihoods; and (e) conserve biodiversity and ensure that communities benefit from these resources including considerations for mitigation and adaptation to climate change effects and the promotion of innovative land management practices.

Donor	Focus Areas/Notes
World Bank	Supports programs in agriculture, private sector development, and infrastructure through policy analysis, advice, grants, and credits. The Bank's current portfolio in Tanzania includes 25 activities with funding of nearly US $2.9 billion, the largest share of which is for transportation infrastructure. Agricultural Sector Development Project (ASDP) in SAGCOT is most relevant; Strategic Regional Environmental and Social Assessment (SRESA) now being conducted. Tanzania Marine and Coastal Environmental Management Project (MACEMP): goal is to improve management and use of Tanzania's marine EEZ and its coastal resources. The project will (a) implement a common governance regime for the EEZ; (b) support a comprehensive system of managed marine areas building on integrated coastal management strategies; and (c) give coastal communities access to economic opportunities that improve livelihoods and help manage the marine ecosystem.
USAID	See Chapter 8, Section 8.2 for review

ANNEX G: ACTIONS NEEDED ACCORDING TO KEY INFORMANTS

Need/need to:

1) address issues of fencing that blocks wildlife movements
2) understand and manage changes in the agro-pastoral economy
3) address human-wildlife conflicts (eles and crops, lions and livestock)
4) give higher priority to Eastern Arc mountains conservation
5) control corruption in NR sector (driving illegal trade, live animal trade)
6) develop adequate EIA procedures to prevent or mitigate negative impacts of extractive industries
7) control poaching
8) control poaching and trade in illegal wildlife products
9) control dynamite fishing
10) review and update the National Forest Policy, based on the results of the NAFORMA
11) increase efficiency or find alternatives to wood fuel and charcoal
12) control poaching of highly valuable tree species
13) ensure a sustainable supply of forest products
14) conserve forest ecosystems for ecosystem services
15) educate policymakers about ecosystem services and compensation mechanisms to conserve them, develop a policy framework, and provide pilots/models
16) "We need a multi-sectoral approach that involves the ag. sector, water/irrigation sector, energy sector, and environmental sector." Because a major cause of threats to biodiversity is uncoordinated and conflicting policies of sectoral institutions – "Kilimo Kwanza" is a good example of this cause of threats to the environment.
17) integrated, multisectoral policy framework for conservation of ecosystem services.
18) integrated NRM
19) TFS needs to "push" the issue of paying to conserve catchment forests
20) a revised forest policy that covers all stakeholders – national government, local government, NGOs, all.
21) community awareness of benefits of PAs and wildlife
22) "partnerships" (I think he meant donor funding) to develop more WMAs, or rather the capacity in communities for WMAs
23) infrastructure development for access to PAs – for tourism, resource assessment, antipoaching
24) land use planning to implement the Livestock Act of 2010 and prevent pastoralist encroachment in PAs
25) multi-sectoral political dialogue among Ministry of Land, Ministry of Agriculture, Min. of Local Government, Livestock, Wildlife, Fisheries, etc.
26) to find alternative sources of livelihoods and income to swidden agriculture, poaching, and bushmeat
27) adequate national EIA capacity and authority
28) management plans or updated management plans for all PAs in TZ (most now have no management plans, they told us)

