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ENVIRONMENTAL THREATS AND OPPORTUNITIES ASSESSMENT (ETOA)




FEBRUARY 2016

This document was prepared for review by the United States Agency for International Development. It was prepared by Eurasia Environmental Associates, LLC and The Cadmus Group, Inc. through the E3 Global Environmental Management Support II (GEMS II) Contract.

Cover Photos: Hyrax near the Itezhi-tezhi Hydropower Project hunted for bushmeat to feed the influx of construction workers (top left). Commercial fishermen bringing in their lines at the end of the day (top right). Scorched miombo woodlands in a Game Management Areas bordering South Luangwa National Park (bottom right). Stakeholders map threats and resources (bottom left).

USAID/Zambia

Environmental Threats and Opportunities Assessment (ETOA)

February 2016

Prepared under:

The E3 Global Environmental Management and Support II (GEMS II) Contract,
Award Number AID-OAA-13-00018, by The Cadmus Group, Inc. (www.cadmusgroup.com).

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ACRONYMS

ADS	Automated Directives System
AER	agro-ecological region
AIRS	Africa Indoor Residual Spraying Program
ANC	antenatal care
ARC	AIDS Related Complexes
ARCC	African and Latin American Resilience to Climate Change
BCC	Behavior Change and Communication
CASH	Commercial Agribusiness for Sustainable Horticulture
CBD	Convention on Biological Diversity
CBNRM	Community-based Natural Resource Management
CCP	Community Conservation Park
CCRA	climate change risk analysis
CCVA	Climate Change Viability Analysis
CDCS	Country Development Cooperation Strategy
CEP	Copperbelt Environment Project
CFP	Community-based Forest Management Program
CFR	code of federal regulations
CIF	Climate Investment Funds
CIP	Climate Information Platform
CITES	Convention on International Trade in Endangered Species
CMIP	Coupled Model Intercomparison Project
COMACO	Community Markets for Conservation
CRB	Community Resource Board
CSAG	Climate Systems Analysis Group
CSO	Central Statistical Office
DCA	Development Credit Authority
DDT	Dichlorodiphenyltrichloroethane
DG	Democracy and Governance
DHS	Demographic and Health Survey
DO	Development Objective
EC-LEDS	Enhancing Capacity for Low Emission Development Strategies
ECZ	Environmental Council of Zambia
EDEV	Economic Development Office
EGRA/EGMA	Early Grade Reading/Mathematics Assessment

EIA	Environmental Impact Assessment
EIS	Environmental Impact Statement
EMA	Environmental Management Act
EMMP	Environmental Monitoring and Management Plan
EPPCA	Environmental Protection and Pollution Control Act
ETOA	Environmental Threats and Opportunities Assessment
FAA	Foreign Assistance Act
FACT	Fostering Accountability and Transparency in Zambia
FAO	Food and Agriculture Organization of the United Nations
FDI	Foreign Direct Investment
FETP	Field Epidemiology Training Program
FEWSNET	Famine Early Warning Systems Network
FNDP	Fifth National Development Plan
FTF	Feed the Future
FY	Fiscal Year
G2G	Government to Government
GBV	gender based violence
GCC	Global Climate Change
GCM	Global Climate Model
GDA	Global Development Alliance
GDP	Gross Domestic Product
GEF	Global Environmental Facility
GEMS	Global Environmental Management Support
GHG	Greenhouse Gas
GHCN	Global Historical Climatology Network
GIS	geographic information systems
GKNP	Greater Kafue National Park Economic Development Project
GMA	Game Management Area
GMP	General Management Plan
GRZ	Government of the Republic of Zambia
HIV/AIDS	Human Immunodeficiency Virus/Acquired Immune Deficiency Syndrome
IAPRI	Indaba Agricultural Policy Research Institute
IEE	Initial Environmental Examination
IFAD	International Fund for Agricultural Development
ILO	International Labour Organization
IPCC	Intergovernmental Panel on Climate Change

IPTp	intermittent preventive treatment in pregnancy
IR	Intermediate Result
IRS	Indoor Residual Spraying
ITN	insecticide-treated nets
IUCN	World Conservation Union (formerly International Union for the Conservation of Nature)
JICA	Japan International Cooperation Agency
KAZA	Kavango–Zambezi
KNP	Kafue National Park
LEDS	Low Emission Development Strategy
LLIN	Long-Lasting Insecticide-treated Net
Mawa	Zambia Economic Resilience Project for Improved Food Security
MCA	Millennium Challenge Account
MCC	Millennium Challenge Corporation
MDG	Millennium Development Goal
MESVTEE	Ministry of Education, Science, Vocational Training and Early Education
MLNREP	Ministry of Lands, Natural Resources and Environmental Protection
MOH	Ministry of Health
MOTA	Ministry of Tourism and Arts
MSE	medium-scale enterprises
NAPA	National Action Plan for Adaptation
NBSAP	National Biodiversity Strategy and Action Plan
NGO	Non-governmental Organization
NMCC	National Malaria Control Centre
NMCP	National Malaria Control Programme
NPE	National Policy on Environment
NRM	Natural Resources Management
NTFP	non-timber forest product
OTSS	Outreach Training and Support Supervision
OVC	Orphans and Vulnerable Children
PA	Protected Area
PAD	Project Appraisal Document
PAPA	Participating Agency Partnership Agreement
PEPFAR	President's Emergency Plan for AIDS Relief
PERSUAP	Pesticide Evaluation Report Safer Use Action Plan
PMI	President's Malaria Initiative
PPE	personal protective equipment

PPP	Public-Private Partnership
PROFIT+	Production, Finance and Technology+
PTA	Parent Teacher Associations
PTR	pupil to teacher ratio
PSP	Policy Strengthening Project
R&D	Research and Development
RCP	Representative Concentration Pathway
REDD+	Reducing Emissions from Deforestation and Forest Degradation
RSNDP	Revised Sixth National Development Plan
SDG	Sustainable Development Goal
SHIELD	Sustainable Health Improvements through Empowerment and Local Development
SNDP	Sixth National Development Plan
STEP-Up	Strengthening Education Programs Up
TCFA	Trans-Frontier Conservation Area
TTL	Time to Learn Program
UNCBD	United Nations Convention on Biological Diversity
UNDP	United Nations Development Programme
UNEP	United Nations Environment Programme
UNFCCC	United Nations Framework Convention on Climate Change
USAID	United States Agency for International Development
USADF	United States African Development Foundation
USFS	United States Forest Service
USFWS	United States Fish and Wildlife Service
USG	United States Government
VAG	Village Action Group
VIGOR	Various Incentive-based Grant Opportunities and Rewards
WATCH	Water and Global Change Programme
WMO	World Meteorological Organization
WWF	World Wide Fund for Nature
ZAWA	Zambian Wildlife Authority
ZEMA	Zambia Environmental Management Agency
ZERS	Zambia Economic Resilience Program for Improved Food Security
ZPCTII	Zambia Care and Treatment Partnership

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EXECUTIVE SUMMARY

PURPOSE AND SCOPE

The purpose of this assessment is to analyze environmental threats and their root causes and then identify opportunities for environmental conservation, protection, and improved natural resource management (NRM) — specifically as it relates to U.S. Agency for International Development (USAID)/Zambia programming. By incorporating biodiversity and tropical forestry conservation needs and related issues, this assessment complies with sections 117, 118 (c), and 119 (g) of the Foreign Assistance Act (FAA) of 1961, as amended. It will be used to inform the USAID/Zambia Mission in strategic planning, under Automated Directives System (ADS) 201.3.5.2(a) and ADS 204.4.1, and to help set priorities for conservation by identifying direct environmental threats, examining country-level actions, and identifying potential priority sites where USAID's future and existing portfolio of projects may impact biodiversity and tropical forestry. This assessment supersedes the 118/119 Biodiversity and Tropical Forests Assessment conducted in 2010 and finalized in 2011 and the Zambia Environmental Threats and Opportunity Assessment (ETOA) from 2010.[1]

To support these objectives, this assessment identifies important linkages across sectors with respect to environmental conditions and threats, to which USAID/Zambia must be aware of, as it drafts its next Country Development Cooperation Strategy (CDCS) planned for 2017–2022. The assessment will also provide recommendations on handling conditions and threats while utilizing best practices in order to protect the natural resource base and thereby continuing to provide the goods and services needed for healthy communities and economic growth. It is not an exhaustive discussion of the literature documenting the threats and their linkages to the root causes. The intent is to provide a useful synopsis, including input from stakeholders, to inform forward programming under the further guidance of USAID's policies and Executive Orders for biodiversity, climate change, and tropical forests.

The statement of purpose for this ETOA is as follows:

1. This ETOA addresses the requirements of sections 118 (e) and 119(d) of the Foreign Assistance Act (FAA) of 1961, as amended and ADS 201.3.5.2(a) regarding tropical forestry and biodiversity analyses for country strategic plans by identifying a) actions necessary to conserve Zambia's forests and biodiversity and b) the extent to which the proposed actions meet the needs. To conduct this assessment, the existing condition and needs are determined first (Section 2 and 4). In a typical scenario, the activities proposed for support under the CDCS would be compared against the needs to determine where they are congruous. However, in this case, the future activities have not yet been developed. Therefore, this document retrospectively analyzes the existing programs of USAID/Zambia in Section 3 and then identifies how these programs are currently meeting the needs and how future work could be augmented (Section 7) through strategic recommendations. The expectation is that some programmatic approaches in the future CDCS will be similar to those currently in operation.

2. The FAA section 117 on Environment and Natural Resources requires that operating units implement their programs with an aim toward maintaining (and restoring) natural resources, upon which economic growth depends, and to consider the impact of their activities on the environment. This assessment identifies important issues with respect to environmental conditions and threats that USAID/Zambia must be made aware of as it implements its CDCS (Section 4). Although current projects contributing to threats or abilities to address opportunities are analyzed, the purpose of this ETOA is not to provide 22 Code of Federal Regulations (CFR) 216 review. It will, however, be a first level of analysis on which USAID/Zambia's compliance with 22 CFR 216 can be subsequently satisfied through the analysis of the current environmental setting in the country (Section 2). Once the new CDCS is approved, each project under the new CDCS will have individual Initial Environmental Examinations (IEEs) prepared and approved prior to obligation of funds. The issues of environmental quality and management will be reinforced and mainstreamed through the IEE process.

[1] USAID 2011a; USAID 2011b

3. The ETOA includes a climate change risk analysis focused on gathering data on current and predicted climate issues, as well as potential vulnerabilities of the USAID/Zambia development portfolio in the new ETOA as presented in Annex A. However, climate is also integrated as a consideration in the document where appropriate. The integration of climate change embodies an initial data gathering and analysis exercise for the purposes of including climate change considerations in the threats analysis and to accounting for climate within the potential opportunities analysis. It is not intended to fulfill the requirements for integration of climate change into the CDCS.

This assessment summarizes the current state of development in Zambia (see Section 2)—including its economic dependency on ecosystems and ecosystem services—then describes USAID Programming (Section 3) and the state of the environment and NRM (see Section 4). This includes a description of biodiversity, forests, and natural resource-based industries (e.g., agriculture, fisheries, and mining). Environmental threats (Section 5) are described in terms of direct threats (i.e., priority issues) that contribute to root causes of environmental degradation.

The actions necessary to conserve biodiversity, sustainably manage tropical forests, and otherwise safeguard the environment (Section 6) are described in general terms and then linked to USAID strategy (Section 7) and discussed in terms of opportunities for USAID to work with the Government of the Republic of Zambia (GRZ), other donors, non-governmental organizations (NGOs), and stakeholders. While the twelve strategic recommendations represent general cross-cutting needs to conserve forests and protect biodiversity, the highlighted opportunities are used as specific examples of where USAID/Zambia could engage in those recommendations.

METHODOLOGY

The Assessment Team conducted the ETOA through three partially overlapping phases including desk research, stakeholder consultations, and analysis. The Assessment Team started with a one-week desk review of available information on socioeconomic issues, ecology and conservation, environmental management, and USAID programming in Zambia. A pre-field draft report identified key resources and gaps in knowledge, and was then used to schedule and prepare for in-country stakeholder consultations. This desk review was completed concurrent with preparations for the three-week field mission.

Stakeholder consultations in Washington included USAID staff (e.g., Office of Forestry and Biodiversity, as well as Africa Bureau environmental, biodiversity, climate change and energy staff) and staff representing other U.S. government organizations (e.g., U.S. Fish and Wildlife Service [USFWS] and U.S. Forest Service [USFS]) NGOs (e.g., Wildlife Conservation Society). Follow-up consultations with international development donors (e.g., World Bank) were conducted before the in-country field visit.

October 13, 2015 began a three-week in-country segment that focused on interviews and stakeholder consultations. The purpose of these consultations was to ground truth the preliminary findings and to expand the scope to that of a full ETOA. This in-country segment began with an in-brief at USAID/Zambia and ended with an out-brief delivery of key findings and recommendations, concluding on October 29, 2015.

In addition to meetings with regional representatives and sectoral experts, the Assessment Team facilitated three half-day stakeholder workshops (Mambwe, Kafue, and Kasanka) with participants representing GRZ, NGOs, and the private sector.[2] During the workshops, the Assessment Team solicited input on the need to consider additional environmental issues in preparing the ETOA. The results of the workshops' small-group exercises were used to validate the assumptions and key environmental threats identified through the desk review and initial stakeholder interviews. A secondary goal of the workshops was to foster a consensus among USAID and other environmental management actors. The workshops were conducted on-site in Protected Areas (PAs) near the villages and lodges from which attendees came. Although a comparable number of contacts were made in South Luangwa, consultations were conducted one-on-one, rather than in a workshop format, due to logistics.

[2] List of participants in Annex B

This ETOA draft was developed based on literature review, geographical information system (GIS) analysis, stakeholder consultations (Annex B), and USAID comments and feedback on the draft consistent with the approved Scope of Work.

Utilizing the recently released USAID risk screening tools described in Annex A to inform the climate risk analysis process, climate change impacts on current USAID programs were analyzed in two steps. The first step was the selection of USAID programs via date and subject matter. Programs ending in 2015 were not analyzed, and the sectoral focus was limited to the four key sectors for the overall ETOA (economic development, food security, health and the environment). Due to the overlap between programs addressing economic development and those addressing food security, these two sectors were combined for the purposes of this analysis. In the second step, individual programs were reviewed, and the impact of climate change on the programs was analyzed. Adaptation measures were then suggested. For the relevant programs, their impact on climate change (in terms of greenhouse gas (GHG) emissions) was analyzed, and mitigation measures were suggested where appropriate.

STATE OF THE ENVIRONMENT AND NATURAL RESOURCE MANAGEMENT

With a population of 13.1 million, and an average age of 16.6 years, Zambia faces serious challenges in providing employment, food, shelter and a quality of life. With a 2.8 percent annual population growth rate, Zambia has one of the fastest growing populations in the world. However, over 60 percent of Zambians live in poverty with up to nearly 80 percent in rural areas and even higher in areas that surround the PAs and Forests that are informally exploited by impoverished rural populations. A fundamental poverty-environment link exists.

Zambia is a landlocked country of 752,512 km^2, comprised of 10 Provinces (see Figure ES1), and has a PA network including 490 Forest Reserves of 74,361 km^2, 20 National Parks covering 63,630 km^2, 36 Game Management Areas (GMAs) of 167,557 km^2, and 59 Botanical Reserves (see in part Figure ES 2). The Parks and GMA's cover about one-third of the country; however, they are under severe pressure. For example, 90 percent of the largest National Park, Kafue, is burned every year compared to the countrywide average of 25 percent.[3] Although Eastern Province may be impacted by fire to a lesser degree than the national average (20% land area affected compared to 25% nationally), fires set intentionally still substantially infringe upon habitat quality in the PAs of North and South Luangwa and their surrounding GMAs.[4]

Zambia has sixteen major vegetation types, but relatively small areas of tropical evergreen forest. Significant areas of forest reserves have been degraded by agricultural incursion—again underlining the force of poverty in degrading the environmental systems of the country. Some forest are gazetted and under special protection under GRZ Forestry Act (1999), but pressure on the forests are high. The GMAs have been established as part of the PAs systems as community-owned lands intended for use of wildlife resources through regulated safari hunting, game ranching, or other forms of tourism, but they have also suffered significant spontaneous agricultural encroachment, reportedly by farmers from distant areas.

[3] Sikaunde 2013
[4] Hollingsworth et al. 2015

Figure ES 1. Political boundaries of Zambia

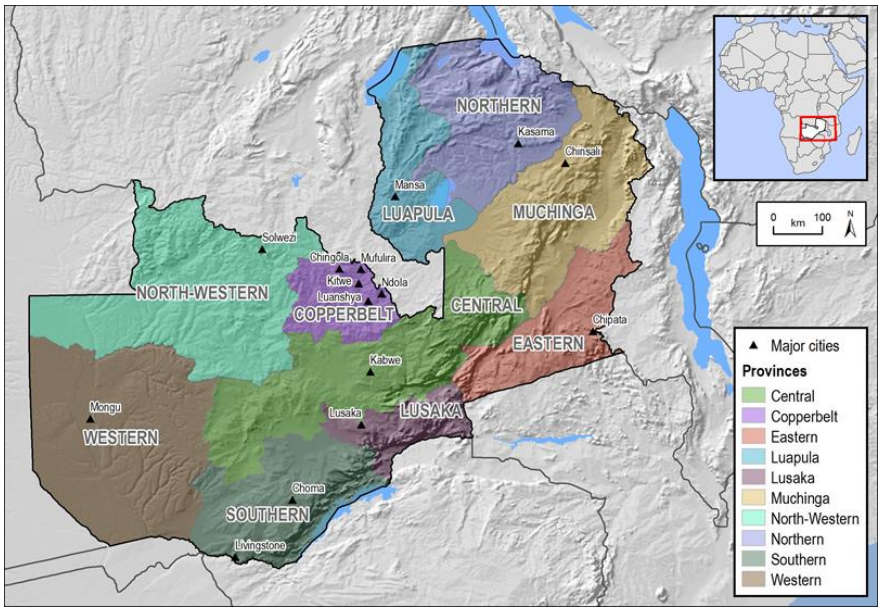
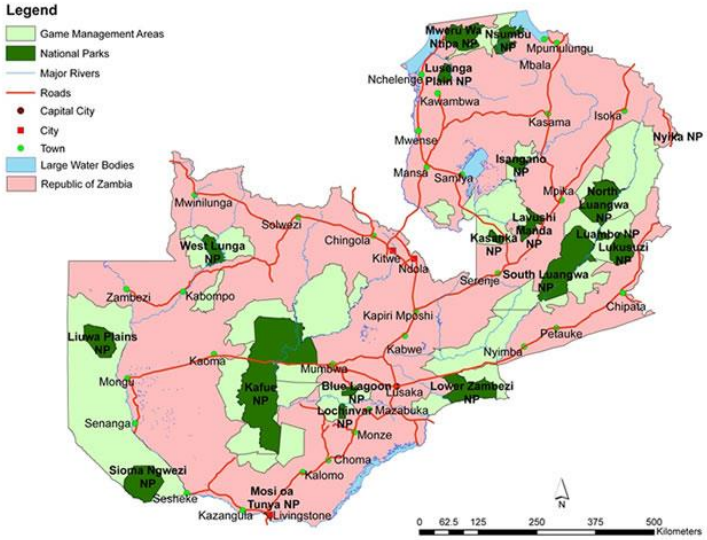


Figure ES 2. Protected Areas in Zambia



Source: GRZ Ministry of Tourism and Arts 2015

Zambia has high biodiversity with over 12,500 species of which 33 percent are plants and 63 percent are animals. Of the 242 mammal species, 24 are threatened with extinction. Estimates indicate that woodland and grassland vegetation types hold the highest diversity of mammals, with grassland having the highest number of endemic species. The highest diversity of antelope species in the world are found in northern Kafue National Park.

Zambia has eight Ramsar wetland sites totaling 40,305 km². Water resources, such as the reservoirs of Lake Kariba and Itezhi-tezhi, provide most of the inland fishery. These inland fisheries contribute 29 percent of the animal protein diet of Zambians (80,826 tons in 2014).

There are 107 species of cultivated plants (52 percent exotic), with cash crops like tobacco, cotton and hybrid maize. While cattle numbers have remained stable, sheep and goats have been increasing at 5 to 7 percent a year.

Zambia has a sub-tropical climate with three distinct seasons: a hot and dry season between mid-August and November, a rainy season from November to April, and a cool dry season from May to mid-August.[5] Projected climate change impacts for the country—while dependent on the region, model, and assumptions—generally include rises in temperature, shifts in precipitation, and possible increases in the frequency and intensity of weather events.[6] Zambia's Intended Nationally Determined Contributions (2015) report noted, "Climate variability and change has become a major threat to sustainable development in Zambia," indicating that climate variability is already having an impact on the country.[7] These events exert stress on the vulnerable sectors like agriculture, resulting in significant adverse impacts on Zambians' lives and livelihoods.[8]

DIRECT THREATS AND DRIVERS OF ENVIRONMENTAL DEGRADATION AND AFFECTED ECOSYSTEMS

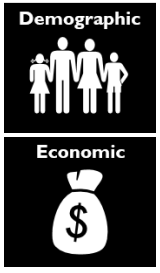
To identify the actions necessary to protect the environment and conserve natural resources, the drivers of the direct threats must be identified. Categories are based on the five groups of generalized driver/root causes described in the USAID Biodiversity Policy (2014).[9] Table ES1 below defines the most significant environmental threats in each ecosystem in Zambia and the drivers of those issues. The information presented is based on the overall analysis of threats, stakeholder consultations, and documents reviewed. Key recommendations to address these threats are discussed later.

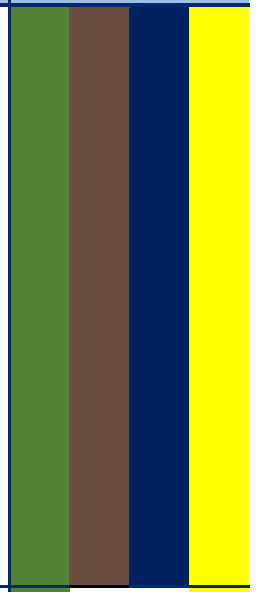
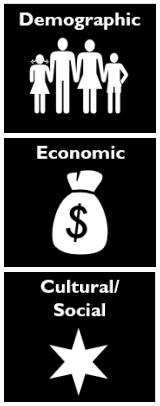
[5] Climate Service Center 2015; USAID 2012c
[6] USAID 2012b
[7] GRZ 2015; USAID 2012b
[8] Climate Investment Funds 2012
[9] USAID 2014a

TABLE ES 1. ENVIRONMENTAL THREATS AND DRIVERS BY ECOSYSTEM

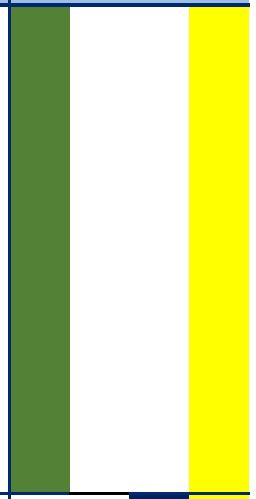
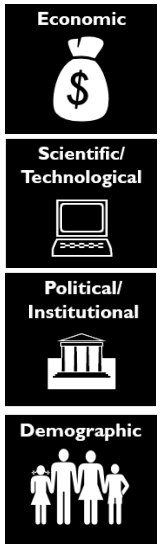
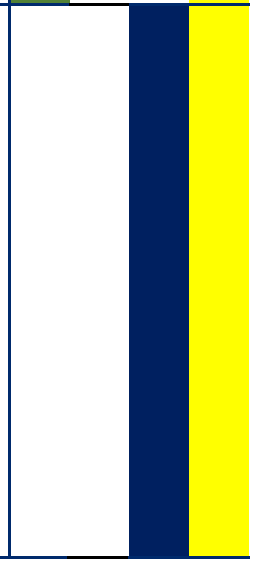
Ecosystem Key

Forests and Grasslands	
Agricultural and Pastoral	
River, Lake, Wetlands	
Protected Areas	

THREATS	DRIVERS/ROOT CAUSES	CATEGORY	ECOSYSTEM
All Threats	• Inadequate organization and inadequately funded, resourced, and educated GRZ employees to carry out their roles in NRM • Limited opportunities and alternative livelihoods to replace consumptive ecosystem uses, particularly for the impoverished • Ineffective and inefficient engagement with community and traditional leaders • Lack of participatory land use planning and clearly established land tenure policies • Lack of integrated natural resource planning and implementation • Presence of an opaque and inadequate enabling environment for business development and investment • Missed opportunities to leverage new and innovative techniques • Lack of appreciation of the intrinsic value of ecosystems		
Agricultural land clearing (including contributions to climate change from deforestation, wetlands development, and burning)	• Agricultural expansion, particularly when spontaneous, into environmentally sensitive areas • Rural poverty from a reliance on maize-centered subsistence agriculture • Low productivity agriculture techniques, at least in part attributed to effects of climate change • Lack of diversification • Low adoption of climate smart agricultural systems and/or conservation agriculture, agroforestry and green manuring • Presence of an opaque and inadequate enabling environment for business development and private sector investment		

THREATS	DRIVERS/ROOT CAUSES	CATEGORY	ECOSYSTEM
	• High degree of government intervention in maize input and output systems • Nutritional vulnerability from a lack of diverse diet and protein • Lack of alternative livelihoods, other than agriculture, including game ranching, sustainable rotational coppicing of miombo for charcoal, etc. • Lack of business interest or economic diversity • Insufficient extension services • Inefficient or inappropriate agricultural practices and techniques working against intensified systems • Maladaptation to climate change (reliance on maize and inputs that are not climate appropriate) • Poor quantitative knowledge for informing land use decisions at the local level • Inadequate reward systems for officials or for community support, largely in the form of existing Community Resource Boards • Insecure and undocumented land tenure • New roads, (e.g., Link 2020 plans)		
Poaching	• Nutritional vulnerability from lack of food source diversity in the diet and protein • Availability of commercial and illicit markets for bush meat, rhino horn, and ivory, pangolins and other wildlife products • Rural poverty and lack of livelihood alternatives, especially those that are non-extractive • Climate variability reducing agricultural productivity and forcing communities into other activities to generate household income • Inability to address human-animal conflict • Lack of monitoring and poaching enforcement, especially during the wet season • Absent enforcement of useful regulations, absent technical assistance/extension, no cooperation with other government agency in system • Lack of required technology to collect and share monitoring data • Lack of basic data on animal and poaching travel patterns • Inadequate reward systems for officials or for community support • Lack of enabling environment for photographic tourism, game ranching, and benefit distributions systems, with community capacity and governance emphasized, that enable local populations to see benefits from wildlife		

THREATS	DRIVERS/ROOT CAUSES	CATEGORY	ECOSYSTEM
	• Communities do not see a value in wildlife, except as meat • Inadequate regional engagement on wildlife trafficking • Inadequate resources (human and other) to address transit of wildlife products; low usage of intelligence-led anti-poaching • Proposed new roads (e.g., Link 2020 plans)		
Deforestation and forest degradation Examples: • Charcoaling (i.e., cooking fuel/energy) • Wild foraging • Illegal logging • Burning	• Lack of reliable energy sources to use for cooking fuel (both during daily operation and during scheduled load shedding) – Load shedding is partially due to low water levels from drought conditions contributed to by climate change. • Unstable prices of alternatives (e.g., cooking gas) • General lack of access to power • Lack of a managed resources to supply the need for household fuels • Lack of education and sensitization of communities • Lack of governance of land resources (honey collection, agriculture, and charcoal production) • Increase in the number of migrants seeking income and turning to marginal livelihoods • Poor infrastructure for patrols • Lack of required technology to collect and share monitoring data • Inadequate reward systems for officials or for community support • New roads		
Unprescribed fires on communal lands/villages (including threats from greenhouse gas emissions from fires)	• Youth hunting for small rodents • Arson with no intent • Clearing of the bush • Regeneration of grasses • Natural fires from extreme weather events • Farmers to fertilize fields or clear standing stocks • Wrong financial incentives/price signals for forest conservation • Lack of streamlined regulations tied to clear fire policy (e.g., of early versus late burning, fire breaks, fire communication) • Lack of fodder for livestock resulting in conversion of forest to grassland • Historical biases/practices by communities • Low productivity pastoralism/livestock management • Poor quantitative knowledge for informing land use decisions at the local level • Lack of monitoring systems • Customary land tenure systems that often encourage land clearing in order to "claim" land		

THREATS	DRIVERS/ROOT CAUSES	CATEGORY	ECOSYSTEM
Fires in PAs (including threats from greenhouse gas emissions from fires)	• Ignition by poachers, fishers and charcoal producers • Loss of control of fires by game scouts and charcoal producers • Cooking fires • Forestry officer corruption • Lack of forestry officer capacity • Inadequate funds for paid professional forestry officers (accept bribes as an income supplement or lower capacity individuals applying for positions) • Lack of streamlined regulations tied to clear fire policy (e.g., of early versus late burning, fire breaks, fire communication) • Intact, pristine landscapes lack value in terms of alternative livelihoods • No ownership of a livelihood alternative that would render burning costly • Inability to control fires once they are started • Inadequate fire surveillance, lack of lookouts		
Overfishing and illegal fishing causing decline in fish populations	• Lack of development and implementation of management plans • Lack of locally managed processes (fishing committees) • Lack of diet diversity and protein • Unlimited open access to the resource • Weak enforcement of fishing bans • Inability to deter repeat offenders • Not addressing repeat offenders motivation • Use of inappropriate fishing materials (e.g., monofilament, repurposed mosquito nets) • Lack of human resources, technical capacity, and equipment to monitor the resource fish populations and fishing operations • Lack of access to information on the status of fish stocks, sustainable harvest targets, environmental variables, population dynamics • Limited connectivity of remote villages to administrative hubs and service centers • Lack of livelihood alternatives for the poor such as fish farming		

THREATS	DRIVERS/ROOT CAUSES	CATEGORY	ECOSYSTEM
Invasive species	• Accidental release from aquaculture operations • Lack of natural grazers/predators to keep the invasive species under control • Ornamental use • Expansion of range with climate change • Difficulty in removal • Lack of economic or dietary uses for invasive species	 	
Pollution (i.e., inland surface, ground, and coastal water, and air) from: ○ Industry (e.g., mining, agribusiness, cotton) ○ Rapid population growth ○ Human and animal waste ○ Solid waste management systems ○ Medical waste and malaria vector control waste (insecticides) ○ GHG emissions ○ Smoke pollution from cooking	• Industrial development with few point discharge regulatory controls • Lack of technology for pollution monitoring • Deficiencies at the federal government level to enforce environmental laws • Increased development of agriculture and livestock sectors without clear regulations on waste disposal • Increased encroachment and human population densities in wildlands • Inadequate solid waste management systems • Inadequate hazardous waste management systems • Lack of guidance on handling of waste disposal • Unregulated mining and lack of mining mitigation • Cumulative impacts of infrastructure development (e.g., Link 2020) on natural resources – roads, transmission, hydro, tourism, etc. • Weak enforcement of emission standards	 	

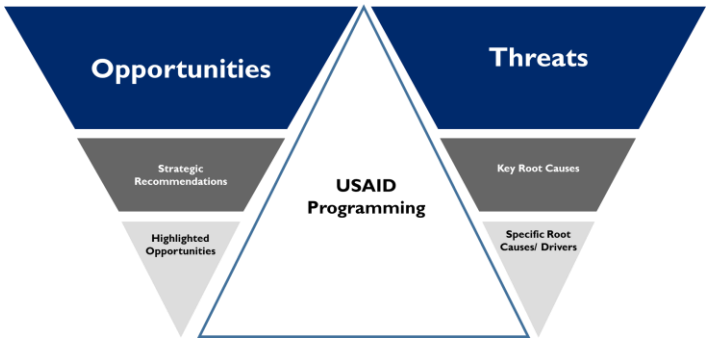
KEY THREATS AND RECOMMENDATIONS FOR USAID/ZAMBIA AND ANTICIPATED OUTCOMES

Each of the strategically recommended actions—regardless of the current status of USAID engagement—will support sustainable economic growth and development in Zambia, as well as climate change resilience and GHG emission reductions. From USAID's perspective, the implementation of these actions could reduce environmental risks to USAID projects, and therefore, improve the outcomes of U.S. Government interventions.