29) Need a Strategic Environmental Assessment for the Selous ecosystem (to block a proposed hydropower dam at Stigler's Gorge, they said)
30) a sustainable conservation finance strategy and business plan for TZ PA system (I would say that "sustainable" means to get completely away from donor-dependence)
31) regulations for implementing the Water Resources Management Act of 2009 (to replace those from the Water Utilization Act of 1974, which are outdated but still being used, still in force)
32) "legal harmonization" of contradictory laws governing natural resources and land
33) to improve forest governance to prevent elite capture, often through corruption, and loss of opportunities/livelihoods for local communities
34) good governance (transparency, lack of corruption, and fairness)
35) an update assessment of the WMA process in Tanzania
36) to bring best practices from elsewhere around the world to Tanzania – this is an opportunity for donors
37) to address the energy requirements of watershed-adjacent communities, because their energy requirements are causing a threat to forests
38) research and technology to give people sustainable choices for water use, energy use, and tree species
39) reform of anti-poaching and law enforcement policies
40) integrated land use planning to avoid conflicting land uses
41) fuel-efficient cookstoves
42) strengthen Parliamentary advocacy for reforms and build on recent interest by Parliamentarians in overseeing the MNRT, esp. the Wildlife Division
43) to continue to improve democracy and governance in Tanzania
44) to assist pastoralists in adapting to climate change through destocking and maintaining the mobility of traditional pastoralists
45) to develop the concept of "endangered ecosystems" and "ecosystem Red-Listing," not just endangered species focus
46) a very high standard for environmental analysis/impact assessment for irrigation development
47) Need land use planning to stop agricultural expansion and expansion of grazing in Western Tanzania
49) to support the Nature Reserve Units in Eastern Arc mountains, which have received much less investment than other PAs
50) to look at livelihoods and find sustainable livelihood opportunities for local people
51) more integrated conservation approaches
52) to develop and promote "conservation agriculture," including cover crops, agroforestry, and other soil and soil fertility conservation techniques
53) better governance
54) alternatives to charcoal or improved charcoal making technology (kilns, etc) – treat charcoal as an opportunity, not a problem
55) Government of Tanzania needs to give small-scale farmers a voice in big development projects like Kilimo Kwanza and SAGCOT
56) to address issues of environment, conservation, and development in a much more holistic way

57) harmonization of currently conflicting laws and policies, because conflicting laws and policies cause threats to biodiversity, forests, water, environment
58) Need a National Biofuels Policy, because land-grabbing for biofuels production for the European market is causing threats to biodiversity in the absence of such a policy framework. Policy should protect environment, food security, and promote low-emissions development
59) to broaden the participation of all stakeholders in NRM
60) eventually to get the benefits of WMAs to reach the household level, not only the village level for community projects
61) civil society pressure to advocate and lobby for sustainable NRM and decentralized CBNRM
62) to bring nearshore fisheries into a managed system – now they are an unmanaged commons
63) more focus on fisheries co-management and participatory fisheries management
64) to bring the "corruption syndrome" in Tanzania under control – it is the root cause of wildlife poaching and illegal trade, illegal timber harvesting, and dynamite fishing
65) much better EIA capacity – "EIA processes are very weak, scrutiny of EIA results very weak"
66) more climate data stations, and about 20-30 of data, to be able to make any very sound projections of climate change effects inTanzania – biggest conclusion right now is that data are very weak, and therefore can't really make robust climate change models or projections
67) an Integrated River Basin Management Plan for the Rufiji Basin
68) improved coordination between local and national levels, between national GOT agencies and their local implementing staff
69) to do a thorough analysis on vulnerability of coastal zones to climate change effects
70) to strengthen pelagic fisheries management and stop fisheries "piracy"
71) to conduct an assessment to determine the needs for environmental flows on the Great Ruaha River, and apportion the amount of water taken out to protect those ecological flow requirements
72) integrated river basin management on the Great Ruaha River
73) to harmonize the currently uncoordinated policies of different sectors, for example irrigation, agriculture, and wildlife sectors
74) to bring water demand in line with supply
75) better, and more freely available, meteorological data for hydrological modeling and forecasting
76) need to harmonize and coordinate contradictory and conflicting requests from water allocation from different GOT agencies
77) better land use planning to prevent smallholders from channelizing rivers for irrigation, which can change the course of a river
78) study to determine the role of grazing in controlling vegetation in wetlands like Usangu – is pastoralism really a threat, as many people say? Or not?
79) village land use plans
80) land use planning
81) to link conservation to livelihoods and livelihood security
82) education, information, and awareness in communities about laws, requirements, and regulations, and how to follow them – they often don't know this
83) to improve the linkage and communication between politicians and civil servants – civil servant professionals can plan well, but politicians often challenge or override or veto those plans

84) National level GOT agencies need to consult local residents and stakeholders, and not make top-down decisions.
85) to improve communication and coordination between lines of authority in the Ministry of Water and Ministry of Local Government, or other ministries for that matter.
86) studies of hydrology/flows of all rivers coming from Udzungwa Mountains
87) to develop some mechanism for water users – especially large commercial users such as the Kilombero Sugar Company – to pay something for the water they use that comes from the park, and which they now get essentially free, to compensate the park for protecting the watershed forests that supply the water
88) a national PES-enabling policy for watershed ecosystem services
89) to ban all legal international sale of ivory to stop the upsurge in elephant poaching
90) land use planning, especially at the village level
91) energy alternatives to fuel wood
92) to start the kind of monitoring that will eventually be able to detect climate change and its ecological effects
93) to control the illegal use of DDT in mangrove rice-farming
94) to control illegal mangrove harvesting, esp. in Rufiji Delta
95) to intensify smallholder maize production and improve yields to reduce incentives for "slash and burn" expansion of fields into forest and woodland, and stop agricultural expansion
96) energy alternatives to fuel wood and charcoal, and/or more efficient stove technology to be widely adopted
97) land use planning at a landscape scale to maintain corridors for movement of wildlife between core and dispersal areas
98) a study of WMAs to quantify and "map" the benefits to different stakeholders – communities, households, Wildlife Division, NPs
99) to give a larger share of revenues from wildlife to WMAs/local communities – the Wildlife Division takes a large cut of the revenue, and provides very little management effort/input
100) follow up on capacity-building in WMA communities after they are established
101) coordination between WMAs in the same area
102) to abolish the Wildlife Division – it is a broken institution, and needs to be reformed, re-founded
103) to give the majority of revenues from wildlife to the local level through WMAs
104) to work on linkages between conservation and population control, maternal and child health, and reproductive health, given the rapid population growth in Tanzania that will eventually undermine conservation efforts anywhere unless population growth is slowed and stopped
105) a mechanism for USAID to support smaller, local organizations, and not necessarily give so much money to larger NGOs.
106) to link conservation with local livelihoods
107) "bottom up" conservation – and WMAs are still a "top down" thing, driven by government and conservation organizations
108) small grants – very small grants actually, so as not to create donor dependency – to support local initiatives
109) need private sector initiatives (lodge owners) to support local communities, rather than WMAs where central government takes a big cut
110) to protect corridors for seasonal migrations of wildlife

111) real devolution of power to WMAs
112) capacity-building on aspects of transparency
113) capacity for conflict resolution

Zanzibar

114) donors need to give long-term support to build capacities of local institutions
115) need to control beach erosion and sewage discharge caused by coastal tourism development
116) coordinate and harmonize sectoral policies of the government
117) a sustained commitment to eradication of the Indian House Crow
118) confront increasing elephant poaching and illegal ivory export for ivory during recent years and the illegal export to Asia
119) control the currently uncontrolled development of hotels along the Zanzibar coast
120) control lighting at beach hotels which threatens nesting turtles
121) protect turtle nesting beaches from hotel development
122) control number of fishing boats and harmful fishing gear (small mesh nets, basket traps, drag nets)
123) develop regulations regarding carrying capacity of dolphin tourism
124) educate fishermen about laws regarding fishing gear and fishing
125) control sand mining
126) coordination between government ministries and agencies
127) control building of jetties by hotels
128) create a single deep sea fisheries management authority for the URT, unifying separate authorities for the mainland and Zanzibar
129) assess carrying capacities and develop sustainable management plans for all deep sea fisheries to control current overharvesting
130) stop illegal fishing by foreign fleets in the EEZ through patrols
131) diversify tourism areas and activities in Zanzibar to take tourism pressure off of Jozani NP
132) increased training and resources for Jozani NP rangers
133) improve capacity for EIAs, which is not adequate at present
134) redefine and harmonize responsibilities of the Forestry Department and Fisheries Department regarding mangrove management
135) an independent authority needed in Zanzibar (like NEMC on mainland) to monitor compliance with environmental policies and EIA recommendations
136) improve knowledge and capacity to monitor and protect groundwater supply and quality
137) coordination and harmonization of the URT's multiple agencies dealing with energy issues: oil (Ministry of Finance); electricity (Tanesco); charcoal (Tanzania Forest Service), oil exploration (Ministry of Energy and Minerals)
138) conduct a ZAFORMA (using methodology of NAFORMA from mainland)
139) support community forestry
140) develop and promote more efficient stoves and alternative sources of cooking fuel
141) develop conservation agriculture
142) eradicate the Indian House Crow from Zanzibar
143) improve protection of catchment forests to protect groundwater recharge and supplies
144) improve coordination of key actors in environmental management
145) better fisheries research
146) a National Spatial Plan to coordinate data sharing across ministries