In traveling the country and meeting with 150+ individuals in four communities and over 27 agencies of government, NGOs, development donors, farmers, fishermen and community leaders, the ETOA team has heard a diverse array of accounts related to biodiversity and forest threats and opportunities. This ETOA will document these stories as previous ETOAs have done. It will also address climate change and the repurposing of mosquito nets. However, when winnowed and rendered, these "stories" describe several distinct environmental threats that have been heard repeatedly—the immediate large-scale direct environmental threats posed by **agricultural land clearing, poaching, deforestation, forest degradation, fire, over-fishing, and pollution** with the exacerbating factors such as poverty, environmental degradation, climate change, land tenure, and inadequate government support.

In fact, these are the same threats that have been described for years and were listed in the previous ETOA in 2010. But when attempting to find more fundamental proximate agents, those that actually generate these many accounts, a broader and higher level assessment of the key threats and root causes must be evaluated. Finding these root causes will provide a more informed path to addressing the many individual threats to the Zambian environment.

Figure ES 3. ETOA structure



After examining the drivers and describing their impact on conservation, tropical forests, biodiversity, and the environment, the key root causes linking together these drivers are presented. These primary root causes are exacerbating nearly every environmental threat in Zambia. While the specific threats and drivers are identified in Table ES1 by ecosystem type, the strategic recommendations in Table ES2 are designed to address the root causes of all these drivers. So for example, pollution is partially attributable to lack of regulatory controls; agricultural expansion is contributing to deforestation and forest degradation, which is driven by insufficient extension services by farmers; and poaching, is driven by the lack of monitoring from officials. Poverty is a key underlying factor in all of these drivers, so the key root cause, is in part a "Need for addressing rural poverty by generating opportunities and alternative livelihoods that can replace consumptive ecosystem uses" as noted in TABLE ES 2. While this is only one example, the other strategic recommendations for each of these key root causes are further identified.

KEY ROOT CAUSES

To identify the actions necessary to protect the environment and conserve natural resources, key root causes contributing to nearly all environmental issues in Zambia were identified (some recommendations may offer opportunities for addressing more than one root cause). Table ES2 shows root causes of the stakeholder-identified priority issues vetted by the overall analysis of threats and documents reviewed. Each key root cause encompasses more than one specific driver. Strategic recommendations are provided for each root cause (twelve unique recommendations) and at least one highlighted opportunity for each root cause is provided. Highlighted opportunities are intended to be very specific examples of how to utilize the strategic recommendations.

TABLE ES 2. KEY ROOT CAUSES AND STRATEGIC RECOMMENDATIONS

KEY ROOT CAUSES	STRATEGIC RECOMMENDATIONS
A. Lack of an organized and adequately funded, resourced, and educated GRZ staff to carry out their roles in NRM	**Highlighted Opportunity:** Extend support to Wildlife Management
	Build institutional capacity through training, knowledge sharing, financial support, and updated technological capacity for GRZ NRM agencies and offices
	Realign NRM policies and agency organizations to make them more efficient and able to leverage private sector interests
	Improve the transparency of governance of natural resources and enforce policies and regulations
	Establish life cycle monitoring and enforcement of policies for pollution and hazardous waste management
B. Need for addressing rural poverty by generating opportunities and alternative livelihoods that can replace consumptive ecosystem uses	**Highlighted Opportunity:** Promote poverty alleviation through alternative income generation activities, such as game ranching, eco-tourism, non-wood forest products, payment for ecosystem service **Highlighted Opportunity:** Invest in conservation, development and management of candidate Protected Areas
	Focus interventions regionally to leverage unique opportunities for development (e.g., key PAs)
	Promote agricultural intensification, diversification, and climate-smart practices rather than expansion
C. Ineffective and inefficient engagement with community and traditional leaders	**Highlighted Opportunity:** Strengthening the community institutions
	Focus interventions regionally to leverage unique opportunities for development
	Develop local level NRM engagement through education, capacity building, and institutional controls
D. Lack of integrated natural resource planning and implementation	**Highlighted Opportunity:** Developing and implementing integrated NRM plans
	Develop integrated NRM plans that are cognizant of local economic, social drivers, climate change and support implementation
E. Presence of an opaque and inadequate enabling environment for business development and investment	**Highlighted Opportunity:** Enabling the business environment
	Create an enabling environment for businesses to engage in conservation and economic development of "green" or environmentally responsible projects
	Realign NRM policies and agency organization to make them more efficient and able to leverage private sector interests
	Encourage public private partnerships (PPPs) and private enterprise in waste management and control
F. Missed opportunities to address legacy environmental issues	**Highlighted Opportunity:** Addressing legacy mine pollution **Highlighted Opportunity:** Studying the impact of insecticide-treated nets (ITNs) and devise management and disposal plans **Highlighted Opportunity:** Improve pesticide handling and disposal
	Develop reliable forms of energy, alternative sources of energy, and put in place stop-gap energy delivery systems until the national energy infrastructure develops
	Develop donor led strategies that are integrated and sustainable at the national health care system level to handle wastes (management and disposal of pesticides and medical waste)

EXTENT TO WHICH PROPOSED AND CURRENT USAID PROGRAM ACTIONS ARE ADDRESSING GAPS ILLUSTRATED BY THE STRATEGIC RECOMMENDATIONS

Table ES 3 identifies where current USAID programmatic pillars are at least partially addressing the strategic recommendations. Although the recommendation may be addressed in some form, the ETOA focuses on the current gaps, which may require additional inputs to, or refocusing of, existing programs. Other recommendations may present new opportunities for particular areas of the Mission to engage. The analysis is broken into programming areas for convenience rather than by office.

TABLE ES 3. EXTENT TO WHICH PROPOSED AND CURRENT USAID PROGRAM ACTIONS ARE ADDRESSING GAPS

Key:
O = Opportunity for USAID, activities are not currently supporting the necessary action, but could in future programs
+ = Existing programs and identified new activities support the necessary action
Blank = no or minimal relationship

	USAID/ ZAMBIA PROGRAMMING AREAS							
STRATEGIC RECOMMENDATIONS	DEMOCRACY AND GOVERNANCE	EDUCATION	AGRICULTURE	CLIMATE CHANGE AND FORESTS	BIODIVERSITY	ENERGY*	MALARIA CONTROL	HEALTH
1. Build institutional capacity through knowledge sharing, financial support, and updated technological capacity for GRZ NRM agencies and offices			O	+	+			
2. Focus interventions regionally to leverage unique opportunities for development (e.g., selected PAs)			+	+	+	O	O	
3. Develop local level NRM engagement through education, capacity building, and institutional controls	O	O	+	+	+	O	O	O
4. Develop integrated NRM plans that are cognizant of local economic, social drivers, and climate change and support implementation			O	+	O	O		
5. Create an enabling environment for business to engage in conservation and economic development of "green" or environmentally responsible projects	O		+	O	O	+		
6. Realign NRM policies and agency organization to make them more efficient and able to leverage private sector interests	O		O	O	O			

	USAID/ ZAMBIA PROGRAMMING AREAS							
STRATEGIC RECOMMENDATIONS	DEMOCRACY AND GOVERNANCE	EDUCATION	AGRICULTURE	CLIMATE CHANGE AND FORESTS	BIODIVERSITY	ENERGY*	MALARIA CONTROL	HEALTH
7. Improve the transparency of governance of natural resources and enforce policies and regulations	O		O	O	O			
8. Promote agricultural intensification, diversification and climate-smart practices rather than expansion			+	+	+			
9. Develop reliable forms of energy, alternative sources of energy, and put in place stop-gap until the national energy infrastructure develops				+		+		
10. Establish life cycle monitoring and enforcement of policies for pollution and hazardous waste management	O	+	O			O	O	O
11. Encourage PPP and encourage private enterprise in waste management and control			+				O	O
12. Develop donor led strategies that are integrated and sustainable at the national health care system level to handle wastes							O	O

* Energy policy and Power Africa are still evolving aspects of Mission interest. Generally, strategies have been identified as potential future Mission activities, yet the details are unavailable. Therefore, the mission engagement on the strategic recommendations in this sector is noted as an "identified new activity", which may or may not be taken up in the course of development.

HIGHLIGHTED OPPORTUNITIES

Based on the actions identified as necessary to address environmental threats, as listed above, this section outlines some of the highlighted opportunities for USAID/Zambia that exemplify the strategic recommendations. "Opportunities" indicates that specific recommendations are proposed but not implied. These recommendations are intended to inform USAID/Zambia of the opportunities that respond to the threats indicated by the review. However, they are not intended to solicit nor commit to USAID funding or programming and are not necessarily reflective of the opinions of the Mission. They constitute a menu of possible areas of investment from which the Mission could choose. The recommendations reflect those areas where USAID support could significantly affect the protection of Zambia's biodiversity and forests with consideration given to predicted climatic conditions. Full analysis is provided in the body of the ETOA with a summary here (not necessarily in order of importance).

EXTEND SUPPORT TO WILDLIFE MANAGEMENT

The Zambian Wildlife Authority (ZAWA), as the essential, indispensable agency for protecting wildlife biodiversity and habitats, is under-resourced and lacks transparency. The new draft National Parks and Wildlife Policy states (Sec. 7.14) that "law enforcement will aim at achieving an operational staff density of one wildlife scout to 23 km^2 for PAs with elephants and rhinos and one wildlife scout to every 40 km^2 of PA elsewhere." This goal is far from being met. USAID has a unique opportunity to support ZAWA through government-to-government agreements and mentoring support so ZAWA can act as an effective, well-staffed, transparent, and fully functioning steward of Zambia's natural resources. ZAWA should be a target of capacity building for scouts and inspectors investigating and prosecuting poaching, as well as improving field tactics. Training is also a critical need for ZAWA, which was confirmed by the ETOA, and could contribute to a reduction in poaching. Any projects using donor funds will also have to make stressed institutions like ZAWA work smarter through technology (e.g., data collection, mapping, trained dogs and drones) and augmented basic resources like vehicles, communication devices, and fuel.

Such skills are currently within the capacity of ZAWA, but the capacity needs to be strengthened and become an inherent part of the organization in order for contributions from donors to be sustainable. The ETOA team met with ZAWA management and encountered a very committed and talented staff, stymied by a spontaneous loss of support, lack of government appreciation and lack of a reasonable reward system. Another, related concern is the sustainability of any support for an organization that is vulnerable to impositions over which it has little control, such as the raiding of its budget by government. In response, it should be noted that efforts to support ZAWA would be more sustainable if ZAWA's planning unit would be located in the planning unit of the Ministry of Finance to protect its funding. An additional means of improving sustainability would be to form an international trust to hold and disburse hunting receipts for particular species management, as required by U.S. Fish and Wildlife Service (USFWS) Convention on International Trade of Endangered Species (CITES) II. Although this would address the built-in conflict between revenues realized from hunting and rack taxes in tourist facilities (similar to the support for Fish and Game Departments in the United States), a well-trained and funded ZAWA has the best control over its funding and programming.

Specific recommendations:

- Monitor the move of ZAWA into the Ministry of Tourism and Arts and, if ineffective, advocate to re-locate ZAWA planning into the Ministry of Planning.
- Increase wildlife enforcement skills with participation in USFWS' Special Agent training program.
- Upgrade the wildlife curricula at a selected university to foster a regional center of excellence for the topic.

- Develop a Research Institute to attract Zambian and international scientists working on vital social and biological unknowns (counts and trends of harvested and park populations, natural fire regimes, system drivers and feedback loops like termitaria) to conduct the basic research needed to support management by ZAWA.
- Develop communication and outreach plans for ZAWA regarding rules and regulations of parks, fire control and back burning efforts, and poaching information.
- Support a clear reward system for ZAWA and Forest Department staff (e.g., salary raises, study tours, graduate work at centers of excellence in the U.S.).
- Develop alternative livelihoods compatible with sustainable land uses in GMAs in coordination with ZAWA (see also next section).

PROMOTE POVERTY ALLEVIATION THROUGH ALTERNATIVE INCOME GENERATION ACTIVITIES, SUCH AS GAME RANCHING, ECO-TOURISM, NON-WOOD FOREST PRODUCTS, PAYMENT FOR ECOSYSTEM SERVICE

Diversifying uses of wildlands, for household income generation in a non-destructive and sustainable way, is of significant interest for addressing poverty alleviation through alternative livelihoods while promoting conservation and supporting growth in biodiversity. The poor rely disproportionately on the environment for income generation and to meet basic needs, typically taking their income from sectors such as agriculture, forests, and fishing. This reliance also makes these populations more vulnerable to disasters, climate change, and shocks. Reversing negative environmental trends has been shown to achieve poverty reduction as income, health, and opportunities are influenced by ecosystem quality.[10] The poor's reliance on wildland use needs to be diversified and sustainable so communities have lasting benefits from income, protein, and employment while maintaining the natural assets of the land and improving resilience to climate change (by maintaining soil integrity, reducing erosion, and maintaining intact forests).

Many activities already supported by USAID/Zambia have examined and implemented some of these alternatives. Community Markets for Conservation (COMACO) has created successful enterprises in non-timber forest products through the specialty food market. The Community-based Forest Management Program (CFP) flagship for USAID/Zambia is also already engaged in alternative livelihoods on existing lands including honey production and mushroom collection with potential components that include game ranching. Therefore, new opportunities have been explored.

An additional form of alternative use of wildlands includes the concept of payment for ecosystem services. While this is of interest, few studies have quantitatively demonstrated the benefits for rural communities from payment for ecosystem services. There are serious challenges in developing a payment for ecosystem services program, particularly in scaling the project, to which USAID/Zambia would need to respond for successful implementation of payment for ecosystem services schemes. There must be a clear definition of the services and there must be buyers linked to a framework for reimbursement and monitoring. While payment for ecosystem services may not be a singular solution to conservation in rural areas, it can be considered as part of the toolkit in overall conservation efforts.

Game ranching is another option for diversifying household incomes in a less consumptive manner. Game ranching generates more income per kg of biomass than livestock farming, allows for the utilization of marginal lands, and provides a buffer against drought and climate change. Ranchers who utilize wildlife, in addition to crop farming and/or livestock farming, boosted their income by an average of 23 percent. The game ranching results in significant foreign currency inflow due to the sale of hunting and tourism experiences to foreign visitors. However, at the present time, the regulatory environment for game ranching is confused with the Wildlife Act of 2015, potentially banning the private ownership of wildlife, but this has yet

[10] Lusigi 2008

to be determined. Regardless, this is an example of wildland use, in addition to eco-tourism, non-wood forest products, and payment of ecosystem services, that offers USAID an opportunity to sustainably support communities by putting in place programs that could generate profits, protein, and employment while maintaining the natural assets of the land and improving resilience to climate change.

Specific recommendations:

- Continue to develop and engage in non-timber forest products promotion as a source of alternative household incomes.
- Payment for ecosystem services schemes can be considered as part of the toolbox of conservations efforts, but substantial effort to establish frameworks for accounting and monitoring of those services, as well as agreements between buyers and sellers, and the potential benefit to rural poor communities, must first be carefully examined.
- While game ranching is explored as another alternative livelihood option, the future of the industry is partially dependent on evolving policy from GRZ, especially relating to the ownership of game. Models in other parts of Southern Africa have shown success in this area. However, without ownership rights, this recommendation will be significantly challenged and should be caveated as such.
    - The establishment of game operations must be accompanied by careful siting based on vegetation composition, total land area available, and access to markets (be it tourism, hunting, or grocery outlets).
    - The complexity of establishing and marketing these ventures will likely require local communities to partner with knowledgeable private enterprises. Communities will need support to understand and contribute to the business plan for their lands.
    - A cross-linked issue is the current business-enabling environment in Zambia for investment, especially in natural resources. Incentives for investment and ease of establishing and running a business will need to be improved for game ranching to be successful, both for domestic and foreign investors.

INVEST IN CONSERVATION, DEVELOPMENT AND MANAGEMENT OF CANDIDATE PROTECTED AREAS

Three protected areas representing a diversity of natural assets and environmental issues were visited by the ETOA team. Through a case study of Kafue National Park, recommendations, as they could also be applied to other PAs, are noted. These recommendations are not a bandage for the PAs in Zambia, but are direct approaches for the renovation and reinvigoration of the sector through phased steps that involve changes at the highest policy level, restructuring and support to oversight and management, and integrated investment from sectors with overlapping interests. These recommendations are a start.

Kafue Case Study. Kafue development is a challenging proposition for donor support, and the Millennium Challenge Account (MCA) has already cancelled the Greater Kafue National Park Economic Development Project (GKNP). The reasons identified for turning down support of the project largely centered around a heavy focus on infrastructure and difficulty with an under-resourced ZAWA being able to effectively engage in an ~ $160 million USD program. However, it does not mean that this opportunity should be ignored or completely abandoned and that incremental improvements could not lead to a thriving park one day. Kafue's needs are largely driven by the needs of ZAWA and other GRZ entities that are charged with its protection and promotion of tourism in the area. Notably, the needs of these agencies cannot be decoupled from the needs of the Park itself. Additionally, businesses need to be enticed to operate in the park and with local GMAs, but first, the enabling environment for business growth needs to be inclusive rather than exclusive and should target a more diverse tourist market, rather than focusing on high end tourism. Finally, USAID

could assist Kafue in implementing its integrated NRM plan to sustainably manage the park toward improving the abundance of wildlife, allowing vegetation to thrive rather than being burned, integrating climate change vulnerabilities into planning, and working with communities rather than fighting them.

Extrapolation of Lessons from Kafue to other PAs. The challenges for managing and promoting Kafue National Park are in many ways unique, but in other ways, exemplify challenges across the entire PA system in Zambia. Improvements need to be made in order to improve the functioning and sustainability of the PAs system to preserve the unique biodiversity and forest ecosystems of Zambia. Some of these challenges, such as engaging Community Resource Boards (CRBs) and integrated land use planning, are discussed below, but are reiterated here for completeness of thought and vision.

Specific recommendations:

- PAs are lacking integrated planning and funding for implementation of management plans. Detailed studies, with long -term hard data on wildlife population counts, movements, and habitat quality, are generally lacking for most parks. While South Luangwa has been the subject of study for many years, the other 19 National Parks, numerous GMAs and gazetted forests, lack sufficient data upon which to base management plans. By drafting clear management plans, budgets to support wildlife and park management can also be developed. There is clearly a shortfall in funding necessary to meet the needs of parks, but the exact gap in available funding is unknown without having fully functioning plans. A needs assessment should be conducted first to characterize the biology of the park, the status of the surrounding social environment, and the economic factors. Then, as scientific studies and censuses begin, the drafting of interim integrated NRM plans can commence. These plans must include considerations of fire regimes, sustainable and multiple uses (e.g., hunting, timber production, safari operations, non-timber forest products, etc.), and of course, critical wildlife habitat.

- All planning, especially in GMAs, must include social communication plans and assessments of local needs and views in order for the plans to be sustainable. GMAs are, in fact, multiple use areas, but efforts to make the multiple uses work in harmony have not yet been successfully identified. It is acknowledged that there will always be differing motivations, but social contracts and mutual understanding for appropriate uses must be gained in order to make management mutually beneficial and sustainable.

- Profitability schemes must be developed for all PAs. Funding from central sources is inadequate for the critical functioning of parks. If GRZ is going to maintain such a large area under protection (inclusive of all its GMAs, forests, and National Parks) and focus on quantity rather than quality, then a fund sharing scheme must be developed for those parks that offer critical habitat, but are less attractive to development interests. Without a clear finance strategy, inclusive of all parks, it is inevitable that many, except the top tier of PAs, will not have sufficient funds for operation and management. Prioritizing the existing PAs for investment and privatization should be considered.

- PAs lack monitoring schemes that are efficient for tracking poachers, identifying and fighting fires, conducting wildlife censuses, or even for ensuring that conflicting uses are well separated spatially. Both simplistic tools, as well as advanced remote monitoring, could contribute to the effort and a one-size fits all approach is not necessary. Simple surveys and aggregation of data from observed poaching kill sites collected from scouts could help map zones of most concern for wildlife trafficking. Overlaying those areas with wildlife trails and grazing areas can help to prioritize the areas most important for patrols. Increasing the ability of ZAWA to conduct and report on censuses is also important as the ban on hunting has been lifted in 2015 and the census data is critical for sustainable management.

- Private enterprise must be encouraged, rather than discouraged, from participating in PA management and development. The parks, as they exist, are faltering and GRZ clearly cannot sustain them on their own. GRZ has made development of GMAs by private enterprise easier than

development in National Parks, but the process in all PAs is confusing and decentralized. Leases must be longer than 5 to 7 years (i.e., in National Parks) for enterprises to accept the risk of investment in this challenging economic climate and have time to build their client base. The GMA investment is challenging because of land tenure issues with chiefdoms in GMAs and the coordination and operational authority over management of those lands between the private enterprise, ZAWA, and chiefdoms. Mutually beneficial user schemes for all residents must be transparently identified and mapped.

STRENGTHENING COMMUNITY INSTITUTIONS

CRBs and Village Action Groups (VAGs) are crucial in GMAs and adjacent open areas. Based on observations during the field visits, the CRBs are generally non-functional actors in NRM for a number of reasons, including the lack of funding. VAGs are organized at a more local level. Studies suggest that communities participating in either CRBs or VAGs tend to be non-poor and that this group benefits more from these institutions than do the poor. Across all CRBs interviewed, there was a lack of transparency on how the money was managed and spent. There are also issues with funds passed through CRBs from tourism operations because revenue is lost to tributes to chiefs. In some areas, game ranching can be the best use of the natural landscape, and CRBs and VAGs could be instrumental in promoting and managing ranching, whether for meat or for trophy hunting, although there are numerous challenges to overcome, such as ownership of property by CRBs and the right to game species. Alternatively, CRBs and VAGs could together also function as the main promoter and organizer for private enterprise investment in agriculture. The communities currently lack a sense of how to form cooperatives to transport, sell, and market products, a role that could be filled by knowledgeable VAG members consolidating their efforts through the CRB. Communities also need members who work for the collective good to promote private investment and who can vet business plans for fairness and implementability, and who also understand how to integrate the most vulnerable and impoverished community members into the community's development groups. Rather than waiting for enterprises to come to them, VAGs could benefit first form entrepreneurship skills development and then from matching programs between private enterprises aggregated at the larger CRB-level. These partnerships of course could not take place without transparent systems of accounting and allocation of assets.

Specific recommendations:

- Formation of a single management structure for multiple natural resources rather than the stove-piped divisions that currently exist among the different resources.
- Support for the development organizations, or modification of existing organizations to be more inclusive, which are representative of the community as a whole, including the most vulnerable groups, rather than skewed toward the non-poor.
- Engaging and incentivizing community NRM groups so they are committed.
- Providing and ensuring members of the group are adequately trained for addressing integrated NRM issues.
- Allowing for the NRM groups to have a formal relationship with stakeholders through contracts and charters (this would require policy work with GRZ).
- Providing an avenue for the groups to exploit opportunities for economic development.
- Encourage policy that grants clear and concise rights to natural resources in a manner that is sensitive of traditional values and promotes realistic and sustainable management.
- Promote governance and accounting structures that are transparent and fair.

DEVELOPING PARTICIPATORY INTEGRATED NATURAL RESOURCE MANAGEMENT PLANS

The many instances of agricultural expansion in PAs (i.e., illegal exploitation of fish, wildlife, and forests) and related threats to the environment are closely linked with land tenure also playing an important role as a driver. These issues should be considered as an integrated system with one sector influencing the outcomes in another. Tourism is driven partially by wildlife abundance. Wildlife abundance is influenced by habitat fragmentation and agricultural incursions. Droughts reduce water availability, which in turn, concentrates wildlife around watering holes earlier in the dry season giving poachers more time and an easy opportunity to kill the animal. The solution here is not to have separate agriculture, wildlife, and tourism marketing activities, but to routinely, as a matter of policy, insist on planning together and employing an objective integrated model of the particular system interventions being planned. Although some plans have been developed, many also need updating, particularly for climate vulnerabilities and the inclusion of participatory planning. Implementation of the plans is seriously impeded by coordination at the government, local, and community level, and the unresolved issues behind the multiple systems of land tenure further confound implementation. To implement plans, an initiative to divide responsibilities could be used through a community resource enhancement project, or community conservation parks (CCPs), that employ the support of traditional and religious leaders, include participation of villagers and sectoral professionals, and involve both conservation agriculture and sustainable game utilization.