147) studies and monitoring of groundwater recharge and saline intrusion
148) a National Strategic Plan for Coastal Development that links spatial planning with environmental management
149) develop guidelines for oil and gas development and mining within marine conservation areas
150) improve communication of scientific findings to policy makers
151) carry out hydrological and EIA studies for the planned USAID rice project
152) educate communities on climate change and adaptation strategies
153) strengthen capacity and improve monitoring and enforcement of water user permits

ANNEX H: ACTIONS NEEDED GROUPED BY THEME

Use Integrated, Multi-Sectoral Approaches

- "We need a multi-sectoral approach that involves the ag. sector, water/irrigation sector, energy sector, and environmental sector." Because a major cause of threats to biodiversity is uncoordinated and conflicting policies of sectoral institutions – "Kilimo Kwanza" is a good example of this cause of threats to the environment.
- integrated NRM
- multi-sectoral political dialogue among Ministry of Land, Ministry of Agriculture, Min. of Local Government, Livestock, Wildlife, Fisheries, etc.
- "legal harmonization" of contradictory laws governing natural resources and land
- more integrated conservation approaches
- to address issues of environment, conservation, and development in a much more holistic way
- harmonization of currently conflicting laws and policies, because conflicting laws and policies cause threats to biodiversity, forests, water, environment
- an Integrated River Basin Management Plan for the Rufiji Basin
- integrated river basin management on the Great Ruaha River
- to harmonize the currently uncoordinated policies of different sectors, for example irrigation, agriculture, and wildlife sectors
- need to harmonize and coordinate contradictory and conflicting requests from water allocation from different Government of Tanzania agencies
- coordinate and harmonize sectoral policies of the government
- coordination between government ministries and agencies
- create a single deep sea fisheries management authority for the URT, unifying separate authorities for the mainland and Zanzibar
- redefine and harmonize responsibilities of the Forestry Department and Fisheries Department regarding mangrove management
- coordination and harmonization of the URT's multiple agencies dealing with energy issues: oil (Ministry of Finance); electricity (Tanesco); charcoal (Tanzania Forest Service), oil exploration (Ministry of Energy and Minerals)
- improve coordination of key actors in environmental management

Improve Land Use Planning

- land use planning to implement the Livestock Act of 2010 and prevent pastoralist encroachment in PAs
- integrated land use planning to avoid conflicting land uses
- need land use planning to stop agricultural expansion and expansion of grazing in Western Tanzania
- better land use planning to prevent smallholders from channelizing rivers for irrigation, which can change the course of a river
- land use planning
- village land use plans
- land use planning, especially at the village level

- land use planning at a landscape scale to maintain corridors for movement of wildlife between core and dispersal areas
- control the currently uncontrolled development of hotels along the Zanzibar coast
- a National Spatial Plan to coordinate data sharing across ministries
- a National Strategic Plan for Coastal Development that links spatial planning with environmental management

Improve Environmental Impact Assessment

- develop adequate EIA procedures to prevent or mitigate negative impacts of extractive industries
- adequate national EIA capacity and authority
- need a Strategic Environmental Assessment for the Selous ecosystem (to block a proposed hydropower dam at Stigler's Gorge, they said)
- a very high standard for environmental analysis/impact assessment for irrigation development
- much better EIA capacity – "EIA processes are very weak, scrutiny of EIA results very weak"
- improve capacity for EIAs, which is not adequate at present
- an independent authority needed in Zanzibar (like NEMC on mainland) to monitor compliance with environmental policies and EIA recommendations
- carry out hydrological and EIA studies for the planned USAID rice irrigation project

Control Poaching and Illegal Harvesting

- control poaching
- control poaching and trade in illegal wildlife products
- control poaching of highly valuable tree species
- reform of anti-poaching and law enforcement policies
- to strengthen pelagic fisheries management and stop fisheries "piracy"
- to control illegal mangrove harvesting, esp. in Rufiji Delta
- confront increasing elephant poaching and illegal ivory export for ivory during recent years and the illegal export to Asia
- stop illegal fishing by foreign fleets in the EEZ through patrols