These specific recommendations are the same as those noted for support to ZAWA and to support the PAs. Recommendations based on defensible and timely data are critical to the development of plans. After planning, implementation will fall on a host of entities that include GRZ, CRBs or other associated VAGs, donors, and the private sector. Carrying through the implementation plans, prioritizing efforts, and monitoring the results will build upon the foundation that the integrated plans create.

ENABLE THE BUSINESS ENVIRONMENT

Natural resource protection is in need of additional resources. One way to leverage additional resources is to engage private investment. There are multiple reasons for the underwhelming current investment rate. Investors are clearly distracted by the confusing, dispersed, and sometimes corrupt labyrinth of entities, paperwork, fees, and waiting times needed to operate. Once operational, there is little cooperation among investors to spur business development. The supporting infrastructure and government services that underlie successful ecotourism are usually lacking or underperforming. Support is also needed to form strong business associations among the lodges, tour operators, hunting operations, community leaders, and CRBs/VAGs. Lodges need to form a unified body instead of fighting each other for business in the market where currently only two niches are viable (i.e., high-end photography tourism and trophy hunting). There is a definite lack of communication and transparency among lodges, conservation societies, CRBs and chiefs in handling funds for community development projects. The diversified and transparent tourism marketplace would increase the total tourism revenue in Zambia and for ZAWA, but assuredly would reduce the amount of funds going to tributes, per diems, and bribes. Streamlining these processes, reducing fees, encouraging diversification, and developing transparent processes would improve the investment process benefiting all stakeholders in conservation and tourism.

Specific Recommendations:

- Work with the GRZ to streamline the business licensing and investment process by clearly identifying, in writing and publically available resources, the process for obtaining licenses to invest and operate, procedures for negotiating with traditional leadership, gazetting of investments, and paying fees and taxes.
- Consolidate business development offices into a single location (or regional offices) where developers could file most of their paperwork, pay fees, and document their investment.
- Provide matching services between interested investors and community organizations and work with communities to ensure fair and transparent representation and investment.

- Build a sense of entrepreneurship in communities by creating youth education and investment curriculum on business administration and accounting starting with elementary-aged children through high school.

- Conduct a business development assessment to identify areas where the eco-tourism market can be diversified as only high-end tourism and "overlander" self-catering markets are supported. Tourism supporting nationals and the middle-income foreign market are nearly non-existent.

ADDRESSING LEGACY MINE POLLUTION

Some thirty years after Independence, mining productivity was declining and the Government privatized the industry to stimulate foreign investment and productivity. However, 70 years of mining, beginning in the colonial era, left an extensive environmental legacy of contaminated sites and abandoned mines for which investors were unwilling to accept liability for remediation, and the GRZ was lacking resources to address the environmental debt. There is an opportunity to address mining-related environmental issues by improving accountability and responsibility for mining-associated risks with current mining projects as well as legacy sites.

Specific recommendations:

- Cooperate with other donors on the remediation of known hotspots.

- Improve the institutional capacity to monitor and enforce regulations by Zambia Environmental Management Agency (ZEMA), the Mine Safety Department, and the Kabwe and Kitwe municipality.

- Educate and empower the communities at risk to improve their participation in cleanup and monitoring efforts.

- Contribute to the development of alternative livelihood opportunities for affected people in mining areas to reduce their contact with contaminated soils.

STUDY THE IMPACT OF INSECTICIDE-TREATED NETS AND DEVISE MANAGEMENT AND DISPOSAL PLANS

Vector Works, implemented through John Hopkins University and supported by President's Malaria Initiative (PMI), has begun to investigate the misuse of insecticide-treated nets (ITNs) for fishing and is attempting to quantify the problem and respond with guidance on the topic.[11] There are three concurrent projects taking place, just beginning in FY16, of which opportunities exist for USAID/Zambia to collaborate to address some of the specific issues identified for Zambia, but also more broadly affecting sub-Saharan Africa. USAID/Zambia could contribute to information gathering and proactively addressing mosquito net fishing, both on the environmental monitoring side and on the side as a donor of ITNs. While ITNs can be addressed individually, many of the recommendations for handling poaching issues associated with ITNs also apply more broadly across poaching for bushmeat as well.

Specific recommendations:

- Vector Works is looking for a pilot project location to validate their literature research and modelling. USAID/Zambia could assist with planning, potentially link Vector Works with other partners in the field who could assist with monitoring, and help aggregate data. USAID Zambia could play a critical role in communicating the results to GRZ and other donors working with net distributions and finding a plan to reduce illegal uses.

[11] Johns Hopkins Center for Communication Programs 2015

- Provide additional support to assist the Department of Fisheries with monitoring fish stocks, provide training and software for analyzing the data, and, in broader efforts, help the Department of Fisheries engage with ZAWA and other ministries to include the data in integrated NRM plans.
- Contribute to enforcement, along with data collection, by providing hard goods, such as boats and recording equipment, as well as helping in the development of innovative remote sensing techniques.
- Improve accessibility to fishing permits by establishing public/private partnerships to sell fishing licenses (e.g., authorized outlets) so that they are more accessible.
- Promote aquaculture of fisheries, clams, and crayfish and/or assist in changing the policies on the sale of legally obtained game meat from GMAs to reduce pressure on wild populations of fish and game.
- Contribute to a controlled study of whether the type of ITN alters the use of ITNs for fishing, essentially examining the preferences for net types.
- Support communication and education efforts to relay the potential environmental detriment and fines for illegal fishing and poaching.
- Create rehabilitation programs and invest in alternative livelihoods with a target of repeat offenders of poaching.
- Reinforce attention from ZEMA on assessment and monitoring of new construction on poaching levels.

IMPROVE PESTICIDE HANDLING AND DISPOSAL

When used improperly, pesticides are a threat to the health of communities, water quality, and non-target fauna and flora. Zambia has already seen insecticide resistance of mosquitos due to widespread use of certain chemicals. There are opportunities for USAID to engage in monitoring the safety of pesticide supply and use, as identified in this ETOA, without directly handling or promoting pesticides.

Specific Recommendations:

- Assist ZEMA in developing a database and tracking system to monitor what types and how many pesticides are being promoted in rural areas by private companies. There is also a need to document what mitigation and personal safety measures are also being communicated. ZEMA indicated that they had a great need to move the operations, and pesticide monitoring in particular, to a modern advanced system.
- With incidence of accidental and intentional poisoning a concern, USAID/Zambia could support ZEMA in creating a database that tracks these incidences, identifies the specific pesticides involved, and establishes a reporting hotline so ZEMA can appropriately develop a safety messaging campaign.
- USAID/Zambia could establish partnerships with pesticide producers, or commission a study to explore labelling of pesticide bottles so the label cannot be removed, while also making the bottles unattractive for drinking water purposes (explore preferences for color, opaqueness, neck and opening design, etc.). This may help address demand for reusing these bottles.
- With the Agency reevaluating its pesticide procedures, a co-developed database that parallels each other (i.e., U.S.-approved vs ZEMA approved) would allow for ease of comparison between USAID programs using pesticides. Harmonizing standards for mitigation measures through a database would also be useful so that different mitigation practices do not exist for different users across different regions. This is an excellent opportunity for USAID/Zambia to engage in a pilot project to support

development of a pesticide database in Zambia with ZEMA that could parallel a trial USAID system to streamline approvals and potentially replace Pesticide Evaluation Report Safer Use Action Plans (PERSUAPs).

1. INTRODUCTION

PURPOSE AND SCOPE

The purpose of this assessment is to analyze environmental threats and their root causes and then identify opportunities for environmental conservation, protection, and improved natural resource management (NRM)—specifically as it relates to U S Agency for International Development (USAID) programming. By incorporating biodiversity and tropical forestry conservation needs and related issues, this assessment complies with sections 117, 118 (c), and 119 (g) of the Foreign Assistance Act of 1961, as amended. It will be used to inform the USAID/Zambia mission in strategic planning, under Automated Directives System (ADS) 201.3.5.2(a) and ADS 204.4.1, and to help set priorities for conservation by identifying direct environmental threats, examining country-level actions, and identifying priority sites where USAID's future and existing portfolio of projects may impact biodiversity and tropical forestry. This assessment supersedes the 118/119 Biodiversity and Tropical Forests Assessment conducted in 2010 and finalized in 2011 and the Zambia Environmental Threats and Opportunity Assessment (ETOA) from 2010.[12]

To support these objectives, this assessment identifies important linkages across sectors with respect to environmental conditions and threats, to which USAID/Zambia must be aware of, as it drafts its next Country Development Cooperation Strategy (CDCS) planned for 2017–2022. The assessment will also provide recommendations on handling conditions and threats while utilizing best practices in order to protect the natural resource base and thereby continuing to provide the goods and services needed for healthy communities and economic growth. It is not intended to be an exhaustive discussion of the literature documenting the threats and their linkages to the root causes. The intent is more to provide a useful synopsis, including input from stakeholders that can be used to inform forward programming under the further guidance of USAID's policies and Executive Orders for biodiversity, climate change, and tropical forests. The ETOA is an important start to developing programs on biodiversity, conservation and tropical forests, with program decisions based on overarching USAID policies, guidance, and associated Executive Orders.

SELECTED USAID POLICIES AND SUPPORTED GUIDANCES FOR PROGRAMMING IN BIODIVERISITY, TROPICAL FORESTS, AND CLIMATE CHANGE

- USAID Biodiversity Policy (2014a)
- USAID Biodiversity and Development Handbook (2015a)
- USAID Integrating Biodiversity and Climate Change Adaptation in Activity Design (2015b)
- USAID's Measuring Efforts to Combat Wildlife Crime: A Toolkit for Improving Action and Accountability (2015c)
- FAO's Climate Smart Agriculture Sourcebook (2013)
- USAID's Climate Change and Development Strategy (2012a)
- Climate-Resilient Development: A Framework for Understanding and Addressing Climate Change (2014b)

This statement of purpose for this ETOA is as follows:

1. This ETOA addresses the requirements of sections 118 (e) and 119(d) of the Foreign Assistance Act (FAA) of 1961, as amended and ADS 201.3.5.2(a) regarding tropical forestry and biodiversity analyses for country strategic plans by identifying a) actions necessary to conserve Zambia's forests and biodiversity and b) the extent to which the proposed actions meet the needs. To conduct this assessment, the existing condition and needs are determined first (Section 2 and 4). In a typical scenario, the activities proposed for support under the CDCS would be compared against the needs to determine where they are congruous. However, in this case,

[12] USAID 2011a; USAID 2011b

the future activities have not yet been developed. Therefore, this document retrospectively analyzes the existing programs of USAID/Zambia in Section 3 and then identifies how these programs are currently meeting the needs and how future work could be augmented (Section 7) through strategic recommendations. The expectation is that some programmatic approaches in the future CDCS will be similar to those currently in operation.

2. The FAA section 117 on Environment and Natural Resources requires that operating units implement their programs with an aim toward maintaining (and restoring) natural resources, upon which economic growth depends, and to consider the impact of their activities on the environment. This assessment identifies important issues with respect to environmental conditions and threats that USAID/Zambia must be made aware of as it implements its CDCS (Section 4). Although current projects contributing to threats or abilities to address opportunities are analyzed, the purpose of this ETOA is not to provide 22 CFR 216 review. It will, however, be a first level of analysis on which USAID/Zambia's compliance with 22 code of federal regulations (CFR) 216 can be subsequently satisfied through the analysis of the current environmental setting in the country (Section 2). Once the new CDCS is approved, each project under the new CDCS will have individual Initial Environmental Examinations (IEEs) prepared and approved prior to obligation of funds. The issues of environmental quality and management will be reinforced and mainstreamed through the IEE process.

3. The ETOA includes a climate change risk analysis focused on gathering data on current and predicted climate issues, as well as potential vulnerabilities of the USAID/Zambia development portfolio in the new ETOA as presented in Annex A. However, climate is also integrated as a consideration in the document where appropriate. The integration of climate change embodies an initial data gathering and analysis exercise for the purposes of including climate change considerations in the threats analysis and to accounting for climate within the potential opportunities analysis. It is not intended to fulfill the requirements for integration of climate change into the CDCS.

Incorporation of environmental threats and opportunities into USAID/Zambia's strategic planning process will ensure compliance with the above regulations, as well as guide development activities. In addition, the ETOA will inform technical teams on how to better address and integrate critical environmental issues that affect and/or are affected by their programs to enhance results across the USAID/Zambia Mission's strategy. This is especially important in the context of a rapidly changing programmatic environment within not only USAID/Zambia, but also within the Agency. Many new initiatives are being implemented within the USAID/Zambia Mission's programming including Biodiversity, Feed the Future (FTF), and Global Climate Change (GCC). 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.

While one portion of this assessment discusses climate change (Annex A) — primarily as a factor exacerbating existing environmental threats and vulnerabilities—this assessment is not a stand-alone climate vulnerability assessment, and may or may not meet the criteria needed to meet Executive Order 13677 on Climate-Resilient International Development, considering this document was drafted prior to the finalization of USAID guidance. Mandatory reference for ADS Chapter 201 "Climate change in USAID strategies" were incorporated. While USAID continues to develop guidance on how contractors should address climate change in ETOAs, the preparers of this ETOA were informed by the recently issued guidance for USAID staff to use in developing "climate change risk analyses" (CCRAs) to support the development of CDCSs and other USAID strategies. Annex A includes a description of the methodology that the ETOA team adapted from the CCRA guidance.

To address the expanded scope in programs and priorities—to the greatest extent possible and in terms of USAID programming—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 and make recommendations regarding environmental risk mitigation.

This assessment summarizes the current state of development in Zambia (see Section 2)—including its economic dependency on ecosystems and ecosystem services—then describes USAID Programming (Section 3) and the state of the environment and NRM (see Section 4). This includes a description of biodiversity, forests, and natural resource-based industries (e.g., agriculture, fisheries, and mining). Environmental threats (Section 5) are described in terms of direct threats (i.e., priority issues) that contribute to root causes of environmental degradation.

The actions necessary to conserve biodiversity, sustainably manage tropical forests, and otherwise safeguard the environment (Section 6) are described in general terms and then linked to USAID strategy (Section 7) and discussed in terms of opportunities for USAID to work with the Government of the Republic of Zambia (GRZ), other donors, non-governmental organizations (NGOs), and stakeholders. While the twelve strategic recommendations represent general cross-cutting needs to conserve forests and protect biodiversity, the highlighted opportunities are used as specific examples of where USAID/Zambia could engage in those recommendations.

METHODOLOGY

The Assessment Team conducted the ETOA through three partially overlapping phases including desk research, stakeholder consultations, and analysis. The Assessment Team started with a one-week desk review of available information on socioeconomic issues, ecology and conservation, environmental management, and USAID programming in Zambia. A pre-field draft report identified key resources and gaps in knowledge, and then was used to schedule and prepare for in-country stakeholder consultations. This desk review was completed concurrent with preparations for the three-week field mission.

DIRECT THREATS

The proximate human activities or processes that have caused, are causing, or may cause the destruction, degradation, and/or impairment of biodiversity targets (e.g., unsustainable fishing or logging). Direct threats are synonymous with sources of stress and proximate pressures. Threats can be past (historical), ongoing, and/or likely to occur in the future.

DRIVERS/ROOT CAUSES

The ultimate factors, usually social, economic, political, institutional, or cultural, that enable or otherwise add to the occurrence or persistence of proximate direct threats. There is typically a chain of contributing factors behind any given direct threat. In a situation analysis, these factors are often subdivided into indirect threats (factors with a negative effect, such as market demand for fish) and opportunities (factors with a positive effect, such as a country's land-use planning system that favors conservation).

Source: Salafsky et al. 2007.

Stakeholder consultations in Washington included USAID staff (e.g., Office of Forestry and Biodiversity, as well as Africa Bureau environmental, biodiversity, climate change and energy staff) and staff representing other U.S. government organizations (e.g., U.S. Fish and Wildlife Service [USFWS] and U.S. Forest Service [USFS]) and non-governmental organizations ([NGOs], e.g., Wildlife Conservation Society). Follow-up consultations with international development donors (e.g., World Bank) were conducted before the in-country field visit.

October 13, 2015 began a three-week in-country segment that focused on interviews and stakeholder consultations. The purpose of these consultations was to ground truth the preliminary findings and to expand the scope to that of a full ETOA. This in-country segment began with an in-brief at USAID/Zambia and ended with an out-brief delivery of key findings and recommendations, concluding on October 29, 2015.

In addition to meetings with regional representatives and sectoral experts, the Assessment Team facilitated three half-day stakeholder workshops (Mambwe, Kafue, and Kasanka) with participants

representing GRZ, NGOs, and the private sector.[13] During the workshops, the Assessment Team solicited input on the need to consider additional environmental issues in preparing the ETOA. The results of the workshops' small-group exercises were used to validate the assumptions and key environmental threats identified through the desk review and initial stakeholder interviews. A secondary goal of the workshops was to foster a consensus among USAID and other environmental management actors. The workshops were conducted on-site in Protected Areas (PAs) near the villages and lodges from which attendees came. Although a comparable number of contacts were made in South Luangwa, consultations were conducted one-on-one, rather than in a workshop format, due to logistics.

The remainder of the field visits, held from October 15–23, 2015, focused on interviews and stakeholder consultations. The objectives of the field visits were to "ground-truth" the draft report's preliminary findings and appropriately expand the scope of assessment to that of a full ETOA. This phase included visits to Kafue National Park (KNP), Mumbwa, Iyanda, Kasanka National Park, South Luangwa National Park, and Chipata. NGO and GRZ meetings were held primarily in Lusaka with the exception that many regional Zambian Wildlife Authority (ZAWA) staff attended the field workshops. A complete list of meetings held is provided as Annex B.

Utilizing the recently released USAID risk screening tools described in Annex A to inform the risk analysis process, climate change impacts on current USAID programs were analyzed in a two-step process. The first step was the selection of USAID programs via date and subject matter. Programs ending in 2015 were not analyzed, and the sectoral focus was limited to the four key sectors for the overall ETOA (economic development, food security, health and the environment). Due to the overlap between programs addressing economic development and those addressing food security, these two sectors were combined for the purposes of this analysis. In the second step, individual programs were reviewed, and the impact of climate change on the programs was analyzed. Adaptation measures were then suggested. For relevant programs, the programs' impact on climate change (in terms of greenhouse gas (GHG) emissions) was analyzed, and mitigation measures suggested where appropriate.

This ETOA was finalized based on updated literature, GIS analysis, stakeholder consultations, and USAID comments and feedback on the draft consistent with the approved Scope of Work.

The Assessment Team was not able to meet with Zambian Department of Meteorology and the United Nations Development Programme (UNDP), both of which were scheduled.

2. SOCIAL, ECONOMIC, AND POLITICAL CONTEXT

This section provides an overview of the social and economic context of the country, as well the governmental institutions, policies, and laws affecting the sustainable management and conservation of biodiversity (riverine, lacustrine, and terrestrial), forests, and ecosystems and their enforcement and effectiveness.

SOCIETY[14,15]

Zambia is a large landlocked country in southern Africa. A predominantly rural (61 percent) population occupies 752,600 km^2 and the population is doubling nearly every 20 years. The economy grew by 6.7 and 6.0 percent, respectively, in 2013 and 2014, about average for the years just preceding it. However, the wealth of its resources has not translated into human development—what is called the "paradox of plenty". Zambia is one of the poorest countries in the world – ranking 141st of 187 countries in the UN Human Development

[13] List of participants in Annex B
[14] UNDP Strategy and Policy Unit 2013; GRZ Central Statistical Office et al. 2014; The Economist 2015.
[15] GRZ Central Statistical Office (CSO) et al. 2014

Index for 2014—with 60 percent of its population living in poverty (<$1 USD/d) and 42 percent considered to be in extreme poverty, the majority of whom are engaged in rural agriculture. This will make poverty reduction even more difficult, particularly since the connection between economic growth and sectors that employ the poor is so weak (low growth elasticity). Income inequality (as measured by the Gini coefficient) further reduces the growth gains that might accrue to the poor, particularly in rural areas.

An average of 5.1 people occupy the Zambian household. One quarter of households are headed by women and half the population is under the age of 15. Sixty-five percent of all households have access to improved potable water (90 percent in urban areas). Thirty-five percent of urban households have an improved sanitation facility not shared with other households, whereas only 18.5 percent of rural households have a similar facility. Two-thirds of all households have a mobile phone. Seven percent have a vehicle and 40 percent own at least one bicycle. Sixty percent of households have some agricultural land and nearly half own a farm animal. One-quarter of households have enough insecticide-treated nets (ITNs) to cover its inhabitants. Twenty-one percent of children had malaria. Six in ten women, ages 15–49, were employed in the past 12 months, compared with 97 percent of married men. Women are slightly more likely to own a house (46 percent versus 42 percent for men). These statistics are reflected in such indicators as underweight children. Four in ten children in Zambia are stunted, and 15 percent are underweight- indicative of chronic malnutrition. However, the percentage of underweight children under five years of age declined from 25 to 13 percent from 1992–2010. These improvements are supported by government programs for feeding and immunizations.

While the extreme poverty is in decline (0.5 percent per year), the pace of that decline is slowing. Extreme poverty is concentrated in the rural areas, where it is four times the rate in urban areas. The most impoverished areas are the Western, Eastern and Luapula Provinces. Rural poverty is closely tied to limited access to infrastructure, such as roads, electricity, and medical facilities. Only 28 percent of Zambian households are connected to electricity. Where poverty and biodiversity co-exist, rural populations will exploit natural resources, uninhibited by regulation. The historic USAID selection of geographic focus in Eastern Province and the Luangwa Valley was because 79 percent of the population in this area lives on less than $1.25 USD per day with approximately 25 percent experiencing food insecurity and hunger during the lean season, and 51 percent of children under the age of five being stunted due to chronic malnutrition. Eastern Province is also home to several dozen national parks, GMAs, and forest areas with many communities living in or near wildlife habitats. Encroachment by opportunistic farmers seeking to claim new "un-used" lands, or chiefs granting lands that either border on, or are inside of, PAs not only encourages new deforestation, but also destroys wildlife habitats and puts humans in direct competition with animals over resources. USAID/Zambia's country-tailored Biodiversity project, incorporated into the Environment Project Appraisal Document (PAD), links field-based activities with national efforts to protect Zambia's wildlife populations and improve shared benefits of NRM between GRZ and local communities.

POPULATION TRENDS[16]

Zambia's population increased from 5.7 million in 1980 to 13.1 million in 2010 (now estimated at approximately 14 million), growing 2.8 percent per year. The median age is 16.6 years compared to 37.4 for the United States. Fertility has decreased from 7.2 births/woman in 1980 to 5.9 by 2010, but this still implies a population doubling time of about 25 years. Women without education generally begin sexual activity 4.3 years earlier and have 4.2 more children than women with more than a secondary education. Half of married women use contraceptives and this use correlates positively with education and household wealth. The use of any method of family planning has increased from 15 percent to 49 percent in the past 20 years. One in 22 Zambian children dies before age one and one in 13 before their fifth birthday (75 deaths/1000 to 85/1000 in rural areas), a decrease of about half since 1991.

[16] GRZ Central Statistical Office (CSO) et al. 2014

Zambia's population density increased from 8 people/km² in 1980, to 17 people/km² in 2010. Average density ranged from a high of 100 people/km² in Lusaka, to a low of six people/km² in Northwestern Province. As the most urbanized provinces, Lusaka and Copperbelt are also the most densely populated. The proportion of the population living in urban areas increased from 35 percent to 40 percent in 2010. Urban population varies by province, with 13 percent in Eastern and Western, to 85 percent in Lusaka.

These demographic factors, along with rapid urbanization, gender concerns, and Human Immunodeficiency Virus/Acquired Immune Deficiency Syndrome (HIV/AIDS), all came to a head in the 1990s and became obvious obstacles to improving the quality of life among Zambians. The government revised the National Population Policy based on these issues in 1996, and again in 2007. The 2007 version has objectives including: integrating population variables, reproductive health, gender and HIV/AIDS into development planning; reducing maternal, infant, and child morbidity and mortality; reducing high fertility levels; improving sexual and reproductive health (including family planning); improving the nation's population database; and achieving a better distribution of rural and urban populations.[17] In 2011, the number of adults and children on anti-retroviral treatment increased from a baseline figure of 344,407 in 2010, to 415,685 in 2011 and 480,925 in 2012. Furthermore, the proportion of the population 15 years and older who died from AIDS Related Complexes (ARC) in 2002 was 1.0 percent. This percentage reduced to 0.3 in 2011. Similarly, the death rate due to ARC among infants reduced from 1.5 percent in 1997 to 0.3 percent in 2011. [18] The Sixth National Development Plan (SNDP), as revised in 2013, has turned a focus to skills development, agriculture, infrastructure development, water and sanitation, education, and health.

EDUCATION[19,20, 21]

Among the most consistent desires heard during the site visits around the country was the need for education beyond the first few years. With 72 ethnic groups and numerous languages spoken across the country, compounded by an education system that often places pupils in learning institutions far from home, the Early Grade Reading/ Mathematics Assessment (EGRA/EGMA) reports that reading and mathematics education is a challenge as the specific language, engagement in reading and math at home, and the socioeconomic status affect reading and math performance.

The Demographic and Health Survey (DHS) identifies that adults (more than 20 years old) have completed 6-8 years of schooling (medians by age group). Rural populations have less education, completing 3 years (median) compared to more than 6 years for urban populations. Not surprisingly, Lusaka Province has the highest level of education among all the provinces. Eastern Province had 23 percent of males with no education, while males in Lusaka with no education comprised 7 percent of the population. Males tend to also have slightly longer residence in school than females, while males and females in the highest income quintile have nearly 4 to 5 times more time in school (median years) than those in the lowest quintile.

Literacy has risen over that time from 75 percent to 89 percent. Pupils also report that 87 percent of their fathers and 80 percent of their mothers could read, but the literacy rates vary by province. Literacy levels for children in the 7–10 age group are low (19 percent), with children in urban areas more than five times more likely to be literate than those in rural areas (37 percent versus 7 percent). Nearly 75 percent of schools do not start the academic year with the appropriate number of books. Children consistently perform poorly on national performance assessment surveys, on average correctly answering 33.3 percent of the English reading test questions and about 35.7 percent of the mathematics questions. English is typically introduced in grade 2.

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[17] GRZ Central Statistical Office (CSO) et al. 2014 and results of the 2010 census
[18] Ministry of Finance. 2014. Revised Sixth National Development Plan. Lusaka, 130 pp.
[19] UNDP Strategy and Policy Unit 2013; USAID 2013
[20] RTI 2015
[21] GRZ Central Statistical Office (CSO) et al. 2014

The need remains to decrease the high pupil teacher ratio (PTR) and increase contact time, which has been in decline. Children in lower grades only attend three hours of school each day because of schools operating double or triple shift systems. The Revised Sixth National Development Plan (RSNDP) notes that children who enrolled in early childhood education benefit in many ways (learning and development), but provision of ECE is deficient in Zambia (18.1 percent of first grade entrants in 2012 – a 3.6% increase over the previous year, largely provided privately).[22]

With the RSNDP, funding to the sector steadily increased from K1.6 billion to K2.4 billion from 2013 to 2016. Objectives in the RSNDP span programs from early childhood education to adult skills development and primarily focus on improved quality, access, and equal participation. From 2013 to 2015, the RSNDP budgets K128 billion for primary education, K63 billion for secondary education, and K1.68 trillion for infrastructure development. According to the 2013 budget address by the Honorable Alexander Chikwanda, Minister of Finance (delivered to the National Assembly in October 2012), the expenditure allocation to the education sector was set at 17.5 percent of the national budget. Although this is a significant increase from allocations below 3 percent in the early 2000s, it is still below the regional average. A troubling fact when fewer than 40 percent of students pass their final exams in secondary school.