Broaden Participation and Decentralize NRM

- to broaden the participation of all stakeholders in NRM
- civil society pressure to advocate and lobby for sustainable NRM and decentralized CBNRM
- national-level Government of Tanzania agencies need to consult local residents and stakeholders, and not make top-down decisions
- "bottom up" conservation – and WMAs are still a "top down" thing, driven by government and conservation organizations
- real devolution of power to WMAs
- more focus on fisheries co-management and participatory fisheries management
- donors need to give long-term support to build capacities of local institutions
- support community forestry

Prevent Corruption

- control corruption in NR sector (driving illegal trade, live animal trade)
- to improve forest governance to prevent elite capture, often through corruption, and loss of opportunities/livelihoods for local communities
- good governance (transparency, lack of corruption, and fairness)
- to continue to improve democracy and governance in Tanzania
- better governance
- to bring the "corruption syndrome" in Tanzania under control – it is the root cause of wildlife poaching and illegal trade, illegal timber harvesting, and dynamite fishing
- capacity-building on aspects of transparency

Develop Mechanisms to Conserve Ecosystem Services

- conserve forest ecosystems for ecosystem services
- educate policymakers about ecosystem services and compensation mechanisms to conserve them, develop a policy framework, and provide pilots/models
- integrated, multi-sectoral policy framework for conservation of ecosystem services
- Tanzania Forest Service needs to "push" the issue of paying to conserve catchment forests
- to develop some mechanism for water users – especially large commercial users such as the Kilombero Sugar Company – to pay something for the water they use that comes from the park, and which they now get essentially free, to compensate the park for protecting the watershed forests that supply the water
- a national PES-enabling policy for watershed ecosystem services
- improve protection of catchment forests to protect groundwater recharge and supplies

Improve Woodfuel Efficiency and Find Alternatives

- increase efficiency or find alternatives to wood fuel and charcoal
- to address the energy requirements of watershed-adjacent communities, because their energy requirements are causing a threat to forests
- fuel-efficient cookstoves
- alternatives to charcoal or improved charcoal making technology (e.g., kilns) – treat charcoal as an opportunity, not a problem
- energy alternatives to fuel wood
- develop and promote more efficient stoves and alternative sources of cooking fuel

Improve Climate Information and Maintain Traditional Coping Mechanisms

- to assist pastoralists in adapting to climate change through destocking and maintaining the mobility of traditional pastoralists
- more climate data stations, and about 20-30 of data, to be able to make any very sound projections of climate change effects in Tanzania – biggest conclusion right now is that data are very weak, and therefore can't really make robust climate change models or projections
- to do a thorough analysis on vulnerability of coastal zones to climate change

effects
- to start the kind of monitoring that will eventually be able to detect climate change and its ecological effects
- to protect corridors for seasonal migrations of wildlife
- educate communities on climate change and adaptation strategies

Improve Watershed and Water Management

- an Integrated River Basin Management Plan for the Rufiji Basin
- to conduct an assessment to determine the needs for environmental flows on the Great Ruaha River, and apportion the amount of water taken out to protect those ecological flow requirement
- to bring water demand in line with supply
- strengthen capacity and improve monitoring and enforcement of water user permits
- studies and monitoring of groundwater recharge and saline intrusion

Stop Forest Conversion to Agriculture

- to find alternative sources of livelihoods and income to swidden agriculture, poaching, and bushmeat
- Need land use planning to stop agricultural expansion and expansion of grazing in Western Tanzania
- to look at livelihoods and find sustainable livelihood opportunities for local people
- to develop and promote "conservation agriculture," including cover crops, agroforestry, and other soil and soil fertility conservation techniques
- to intensify smallholder maize production and improve yields to reduce incentives for "slash and burn" expansion of fields into forest and woodland, and stop agricultural expansion

Control Beach Tourism Development

- control beach erosion and sewage discharge caused by coastal tourism development
- control the currently uncontrolled development of hotels along the Zanzibar coast
- control lighting at beach hotels which threatens nesting turtles
- protect turtle nesting beaches from hotel development
- control building of jetties by hotels

ANNEX I: ZANZIBAR LAWS, POLICIES, AND GOVERNMENT INSTITUTIONS

Laws

Zanzibar Environmental Management for Sustainable Development Act, 1996

The Environmental Management for Sustainable Development Act (1996) encompasses all matters pertaining to the environment on Zanzibar. The main objectives of the Act are to maintain basic ecological processes of land, water and air, ensure the environmentally sound and healthy quality of life of the people of Zanzibar (both present and future), promote sustainable use of renewable natural resource and the rational use of non-renewable natural resources and preserve the biological and cultural diversity of Zanzibar's lands and seas. It provides the basis to strengthen the institutional capabilities for protecting the environment. It also sets out standards and procedures for Environmental Impact Assessment (EIA) and Environmental Audit (EA) and defines obligations for all stakeholders, to benefit human needs and govern sustainable resources. It includes the composition and responsibilities of the environmental authorities i.e., The Minister, the Committee of the Revolutionary Council on Environment (the Committee) and the Department of Environment (DOE). It also allows for the development and revision of National, Local and Community Environmental Action Plans. The Act cuts across all sectors, that in one way or the other are affected or impact the environment.

Zanzibar Forest Reserves Management and Conservation Act No. 10, 1996

This is a regulation on forest matters. It seeks to preserve forest stock and help protect biodiversity. It was formulated to promote the protection, conservation and development of forest resources for the social, economic and environmental benefits of the people of Zanzibar. It also provides a mechanism for managing coastal forest resource use through and the formation of Community Forest Management Areas.

Zanzibar Fisheries Act (1988) and Fisheries Regulation of 2003

The Act highlights the strategies for protection and maintenance of the genetic and species diversity as well as protection of trans-boundary aquatic ecosystems.

Zanzibar Land Acts

These include The Land Tenure Act, 12/1992, The Land Tribunal Act, 7/1994, The Land Transfer Act, 8/1994, The Land Adjudication Act, 8/1989, The Registered Land Act, 10/1990, The Land Survey Act, 9/1989, The Town and Country Planning Decree, Cap. 85 of 1955, Land Acquisition Decree, Cap. 95 of 1909.Under the Land Tenure Act, all land is public and vested in and at the disposition of the President for the use and common benefit of Zanzibar. The Act creates land administrative institutions such as Land Allocating Committees at District Level, where the District Commissioner is the Chairman of the Committee and Director for Land and Registration is the Secretary. The Act also provides for liberal methods of acquisition of land or right of use of land for works of national interests. However, inadequate strategies and capacities to enforce the laws has attracted uncontrolled encroachment of urban settlements into fertile

lands for agriculture, horizontal urban expansion, unsustainable land-use practices; and degradation of natural resources

Zanzibar Ancient Monuments Preservation Act, 2002

Part VI of the Act relates to the discovery of ancient monuments and artefacts. It requires that the Authority be notified if any person discovers an antiquity either as part of research undertaken under a Permit or through any other activity. The requirement relates both to antiquities discovered on land or in water within the boundary of Zanzibar. Any artefacts discovered must be notified to the Authority (Department of Archives, Museums and Antiquities) on Zanzibar and care must be taken to ensure that the antiquities discovered are not damaged in any way as it is an offence to do so.

Policies

National Environmental Policy for Zanzibar (NEMPZ), 1992

The main objective of NEMPZ is to "protect and manage country's environmental assets, such that their capacity to sustain development is unimpaired and Zanzibar's rich environmental endowment is available for future generations to enjoy and use wisely" (NEMPZ, 1992).

NEMPZ recognises the essential link between sustainable development and sound environmental management. It takes into account the special limitations of the island ecosystems and in particular their vulnerability. It also emphasises the need for cross-sectoral involvement in the decision making process and inclusion of EIA into procedures for design of development projects. Nevertheless, the policy is outdated to counteract the emerging challenges, and therefore the Revolutionary Government of Zanzibar has decided to review its policy to address these challenges and issues of the 21st Century pertaining to the whole structure and function of environmental and climate change governance for the country.