In 2008, the Ministry of Education, Science, Vocational Training and Early Education (MESVTEE) began to address the massive backlog in classroom construction, highlighting the need for approximately 56,000 classrooms. In 2012, there were 8,360 basic schools of which 31.6 percent were community schools. The majority of basic schools (83.2 percent) were found in rural areas. Primary school enrollment has increased an average of 5.2 percent per year with a projected enrollment of 4 million by 2016. An additional 30,000 classrooms is needed to accommodate the entire primary school population. Most of the 3,000 community schools are in temporary facilities and lack basic amenities (such as water supply and sanitation facilities). These facts indicate an educational quality shortfall, particularly if transitioning to the workforce is a goal.

The number of qualified and experienced planners, researchers, policy analysts, managers, trainers, and teachers is insufficient to meet growing educational demands and expectations of higher learning. This problem could hinder the success of the MESVTEE restructuring program, decentralization, and the free primary education policy, as more skilled personnel are required in all districts. The budget in the RSNDP allocates K38 billion for teacher education and K417 billion for university education. Additional focus will be placed on research and development initiatives in the agricultural sector, reforms in policy to promote education and agriculture, and additional higher education facilities.

ECONOMY[23],[24]

In the wake of "somber" global and domestic economic challenges in 2015, the 2016 Zambian National Budget seeks to accelerate the diversification of the economy towards tourism, energy, agriculture, and agro-processing. This was largely the result of the reduction of the mining royalties target by 44 percent. Copper accounts for 70 percent of Zambia's exports. In the first quarter of 2015, Zambia saw the kwacha depreciate by 15.6 percent against the U.S. dollar, a trend that continued from 2014. With the value of the kwacha tied closely with exports of copper, and a falling copper market, the kwacha looks like it will continue to fall further despite efforts of the national government to diversify exports.[25] In fact, by 25 September 2015, the kwacha had devalued by 45 percent over the course of the year, compared to the U.S. dollar, and Moody's

[22] GRZ 2011 (as revised 2013)
[23] UNDP Strategy and Policy Unit 2013; ZIPAR 2015; Liebenthal 2015
[24] Liebenthal, pers. Comm. Oct, 2015
[25] Shula 2015

Investor Service downgraded the credit rating of Zambia to B2.[26] However, the 2015 growth rate was reported at 7.1 percent, achieving the GRZ target of 5 percent.[27]

The goal is to reduce the fiscal deficit from 6.9 percent of Gross Domestic Product (GDP) in 2015 to 3.8 percent in 2016. This will be achieved by increasing domestic revenues to 20.4 percent of GDP up from 18.1 percent in 2015. With the achievement of increased domestic revenue, the government intends to spend 14 percent more in 2016. However, the rising interest payments on debt are crowding out social sector spending that underpins growth and poverty reduction with, for example, cuts in health spending of 6 percent with inevitable impacts on poverty.

Development Assistance (official development assistance) for Zambia peaked at 5.9 percent of the GDP in 2009, falling to 3 percent in 2010. This is attributed to a freeze of some aid to the health and road sectors as a result of corruption findings. Overseas development assistance comes from the Millennium Challenge Corporation, Global Fund to Fight AIDS, Tuberculosis and Malaria, the President's Emergency Plan for AIDS Relief, (PEPFAR) and others. Still, Zambia is searching for innovative domestic financing mechanisms. Its first sovereign bond was issued for $750 million in 2012. Foreign Direct Investment (FDI) grew fourteen-fold between 2000 and 2010. This input has led to increases in employment, primarily in manufacturing and agriculture.

The two major issues facing the national government, which has an already-tight budget, are the energy crisis and globally reduced copper prices. In a review of current fiscal conditions, the Lusaka-based economist Robert Liebenthal noted that the current power crisis results in a 30 percent shortfall in electricity which impacts key sectors like mining, agriculture and manufacturing with knock on effects on government revenues. Reduced energy production has been attributed to the extremely low rainfall in 2014-2015 (50 percent below average) and, with energy production relying on hydropower schemes at Kariba Dam and Kafue Gorge, production has been insufficient to supply the country's demand. Load shedding was common in 2015 with Lusaka seeing power cuts for eight hours or more.[28] While not only being an inconvenience and affecting productivity and profitability of industry, the cuts have also resulted in Lusaka Water and Sewerage not having enough energy to run its operation, potentially leading to a health crisis. Reports also indicate that power to the copper mines has also been cut, further reducing their production and profitability. Furthermore, the lost energy cuts and decline in copper prices and output has led to mine closures, a reduction of exports (of which copper had accounted for 80 percent), and, again, reduced government revenues. These declines have led to the projected 6.9 percent fiscal deficit, up from 4.6 percent. To make up these deficits, the government must raise revenue and borrow—internally with a rise in inflation, or externally, as it has done with Eurobond loans with attendant crushing repayments of $500 million/year at 9.375 percent interest. Liebenthal believes an International Monetary Fund loan, as done for Ghana, Chad, Burundi, Kenya, and other African nations, at 2 percent would reduce pressure and inflation and permit recovery, but with its conditional austerity, it is unlikely to be done in an election year.

ECOSYSTEM SERVICES

The RSDNP envisions Zambia becoming a middle-income country by 2030, while recognizing that Zambia's natural resources must provide an impetus to the development of agriculture, tourism, manufacturing and the mining and energy sectors. All of these are potentially harmful to natural resources and the environment with a population doubling every twenty years, demanding the benefits of short-term unregulated growth. This is currently evident in the depletion of Zambia's natural resources and impacts on the environment and should

[26] Hill 2015
[27] See http://www.tradingeconomics.com/zambia/gdp-growth-annual. Accessed 7 Jan 2016.
[28] Kalaki 2015

concern and energize the promotion and conservation of biodiversity, all the while, Zambia is dependent on exploiting renewable natural resources.

Biodiversity and a healthy environment contribute to ecosystem services and to rural livelihoods. Most biodiversity research focuses on species with less attention to ecosystem and genetic/molecular levels. Zambia has sixteen ecosystems based on vegetation types as noted in Table 1.[29]

Table 1. Extent of ecosystems in Zambia

BIOME	ECOSYSTEM	APPROXIMATE EXTENT	
		KM^2	PERCENTAGE
Forest	Dry evergreen	15,835	2.10
	Deciduous	6,735	0.90
	Thicket	1,900	0.25
	Montane	40	0.01
	Swamp	1,530	0.20
	Riparian	810	0.11
Woodland	Chipya	15,560	2.07
	Miombo	294,480	39.13
	Kalahari sand	84,260	11.20
	Mopane	37,010	4.92
	Munga	30,595	4.06
	Termitaria	24,260	3.22
Grassland/ Wetland	Dambo	75,760	10.07
	Floodplain/Swamp	129,075	17.15
Aquatic	Lakes and rivers	10,500	1.40
Anthropic	Cropland, fallow, forest plantations, and built-up areas	24,210	3.21
TOTAL		752,578	100.00

Forest/Woodlands value. Forests have substantial value of ecosystem services, such as moderating the water cycle, carbon sequestration, repositories of biodiversity, wildlife and tourism, and watershed stability. Zambia's forests also contribute to residents' livelihoods, particularly for the rural poor. Timber and non-timber forest products include fiber, medicinal plants, edible wild plants, edible fruits, edible insects, bush meat, mushrooms, honey, and energy. The contribution of forest products to the rural poor household income is estimated to be 20.6 percent. The country-wide contribution of forests to GDP was estimated at 6.3 percent, or U.S.$ 1,252 million.[30]

The following forestry functions also contribute to economic value:

- *Carbon*: The value of carbon can be estimated in terms of its damage costs, but the social cost of carbon (estimated to be $29 per ton), which, if aggregated, would amount to about $15 million per annum. In evaluating potential for Reducing Emissions from Deforestation and Forest Degradation (REDD) projects, carbon can also be valued in terms of its market value, which was estimated to be in the region of $6 per ton. Depending on location, carbon stocks in Zambian forests are potentially

[29] Fanshaw 1971, Edmonds 1976
[30] Turpie et al 2014

worth about $150 per ha on average (once off), but ranging up to $745 per ha for intact forests. Annual values of sequestration in degraded areas are about $16–30 per ha per year.

- *Sediment retention:* Based on a model of soil erosion and transport (using InVEST) developed through this analysis, it was estimated that current rates of sediment output are on the order of 250 million tons (average 2.23 tons per ha) and that sediment retention by forests are on the order of 274 million tons, generating a cost savings of $237 million per annum.
- *Water and climate regulation:* While Zambia's forests are unlikely to have positive benefits on dry season flows through infiltration, or contribute significantly to flood attenuation, the loss of forest cover over large areas could result in reduced precipitation in the region, impacting on flows, water yields and hydropower generation, and driving up the costs of electricity.
- *Pollination:* Based on the costs of alternative means of pollination, the value of forest pollination services was estimated to be on the order of $74 million per annum.

Grassland/Wetlands value. The dambos (shallow wetland complexes) and floodplains support livestock grazing in the dry season. The storage, recharging, and releasing of water to the watershed ecosystem further serves to filter sediment and pollutants. Wetlands provide essential (sometimes seasonal) habitat for wetland obligates such as the endemic Kafue lechwe, wattled crane, waterfowl, and a range of aquatic species.

Grasslands are vital for grazing livestock, as large numbers of cattle are moved across the grasslands each year between the floodplain in the dry season and more wooded uplands in the rainy season. The grasslands are thus an important part of migration routes for livestock, as well as for wild animals. This ecosystem is a popular grazing area for large numbers of ungulates and also supports a variety of birds, especially during the flood season. Two bird species (the wattled crane and slaty egret) occur in this region as well and are considered vulnerable because they are limited to the floodplain habitats, which are threatened by habitat destruction.[31]

Aquatic value. Zambia has 15 million ha of water in rivers, lakes, and swamps, which are a source of livelihood for a majority of the rural population of Zambia. Fisheries provide income and employment to over 300,000 fishermen, contributing to national food security and accounting for 29 percent of the animal protein supply.[32]

Rivers and lakes in Zambia also constitute a major tourism resource for recreation and sightseeing. Travel and tourism contributed a total of 5.2 percent of GDP in 2013 (although some attractions, like National Parks, are not necessarily aquatic-related). The Zambezi River is a main attraction for water recreation while Victoria Falls, located between Zambia and Zimbabwe, is one of the natural wonders of the world.[33]

[31] World Wildlife Fund 2015

[32] FAO 2006

[33] Our Africa N.D.

Human-altered Ecosystem Value. Of the various human altered ecosystems in Zambia (cropland, fallow, tree plantations, and built-up environments), agriculture is the most important in terms of biodiversity. More than 600,000 households depend directly on agricultural biodiversity for their livelihood. Agricultural biodiversity contributes 100 cultivated plant species (15 percent indigenous and 7 percent naturalized), as well as 16 species of domesticated animals (mainly cattle and chickens).[34]

There are over 55,000 ha of industrial forest plantations in Zambia, which were created to supplement the low-yielding timber supply from indigenous forests and to provide timber for the mining industry. Forest plantations have helped reduce pressure on indigenous forests, especially in the copper belt. The main species used have been pine (79 percent) and eucalyptus (20 percent).[35]

Man-made lakes cover about 9,000 km^2 in Zambia. Lake Kariba is the largest man-made lake in Zambia and was created when a dam was built on the Zambezi River. The lake sustains a thriving fisheries industry, including tilapia, which was introduced to the lake and now provides 15,000 tons annually.[36]

ECOSYSTEM SERVICES

Ecosystem services are the benefits provided by ecosystems to humans. The types of services generated by ecosystems include:

- Supporting (e.g., soil formation, nutrient cycling, primary production);
- Provisioning (e.g., food, fresh water, fuelwood, fiber, genetic resources);
- Regulating (e.g., climate regulation, disease regulation, water purification, pollination); and
- Cultural (e.g., spiritual and religious, recreation, sense of place, cultural heritage).

Biodiversity is a valuable ecosystem service. A wide range of genetic materials increases the resiliency of an ecosystem and its inhabitants and interaction between species generates vital regulatory functions. As the effects of climate change are more profoundly felt, the conservation of healthy ecosystems can help to mitigate the associated environmental stressors.

Source: FAO 2014

GEOGRAPHY

Zambia is a landlocked country of 752,512 km^2 bordered by the Congo to the north; Tanzania to the north-east; Malawi to the east; Mozambique, Zimbabwe, Botswana, and Namibia to the south; and Angola to the west. Zambia is divided into ten provinces and is centered on the plateau of Central Africa between 1000 and 1600 meters above sea level. The eastern border has isolated mountain ridges that rise to 1,829 meters, with several reaching over 2,134 meters. Most of the surface of the country is flat, broken up by small hills, which are the result of undisturbed erosion of the underlying crystalline rocks.

Zambia's name is derived from the Zambezi River, which rises in the northwest corner of the country and also forms its southern boundary. The plateau is broken up by valleys of the upper Zambezi and its major tributaries (Kafue and Luangwa are the largest). The plateau formation allows for the swift discharge of water towards the coast and also interruptions by waterfalls and rapids, which make transportation impossible but provide opportunities for hydroelectric schemes. Lake Kariba, the largest man-made lake in Africa, stretches along the southern border of the country at 280 km long and 40 km across at its widest.[37]

Zambia has a moderate climate with three seasons: rainy (November–April growing season), cool/dry (May–August), and hot/dry (September–October).

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[34] Convention on Biological Diversity 2006

[35] Njovu 2002

[36] Encyclopedia Britannica N.D.

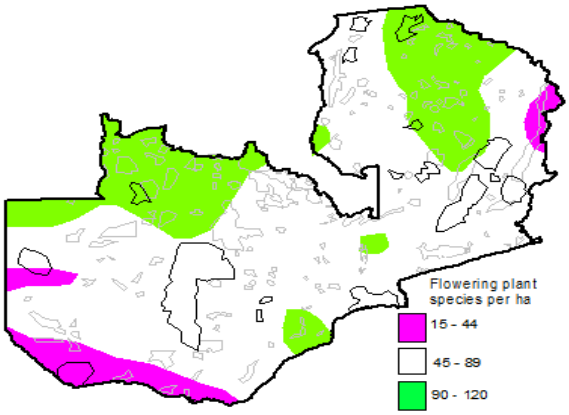
[37] Zambia Tourism 2015

BIODIVERSITY[38]

There are over 12,505 different species of living organisms recorded in Zambia, of which 4 percent are bacteria and microorganisms, 33 percent plants, and 63 percent animals. The actual numbers are undoubtedly higher and await further identification.

There are an estimated 3,543 species of flowering plants, including 2,660 herbaceous plants and 1,610 woody plants. The highest diversity of flowering plants is in the northwestern part of the country (Figure 1). Over half of the flowering plants are rare, but are found in isolated, small populations throughout the country, suggesting that the current PA system is inadequate for conserving many of those at risk due to narrow site requirements, such as certain soils. The information required to assess and protect these species is inadequate, with nearly 80 percent lacking data.

Figure 1. Species richness of flowering plants in Zambia



Source: GRZ Ministry of Lands, Natural Resources, and Environmental Protection In Press
Note: Forest Reserves and National Parks outlined in grey/black.

Of the 242 mammal species in Zambia, 24 are threatened with extinction. Assessments indicate that woodland and grasslands have the highest diversity of mammals and woodlands have the highest number of endemic species.

Spotty surveys do not paint a dependable picture of species status country-wide. Aerial surveys have been conducted in South Luangwa and Kafue in 2002, 2006, 2009, and 2012. A current effort supported by Paul Allen, co-founder of Microsoft and philanthropist, is repeating some of these surveys. They are focused on elephants, but count other species, as well as poacher camps. Elephants have suffered sharp declines from the 1960s into the 1990s and appear to still be in general decline (rates differ with sites) since 2000, as are most populations of large wildlife. Elephants are now gone from Mweru Wantipa National Park and are depleted in Lower Zambezi NP, while roughly stable in Kafue and the Luangwa. Population estimates and trends should be updated upon completion and reporting of Paul Allen's Pan African survey. The biological diversity of Zambia is protected by a system of National Parks that attempts to represent all of the ecotypes found in the country. A comparative assessment of these areas is offered in Table 2.

[38] GRZ Ministry of Lands, Natural Resources, and Environmental Protection In Press

Table 2. Comparison of the twenty National Parks of Zambia.[39]

No	Name of NP	Area km2	Conservation status	Threats P, F, E	Tourism Potential
1	South Luangwa	9,050	Good, PPP	P, F	V High
2	North Luangwa	4,636	Good, PPP	P, F	Medium
3	Lukusuzi	2,720	Good	P, F	Medium
4	Luambe	254	Good	P, F	Medium
5	Mweru Wantipa	3,134	Depleted	P, F, E	Low
6	Nsumbu	2,063	Stable	P, F	Low
7	Lusenga Plain	880	Depleted	P, F, E	Low
8	Isangano	840	Depleted	P, F, E	Low
9	Lavushi Manda	1,500	Depleted, PPP	P, F	Low
10	Kasanka	390	Good, PPP	P, F	Limited
11	Kafue	22,480	Good, TFCA	P, F	V High
12	Nyika	80	Stable, TFCA	P, F	Low
13	Lochinvar	410	Depleted	P, F, E	Medium
14	West Lunga	1,684	Stable	P, F	Medium
15	Liuwa Plain	3,660	Good, PPP	P, F, E	High
16	Sioma Ngwezi	5,276	Stable	P, F	Medium
17	Mosi-oa-Tunya	68	Good	P	High
18	Blue Lagoon	450	Stable	P, F, E	Limited
19	Lower Zambezi	4,092	Good, PPP	P	V High
20	Lusaaka	6	Good	P	High

* This Table has been adapted from numerous sources Chemonics 2011; GRZ 2004a,b; GRZ 2015b; Lindsey et al. 2013a,b, Lindsey et al. 2014; Carline 2004; Manning 2012; Simasiku et al 2008; Simasiku et al. 2009; UNDP 2004; Watson et al. 2014; ZAWA 2008; Chivumba 2015.

P = Poaching F = Fire E = Encroachment V= Very

Definitions:

Depleted/Good - Refers to an estimate of the status of game species populations in GMAs and is a term used by ZAWA and the Professional Hunters Association of Zambia (PHAZ).

Public Private Partnership **(PPP)** - In the PA sector this is usually (not always) tripartite between: i) private sector entity (investor, NGO, philanthropist or company/corporation) plus ii) ZAWA iii) the local community/Traditional Leader.

Trans-Frontier Conservation Area (**TFCA)** – The park if part of the Kavango–Zambezi (KAZA) TFCA.

The total avifauna of Zambia consists of 757 species, of which 76 are rare and 100 are endemic. Fifteen species are threatened or endangered. Zambia has a network of 42 significant bird areas covering 14 percent of the land area. About 80 percent receive some form of protection from ZAWA, the GMA management, or private owners.[40]

[39] Adapted from: Carline 2004; Manning 2012; Simasiku et al 2008; ZAWA internal records; Chivumba 2015; REMNPAS 2004
[40] Leonard 2005

Although invertebrate inventories are deficient and taxon-biased (e.g., to insects of economic influence), it is estimated that 69 endemics of over 6,135 species include 14 species that are endangered or threatened.

Herptiles include 74 species of frogs and toads, with 13 considered rare. Of the reptiles, there are 156 species of lizards, snakes, and tortoises, of which 45 are considered very rare.

ECOREGION BIODIVERSITY[41]

The following ecoregions are located in Zambia (see Figure 2):

Central Zambezian Miombo woodlands. These woodlands cover most of the country and contain more floral richness than anywhere else in the miombo biome. Despite the fact that the ecoregion experiences harsh dry seasons, long droughts, and poor soils, 30 percent of the region is covered by wetlands, resulting in a diverse mix of animals from swamp-dwelling antelopes to chimpanzees. Bird and amphibian life is also rich in this area.

Itigi-sumbu Thicket. This region is known for its dense deciduous vegetation containing a number of endemic plants. It used to also be part of the black rhino habitat, although poachers have decimated the rhinos in this area.

Zambezian flooded grasslands. These grasslands are characterized by nutrient poor soil and vegetation, but also provide habitats to large numbers of animals, since food and water are abundant during most of the year. Water birds frequent the area during the rainy season, as well as herd animals and carnivores.

Zambezian and Mopane woodlands. These woodlands have very few endemic species, but support some of the largest, most significant wildlife populations in Africa, such as the African elephant and critically endangered black rhino, as well as important populations of predators. The high levels of protection of this ecoregion (45 percent) allows for this abundance of wildlife.

Southern Miombo woodlands. The Miombo woodlands mix with mopane and smaller wetlands to provide habitats for endangered animals like the African elephant and black rhino, a species that was once found but has been extirpated from historic range in these woodlands. There are numerous PAs in this ecoregion but poaching of ivory and rhino horn remains a serious problem where they are still found. A secure relocation site must be found within the historic range of the rhino.

Southern Rift montane forest-grassland mosaic. The Nyika Plateau in this region is known for its orchid flora and is also home to a lot of endemic plant and animal taxa. With the exception of the Nyika Plateau, the area is poorly conserved and is threatened by cultivation and overexploitation of forests and grasslands.

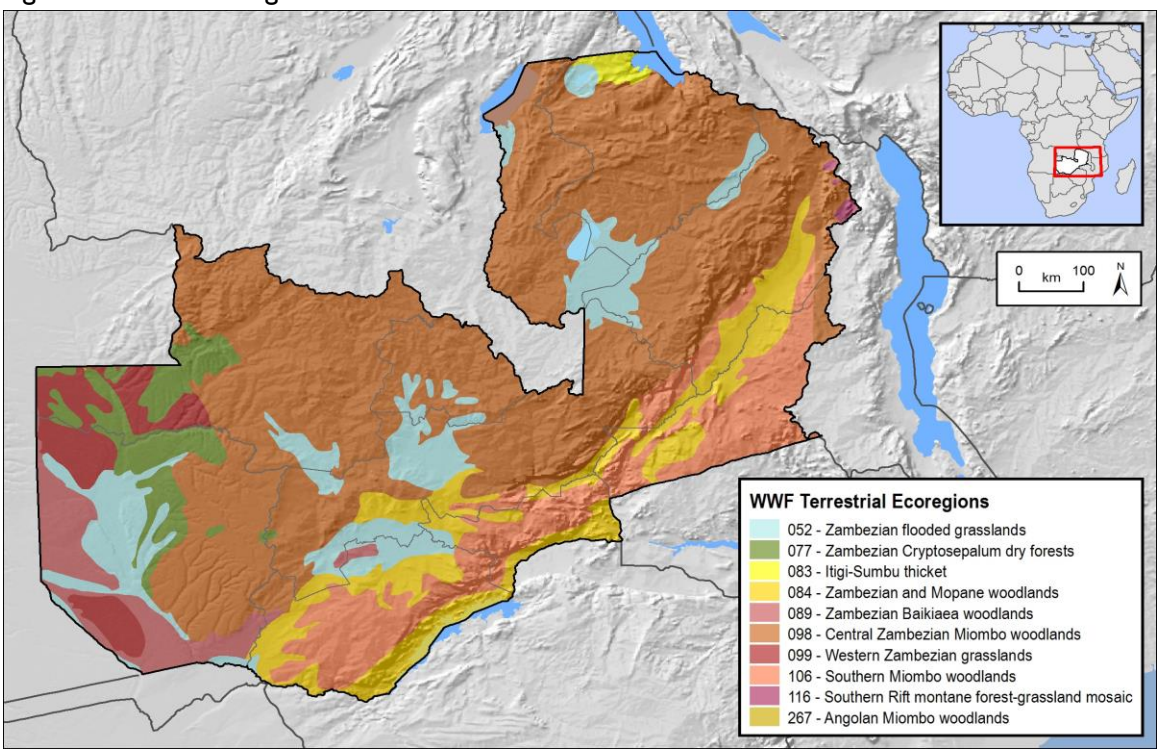
Western Zambezian grasslands. These grasslands are home to many ungulates, including the largest blue wildebeest herd in Zambia. The grasslands are highly populated, but are adapted to human disturbances such as fires.

Zambezian Cyptosepalum dry forests. This ecoregion is home to the largest area of tropical evergreen forest outside the equatorial grown. It has remained relatively uninhabited due to its lack of permanent surface water and infertile sands, but is species rich with avifauna, a mixture of moist evergreen species, and woodland species.

Zambezian Baikiaea woodlands. This ecoregion has retained some of its natural vegetation since it is unsuitable for farming. It is home to over 160 mammal species including ungulates and large predators. However, there are many settlements along the rivers that are threatening the valuable Baikiaea plurijuga tree (used for timber).

[41] World Wildlife Fund 2015

Figure 2. WWF ecoregions in Zambia



Source: WWF 2015.

ENERGY

Zambia's energy sources consist of electricity, petroleum, coal, biomass, and renewables. Zambia is self-sufficient in all energy resources, besides petroleum, which is wholly imported. Demand for electricity has been growing at about 3 percent annually due to increased economic activity, especially in agriculture, manufacturing, and mining. Energy demand roughly tracks population growth and migration to urban areas. Demand for petroleum and coal, as well as renewable energy sources, is also growing to support industrial production and operations.[42]

Zambia's installed electricity capacity is only about 2,000 MW. In the electricity sub-sector, the generation capacity in 2011 was 1,808 MW. There was an addition of 181 MW in 2012 to bring generation capacity to 1,989 MW. The Sector recorded progress with the signing of various implementation agreements for major power stations – Itezhi-tezhi Hydropower Project (120 MW), Kalungwishi (247 MW), Maamba Coal Fired Power Project (300 MW) and EMCO Coal Fired Thermal Power Plant Project (300 MW) – which paved the way for commencement of the projects. The sub-sector further recorded successes in the completion of the rehabilitation and uprating of the Kariba North Bank Project (180 MW) in November 2012.[43]

Despite the fact that Zambia has a large potential for expanding its energy supply (including an estimated 6,000 MW of hydroelectric potential), current demand is still much greater than supply, especially in rural areas, and access is low. About 28 percent of the total population have access to electricity, with 62 percent of the urban population having access in 2013-2014 (up from 48 percent), compared to only 4 percent in rural areas.[44] The RSNDP notes that the Sector experienced some challenges in the electricity sub-sector. The main challenge was interruption in power supply due to constrained generation, transmission, distribution capacity,

[42] GRZ Development Authority 2014
[43] GRZ 2011, as revised 2013
[44] GRZ CSO et al. 2014

and increasing demand for power. This was mainly because of inadequate investment

Zambia has made efforts to undertake reforms to spur private sector investment in energy. The 1997 Electricity Act provides a legal basis for independent power producers, but the process is still complex. The Energy Ministry is currently revising the Act to streamline the process and procurements and is also revising its power sector Master Plan (expected in 2016). The Ministry is also developing a Renewable Energy Feed in Tariff policy to attract private sector investment in small-scale renewable energy projects of up to 10MW. However, in order for the sector to be sustainable, reforms are needed to shift towards cost-reflective tariffs. The starting average tariff was $0.07 kWh in 2007, which set the country on the path towards cost reflectivity, but reforms have not been implemented and the current gap between true cost and customer tariff is approximately 100 percent.

RENEWABLES[45]

Biofuel. Demand for biofuels in Zambia are about 84 million liters for biodiesel and 40 million liters for bio-ethanol. Currently, some bioethanol is being produced from molasses, but it is not enough to blend with petrol. Jatropha has been promoted as the main feedstock for biodiesel, but neither of these options has been exploited to any extent due to the new nature of the bio-fuels industry in the country.

Solar. Zambia has an average of between 2000 and 3000 hours of sunshine every year, but the high cost of solar power has kept the country from harnessing this potential. Due to high prices, the photovoltaic market is currently dominated by donor-funded, government, or NGO projects.

Wind. Wind energy potential in Zambia is relatively low; ground speeds are about 0.1 to 3.5 meters per second, with an annual average of 2.5 meters per second. These speeds are not particularly promising for electricity generation, but are sufficient for water pumping for household use and irrigation. The GRZ Department of Energy is developing a wind atlas to identify areas where electricity might be generated from winds. In Western Province, wind speed as high as 6 meters per second have been recorded.