National Forest Policy for Zanzibar (1999)

The overall goal of the National Forest Policy for Zanzibar is to protect, conserve and develop forest resources for the *social, economic and environmental* benefit of present and future generations of the people of Zanzibar. The Policy recognises that the three specific goals (social, economic and environmental) are interrelated and must be considered jointly in terms of forest management. It encourages the active involvement of local communities in the sustainable management of forest resources and to safeguard and enhance the environmental functions of these resources. The preservation of natural forests and their biodiversity is seen as key and in particular the conservation of Mangrove forests within the framework of integrated coastal zone management is identified as a priority. Good forestry practice is seen as crucial to reduce soil erosion and maintenance of watershed balances. The enhancement of forest productivity in a sustainable manner, the need for capacity building, improvements to forest administration, better financing and improved legal framework are also identified as goals to be achieved. However the policy has left out some important issues like Climate Change issues and their implications that are totally missing in the document. Many strategies also remained unattended to in the life of the policy since when it was passed in 1999. Inadequate funding has been found to be a major bottleneck to policy implementation.

Fisheries Policy (2002)

Environmental norms and guidelines have been directly mainstreamed into the Fisheries policy. Some of the main environmental issues highlighted in the policy include Sustainable fishing practices; control of destructive fishing gear; sustainable utilization of offshore resources; and increasing environmental conservation awareness among fishermen.

Zanzibar Tourism Policy (2004)

The Tourism policy emphasizes on the need for environmental conservation and protection and, rational and efficient utilization of the natural resources. It supports sustainable tourism development that is consistent with best practices of environmental management. It also describes general approaches for achieving local benefits and community participation in marine environment. Implementation of the policy is however challenged by the expansion of tourism activities causing a lot of environmental impacts.

National Water Policy (2004)

The water policy recognizes the importance of environmental consideration in the development and implementation of water resources and sanitation management in the country. It state that the development of water and sanitation programs should be done in a way that is not harmful to the environment and that the utilization of water by one generation should not in any way adversely affect the prospect of utilization by subsequent generations. The policy pays special attention to the implementation of EIA, environmental monitoring and control, water security, water pollution, soil degradation, depletion of water resources, drinking water quality, waste disposal, hygiene, drainage and sanitation as requisite issues towards provisions and supply of potable water. The policy calls on environmental authorities to provide environmental advisory and guidance so as to ensure that the set objectives for the water policy with respect to environmental conservation and protection are properly achieved.

In addition, the policy recognizes the importance of water tariffs and user charge for the collection of waste to sustain the sector. However, the overall current challenge of the water sector is to implement the developed policy with appropriate strategies and regulations so that the key problems are dealt with satisfactorily.

Agricultural Sector Policy (2000)

The overall goal of Agricultural Sector Policy is to promote sustainable development of the agricultural sector for economic, social and environmental benefits for Zanzibar people. The policy recognizes that environmental degradation is an issue of major concern in agricultural development is mainly attributed to lack of public awareness the preservation and conservation of environment. Other attributed factors include the rate of population growth and density; and use of dangerous agro-chemicals and pesticides in agricultural activities. On balance, the policy recognizes that environmental protection is a prerequisite management tool for achievement of sustainable agricultural production although land and water shortages are the main challenges constraining execution of the policy.

Zanzibar Disaster Management Policy (2011)

The focus of this policy is on disaster risk reduction and livelihoods support. The aim is to develop as much as necessary the national capacity to coordinate and collaborate on comprehensive disaster management programs among the principal players at all intersectoral levels. Aspects considered in the policy include erratic rainfall patterns, food shortages, marine accidents, fire outbreaks, terrestrial and marine degradation, depletion of mangrove forests, and waste management.

National Land Use Plan (1995)

The National Land Use Plan (NLUP) for Zanzibar recognizes that agriculture forms one of the largest land consuming sectors in Zanzibar, absorbing about 60 percent of total land area. The critical environmental issues with respect to land aspects have come as a result of rapid increase of population growth; uncontrolled encroachment of urban settlement into fertile land for agriculture; horizontal urban expansion without considering any integrated environmental regulations and guidelines; and problems of un-registering land parcels. The main inadequacy in NLUP is lack of land zoning resulting into encroachment of potential agricultural land. These inadequacies could result into land use conflicts; uneconomic use of land; wastage of scarce land; and degradation of natural resources.

Zanzibar Vision 2020

The Zanzibar Vision 2020 articulates the overall development goal for Zanzibar as the eradication of absolute poverty and the attainment of sustainable human development. The Vision's policy on environment is the conservation and protection of the environment, rational and efficient utilization of natural resources. It stipulates that sustainable economic development should be accompanied by proper environmental management so that Zanzibar's natural resources and natural heritage are passed on to future generations.