Geothermal. Zambia has over 80 hot springs, 35 of which are rated high in terms of surface temperature, flow rate, proximity to power lines, ease of access, and energy potential. These springs have not been tapped due to high costs. There is currently only one small geothermal power plant in the country, which was installed in the 1980s and developed further in 1987. Studies indicate that the plant could be upgraded to produce 2 MW of electricity and efforts are underway to revive the plant.

Mini Hydro. The highest potential for micro-hydro projects is on smaller rivers in the northern and northwestern parts of the country because of topography, geology, and high levels of rainfall. These smaller rivers such as the Luswishi, Lumbe, and Luanguinga, are in the Zambezi and Kafue watersheds.

MULTILATERAL DEVELOPMENT BANK ENERGY SECTOR PROJECTS IN PROGRESS OR ANTICIPATED IN ZAMBIA

- **Maamba Coal Power Plant.** The World Bank notes that Maamba Collieries Limited will construct a 300MW coal-fired power plant on the site of their existing coal mine, as well as a transmission line to connect to the national grid.[46]
- **Itezhi-Tezhi Hydro Power and Transmission Line Project.** This project combines a PPP clean-energy generation and a public transmission line to evacuate power in Zambia. It will be a 120 MW

[45] GRZ Development Authority 2014

[46] Churchill & Sagan 2015

base load hydro power plant at the Itezhi-Tezhi dam on the Kafue River, with a transmission line to Mumbwa and Lusaka West substations.[47]

- **Zambia and Zimbabwe Kariba Dam Rehabilitation Project.** This project will rehabilitate the plunge pool of the Kariba Dam and the spillways to avoid possible jamming and malfunction.[48]
- **Zambia-Tanzania-Kenya Power Grid Interconnection.** The goals of this project include facilitating trade in power to reduce average energy production costs; offering improved reliability and security of power; meeting immediate and future power demand; and contributing to poverty alleviation.[49]
- **Electricity Access for Low-income Households in Zambia Project.** This project aims to increase access to grid-based electricity for low-income households in urban and peri-urban areas. The project provides subsidies to low incomes households and medium-scale enterprises (MSEs) to connect to the national grid. It aims to connect about 22,000 households and 5,000 MSEs.[50]

CLIMATE CHANGE RISK ANALYSIS

Annex A provides the full text of the CCRA, including a list of sources and methodology and an annotated bibliography.

FACTORS INFLUENCING VULNERABILITY TO CLIMATE CHANGE

Zambia is a land-locked country in the tropics with a warm climate. It contains five watersheds, as well as several wetlands.[51] The population of Zambia is currently about 14 million people, an increase of 7 million from 1994. It is projected to reach 22 million by 2030.[52] Poverty levels are high—currently estimated at 60 percent overall, and 80 percent in rural areas over the past 20 years.[53]

This combination of geographic characteristics and high poverty levels, along with high dependence on climate-sensitive sectors such as agriculture, mining and forestry, renders the country and its inhabitants highly vulnerable to climate change.[54] For instance, approximately two-thirds of the population depends on rain-fed agriculture for their livelihoods.[55] The low adaptive capacity of Zambian institutions is an additional challenge.[56]

CLIMATE VARIABILITY ALREADY AFFECTING ZAMBIA

Zambia's Intended Nationally Determined Contributions (2015) report noted, "Climate variability and change has become a major threat to sustainable development in Zambia," indicating that climate variability is already having an impact on the country.[57] The last few decades have seen an increase in the frequency and intensity of climatic extremes, including dry spells and droughts, seasonal and flash floods, and extreme temperatures.[58]

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[47] African Development Bank Group 2012
[48] African Development Bank Group 2014
[49] COMESA N.D.
[50] World Bank 2015a
[51] World Bank 2015b
[52] Ibid
[53] USAID 2012c; 80 percent live under UN defined levels of poverty.
[54] World Bank 2015b; GRZ 2015; Climate Investment Funds, 2012
[55] USAID 2012c
[56] Climate Investment Funds, 2012
[57] GRZ 2015; USAID 2012b; USAID 2015a
[58] World Bank 2015b

These events exert stress on the vulnerable sectors, like agriculture, resulting in significant adverse impacts on Zambians' lives and livelihoods.[59]

ZAMBIA'S CLIMATE AND PROJECTED CHANGES

Zambia has a sub-tropical climate with three distinct seasons: a hot and dry season between mid-August and November, a rainy season from November to April, and a cool dry season from May to mid-August.[60] Projected climate change impacts for the country—while dependent on the region, model and assumptions—generally include rises in temperature, shifts in precipitation, and possible increases in the frequency and intensity of weather events.[61]

TEMPERATURE

Historic trends: Recent climate trends, based on records from 1960 to 2003, indicate that mean annual temperature has increased by 1.3ºC, an average rate of approximately 0.3ºC per decade.[62]

Future trends: Future trends in the country are towards a higher average temperature.[63] Projected increases in mean annual temperature for the southern African region are between 0.8°C and 1.00°C by 2035.[64] For Zambia in particular, a majority of climate models suggest that in the absence of climate mitigation, annual temperature increases above the 1970–1999 average of 1.2–3.4°C by 2060 and 1.6–5.5°C by 2090 can be anticipated.[65] The range of temperatures expected suggest a variety or similar range of mitigations from land uses to agricultural R&D for crops that tolerate altered climate regimes.

RAINFALL AND FLOODING

Historic trends: Since 1960, there has been an average decrease in annual rainfall of 1.9 mm per decade.[66] Conversely, flooding events have increased in frequency and intensity. From 2000–2007, with an increasing number of floods, the size of the affected area and population also increased.[67]

Future trends: A majority of climate models suggest that the decrease in annual rainfall and increase in the frequency and intensity of heavy rainfall events during the rainy season will continue.[68]

DROUGHTS

Historic trends: A drying trend has been observed for many countries in the region—some evidence suggests a spatially coherent increase in consecutive dry days over much of southern Africa in the last decades of the twentieth century.[69] There has been an increase in the frequency and intensity of dry spells[70] and droughts since 1979.[71]

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[59] Climate Investment Funds 2012
[60] USAID 2012c
[61] USAID 2012b
[62] GRZ 2015
[63] Ibid
[64] IPCC 2015; RCP4.5 mean model ensembles 25th, 50th, and 75th percentiles
[65] USAID 2012b
[66] World Bank 2015b
[67] Ibid
[68] USAID 2012b
[69] Kusangaya et al 2013; USAID 2015a
[70] IPCC 2015
[71] USAID 2012b; USAID 2015e

Future trends: Evidence points to an increased inter-annual variability (changes in rainfall timing, intensity and frequency) by 2030, which may result in more—and more intense—droughts, as well as longer periods between rainfalls.[72]

WINDS AND OTHER STORMS

Historic trends: Disaggregated information for this climate condition in the southern African region is sparse.[73]

Future trends: The Indian Ocean High, southeast of the African continent, is projected to strengthen, on average, during this century. This could be responsible for a portion of the projected increase in heavy rainfall events, but heavy winds do not appear to be of particular significance.[74] Large uncertainties surround projected changes in tropical cyclone landfall from the southwest Indian Ocean that have resulted in intense floods during the 20th century.[75]

IMPACTS OF CLIMATE CHANGE FOR ZAMBIA BY SECTOR

Zambia is already constrained by a high rate of population growth, the spread of HIV/AIDS, and environmental issues, such as air and water pollution, substandard sanitation, wildlife depletion, land degradation and biodiversity loss.[76] Climate change is likely to exacerbate these existing development challenges.[77]

ECONOMIC DEVELOPMENT

The adverse impact of climate change on food and water security, water quality, energy, and the sustainable livelihoods of rural communities limits economic development.[78] The poor disproportionately rely on the environment for their health, wealth, and livelihoods, and therefore, are less resilient to changes in environmental systems affected by climate change.[79] Droughts, floods, and other extreme weather and climate events inflict annual damages of around 0.4 percent GDP. Without adaptation measures, these events are expected to consume around 1 percent of Zambia's annual GDP in the future.[80]

HEALTH

Malaria, diarrhea, cholera, dysentery and respiratory infections, which have increased mortality and morbidity rates in Zambia, are all climate-sensitive diseases.[81] Among them, malaria is the most common and is a source of even greater concern in light of increases in heavy rainfall events and rising temperatures, which facilitate mosquito breeding and may cause the areas inhabitable by mosquitoes to expand, potentially putting a greater percentage of the population at risk.[82]

Beyond disease, an increase in the number and severity of droughts could cause crop failures, potentially leading to malnutrition. Similarly, increased flooding may lead to water pollution, exacerbating health and sanitation problems.[83] Non-climate stresses, such as inadequate health care facilities, high poverty levels, poor

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[72] Ibid
[73] USAID 2015e
[74] Republic of South Africa Department of Environmental Affairs 2013
[75] IPCC 2015; USAID 2015e
[76] USAID 2012c
[77] USAID 2012b
[78] World Bank 2015b
[79] Lusigi 2008
[80] Climate Investment Funds, 2012
[81] USAID 2012b; GRZ Ministry of Tourism, Environment, and Natural Resources 2007
[82] USAID 2012b; USAID 2012c
[83] USAID 2012c

water supply, food insecurity, poor nutrition, and a high rate of HIV/AIDS exacerbate the impacts of climate change on public health.

FOOD SECURITY

Agriculture in Zambia accounts for 18–20 percent of the country's GDP, employs approximately two-thirds of the country's labor force, and is a key source of livelihoods for 50 percent of the country. Over 80 percent of the country's farmers are subsistence farmers.[84] Farmers in the country's Northwestern, Eastern, and Southern Provinces are particularly challenged because their soils are less fertile, more acidic, and drier than those in the fertile, central part of the country, making them more vulnerable to changes in climate as they are already on the margin of productive lands.[85]

As agricultural and livestock production are largely dependent on rainfall, they are vulnerable to climate change. Low, unpredictable, and unevenly distributed rainfall over the last two decades has led to increasing crop loss and food insecurity.[86] Increased frequency of droughts and shorter rainy seasons can truncate the growing season, while flash floods can lead to the destruction of crops and cultivatable land, as well as soil erosion.[87] These results of climate change can also degrade grazing land, leading to loss of livestock.[88] Lower rainfall has also been found to reduce nutrient levels in rivers and lakes, in turn, impacting fish breeders and leading to the depletion of vulnerable fish species.[89]

ENVIRONMENT

Water Resources. Zambia has a relatively abundant supply of surface water and groundwater. However, surface water is unevenly distributed throughout the country and the southern region often experiences water shortages during the summer.[90] Non-climate stresses like pollution, inadequate sanitation facilities, increased demand for water, and mismanagement exacerbate the impacts of climate change-induced droughts and floods on agriculture,[91] livestock and fisheries, health and sanitation, and hydroelectric power.

Grasslands and Forests. The main climatic hazards that threaten the forestry sector are extended droughts, which lead to loss of vegetation, land degradation, and diminished soil fertility, as well as forest fires.[92] Warmer temperatures also bring a range of pests and pathogens, which can impact tree growth and survival. More intense rainfall and flooding events can cause soil erosion.[93] Non-climate stresses, that further exacerbate the effects of climate change on forests and grasslands, include increasing demand for fuelwood and charcoal, clearing of forestland for agricultural expansion, greater demand for timber, and unsustainable land use.

Wildlife. Over 30 percent of Zambia's land is managed in PAs. The park system and the wildlife it supports is a major draw for foreign tourism, an important source of livelihoods and economic growth. Changes in precipitation, temperature, and forest fires may reduce wildlife diversity and abundance and alter the ecosystems and habitats they depend on for survival. Droughts and decreases in rainfall may increase water scarcity and reduce the quality of fodder that wildlife populations depend upon for survival.[94] Under

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[84] USAID 2012b
[85] IFAD ND
[86] USAID 2012b
[87] USAID 2012b; USAID 2012c
[88] USAID 2012c
[89] GRZ Ministry of Tourism, Environment, and Natural Resources 2007
[90] USAID 2012b; Climate Investment Funds, 2012
[91] USAID 2012b; USAID 2012c
[92] USAID 2012b; GRZ Ministry of Tourism, Environment, and Natural Resources 2007
[93] USAID 2012b
[94] USAID 2012b

excessive rainfall, wetland animals would be adversely affected.[95] Both droughts and flooding events may force or enable animals to migrate uncontrolled into human settlements, increasing the potential of conflict.[96]

IMPACTS OF CLIMATE CHANGE BY USAID PROJECT

ECONOMIC DEVELOPMENT AND FOOD SECURITY

Current USAID activities in this sector that either aim to improve agricultural productivity or depend on sustainable agricultural production include: Commercial Agribusiness for Sustainable Horticulture (CASH), Production, Finance and Technology+ (PROFIT+), Zambia Economic Resilience Program for Improved Food Security (ZERS), FTF Zambia Policy Strengthening Project, the Development Credit Authority (DCA), United States African Development Foundation (USADF) Participating Agency Partnership, and PPPs to Scale up FTF and Integrate GCC and Biodiversity into Agricultural Development in Eastern Province. For these projects, climate change could negatively impact outcomes, as increases in temperature, droughts and decreases in precipitation, as well as floods, could all harm crops. The resulting decrease in agricultural activity would harm farmers (CASH), local trade and markets (PROFIT+, USADF), vulnerable households and agricultural value chains (ZERS), and overall national productivity (Feed the Future). In most cases, selecting crops and varieties of crops that are drought resistant to promote or fund (DCA) will help to ensure that climate change does not adversely affect project impacts. Some projects, like Feed the Future, are already integrating climate change considerations.

HEALTH

The potential impacts of climate change on food security may have knock-on effects for projects tackling health issues. HIV prevention and care projects such as Zambia Care and Treatment Partnership (ZPCTII) and PEPFAR may be impacted by, for instance, 1) decreased nutrition negatively contributing to outcomes for people with HIV/AIDS, and 2) climate change-induced migration changing geographic patterns of infection. These programs can avoid negative consequences by taking these potentialities into consideration.

Malaria-related programs, such as the President's Malaria Initiative (PMI) (including ITNs and the Africa Indoor Residual Spraying Program (AIRS)), may also be impacted by climate change. Changes in temperature and rainfall patterns may alter the geographic shape/size/location of breeding areas for mosquitoes carrying malaria. These projects can maintain the potential for good results by allowing flexibility in the geographic distribution of nets and spraying. Sanitation and hygiene projects like Sustainable Health Improvements through Empowerment and Local Development (SHIELD) can be negatively impacted by climate change via the impact of flooding on sanitation infrastructure.

ENVIRONMENT

Temperature and rainfall changes can negatively impact forests and wildlife; over longer periods of time forests may deteriorate, and wildlife food security and habitat may suffer. Natural resource and wildlife management and conservation projects like the Community-based Forest Management Program (CFP), Government to Government (G2G) Support, Various Incentive-based Grant Opportunities and Rewards (VIGOR), Participating Agency Partnership Agreement (PAPA), Althelia Climate Fund, and Global Development Alliance (GDA) may face extra challenges if climate change leads to the deterioration of forests, thus impacting the communities that depend on them. Furthermore, decreases in food security, due to the negative impacts of climate change on agriculture, may prompt local communities and vulnerable households to rely increasingly on forest products and wildlife.

[95] GRZ Ministry of Tourism, Environment, and Natural Resources 2007
[96] USAID 2012b; GRZ Ministry of Tourism, Environment, and Natural Resources 2007

IMPACTS OF USAID PROJECTS ON CLIMATE CHANGE

The USAID Zambia portfolio includes a number of project activities that specifically address climate change through the funding of renewable energy or low-emission energy generation (Power Africa, Enhancing Capacity for Low Emission Development Strategies (EC-LEDS), USADF), as well as through REDD+ (Althelia Climate Fund, CFP). There are also several forest management projects that indirectly address GHGs, including CFP, G2G, VIGOR, and PAPA. These projects should all have a positive or neutral impact on climate change, as they either avoid an increase in GHG emissions from the combustion of fossil fuels (though they do not necessarily *reduce* the level of GHG emissions from existing traditional energy sources), or reduce the rate at which sequestration of CO2 by forests is declining (though not necessarily *increasing* the overall level of sequestration).

POLICY, INSTITUTIONAL FRAMEWORKS, AND ENVIRONMENTAL GOVERNANCE

Zambia has formulated numerous environmental policies, laws, management plans, guidelines, and planning documents. In addition, Zambia is a party to many conventions of international importance, including the Convention on International Trade in Endangered Species of Wild Flora and Fauna (CITES), the Ramsar Convention, the African Convention, the United Nations Framework Convention on Climate Change (UNFCCC) and the Convention on Biological Diversity (CBD). Most policies and laws, however, are sector-based, and, therefore, somewhat fragmented. There is a need for an overarching legal and policy framework, so that integrated management frameworks are feasible.

MODERN BIODIVERSITY POLICY

Zambia's implementation of the CBD, (to which Zambia is a signatory), and development of a National Biodiversity Strategy and Action Plan (NBSAP) in 1999, are in need of updating as both the national and global environments have changed (e.g., the acceptance of the Millennium Development Goals (MDGs), and now Sustainable Development Goals (SDGs)). Article 6 of the CBD requires countries to have a national biodiversity strategy. Zambia is now in the process of drafting a revised NBSAP, realigned to address contemporary challenges and serve as a framework to address biodiversity in the country for the next ten years. This effort is being supported by GRZ and UNDP through the Global Environmental Facility (GEF). The strategy, in draft, resulted from extensive consultation with stakeholders in line ministries, civil society, the private sector, and academia. As a final stage in preparing the new (second) strategy, the Ministry of Lands, Natural Resources and Environmental Protection (MLNREP) will prepare an investment plan to submit to the United Nations Convention on Biological Diversity (UNCBD) Secretariat by the end of 2015. It will indicate the funding that the GRZ can commit and funding needed to be outsourced for implementing the strategy.

2015 ZAMBIA WILDLIFE ACT

The Zambia Wildlife Act (No. 14 of 2015) is an important step toward improved management of Zambia's wildlife resources and its promulgation is a first step in developing and implementing the recommendations of this ETOA. It is widely believed that the underperformance of ZAWA was a partial impetus for the act. Although the full implications of the Wildlife Act are unknown, a number of stated provisions are pertinent to underpinnings of this ETOA (noted with associated recommendations in parenthesis) including:

- Establishing the Department of National Park and Wildlife in the Ministry of Tourism and Arts, transfer ZAWA functions, and appoint a Director and officers to serve therein; (see Support for Wildlife Management)
- Establish a Wildlife Management Licensing Committee; (see Enable the Business Environment)
- Establish control and management of "*National Parks, bird and wildlife sanctuaries and for the conservation and enhancement of wildlife eco-systems, biological diversity and objects of aesthetic, pre-historic, historical, geological,*

archeological and scientific interest in National Parks"; (see Invest in Conservation, Development and Management of Candidate Wildlife Protected Areas)

- Promote opportunities for the equitable and sustainable use of the special qualities of public wildlife estates; (see Game Ranching, Eco-tourism, Non-wood Forest Products, Payment for Ecosystem Service)
- Provide for the establishment, control, and co-management of Community Partnership Parks (CCPs) (see Developing Integrated Natural Resource Management Plans)
- Provide for the sustainable use of wildlife and the effective management of the wildlife habitat in GMAs, as well as address community involvement in GMAs; (see Strengthening Community NRM Institutions)
- Develop and implement management plans; (see Developing Integrated Natural Resource Management Plans)
- Provide for the regulation of game ranching; (see Game Ranching, Eco-tourism, Non-wood Forest Products, Payment for Ecosystem Service)
- Provide for the licensing of hunting and control of the processing, sale, import, and export of wild animals and trophies; (see Enable the Business Environment; Study the Impact of ITNs and Devise Management and Disposal Plans)

One important provision of the Wildlife Act 2015 is the provision of ownership of every wild animal to the President on behalf of the Republic; however, in Part 3(1)(c) it states that "*subject to such regulations as the Minister may prescribe on the advice of the Director, where a wild animal is found resident on any land, the Director may grant the right to harvest the wild animal to the owner of the land.*" Part 3(1)(b) also provides for authorized hunting and trophies. The implications of these provisions, especially in unfenced areas, have yet to be tested and precedence has not been set for granted rights to harvesting.

EVOLUTION OF POLICIES ADDRESSING BIODIVERSITY

Over the years, Zambia has developed a number of policies, legislation, and agreements supportive of biodiversity conservation and sustainable environmental uses, protection, and management as noted in Table 3.

Table 3. Relevant national policies, legislation, plans, regional protocols, and international agreements and conventions supportive of biodiversity conservation in Zambia

NATIONAL POLICIES	NATIONAL LEGISLATION	NATIONAL PLANS AND STRATEGIES
1. National Policy on Climate Change (NPCC, 2012-draft) 2. National Agricultural Policy (NAP, 2013- draft) 3. Forest Policy (2015) 4. Mining Policy (2013) 5. Water Policy (2013) 6. Fisheries Policy (2001) 7. National Irrigation Policy and Strategy (2004) 8. Land Policy (1995-draft) 9. Wildlife Policy (1998—currently being reviewed) 10. Wetlands Policy (2014—still under development)	1. Agricultural Lands Act (1994) 2. Forest Act (2015) 3. Mines and Minerals Development Act (2012) 4. Water Resources Management Act (2011) 5. Fisheries Act (2011) 6. Lands Act (1995) 7. Wildlife Act (1998) (2015) 8. Environmental Management Act (2011) 9. Disaster Management and Mitigation Act (2010) 10. Energy Regulation Act (1995) 11. Biosafety Act (2007) 12. Local Government Act (1991)	1. Vision 2030 (2006) —to transform Zambia to a middle income country by 2030 2. National Reducing Emissions from Deforestation and Forest Degradation (REDD+) Strategy (2015) 3. Revised Sixth National Development Plan (R-SNDP, 2015) 4. National Agriculture Implementation Plan (2014) 5. National Climate Change Response Strategy (2011, draft) 6. Integrated Water Resources Management Plan (2011) 7. Integrated Water Resources

11. National Policy on Environment (NPE, 2007) 12. National Energy Policy (2008) 13. Biotechnology and Biosafety Policy (2007)	13. Natural Heritage Conservation Commission Act (1989) 14. Natural Resources Conservation Act (1970) 15. Tourism Act (1979) 16. Noxious Weeds Act (1953) 17. Plant Pests and Diseases Act (1959) 18. Plant and Variety Seeds Act (1968)	Management and Water Efficiency Implementation Plan (2008) 8. National Adaptation Program of Action on Climate Change (2007) 9. National Biodiversity Strategy and Action Plan (1999) 10. National Environmental Action Plan (1994) 11. National Conservation Strategy (1984)

REGIONAL AGREEMENTS/PROTOCOLS	INTERNATIONAL AGREEMENTS/CONVENTIONS
1. Protocol on Gender and Development (2008) 2. Protocol on Forests (2002) 3. Protocol on Fisheries (2001) 4. Revised Protocol on Shared Watercourses in the SADC (2000) 5. Protocol on Biosafety (2000) 6. Protocol on Wildlife Conservation and Law Enforcement (1999) 7. Protocol on Mining (1997) 8. Protocol on Energy (1996) 9. Protocol on Trade (1996) 10. Memoranda of Understanding on Southern African Power Pool Inter-Utility (1994) 11. Agreement on the Action Plan for the Environmentally Sound Management of the Common Zambezi River System (1987) 12. KAZA Trans-frontier Conservation Area Treaty (2006)	1. United Nations Convention on Biological Diversity (UNCBD), 1971 2. United Nations Framework Convention on Climate Change, 1992 3. United Nations Convention to Combat Desertification, 1994 4. Convention on Wetlands of International Importance especially as Waterfowl Habitat (Ramsar Conventions), 1992 5. Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) 6. International Plant Protection Convention for the prevention and control of the introduction and spread of pests of plants and plant products 7. Stockholm Convention on Persistent Organic pollutants 8. Statutes for the International Union for the Conservation of Nature and Natural Resources 9. International Plant Protection Convention 10. African Convention on the Conservation of Nature and Natural Resources, 1968 11. Vienna Convention of the Law for Treaties 12. Convention concerning the Protection of the World Cultural and Natural Heritage, 1972

Source: Zambia's Second Biodiversity Strategy and Action Plan 2015–2025. GRZ Ministry of Lands, Natural Resources, and Environmental Protection 2015

ZAMBIAN ENVIRONMENTAL GOVERNANCE (INCLUDING IMPACT ASSESSMENT PROCESS)[97]

The Zambian Constitution, as amended by Act Number 18 of 1996, does not specifically state that citizens have the right to a clean and healthy environment. However, it pledges to preserve, develop, and utilize resources for this and future generations. The Environmental Protection and Pollution Control Act, No 2 of 1990 as amended (EPPCA), is the supreme environmental law in Zambia and it prescribes the functions and powers of the Environmental Council of Zambia ([ECZ], now called ZEMA, created under this act. The Council, established in 1992, is mandated to protect the environment and control pollution to provide for the health and welfare of persons and the environment.

[97] USAID 2015e

The ECZ inspectors have wide-ranging powers of inspection, including sample collection and seizure, at any business premise where they reasonably believe that pollution may be occurring. The inspectors may also arrest persons who have been caught committing an offense in terms of the EPPCA, or who are suspected of committing an offense.

Environmental issues cut across a wide variety of sectors and there are a number of government institutions and agencies outside of the ECZ that are involved in environmental management. Sectoral agencies and planning authorities who are of relevance to project activities may include the Ministry of Lands, Natural Resources, and Environmental Protection, and the Ministry of Agriculture and Cooperatives.

The Environmental Impact Assessment (EIA) process has been formalized by the EPPCA. The EIA process is clearly set out in the EIA Regulations, 1997. There are no formal procedures in place for the certification and registration of environmental practitioners in Zambia. The services provided by the ECZ, in relation to EIA studies, include:

- assist the developer to determine the scope of EIA studies,
- review project briefs, terms of reference, and environmental impact statements (EIS) and decision-making,
- disclose the EIS to the public through the media,
- hold public meetings to discuss the EIS,
- conduct verification surveys of the affected environment,
- monitor the project once implemented,
- conduct compliance audits of the project between 12 and 36 months after implementation, and
- generally administer the EIA regulations.

Before a developer can commence with an activity listed in the schedules attached to the EIA regulations, they must obtain an Environmental Authorization from ECZ. In addition, various permits are needed for specific aspects of development planning and EIA. Permits and licenses are issued in accordance with the various regulations.[98]

Further advances in environmental and natural resources management were enhanced by the formulation of the National Environmental Action Plan in 1994. In 1997, EIA Regulations No. 28 of 1997 was signed as a Statutory Instrument meant to provide for a proactive approach in environmental management and as a planning tool for the country. Following the enactment of the Environmental Management Act (EMA) on April 15, 2011, the ECZ was renamed as the Zambia Environmental Management Agency (ZEMA). ZEMA is now the custodian of the EMA and is responsible for its implementation and enforcement through its respective departments.

ZEMA is empowered by EMA No. 12 of 2011 to protect water resources from environmental pollution. ZEMA is also mandated to provide guidelines and enforce the provision in the EMA on the sound management of waste, hazardous waste (such as health care waste), and sound management of chemicals throughout their life cycle. The EMA also provides for the undertaking of an EIA for projects involved in large construction activities. The EMA mandates projects that require an EIA to be implemented only after an approval by ZEMA is granted. Part III of the Act deals with Integrated Environmental Management including EIA, while Part IV deals with Environmental Protection and Pollution Control with specific sections on Waste Management, Air, Water, Pesticides, and Toxic Substances.

With respect to chemicals, the EMA requires that a person who intends to manufacture, import, export, store, distribute, transport, blend, process, reprocess, or change the composition of a pesticide or toxic

[98] SAIEA N.D.

substance, or who intends to reprocess an existing pesticide or toxic substance for a significantly new use, is required to petition the Agency for a license. Concerning pesticides, regulations are also in place concerning their registration, importation, and transportation.

Zambian EIA regulations (Statutory Instrument 28 of 1997) require submission and approval of a Project Brief by the Zambia Environmental Council for activities listed in the First Schedule of the regulations. Possible triggers for the submission of such a brief would be by partners (or customers of partners) engaged in activities, such as forest product processing, brick manufacturing, and pumped storage. More likely triggers for the necessity of submitting an environmental brief include activities in environmentally sensitive areas, such as:

- indigenous forests;
- wetlands;
- zones of high biological diversity;
- areas supporting populations of rare and endangered species;
- zones prone to erosion or desertification;
- areas of historical and archaeological interest;
- areas of cultural or religious significance;
- areas used extensively for recreation and aesthetic reasons;
- areas prone to flooding or natural hazards;
- water catchments that serve as major sources for public, industrial, or agricultural uses; and
- areas of human settlements.

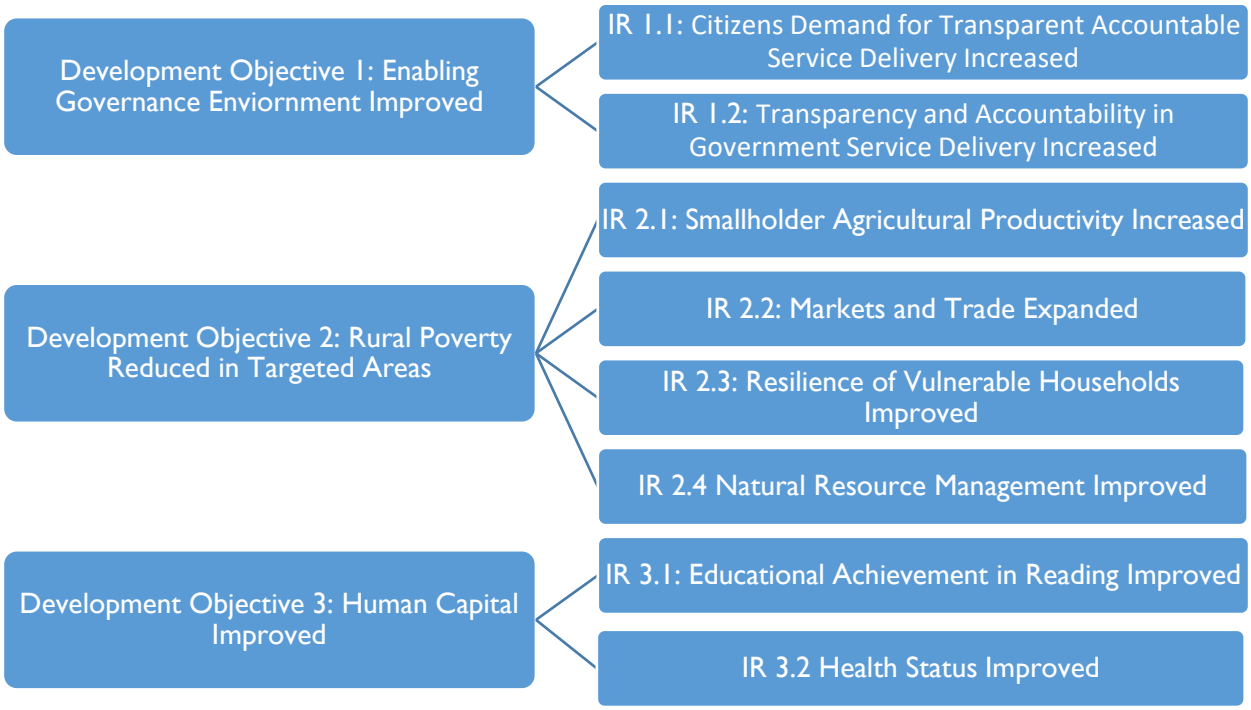
3. USAID PROGRAM OVERVIEW

USAID programming is designed using Development Objectives (DOs), which are strategic and specific goals intended to maximize the impact of development cooperation. DOs are the highest-level, most ambitious result that a USAID mission, together with development partners, can achieve.

Within DOs are Intermediate Results (IRs). IRs are smaller objectives which, when combined, can achieve a DO. IRs can be the starting point for project design, but projects can also be designed for sub-IRs, or even at the DO-level. Zambia's DOs and IRs are outlined in Figure 3 below.[99] Figure 3 represents the existing Results Framework for USAID/Zambia as identified in the 2011–2015 CDCS, but will help frame the direction of the USAID strategy for Zambia as well as tie continuing programs between the existing and future CDCSs.

[99] USAID 2011d

Figure 3. USAID/Zambia Development Objectives and Results Framework (USAID 2011-2015 CDCS)



This section briefly describes USAID programing in terms of key subject areas, not the current organizational structure of USAID/Zambia offices.

DEMOCRACY AND GOVERNANCE

DO1 captures the democracy and governance objective for USAID/Zambia. The democracy and governance work centers on fostering an environment in which an informed and actively engaged citizenry expects high government standards and in which the government, committed to transparency and accountability, responds and works towards meeting those standards. Active projects include Fostering Accountability and Transparency (FACT) in Zambia, Support 2011–2015 Constitutional Reform Process in Zambia, Parliamentary Score Card Project Enhancing Engagement, Zambia Elections and Political Processes Activity, and Zambia Women's Political Leadership Activity.

An effective, accountable, and transparent government is the foundation for growth and prosperity. It is USAID/Zambia's top priority and is essential to long-lasting results in all DOs. The objective is to foster an environment in which the Zambian government provides quality services in a transparent manner and Zambian citizens who expect high standards of government performance and hold under-performing officials accountable. An enabling governance environment will also contribute to strengthening human capital by improving the efficiency and responsiveness of key government services in health and education. As government improves internal management practices and adapts to citizens' demands, Zambians' own abilities and productivity will benefit.

An enabling governance environment reduces waste and channels public resources and energies toward productive purposes. Weak governance and, in particular, poor government effectiveness are cited by the World Bank as a binding constraint on Zambia's development and a critical factor behind market coordination failures. An enabling governance environment will reduce rural poverty by smoothing economic transactions and reducing losses due to corruption and poor policy. As the economy is freed from distorting policies and informal taxation (rent-seeking), rural residents will have more freedom and options to make rational investments.

EDUCATION

Currently, the education team has four sub-IRs to support IR 3.1 Educational Achievement in Reading Improved including; (3.1.1) MESVTEE systems strengthened; (3.1.2) Public and community school performance increased; (3.1.3) Equitable access to education increased; and (3.1.4) HIV/AIDS impact on education mitigated. In 2016, USAID/Zambia will develop two new education activities as their existing activities close out. The current projects are: Strengthening Education Programs Up in Zambia (STEP-Up), Time to Learn Program (TTL), Read to Succeed Program, and the Data Collection Services for USAID/Zambia Education Project.

The education programming works to strengthen the GRZ Ministry of Education by advancing the implementation of the national primary school reading policy, supporting provincial and district education offices to implement reading improvement strategies, supporting the use of data for decision making at all levels, building capacity in the areas of school management and leadership and strengthening research through linkages with higher education institutions. Another focus is the improvement of learner reading outcomes by providing in-service support to teachers, facilitating the development and production of reading materials, training parent teacher associations (PTAs) and providing assistance for them to implement interventions, to strengthen school management and governance, institute assessments and performance standards for quality assurance, and engage PTAs that will support reading and support schools to plan and implement strategies to promote reading. The final sub-IR supports disadvantaged and vulnerable children (including girls) though improved safe water access and improved school sanitation facilities (borehole drilling, water point rehabilitation, and construction of toilets).

AGRICULTURE

Under DO2 Rural Poverty Reduced in Targeted Areas, there are numerous programs focused on agricultural development, while sustainably reducing poverty and under-nutrition in the targeted areas of Eastern Province and peri-urban Lusaka.

Many of the projects are included within the framework of the FTF Strategy. The FTF strategy uses a value chain approach to increase economic opportunities and focuses development interventions on core value chains: legumes, oilseeds, horticulture, and maize. These value chains are key to Zambia's development and overall food security, as the majority of the population relies directly upon these staple foods for their livelihood and food security, as well as for income.

Zambia has been designated as an FTF focus country that addresses the lack of a policy environment, inadequate research and development, and the lack of economic resilience in vulnerable populations, in the face of climate change effects. These efforts seek to improve smallholder farmer competitiveness through access to improved technologies, inputs (including credit), and markets. Activities may be implemented either through bilateral awards or through funding from USAID/Washington. Activities are provided in summary in Table 4. Only current activities as of 2015 or future activities have been included. The targets of many of the interventions of USAID/Zambia are cross-cutting. For example, activities may work on productivity and marketing across multiple sectors such as renewable energy, agriculture, and wildlife products. In those cases, the project is described in a single section with a note on its cross-cutting nature.

Table 4. Agriculture related activities in the current and potential future USAID/Zambia portfolio.

ACTIVITY TITLE	END DATE	DESCRIPTION
Food Security Research Project	9/2015	Builds capacity among agricultural sector planners to achieve improved policy making through applied agricultural economic research, policy analysis, outreach, and dialogue.
Commercial Agribusiness for Sustainable Horticulture (CASH)	2/2016	Engages small-scale farmers, women, and households that are more vulnerable to increase their access to improved technologies such as seeds and irrigation.
Zambia Agriculture Research and Development Project (R&D)	9/2015	Works with international agricultural research centers to build the capacity of Zambia's national agriculture research institutions, raise farm productivity, and promote adoption of improved crop varieties and low cost technologies for smallholders though 8 projects.
Development Credit Authority (DCA)	10/2018	Partners with Zambia National Commercial Bank to make $9 million in financing available for Zambia's agriculture sector. Additionally, supports the agriculture SME Development Credit Authority (Ag DCA) Loan Portfolio Guarantee.
Better Life Alliance	11/2015	Promotes private partnerships that strengthen the link between smallholder farmers and agricultural markets, while promoting agricultural diversity and conservation farming. Improves agricultural extension services, trains farmers in conservation farming techniques and offers farmers incentives to use sustainable farming practices as well as providing extension services and tree nurseries.
Production, Finance, and Technology (PROFIT+)	7/2016	Enhances agricultural input supply with output markets at the community level, promoting value-added rural enterprises linked to selected value chains. Focuses on increasing agricultural productivity and expanding markets and trade in maize, oilseeds and legumes (particularly groundnuts, soya and sunflower), in the Eastern Province economic corridor
Zambia Economic Resilience Project for Improved Food Security (Mawa)	11/2017	Builds assets, improves nutrition practices, and increases economic opportunities for very poor households through an integrated approach linking vulnerable households to productive agricultural value chains and investing in community, district, and provincial health systems.
U.S. African Development Foundation (USADF) Participating Agency Partnership (Cross-cutting)	2017	Enables USADF to expand activities in the FTF and GCC zone of influence, supporting a greater number of viable local partners for agriculture productivity and marketing activities funded under FTF, renewable energy projects under GCC and/or Power Africa, and joint management of forestry and/or wildlife projects under the GCC.
Public-Private Partnership (PPPs) to Scale up FTF and Integrate GCC and Biodiversity into Agricultural Development in Eastern Province	TBD	Supports public and private partnerships to create a follow-on program that fills in gaps in FTF programming, and scales up current PPPs in Eastern Province, intensifies agricultural production, improves NRM, and diversifies farm and off-farm incomes. Addresses challenges, such as soil and water degradation and depletion, deforestation, poaching, poor access to markets, and limited private sector engagement with Community-based NRM (CBNRM) and market-based solutions, and landscape level planning.
Feed the Future Aflasafe Project (Washington-supported)	2017	Supports development and registration of Zambia-specific aflasafe product used to combat aflatoxin contamination in maize and groundnuts.

CLIMATE CHANGE AND FORESTS

USAID is helping countries build resilience to climate change and move toward a "low carbon" economic growth pathway. Such assistance will help Zambia prepare for climate change effects that may include longer droughts, more severe storm events, shorter rainy seasons, and a loss of biodiversity due to increasing temperatures. Failure to meet this challenge could jeopardize many of the development gains the international community and the U.S. Government have worked for decades to secure. The USAID Climate Change and Development Strategy provides a strategic framework for USAID to address these challenges and opportunities. The goal of the strategy is to enable countries to accelerate their transition to climate resilient, low emissions development to promote sustainable economic growth.

In 2013, USAID Zambia developed a new PAD (2013–2018) that aims to: (a) promote livelihoods, particularly in forest and wildlife-dependent communities, that increase household income while decreasing deforestation and poaching; (b) improve the joint management of natural resources between communities and other partners in targeted areas of Eastern, Muchinga, Central, and Lusaka Provinces; (c) build the capacity of the Zambian Government and other key stakeholders at national, provincial, district, and local levels to develop and implement legal frameworks, policies, strategies, and plans that support REDD+, EC-LEDS, community-based NRM (CBNRM), wildlife management, climate-smart agriculture, and energy; and (d) use science, technology, research, and innovation to ensure evidence-based decision-making and facilitate the development and use of new technologies.

USAID/Zambia interventions focus on reducing deforestation and forest degradation through improving the sustainable NRM of forests primarily in Eastern Province, as well as select districts in Central Province and peri-urban Lusaka. The concentration on forest management activities stems from Zambia's deforestation rate of 250,000 to 300,000 hectares per year, among the highest rates of deforestation in the world. Activities include strengthening government capacity to jointly manage forests with communities, improving sustainable livelihoods of forest-dependent communities, and introducing low-emission technologies. The geographic focus in Eastern Province was selected due to its proximity and ease of transportation of charcoal and timber to Lusaka and the high poverty rates in its large rural population. Through this geographic focus, GCC activities decrease GHG emissions by decreasing deforestation in project areas.

Because of the number of activities, a summary of details is provided in Table 5. Only current activities as of 2015 or future activities have been included. The targets of many of the interventions of USAID/Zambia are however cross-cutting. For example, agreements for technical assistance or support for wildlife management may be funded under the same Participating Agency Service Agreement. In those cases, the project is described in a single section with a note on its cross-cutting nature against other sectors for the purpose of this document.

Table 5. Climate change and forests related activities in the current and potential future USAID/Zambia portfolio.

ACTIVITY TITLE	END DATE	DESCRIPTION
USFS Participating Agency Partnership Agreement (PAPA)	2018	Builds capacity of government entities, conducting analyses, and prescribing methods in which to incorporate lessons learned of our other activities into Zambia's national GCC discussion.
Community-based Forest Management Program (CFP)	2/2019	Strengthens communities' capacity to manage forest resources sustainably using a variety of methodologies around joint government- and community-level NRM strategies.
Government to Government (G2G) Support in forest management	2019	Enhances the capacity of the Forestry Department in Eastern Province to effectively manage selected protected forest reserves through increasing forest monitoring, community sensitization and forest boundary clearing.
Enhancing Capacity for Low Emission Development Strategies (EC-LEDS)	2017	Assists the government in promoting their goals through a "whole-of-government" approach. The activity will build capacity and provide technical assistance for capacity for LEDS in energy, forestry, agriculture, waste and industrial sectors.
Various Incentive-based Grant Opportunities and Rewards (VIGOR)	2019	Supplies grants through a competitive process to community-based organizations, non-governmental organizations, and businesses to promote the conservation of forest and wildlife resources.
Peace Corps PAPA (Cross-cutting)	2018	Supports both the GCC and the FTF programs in efforts to conserve forest areas, provide alternative livelihoods to forested communities, and monitor USAID/Zambia activities, as well as assist with small-scale agricultural activities and provide technical training.
Fostering Accountability and Transparency in Zambia (FACT) (Cross-cutting)	2018	Works with Civil Society Organizations (CSOs) currently working in the health, education, and economic growth sectors (specifically, climate change and environment) to improve their ability to develop advocacy strategies and social accountability approaches that enable active and broad citizen participation. Improves the enabling governance environment of Zambia by increasing citizen demand for effective, transparent, and accountable service delivery.

BIODIVERSITY (COMBATING WILDLIFE TRAFFICKING)

In line with the Presidential Executive Order and Initiative on Combating Wildlife Trafficking, USAID/Zambia proposed biodiversity conservation activities centered on decreasing illegal wildlife trade, improving management of targeted areas through innovative partnerships and integrated programs, and increasing benefits from wildlife conservation for local communities. USAID's primary goal, which is aligned with Zambia's national priorities, is to improve the well-being of both wildlife and human populations through strategic partnerships using performance-based incentives and joint accountability among communities, government, civil society, and private sector interests in the Luangwa Valley. USAID/Zambia's country-tailored biodiversity activity will link field-based activities with national efforts to protect Zambia's wildlife populations, and improve shared benefits of NRM between the government of Zambia and local

communities. The activities will build capacity and support to accelerate the country's ability to protect wildlife populations.

ENERGY

Power Africa aims to support an additional 800 MW and 1,257,000 new connections by 2020 in Zambia. Currently, several new projects are under construction that are expected to generate up to 2,000 MW by 2017. Variable rainfall in recent years has impacted hydroelectric generation, leading to increased demand for new projects. The government is seeking out short-to-medium term solutions to combat this environmental challenge, including up to 600 MW of solar power, such as utility-scale photovoltaic plants.

Power Africa and its partners are prioritizing the following activities and reforms in Zambia:

- Support to the International Finance Corporation Scaling Solar Initiative to develop 100 MW of solar projects;
- Extend transaction assistance to non-solar projects;
- Pursue the finalization of a loan guarantee with Standard Chartered Bank to allow the national utility to rehabilitate transmission and distribution;
- Technical support and finance from the World Bank and African Development Bank for new domestic and regional transmission projects;
- Through Sida and their Off-Grid Innovation Facility, provide 1 million end users across the continent with electricity services (Zambia being the first partner country)[100]; and
- Support the Ministry of Health to install solar systems at 600 health posts spread across the country

POLICY

FEED THE FUTURE POLICY STRENGTHENING PROJECT

While policy reform and strengthening is a cross-cutting issue across sectors, activities with a focus on policy interventions solely are presented here. as USAID/Zambia has a Policy Program with the ability to facilitate high level policy reform. Once such activity is the Policy Strengthening Project (PSP) with FTF. Agricultural productivity of most staple crops has been stagnant due to GRZ's policies on agriculture that exacerbate the challenges and focus on maize-centric subsides to the exclusion and detriment of other crops. PSP focuses on sustainable agricultural policy reform and capacity building. Indaba Agricultural Policy Research Institute (IAPRI) informs agricultural and environment sector planners on how to achieve improved policy-making through applied research, policy analysis, outreach, and dialogue. IAPRI builds on previous activity to support and build capacity within the Zambian Government to develop and implement the National Agriculture Investment Plan, the National Climate Strategy and other key documents, to collect and analyze agricultural data, to convene stakeholders for discussion and input, and to build public outreach on evidence-based agricultural and environmental decision-making.

[100] USAID 2015f

MALARIA CONTROL

USAID/Zambia, with support from PMI implements multiple malaria control activities with the goal of achieving and sustaining universal ITN coverage in conjunction with a focused, data-driven approach to geographic targeting for indoor residual spraying (IRS). Other recent PMI-supported activities include training of clinical care teams in supervising intermittent preventive treatment for pregnant women (IPTp); procurement and distribution of rapid diagnostic tests for malaria case management and training in their use; and support of the country's behavior change communication strategy. The PMI portfolio includes:[101]

Insecticide Treated Nets. PMI is contributing approximately 1.6 million ITNs with an additional 600,000 from PEPFAR. PMI will provide technical assistance for the roll out of primary school and community distribution, as well as strategies for care and maintenance of nets. In addition, PMI will continue to monitor the durability of ITNs distributed during the mass campaign.

Indoor Residual Spraying. AIRS began in 2003 following the success of IRS by the private sector at the Konkola Copper Mines. IRS is implemented by the National Malaria Control Centre (NMCC) of the Ministry of Health (MOH). The type of IRS pesticide is chosen based on national GRZ strategies and analyses of resistance from year to year. In 2015, USAID supported a pyrethroid based insecticide in all the targeted 53 districts with the exception of areas within 30 feet of water bodies, wetlands or marshes, and near organic farming areas, beekeeping areas, national forests and parks. Future spray campaigns may consider other pesticides but those decisions are made year to year. Dichlorodiphenyltrichloroethane (DDT) has been proposed for use again in Zambia, but is not being considered for the 2015 season. Every year, PMI and its implementing partner will continue to work closely with NMCC when selecting insecticides, as resistance to pyrethroids might become an area of concern.

Malaria in Pregnancy. In 2014, PMI supported training of provincial- and district-level clinical care teams in providing supervision for IPTp, training of healthcare workers in IPTp, and behavior change and communication (BCC) activities to encourage early and frequent antenatal care (ANC) attendance to receive IPTp. PMI will support supervision and training of health workers in the new National Malaria Control Programme (NMCP) guidelines for IPTp and BCC activities related to malaria in pregnancy.

Case Management (Diagnostics, treatment, and pharmaceutical management). PMI supported the training of clinical and laboratory personnel in the use of diagnostic tools, and training of national, provincial, and district level staff in providing outreach training and support supervision (OTSS) for quality assurance of malaria diagnostics. PMI will continue to strengthen OTSS of health workers, together with quality control of laboratory diagnosis. Under treatment, PMI will purchase 2.5 million ACT treatments and 120,000 60mg vials of injectable artesunate. Under pharmaceutical management, PMI continued to provide technical assistance at the national level through participation in working groups related to procurement and supply chain management. With FY2015 funding, PMI will continue to support strengthening the GRZ's commodities supply and logistics systems at the central, provincial, district and health center levels.

Behavior Change. PMI will support programs to increase use of ANC services, including IPTp, to encourage constant and continuous use of long-lasting insecticide-treated nets (LLINs) every night year-round and to inform caregivers of the importance of seeking care quickly for children with fever.

Monitoring and Evaluation. PMI will provide support to strengthen routine malaria data collection at the health facility, district, and provincial levels through the health management information system, support a health facility survey in 2016, monitor physical integrity of ITNs following the mass campaign, and support the training of two NMCP staff through the Zambia Field Epidemiology Training Program (FETP).

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[101] USAID 2011c

HEALTH

Under DO 3.2, Health Status Improved, USAID/Zambia is working across an integrated health portfolio that includes family planning/reproductive health, HIV/AIDS, maternal and child health, malaria, nutrition, and tuberculosis and aligns closely with the GRZ's National Health Strategic Plan (2011–2015). Activities promote access, as close to the community as possible, to high-quality, cost-effective health services. The key principle of USAID/Zambia's Integrated Health portfolio includes a primary health care approach, equity of access, affordability, cost-effectiveness, accountability, partnerships, decentralization and leadership, and a clean, caring, and competent health care environment.

DO3 encompasses two IRs (with their own Sub-IRs), including:

1) Health Service Delivery Improved;
2) Health Systems and Accountability Strengthened; and
3) Community Health Practices Improved.

DO 3 addresses the numerous health challenges in Zambia, in part, through the integration of activities attributed to numerous USG health initiatives and endeavors, including the Global Health Initiative, PMI, FTF, PEPFAR, and Saving Mothers, Giving Life. Given the various and interlinked health challenges in Zambia, the Project assumes that the combination of these activities will result in sustained improvements in the health status of the Zambian population. PMI and FTF activities are discussed in separate sections although they are cross-cutting with health objectives.

Health activities are summarized in Table 6 are anticipated to be similar to those already being conducted as they focus on similar targets outcomes.

Table 6. Health related activities in the current and potential future USAID/Zambia portfolio

ACTIVITY TITLE	END DATE	DESCRIPTION
Zambia HIV/AIDS Prevention II (ZPCTII B)	11/2016	Implements strategies with the GRZ ministries to initiate, scale up and strengthen a comprehensive package of HIV/AIDS services, including testing and counseling, prevention of mother-to-child transmission, clinical care, male circumcision and antiretroviral therapy, which are supported by strengthened laboratory and pharmaceutical systems.
Sexual and Reproductive Health for All Initiative	4/2020	Supports GRZ to provide accessible, comprehensive, and adolescent-friendly family planning services, with a particular focus on vulnerable populations and those in greatest need.
USAID Better Systems for Health	10/2020	TBD—in procurement
Corridors of Hope III	10/2015	Reduces the spread of HIV in border and transportation corridor communities by targeting traditional high-risk groups; populations at higher risk of HIV exposure whose members may have unprotected sexual relations with individuals who are otherwise at low risk of HIV exposure; and the general population residing in these communities.
Sustainability Through Economic Strengthening, Prevention and Support for Orphans and Vulnerable Children, Youth and Other Vulnerable Populations	3/2016	Provides broad, effective support for community-based HIV prevention and behavior change initiatives while simultaneously building capacity in Zambia to care for and support affected groups.

ACTIVITY TITLE	END DATE	DESCRIPTION
Support to HIV/AIDS Response in Zambia II	11/2015	Supports and strengthens the multi-sector response to HIV and AIDS to reduce the impact of HIV/AIDS through Multi-Sector Response, and ultimately, the attainment of GRZ's vision of a 'nation free from the threat of HIV/AIDS'
Stamping Out and Preventing Gender Based Violence (GBV): Survivor Services	10/2017	Increases the availability and uptake of quality GBV services, including clinical, psychological, and economic assistance, for adults and children survivors of GBV.
Thrive Project	11/2017	Supports the delivery of a consolidated nutrition assessment, counseling, and support package to HIV-positive individuals and orphans and vulnerable children (OVC) in selected sites of Zambia. Promotes good nutrition and prevents malnutrition early in adults and children enrolled in existing HIV/AIDS prevention, care, and treatment programs as well as at-risk OVC. Contributes to the improvement of antiretroviral therapy and palliative care outcomes through the provision of a NACS package to target populations at clinic/ health facility and community levels.
Stamping Out and Preventing Gender Based Violence: Access to Justice	4/2018	Improves access to justice for adult and children survivors of GBV by building the capacity of GBV service providers as well as the policymakers, police, courts, and community leaders in GBV case management and implementation of laws. Provides legal aid to survivors to ensure success of cases in court.
Zambia Rising	6/2018	Builds capacity to support the welfare and development of OVCs through better delivery systems and policies.
Community Rising	9/2018	Builds capacity to engage communities in planning and implementing programs that support OVCs.
Data Rising	11/2015	Supports the Zambian Government to improve the quality of OVC services through strengthened systems, monitoring, and evaluation.
Copperbelt-Lusaka Zambia Family Activity	1/2020	Provides quality comprehensive, compassionate care and support services for OVCs and people living with HIV/AIDS in targeted areas of Zambia with the goal of improved care and resiliency of these vulnerable populations.

4. STATE OF THE ENVIRONMENT AND NATURAL RESOURCE MANAGEMENT

PROTECTED AREAS AND ENDANGERED SPECIES

PROTECTED AREAS

Zambia's natural resources are managed within a network of three types of PAs.[102]

- **Wildlife estate**: Consists of 20 national parks, 39 GMAs, two wildlife sanctuaries (Nchete and Sekula islands), and one bird sanctuary, which are administered by ZAWA, recently moved to the Ministry

[102] GRZ Ministry of Tourism and Arts 2015

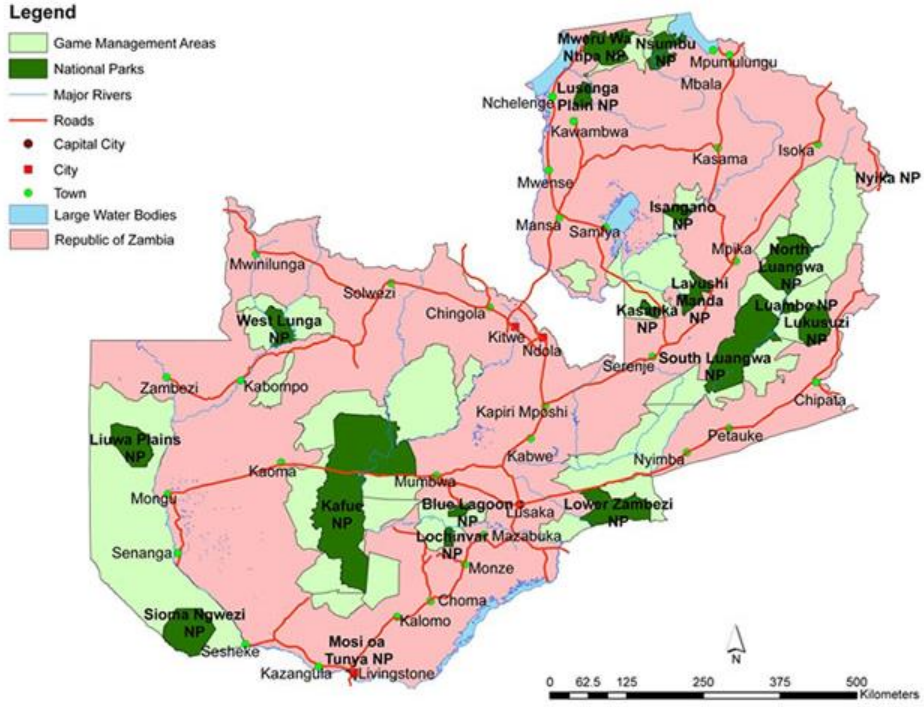
of Tourism and Arts. The motive for such a move is not fully known, but it is believed the intent was to enhance the effectiveness of ZAWA. As a line agency of government, ZAWA and the future DNPW stands a chance of righting the staff, training, research, service, and resources to do their challenging job properly.