Zanzibar Strategy for Growth and Reduction of Poverty (ZSGRP), 2007

SGRP of 2007 is a national development framework intended to implement Vision 2020. The strategy is in line with the international goals, commitments, and targets, including the Millennium Development Goals (MDGs). The focus is on the reduction of both, income and non-income poverty; and ensure the attainment of sustainable growth. The ZSGRP considers the issues of environmental management such as sustainable and gender focused environmental management system, reduction of the environmental degradation and waste management, which include solid, wastewater and hazardous waste.

Institutional Framework

Ministry of Water, Construction, Energy and Lands (MWCEL)

MWCEL is responsible for policy formulation and coordination and supervision of the implementation. The Ministry, through its Department of Water Development (DWD), assumes primary responsibility for water supply as a whole.

Ministry of State (Presidents Office) Regional Administration, Local Government and Special Departments MRALGSD

MRALGSD is responsible for the regional administration, the district administration and the local governments. The Ministry administers its responsibilities through two directorates including; Directorate for Planning and Administration and Directorate for Regional Administration and Local Government. The ministry maintains one office in Zanzibar and one in Pemba (Chake Chake). Inadequate staff and unclear reporting procedures are reported to be the serious problems affecting performance of the Ministry.

The Ministry of Health and Social Welfare (MHSW)

MHSW is mandated for sector policy formulation and also has the responsibility to monitor the water quality and to control waterborne diseases.

Ministry of Agriculture, Natural Resources Environment and Cooperatives (MANREC)

MANREC is mandated for policy formulation and responsible for promoting irrigated agricultural development and water for livestock as well as prevention of pollution for the resource**.**

Ministry of Regional Administration and Special Departments

The Ministry of Regional Administration and Special Departments is responsible for the coordination and administration of the links between different tiers of the government, i.e., Regional administration, District administration, and Local government: (Municipal/village councils (Shehia).

Department of Environment (DoE)

The department was established in 1989 and is in-charge of environmental matters in Zanzibar. The Department is under the Office of the First Vice President of Zanzibar. This Department has a key role in achieving the national goal of sustainable development set out in the National Development Vision 2020. It is also responsible for coordination of all matters related to regional and international conventions and protocols related to environmental affairs. The Department is further responsible for assessing and monitoring the quality of the Environment, as well as providing technical arbitration in the course of significant environmental impacts to the society through enforcing the environmental legislation. It is responsible for the approval or rejection of EIAs in Zanzibar. Another role of the institution is the administration of environmental matters which is connected to other institutional arrangements concerned with Fisheries, Forestry, Lands, Energy, and the Local Government and Regional Administration Authority.

Department of Water Development (DWD)

DWD's principal responsibility is to provide clean, reliable and good quality water supplies through the operation and maintenance of existing facilities, and development of new waterworks. DWD also has a regulatory responsibility to issue drilling permits for boreholes for

agricultural development and other uses. The Department's Director, assisted by executive engineers, caters for both Unguja and Pemba, urban and rural areas.

Rural and Town Planning Division (RTPD)

RTPD is under Ministry of Water, Construction, Energy and Land, responsible for the planning of all land in Zanzibar. Activities of this Division include identifying and planning redevelopment areas, renewing blighted urban areas and monitoring development to ensure compliance with the development program in accordance with master plans of cities.

Land and Development Division (LDD)

LDD is also under the Ministry of Water, Construction, Energy and Land, responsible for preparing and issuing titles to land owners, a titles register, resolving disputes involving land ownership, and registering encumbrances. Other responsibilities of the Land Development Division are to evaluate and assess assets for tax purposes.

Zanzibar Electricity Supply Company (ZECO)

The Zanzibar Electricity Corporation (ZECO) is a parastatal organization owned by the Government of Zanzibar led by the General Manager appointed by the Minister. The Ministry of Energy, Land, Construction and Water regulates the operations of ZECO. The company's core business is the generation, transmission, transformation, distribution and supply of electricity to consumers in Zanzibar. The hydro-electric power supplied by ZECO in Zanzibar is from Mainland Tanzania National Grid, generated from Mtera Dam in Great Ruaha River.

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