- **Heritage estate:** Consists of national heritage sites that are managed by the National Heritage Conservation Commission, within the Ministry of Tourism and Arts (MOTA);

- **Forest estate:** Consists of over 450 forest reserves, managed by the Forestry Department of the Ministry of Lands.[103]

The national parks and GMAs (Figure 4) cover approximately 230,000 km^2, over 30 percent of Zambia's total land area of 752,972 km^2.[104] While the national parks' primary purpose is conservation and tourism, GMAs have multiple land uses (e.g., tourism, safari, limited hunting) and act as buffer zones for the national parks, allowing for movement of animals between the parks and GMAs.[105]

Figure 4. Protected Area network in Zambia



Source: GRZ Ministry of Tourism and Arts 2015

[103] There are also a significant number of game ranches managed by private land owners. This section discusses the wildlife estate; forest reserves are discussed in the Forest Resources section, while the game reserves are discussed in the Agriculture section. Zambia's eight Ramsar sites are described later in this section.

[104] Siamudaala 2008

[105] GRZ Ministry of Tourism and Arts 2015

RAMSAR SITES

Zambia is home to eight Ramsar sites covering more than 40,000 km^2, or about 5 percent of Zambia's total land area (see Table 7). Ramsar sites signify designated wetlands of importance, as guided by the Ramsar Convention. In helping to maintain and preserve the biodiversity and productivity of wetlands, countries party to the Ramsar Convention must work to identify wetland areas—lakes and rivers, underground aquifers, swamps and marshes, wet grasslands, peatlands, oases, estuaries, deltas and tidal flats, mangroves and other coastal areas, coral reefs, and all human-made sites such as fish ponds, rice paddies, reservoirs and salt pans—to protect while pledging support for transnational wetlands.[106]

Table 7. Ramsar sites in Zambia (Source: The Ramsar Convention Secretariat 2014)

RAMSAR SITE	DESIGNATED IN	AREA (KM^2)	PROVINCE
Bangweulu Swamps	1991	11,000	Northern Province
The swamp is an important breeding ground for birds, fishes and wildlife (e.g., African elephant, buffalo, and sitatunga). The site is known to support large numbers of the endemic, semi-aquatic black lechwe and is home to the wattled crane, and the only Zambian home for the shoebill. The swamp is a natural flood controller and important for groundwater recharge and water quality control. The site contains the historical Nachikufu caves with bushman paintings.			
Busanga Swamps	2007	2,000	Northwestern Province
The diverse ecosystems (e.g., swamps, lagoons, woodlands, rivers and large grassy plains dominated by grassland vegetation) support IUCN-listed species such as the wattled crane, cheetah, and lion, as well as significant numbers of migratory birds and other fauna, such as the blue duiker, wildebeest and zebra. Fishing is an important livelihood activity. The site is of local historical and traditional importance due to prominence of a specific baobab tree and the tree's prominence in fables and cultural narratives.			
Kafue Flats	1991	6,005	Southern & Central Provinces
The site contains floodplains, grasslands, woodland zones, and geothermal areas of high biodiversity. The site supports IUCN-listed and endemic species (e.g., the endemic Kafue lechwe, wattled crane, and sitatunga) and hosts migratory birds (e.g., white pelican and cattle egret). The site is of traditional and religious value to the Ila people of the Central Province and is of archeological and historical interest owing to the Gwisho hot springs and Sebanzi hills in the Lochinvar National Park.			
Lake Tanganyika	2007	2,300	Northern Province
Includes the Zambian part of Lake Tanganyika, Africa's deepest and longest lake. The Zambian shoreline (about 238km) is steep and rocky, with some areas of shallow swampy land, limited stretches of sandy beaches, and a rich diversity of vegetation including riverine forest, woodland, thickets, shrub, and grassland. The site supports the African elephant, lion, wild dog, and endemic reptiles like the Lake Tanganyika water snake and water cobra. The Zambian part of the lake supports over 252 fish species, 82 of which are endemic. It supports livelihoods including artisanal fishing and collection of forest products (grass, timber/fuel wood).			
Luangwa Floodplains	2007	2,500	Eastern Province
The site is dominated by rivers, freshwater lakes, lagoons, marshes, streams, hot springs, and brackish cold springs. The main habitats include evergreen miombo woodlands (with wild mango, African ebony, fig, and Natal mahogany) and the alluvial zone which sustains riverine vegetation. The plains host over 50 mammal species, including the African wild dog and the critically endangered Black Rhino. It is an important breeding ground for birds like the southern carmine bee-eater, white-fronted bee-eater, and brown-throated martin.			

[106] The Ramsar Convention Secretariat 2014

RAMSAR SITE	DESIGNATED IN	AREA (KM^2)	PROVINCE
Lukanga Swamps	2005	2,600	Central Province
The largest permanent water body in the Kafue basin, shallow swamps that allow light penetration to the bottom, permitting high photosynthetic activity. The site supports IUCN-listed species (e.g., wattled crane, red lechwe, African python, and the sitatunga, an antelope adapted to walking and swimming in marshy environments). It is also an important breeding ground for fish, including several tilapia species. Fishing is the major economic activity and the site supplies fish to three provinces (Lusaka, Central and Copperbelt) with a population of 6.1 million. The swamps are also an important source of reed material for basketry and act as a trap for metals from the Copperbelt.			
Mweru-Wa-Ntipa Swamps	2007	4,900	Northern Province
The diversity of habitats (rivers, swamps, wetland plains, thickets, woodlands, riverine evergreen forests) support a variety of species, many IUCN-listed, including: – more than 390 bird species (e.g., wattled crane, shoebill, black stork, and Goliath's heron), – mammal species (e.g., slender-snouted crocodile, wild dog, and elephant), and – indigenous fish species. It supports livelihoods including fishing and cultivation of sorghum, millet, cassava, and rice in the swamps.			
Zambezi Floodplains	2007	9,000	Western Province
The second largest wetland in Zambia. The site is home to the IUCN-listed lion, several endemic reptiles, over 80 different fish species, and the world's second largest migration of the blue wildebeest. It supports several livelihoods including fishing, harvesting of reeds and sedges for handicraft, and rice cultivation.			
Total		40,305	

STATUS AND MANAGEMENT

PAs (including national parks and GMAs) in Zambia are managed by the Zambia Wildlife Authority (ZAWA) Figure 5. Table 2 (previously noted), and Table 8 enumerate the existing parks and GMA's.

Table 8. Zambia GMAs – summary[107]

	Name (GMA and hunting blocks)	Area km2	Buffer zone for	Conservation status	Status for hunting concession	Hunting success rate % 2010 non resident
1	Bangweulu (with Chikuni)/pool area	6,470	Lavushi Manda NP	Stable Af Pks	Hunting/Specialized/Specialized – Black lechwe	43, 56
2	Bilili Springs	3,080	Kafue NP	Depleted by agriculture	No hunting	-
3	Chambeshi	620	Isangano NP	Depleted	No hunting	
4	Chiawa	2,344	Lower Zambezi NP	Stable	Hunting/Secondary	63
5	Kalasa Mukoso	675	-	Depleted	No Hunting	
6	Chibwika-Ntambu	1,550	West Lunga NP	Depleted	No hunting	
7	Chisomo	3,390	South Luangwa NP	Depleted	Hunting/Understocked	20
8	Chizela	2,280	West Lunga NP	Stable	No hunting	
9	Kafinda	3,860	Kasanka NP	Depleted by encroachment	No hunting - depleted	
10	Kafue Flats (pool area)	5,175	Blue Lagoon and Lochinvar NPs	Stable	Hunting – Specialised Kafue lechwe only	35
11	Kaputa	3,600	Mweru Wantipa NP	Depleted	No hunting	
12	Kasonso-Busanga	7,780	Kafue NP	Good	Hunting/Prime	64
13	Luano	8,930	-	Depleted	No hunting	
14	Lukwakwa	2,500	West Lunga NP	Depleted	No hunting	
15	Lumimba/Chanjuzi/Nyaminga/Mwanya	4,500	Lukusuzi, Luambe and N and S Luangwa NPs	Stable	Hunting/Prime/Secondary/prime	85, 84, 84
16	Lunga-Luswishi/Lunga-Busanga	13,340	Kafue NP	Stable CBNRM	Hunting/Secondary/Secondary	69, 65
17	Lupande/Msor/Lower/Upper	4,840	South Luangwa	Good	Hunting/Secondary/Prime/prime	33, 96, 71

[107] This Table has been adapted from numerous sources Chemonics 2011; GRZ 2004a,b; GRZ 2015b; Lindsey et al. 2013a,b, Lindsey et al. 2014; Carline 2004; Manning 2012; Simasiku et al 2008; Simasiku et al. 2009; UNDP 2004; Watson et al. 2014; ZAWA 2008; Chivumba 2015.

	Name (GMA and hunting blocks)	Area km2	Buffer zone for	Conservation status	Status for hunting concession	Hunting success rate % 2010 non resident
18	Luwingu	1,090	Isangano	Depleted	No hunting	
19	Machiya-Fungulwe	1,590	Kafue NP	Depleted	No hunting	
20	Mansa	2,070	-	Depleted	No hunting	
21	Mukungule		North Luangwa	Depleted	Hunting/Secondary	29
22	Mulobezi	3,420	Kafue NP	Good TNC	Hunting/Prime	62
23	Mumbwa/East/West	3,370	Kafue NP	Stable GRI	Hunting/Secondary/Prime	58, 68
24	Munyamadzi/Luwawata/Nyampala	3,300	N and S Luangwa NPs	Stable	Hunting/Prime/Prime	74
25	Musalangu/east/Chikwa/west(Fulaza)		North Lunagwa	Good	Hunting/Prime/Secondary/Secondary, Seconadry	74, 66, 51
26	Chifunda	17,350	North Luangwa	Stable	No hunting/Prime	65, 72
27	Musele Matebo	3, 700	West Lunga NP	Depleted	No hunting	
28	Namwala	3,600	Kafue NP	Stable	Hunting/understocked	83
29	Nkala	194	Kafue NP	Stable GRI TNC	Hunting/Prime	72
30	Rufunsa	3,179	Lower Zambezi NP	Depleted	Hunting/Secondary	16
31	Sandwe	1,530	South Luangwa NP	Stable	No Hunting	
32	Sichifulo	3,600	Kafue NP	Depleted	Hunting	
33	Tondwa	540	Lusenga Plain and Mweru Wantipa NP	Stable	Hunting/Secondary	63
34	West Petauke/Nyalugew/Luembe	4,140	South Luangwa NP	Stable	Hunting/Prime	34, 79
35	West Zambezi	38,070	Liuwa Plain and Sioma Ngwezi NPs	Stable Af Pks	Hunting	

Formerly a parastatal organization, ZAWA is being absorbed into the national government in 2015, under the umbrella of the MOTA, partly as a response to ZAWA's failure to meet organizational goals.[108]

ZAWA's objectives, as established by the Zambia Wildlife Act, No. 12 of 1998, are to:

- Improve the quality of life among communities in wildlife estates and maintain sustainable biodiversity in national parks and GMAs;
- Reverse the decline in wildlife resources;
- Improve wildlife resource management to a level which will secure a sustainable flow of benefits from resources;
- Considerably improve the wildlife resource base investment in co-operation with the private sector and local communities.

The new 2015 Wildlife Act also established the National Parks and Wildlife Department, under which ZAWA will reside. In Part II 5.(2), there are 21 duties identified for the new department including, but not limited to, control, manage, conserve and protect PAs; partner with local communities to manage and protect; adopt methods to ensure sustainability and conservation of the PA; encourage development of PAs; educate the public about Zambia's natural assets; prepare and implement management plans; regulate hunting; and carry out tourism activities.

In addition to the national parks and GMAs, ZAWA has established 74 Community Resource Boards (CRBs). CRBs exist within GMA buffer areas and are co-managed by ZAWA and communities. In return for their participation, communities receive 45 percent of revenues (Chiefs receive an additional 5 percent) that accrue from wildlife utilization.[109] CRBs under the 2015 Wildlife Act Part V 33 (3) are allowed to negotiate hunting agreements with the cooperation of the department, manage wildlife within quotas, appoint scouts, and develop and implement management plans.

ZAWA has rated the management efficiency of each park (except for the new Lusaka National Park). Of the sites visited by the ETOA team, South Luangwa was rated highest ("High" Effectiveness Management Category), while Kafue and Kasanka were rated "Intermediate". Based on the site visits, ZAWA's ratings appear much more optimistic than the findings of the ETOA team.

An audit conducted in 2011 to 2012 of ZAWA's performance in the period from 2008 to 2010, found that "ZAWA has not done enough to reduce the decline in wildlife, maintenance of the bio-diversity, monitoring and sensitization activities in the GMAs and also to increase its revenue generation."[110] Specific findings included:

- Irregular cash advance payments to CRBs
- Lack of documentation and monitoring on hunting quotas
- Inadequate numbers of scouts in GMAs
- Mining activities (nine mines) in the national parks without licensing
- Failure to undertake EIAs before issuing 21 licenses to tourist operators
- Failure to prepare and implement general management plans for nine national parks and various CRBs
- Tour operators with valid concession agreements but not operating or paying fees

[108] Lusaka Times 2015

[109] GRZ Auditor General 2014

[110] Ibid

The audit identified root causes of these deficiencies, including lack of an appropriate legal framework, inadequate national land use planning, inadequate involvement of stakeholders, insufficient resources (e.g., appropriate equipment, personnel, and funding), and "misalignment between PA objectives and the needs of the Zambian society."[111]

The audit recommended that the MOTA should immediately move towards strengthening the legal, policy, and institutional framework of ZAWA; and that ZAWA should do the following:[112]

- Develop and implement a livelihoods program for the local communities and robust public awareness for local communities and general public;
- Update information on wildlife resources, socioeconomic indicators, and land-use to enable planning and sustainable management of the wildlife resources;
- Secure PAs as to prevent allocation of land in the national parks
- Develop a strategy to address illegal activities in PAs that includes a wide range of policy, legal, institutional, and technical options;
- Ensure that EIA reports are prepared and approved before development activities are initiated; and
- Develop management plans for all PAs.

As for Zambia's wetlands, including their Ramsar sites, co-management with the private sector indicates improved trends and status of the wetlands (e.g., Lukanga, Banuweulu, and Liuwa Plains) and the wildlife they hold. With reservoirs like, Lower Zambezi, Itezhi-tezhi, and Kariba, they provide the major fisheries of Zambia. Fish are a major food item and contribute 3.2 percent to the GDP[113] and 29 percent of the animal protein consumed (80,826 tons in 2014).[114]

THREATENED AND ENDANGERED SPECIES

Zambia is a signatory to the Convention on Biological Diversity and CITES. According to the International Union for the Conservation of Nature (IUCN) Red List, 10 species are critically-endangered, 24 are endangered, 54 are vulnerable, and 50 are near threatened (see Table 9). The full list is in Annex D.

Table 9. Threatened and endangered plant and animal species in Zambia by IUCN Red List category (Source: IUCN Red List 2015)

RED LIST CATEGORY	NUMBER OF SPECIES		
	PLANTS	ANIMALS	TOTAL
Critically Endangered	1	9	10
Endangered	5	19	24
Vulnerable	13	41	54
Near Threatened	14	36	50
TOTAL	33	105	138

[111] Ibid

[112] Ibid

[113] GRZ Ministry of Agriculture and Livestock 2013

[114] GRZ Central Statistical Office 2006

FOREST RESOURCES[115]

STATUS OF FORESTS

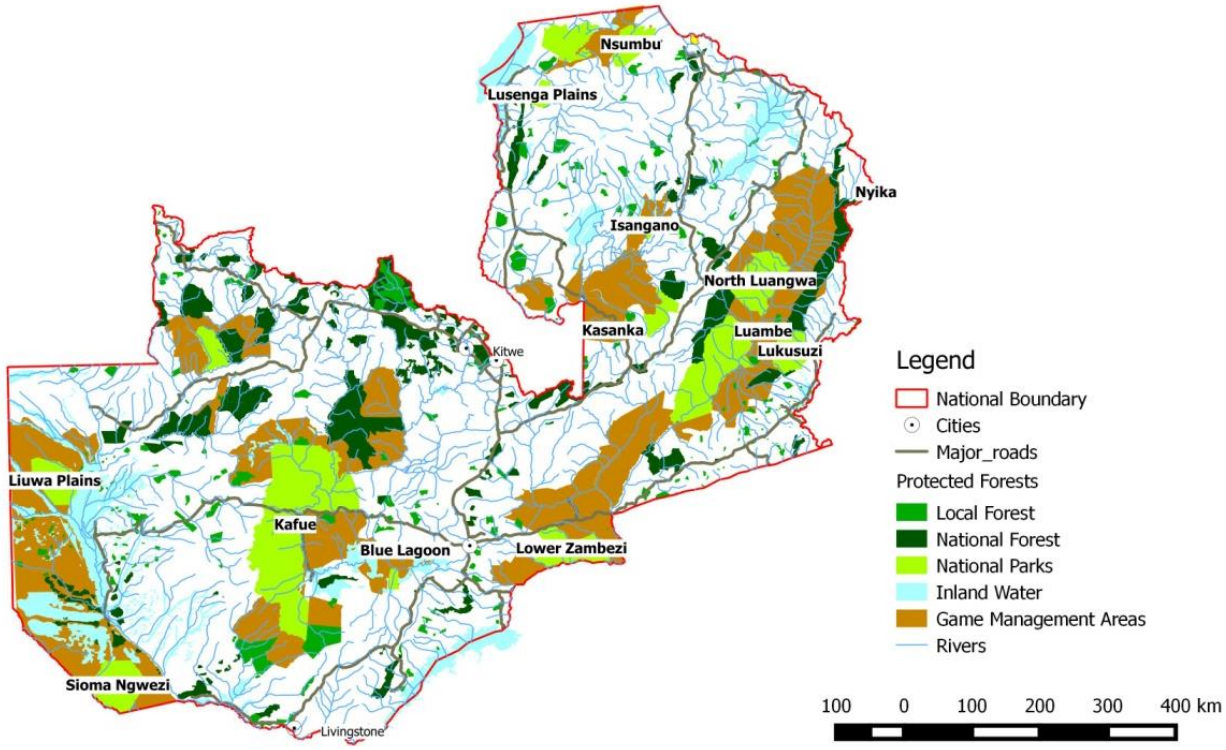
Brachystegia-Julbernardia (miombo) woodland covers 53 percent of Zambia. It is the dominant vegetation type found in national parks of southern Zambia and is heavily cleared for agriculture, fuel use and in charcoal production. According to the Government of the Republic of Zambia, charcoal production and agricultural clearing is a major driver of deforestation and environmental degradation (GRZ 2010). In the city of Lusaka, about 85% of urban households use charcoal, compared to 15% in rural areas where fuelwood dominates.[116] According to Community Markets for Conservation (COMACO 2010), extensive parts of Nyimba (E) district have witnessed substantial tree removal for charcoal production. However, some districts under study (including Nyimba) indicated some villages have produced charcoal for longer than 10 years and most tree removal may be due to clearing for agricultural purposes. Regardless, in the post-cut state, it is very sensitive to late season fires that can convert semi-closed miombo into grassland with scattered trees.

The forested area of Zambia has declined from 60 percent of total land area in 1990 to 50 percent in 2010. Zambia is losing 250,000–300,000 ha annually due to deforestation and by 2010 had only 38 million hectares of forest remaining. The permanent loss is largely due to Chitmene slash-and-burn agriculture typical of the northern and central areas of the country. It was a system whose rotation times worked until population pressure reduced the fallow period and a move to corn monoculture exhausted soil nutrients and structure.

The large, moist tropical evergreen forests of Africa are uncommon in Zambia with moist forest occupying montane, riparian, and lacustrine areas. These areas do not substantially contribute exportable forest products. However, in 1963, the Government of Zambia began to invest in plantations to augment timber from natural forests. There are about 60,000 ha of imported pine and eucalyptus, largely in the Copperbelt. These plantations supply construction timber and exports. Figure 6 shows where the loss of primary forest is greatest (areas in red are where over 40 percent loss of primary forest has occurred).

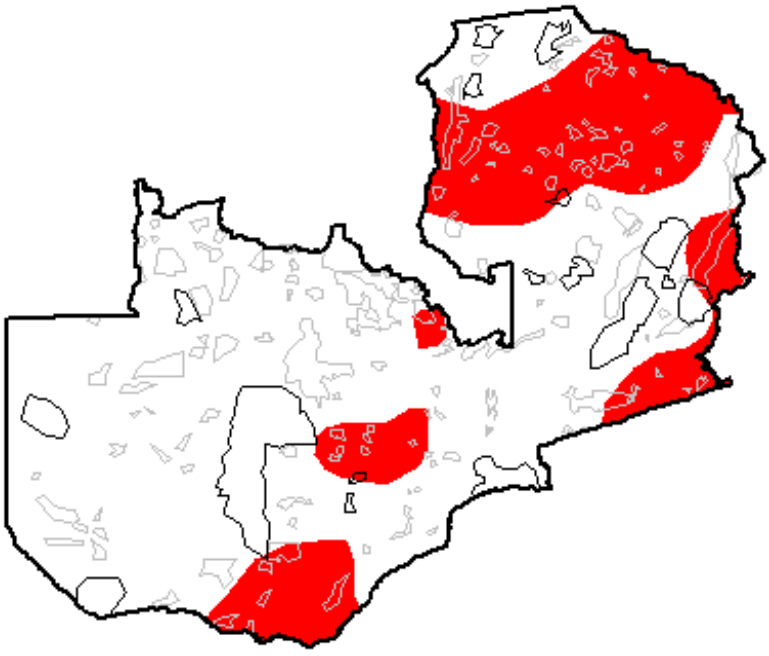
[115] GRZ Ministry of Lands, Natural Resources, and Environmental Protection In Press; Chidumayo 2004; Chidumayo and Gumbo 2013
[116] Technoshare 2010

Figure 5. Zambia's Protected Areas



Source: GRZ Ministry of Lands, Natural Resources, and Environmental Protection 2015

Figure 6. Forests where 40 percent has been lost (areas shaded in red)



Source: GRZ Ministry of Lands, Natural Resources, and Environmental Protection 2015

FOREST MANAGEMENT AND POLICY

Zambia's network of PAs includes 490 forest reserves covering 74,361 km^2. The forest reserves are protected in order to meet the needs for forest products now and in the future. This includes the protection of watersheds and their biodiversity. Additionally, there are 59 botanical reserves to preserve remnant vegetation types and plant genetic resources. Though there are many reserves, their extent and integrity have been diminished due to agricultural encroachment and settlement.

Zambian forests are managed by the Forestry Department within the Ministry of Lands, Natural Resource, and Environmental Protection. The National Forest Policy of 1998 and Forests Act Cap 199 of 1973 form the legal and institutional framework. The National Forest Policy is in draft and expected to be enacted in 2015. There are ten Provincial Forestry Offices, one in each province, and Forestry Department representatives in all 75 districts with new offices being established in newly created districts.

The Zambian Forestry College began in 1949 to provide training for forest guards, expanding to more technical offerings to Forest Rangers, and finally to a diploma in forestry.

The Forestry Department is an understaffed and under-resourced agency in ways similar to ZAWA. One forester interviewed noted that a primary impediment to their work is lack of transport to carry out extension and patrolling efforts.

THREATS TO FORESTS

HABITAT TRANSFORMATION

Forest degradation and deforestation are significant threats to viable habitats, their constituent plants, fauna, and even landscape. The greatest loss has occurred in northern Zambia (Figure 6) with 40 percent or more loss of primary (pristine) forest cover within the areas marked in red including forest reserves and PAs.[117] Such transformation can turn miombo woodland to bush, and bush to scrub, over very large areas. Zambia's Second Biodiversity Strategy and Action Plan: 2015–2025 states that, in central Zambia, nearly 70 percent of forestland cleared for charcoal was subsequently converted to agriculture and settlement.

However, many tropical hardwood trees can resprout from the remaining stump-coppicing if cut properly. This is particularly true in the dry forests of Zambia. In the Sahel, charcoal makers return for reharvest in 9–12 years, and in Zambia 20–30 years. The regrowth areas have a higher tree diversity than that of old-growth areas. A recent inventory showed that 65 percent of the forests in Zambia are re-growth from previous uses and here lies its great potential. The speed and path of regrowth depends upon post-harvest land uses and their intensity. Recurrent late dry season fire impedes such re-growth. Managed wood fuel areas with rotational harvest can provide the resource while maintaining the ecosystem services and minor forest products of a more mature stand. This sustainable productive use can mitigate the destruction seen in much of the miombo forest, but it depends on low-grade management and secure land tenure. Due to such degredation, the endemic Kafue lechwe has declined by over 50 percent in recent years.[118] As an endemic, this species has particular biodiversity value. It is encouraging that a congener, the Banweulu black lechwe, has increased by 50% over the same time period.

LAND TENURE

An important driver of forest threats are the overarching issue of land tenure and property rights. There are two main categories of land in Zambia: 1) State land (26 percent) comprised of Leasehold land (8.0 percent), Protected Forest (9.5 percent), and National Park (8.5 percent); and 2) Customary Land (74 percent), of which about 22.3 percent is GMA. Key issues in land tenure and property rights which can impact conservation of forests are biodiversity are:[119]

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[117] GRZ Ministry of Lands, Natural Resources, and Environmental Protection In Press
[118] GRZ Ministry of Lands, Natural Resources, and Environmental Protection In Press
[119] GRZ Lands Act 1995, and amended 2010

- equitable access to land and resources;
- equitable access to and ownership of land by women;
- land tenure security;
- sustainable and productive management of land resources;
- transparent and cost effective management of land;
- conservation and protection of ecologically sensitive areas
- cost-effective and efficient settlement of land disputes;
- provision for customary and private (leasehold) tenure systems;
- law to prohibit land speculation;
- address imbalances in land speculation;
- provide for periodic land audits;
- provide means for securing customary land tenure;
- provide equitable access to state land;
- establish minimum and maximum holdings of arable land.

USAID identified a number of key issues in land tenure specifically for Zambia.[120] These include a need to support implementation of land principles in a draft constitution; support for community involvement in rural investment, strengthening urban land legal frameworks, strengthen land administration and land dispute resolution, and support community based forest management and forest institutions.

It is unclear whether a long-term land policy has been established yet by GRZ. The National Policy on Environment of 2007, Section 7.1.13 Land Tenure and Land Use, provides "Guiding Principles" and "Strategies" that help address these issues with an "overarching need to provide coordination between ministries, other institutions, and the environmental management institution." In his article "Furor over Land Policy", Singy Hayona[121] contends that vesting most land in the President opens its administration to abuse and land should be vested in the state or leased under a customary tenure system instead, lest agricultural land be sold by speculators to a wealthy minority and mining concerns, evicting the poor, as has been the experience, under the Lands Act of 1995. The RSNDP supports a land audit to remove uncertainty and lack of data defining land resources and occupancy.[122] Political will and resources are needed to initiate both policy and regulation.

OVERUSE OF FIRE AS LAND MANAGEMENT TOOL

Fire has been used as a land management tool in Zambia for millennia; however, current practices are considered to be too extensive, unmanaged, and unsustainable. Fires occur throughout the dry season from April to November; however, the majority of these fires occur during the hot dry post-harvest season between late August and October. Early season burning (April through June) is generally used to promote grass growth and is carefully managed; it occurs when woody plants are dormant and will not critically damage the trees and may promote regeneration. Mid-season fires (July through August) burn the greatest average annual area. Late season burning (September through November) is used for a variety of reasons, including to reduce disease, cover evidence of poaching, and to catch wildlife. Late season fires occur after new coppice growth and may damage the crowns of canopy trees; frequent fire may eventually destroy the

[120] USAID 2010
[121] News from Africa 2007
[122] GRZ 2013 Revised Sixth National Development Plan. Lusaka. 130 p.

canopy and reduce the woodland to coppice.[123]

UNSUSTAINABLE OVERUTILIZATION

A number of native tree species of moist tropical forest have been overexploited and are increasingly rare. Among the timber species are *Pterocarpus angolensis, Afzelia quanzensis*, *Daniela ostiniana*, *Khaya nyasica*, and *Mitragyna stipulosa*.[124] Seventeen species of trees are reserved under the Forest Law and can therefore only be cut with a license. This is difficult to enforce with the current resources of Forest Rangers. A conversation with former Vice President, Enoch Kavindele, revealed that, for about three years (of a ten-year contract), loggers have been taking valuable timber (particularly Mukula, *Pterocarpus,* and rose wood, *Guibourtia*) far in excess of the 7,000 ha and 4,800 m^3 of selected species enumerated in the contract. The violators who have been apprehended have paid fines that are a small fraction of the value of the timber (up to \$584/m^3). The area appears to resemble a clear cut, rather than selection cut, and neither local employment nor government receipts reflect the unsustainable losses of the tropical forest.

AGRICULTURE AND LIVESTOCK[125]

Zambia has a relatively ample supply of arable land—42 million hectares, of which only 1.5 million hectares is cultivated every year—and 5 percent of the water in central and southern Africa.[126] However, agricultural resources in some parts of the country have deteriorated due to overgrazing and over application of fertilizers.

There are three broad categories of farmers in Zambia:[127]

- Small-scale farmers—generally subsistence producers of staple foods with occasional surplus to sell.
- Medium-scale farmers—generally produce maize and other cash crops for the market.
- Large-scale farmers—generally produce a variety of crops for the local and export markets.

There are 1,417,992 small-scale households who contribute an estimated 80 percent of total Zambian crop production.[128] The contribution of small-scale livestock holders is about 30 percent. The large-holders grow wheat, soya bean and sugarcane, which are key to Zambian agricultural exports.

Zambia's agricultural sector is focused on the cultivation of maize, wheat, soya beans, ground nuts, cotton, tobacco, sunflower, sorghum, coffee, rice, cassava, sugar, and vegetables. Emerging products include palm, jatropha, and barley. Livestock typically reared includes cows, poultry, pigs, goats, sheep, and rabbits.[129]

AGRO-ECOLOGICAL REGIONS

The three primary agro-ecological regions (AERs) are distinguished by the amount of annual precipitation (see Figure 7). Data for the 1950s through the 2000s show no striking changes in rainfall in the three regions during that period, except for the eastern part of AER region III (Luapula, Northern Muchinga, Northern and Central Provinces) where rainfall has increased. Temperature increases have been recorded in all parts of the country.

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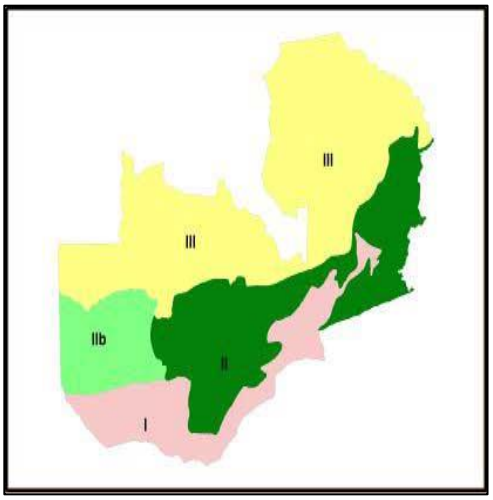
[123] Hollingsworth et al. 2015
[124] Chidumayo and Njovu 1998
[125] Berwick and Faeth 1995; Lindsey et al. 2013a; GRZ 2006; Taylor and Walker 1979; Western and Finch 1986
[126] Demian 2015
[127] Aregheore 2009
[128] Lubangu and Mofya-Mukuka 2012
[129] GRZ Ministry of Agriculture and Livestock 2014

Figure 7. Agro-ecological zones of Zambia



Source: GRZ Ministry of Lands, Natural Resources, and Environmental Protection 2015

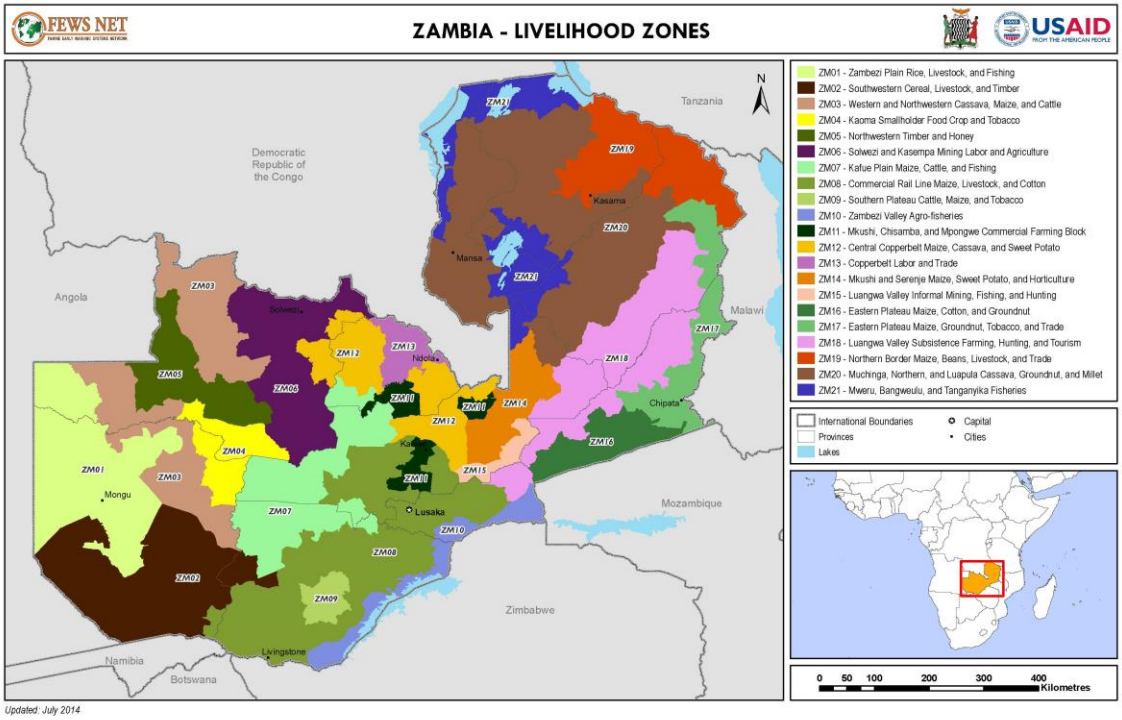
AER I: Covers 23 percent of Zambia, and includes the major valleys (Gwembe, Lunsemfwa and Luangwa). It has the lowest agricultural potential, with rainfall of less than 800 mm per annum, a short growing season of between 80–120 days, and a medium to high risk of drought.

AER II: Covers the Sandveld Plateau, the Kalahari Sand Plateau and the Zambezi floodplains of the Western Province. Rainfall is between 800–1,000 mm per annum and the growing season is 100–140 days. It has a medium to low risk of drought. Eighty-seven percent of the area is suitable for agriculture, but only half of this is accessible, as the remainder is in national parks, game management areas and forests.

AER III: Includes a mean annual rainfall of 1,000 mm and a growing season of 120–150 days. The risk of drought is almost nil. However, only 52.7 percent of the land is suitable for cultivation due to the soils being highly leached. Very little of this zone is in national parks, game management areas, and forests.

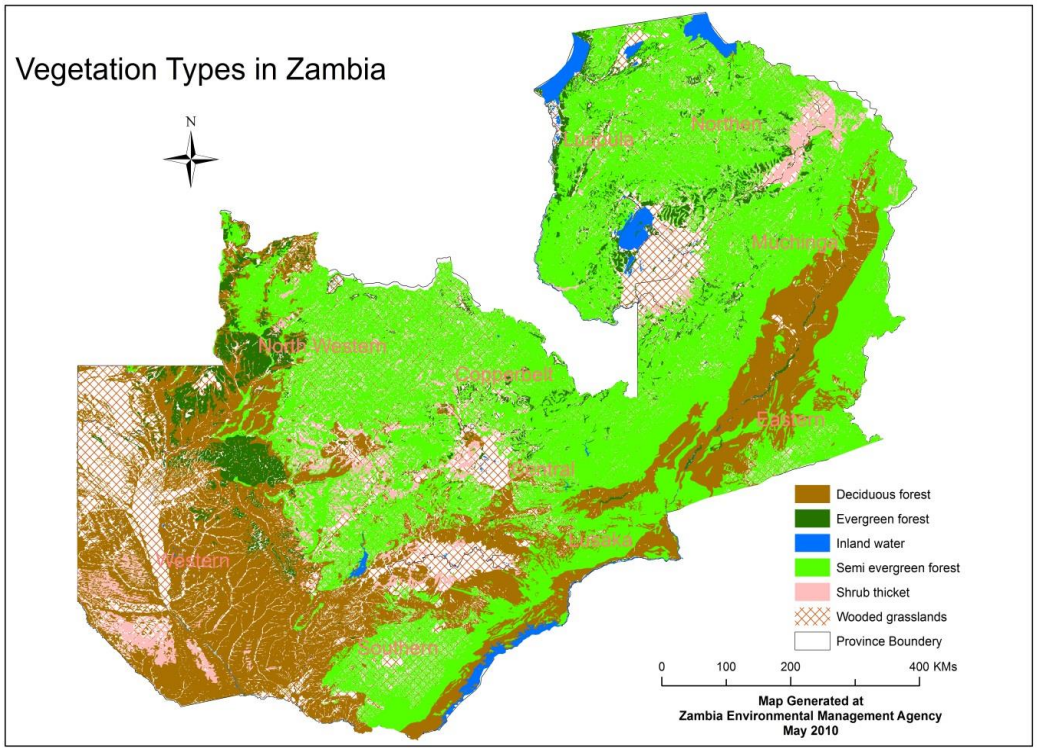
As seen in Figure 7, AER I covers 23 percent of Zambia and has the lowest agricultural potential with precipitation under 800 mm per year, a short growing season, and a high drought risk. AER II covers the sandbelts and Zambezi floodplains of Western Province. Rainfall ranges between 800–1,000 mm and the growing season is 100–140 days with a medium-to-low risk of drought. Only half of the suitable area for agriculture (87 percent of the AER) is accessible; the remainder is in PAs. Agroecological or livelihood zones have been described by the Famine Early Warning Systems Network (FEWSNET) in Figure 8, and they are more detailed than those described by GRZ in Figure 7. Figure 9 also shows vegetation types found throughout Zambia.

Figure 8. FEWSNET livelihood zones.[130]



[130] FEWSNET 2014

Figure 9. Vegetation types in Zambia



Source: ZEMA 2010

DEVELOPMENT OF THE SECTOR

Between 1964 and 1980, Zambia implemented regulatory control policies to enhance food security and agricultural production, including price controls and subsides, and cooperatives and parastatals to purchase produce. These actions corresponded to increased production of maize and increased production area. Starting in 1990, agricultural commodities and inputs were de-regulated and state-owned marketing companies were privatized. These actions corresponded to decreased productivity and market failures. However, since 2001, the agricultural sector has shown signs of improvement based on free-market controls, particularly for large cash crops like tobacco, cotton, and wheat. During the 2011-12 farming season the Food Reserve Agency (FRA) procured 1,000,000 MT of maize compared to the 1,692,307 MT procured during the 2010-11 season. The decline in maize purchases in the 2011-12 farming season compared to 2010-11 is because of high maize production during the 2010-11 farming season. In 2012 more than 655,000 MT of maize were exported to various countries in the region while 580,332 MT were exported in 2011.

Agriculture has become an increasing share of the national economy and exports. In the period from 1993 to 2001, agriculture accounted for 22 percent of GDP. Agro-processing industries account for 84 percent of manufacturing output, over five times larger than the next largest group, textiles and leather (which relies on agricultural raw materials). The contribution of the sector to GDP averaged 18.5 percent between 2009 and 2012, mainly driven by significant growth in the crop and livestock sub-sectors, which have grown at a combined rate of over 13.0 percent during the same period.[131]

[131] GRZ 2011

There are 16 species of domestic animals in Zambia—10 mammals (primarily cattle) and six birds (primarily chickens). The number of cattle has remained the same over the years, although there are large drought-dependent variations year-to-year. Sheep and goats are increasing at 5 to 7 percent a year. Introduction of exotic breeds of livestock is also increasing with Afrikander, Boran, Hereford, Friesian and Jersey being hybridized with the traditional breeds of Zebu and Sanga types such as Tonga, Ngoni and Barotse.[132]

THREATS TO AGRICULTURE AND LIVESTOCK

The performance of the agricultural sector has been hampered by:

- Lack of modern agricultural technology and techniques,
- Poor state of feeder roads and other communication infrastructure,
- Lack of appropriate energy services,
- Inadequate credit facilities,
- Poor agricultural marketing systems, and
- Fluctuations in rainfall patterns.

LACK OF INFRASTRUCTURE AND TECHNOLOGY

Subsistence farmers hold nearly two-thirds of Zambia's agricultural land (including the majority of livestock) scattered around the country, with parcels averaging less than 5 hectares. Land is tilled by hand with few tractors in use. Yields from subsistence farmers are about 50 percent of those realized by commercial farmers. The poor state of infrastructure, coupled with the distance that most small farmers live from markets, has imposed serious constraints on the delivery of vital services and inputs to farmers, including extension, which has affected productivity and made commercial sales difficult.

UNMANAGED FIRE

Farmers use fire as a tool to clear vegetation for agriculture, improving pastures for grazing, hunting, and stimulating the growth of non-timber forest products (NTFPs). Burn rates vary by province, but in Eastern Province, the burn rate is more than one million hectares annually, approximately 20 percent of land area in the province.[133] Although fire has been used as a tool for millennia, there is strong evidence that current fire management is inadequate and the resulting fires may damage the environment, resources, and property, and threaten lives.[134]

REDUCTION IN GENETIC DIVERSITY

Crop genetic resources represented by the 107 cultivated plants include 52 percent that are exotic. There are five indigenous species of wild rice and 567 wild relatives. The amount of land occupied by cash crops like tobacco, cotton, and hybrid maize is increasing. This serves to reduce on-farm genetic diversity as seen in the replacement of local maize varieties by hybrid maize.

AGRICULTURE AND THE ENVIRONMENT

The relationship between agriculture and the environment is complex. Climate change increases the variability of precipitation in Zambia. This increased variability results in more frequent droughts and flooding with decreased agricultural outputs. In addition, unsustainable or inefficient agricultural practices can decrease soil fertility and result in increased soil loss. Depleted soils can drive deforestation as farmers clear additional forested land for agriculture. The misuse of fire can cause additional damage to forested land. The soil lost by erosion can clog and pollute water courses already affected by poor water quality and availability.

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[132] Aregheore 2009

[133] Hollingsworth et al. 2015

[134] Ibid

Animals are essential pollinators of both economically and ecologically important plants. Insects, bats, and birds fulfill this function. Legume crops (beans and peas) are completely dependent on insect pollinators. Animals fulfill the role of seed dispersal of a number of flowering plants. For example, 54 percent and 82 percent of miombo woodland understory and shrub species, respectively, are dispersed by mammals. Some seed requires passage through the digestive tract of an ungulate to germinate. Dung is a significant source of fertilizer for wild and domestic crops. These valuable ecosystem functions provided by wildlife are essential to maintain the agricultural system and are reliant on healthy and diverse wildlife communities and the ecosystems that sustain them.

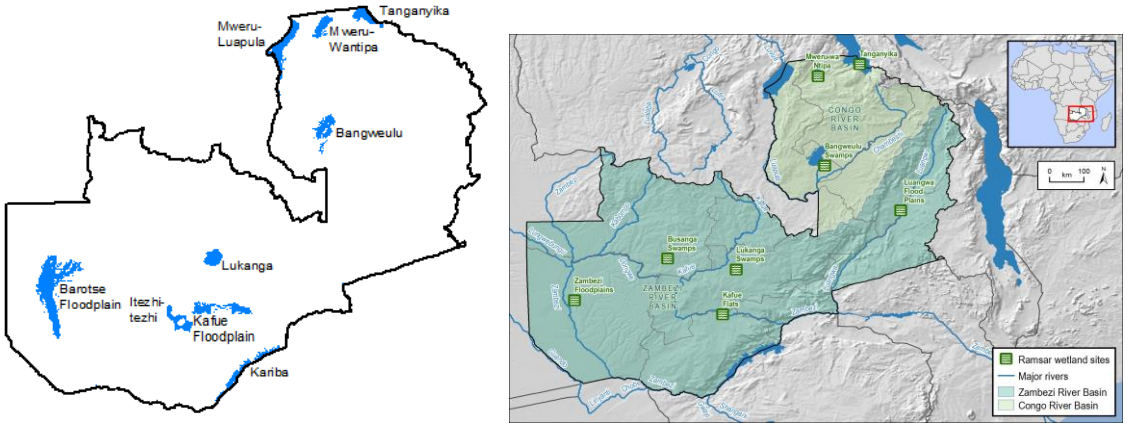
The cotton sector has expanded significantly since the liberalization of Zambia in 1994, and the impact of cotton has great potential for environmental impacts. While yields have risen among experienced farmers, the sector has continuously expanded among smallholder farmers, particularly in Eastern Province where the ETOA team observed many farmers having planted cotton for the first time in 2015.[135] Cotton expansion production requires significant pesticide inputs, such as organophosphates, which can contaminate soils, place applicators at risk for neurological effects, and contribute to pesticide resistance in malaria vectors.

FISHERIES[136]

STATUS

Fisheries in Zambia contribute greatly to nutritional and economic security of households, particularly in rural areas. An estimated 55,000 people derive their livelihood from fishery-related activities; 25,000 from fishing and another 30,000 from fish processing and trading.[137] Fishery activities typically take place in lakes and wetlands, including few RAMSAR sites (see Figure 10).

Figure 10 Wetlands of national importance serving as major fisheries



Source: GRZ Ministry of Lands, Natural Resources, and Environmental Protection 2015

Zambia supports 490 species of fish, including a high rate of endemic species (see Table 10). The group (taxon) with the highest diversity are cichlids (191 species) followed by cyprinids with 93 species. The highest species richness is found in Lake Tanganyika, whereas the lowest is found in Mweru-Wantipa. Catch-per-unit effort measurements reported for 1966–2014 indicate increasing trends for all fisheries except Kafue and Mweru-Wantipa.

One important fishery is the 6,000 km^2 Bangweulu wetlands, which spans six chiefdoms and supports an artisanal floodplain fishery that is the primary livelihood for as many as 80,000 local residents.[138] The fishery

[135] Tschirley and Kabwe 2009

[136] GRZ Ministry of Lands, Natural Resources, and Environmental Protection In Press; Huchzermeyer 2015

[137] FAO 2003

[138] Huchzermeyer 2015

uses several methods to achieve a multi-species catch with the peak season during the floodplain drawdown from March to September. Income to communities is USD $6–8 million.

Table 10. Fish species richness in some major Zambian fisheries (Source: Department of Finance 2015. Note: ND means no data)

	AREA	CENTER COORDINATES		DEPTH	FISH SPECIES	
FISHERY	(KM^2)	LONGITUDE	LATITUDE	(M)	TOTAL	ENDEMIC
Mweru-Luapula	2,591	28.6	-9.3	37	103	24
Mweru-Wantipa	1,555	29.7	-8.68	2	20	0
Bangweulu	7,773	29.75	-11.15	4	87	9
Tanganyika	21,172	30.8	-8.43	1470	252	220
Kafue	7,773	27.24	-15.64	1	61	3
Kariba	1,814	27.71	-17	93	57	13
Itezhi-tezhi	370	26	-15.6	45	ND	ND
Barotse	700	23	-15	2	80	20

Fish production increased by 2.3 percent in 2011 and 23.3 percent in 2012 from aquaculture fisheries due to increased numbers of fish farmers. Given the need for palatable protein and alternative livelihoods, this increase augers well for the future expansion of aquaculture.

THREATS AND ISSUES

Undoubtedly, fish populations are in decline across much of Africa, including Zambian waters. Overfishing and illegal fishing due to inappropriate tackle, off-take of juvenile fish, and lack of regulations over fishing licenses are some factors in fish stock declines. Additionally, water temperatures are among the hottest in 1,500 years in Lake Tanganyika, a climatic factor that is likely contributing to population declines as well. Three other issues are of primary concern:

CLIMATE CHANGE

Climate change impacts on fish species is significant due to the potential for water temperatures warming and therefore carrying less oxygen. Warming and decreased precipitation also can lower the level of water in riverine and lacustrine systems, thereby shrinking habitats and potentially changing the salinity of aquatic systems. Already in Lake Kivu researchers have noted a decrease of 0.58m in the lake followed by declines in the catches of important commercial species.[139]

INVASIVE SPECIES

Invasive species are another significant threat to Zambian fisheries. The large crayfish, *Cherax quadricarinatus*, has infiltrated the dams at Kafue and Kariba. The Nile tilapia, *Oreachromis niloticus,* escaped from aquaculture farms into the Kafue River in the 1980s and is now increasing faster than the native tilapia.

ITNS

The PMI Annual report for FY14[140] states that PMI procured 31.8 million ITNs, which contributed to the 145 million ITNs delivered to PMI focus countries in 2014. Global Fund is the largest supplier of ITNs across all countries. The number of ITNs around the world and the lack of appropriate disposal means is undisputed. However, concerns are being raised regarding the potential environmental impact of these nets

[139] Akonwa et al. 2015
[140] PMI 2015

on fish populations and, potentially, human health as publicized in a recent NY Times piece, "Meant to Keep Malaria Out, Mosquito Nets are used to Haul Fish In" published 24 Jan 2015.[141] The article documents the misuse of ITNs for fishing among other uses, such as corn cribs, soccer balls, and bridal veils.[142]

This assessment identified that ITNs seem to need further investigation as to the prevalence of use for fishing. Reportedly, ITNs are being used because of poverty, the demand for cheap protein, and entry by low skilled persons, causing the decline in fish stocks and abandonment of traditional fishing, which is no longer proving to be a viable livelihood. An estimated 300,000 people earn their income, or part of their income, from fishing, trading, or other fishing related services and 20 percent of the animal protein in Zambia is from fish.[143] The fish demand is being driven locally and, to some extent, demand from urban areas. In the area of Itzehi-tezhi, there is also a hydropower scheme being built with a large influx of laborers who are also a market for the fish, as well as illegal bush meat, a scenario that is repeated across numerous large construction projects in the country. The artisanal fishers, partially supplying the demand, are typically individuals who lack other opportunities and operate without permits and licenses with whatever tackle is available, including mosquito nets and potato sacks. Safari owners, fisheries departments, and local communities do report this as common, although it is illegal in Zambia, punishable by a fine or 18 months in jail. Detection can be difficult because it is an illicit activity and often conducted at night. The nets are used in the shallows where they are strung together and used to physically herd the fish toward shore where they are captured. In some cases, nets are also being used to carry small kapenta, but the nets are not being used for drying as reported in other areas like Lake Tangnikya.[144]

The issue with fishing nets is compounding the problem. The use of the net appears to be driven by the decline in fish stocks of acceptable sizes and, therefore, all fisherman, including those in traditional fisheries with legal tackle, have gone to ITN fishing so they can still make a livelihood from fishing. Declines are reported to be about two-thirds in the past 3 years by the Department of Fisheries. The ITNs seem to contribute to the problem; because of their high tensile strength, they last about 3 months for the fisherman, versus the finer mesh, which are only used for a few times before becoming unusable. Patrols are conducted by the Department of Fisheries, ZAWA, and police collaboratively. Near Itezhi-tezhi, about 120 a year are caught with mosquito nets being illegally used for fishing.

MINING[145]

Zambia's economy grew by 6.7 and 6.0 percent respectively in 2013 and 2014, largely due to mining, agriculture, and transport. Mining growth slowed in 2015 largely due to a new mining tax and a global depression of copper prices. This ETOA addresses mining because it has an outsized influence on the environment and economy and through its operation, can impact forests and biodiversity of Zambia (see Figure 11).

[141] Gettleman 2015

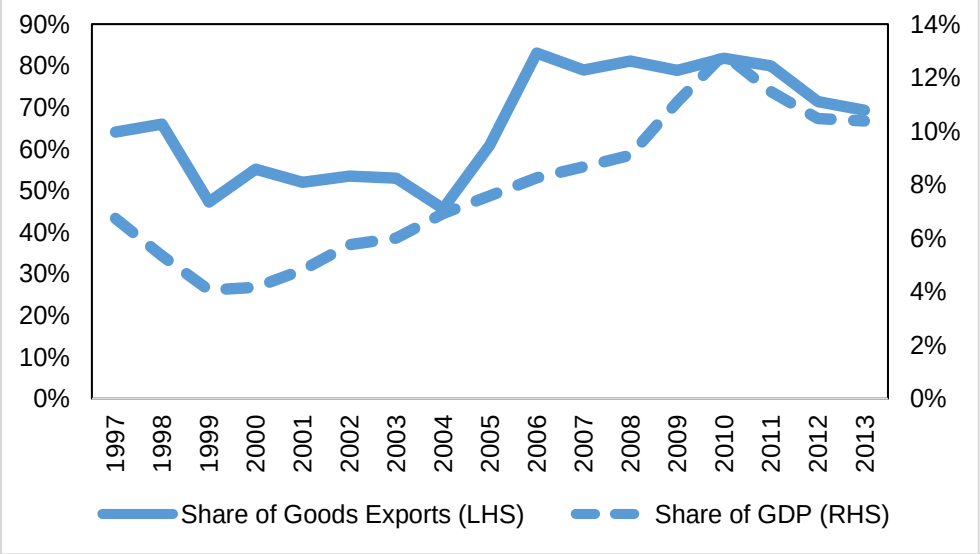
[142] It should be noted that the text of the article identifies the reporting location as Bangweulu Wetlands in Zambia. However, the accompanying video where fishermen are seen with sewn ITNs fishing is from the shores of Lake Tanganyika, a co-managed international boundary waters in northern Zambia. Carl Huchzermeyer, a well-known fisheries manager for African Parks verifies that people do use mosquito nets for fishing in Lake Bangweulu.

[143] FAO 2007

[144] McLean et al. 2014

[145] World Bank 2015c

Figure 11. Mining's contribution to GDP and trade in Zambia (1997–2013)



Source: World Bank 2015c

Cobalt and copper are Zambia's main commodities and accounted for over 80 percent of exports during the years of high copper prices when GDP per capita grew to $1,845. However, the wealth of its mineral resources has not translated into human development—what is called the "paradox of plenty." The profits from mining have not spread through the general population of Zambia.

STATUS OF MINERAL RESOURCES

Copper and cobalt are the principal mineral commodities in Zambia.[146] Other metals include bismuth, lead, zinc, manganese, and nickel. Mineral fuels mined include coal and uranium. Industrial minerals include sulfur, rare earths, and gemstones, such as emeralds.[147] Zambia contains the largest known copper reserves in Africa, approximately 6 percent of known copper reserves in the world.[148] In 2012, Zambia was estimated to rank seventh in the world for production of copper ore and ninth for production of cobalt ore.[149] Zambia produces an estimated 20 percent of the world's emeralds, which are very popular due to their dark green color.[150]

Zambia faces several internal and external obstacles to successful diversification of its mineral production, which include the availability of electrical energy and fuel supplies, cyclical world commodity prices, and high transportation costs.[151]

ENVIRONMENTAL IMPACTS

Zambia experiences environmental impacts from both current mining operations and historical mining activity. Mining impacts the environment in the following ways:

- Land degradation;

[146] Sikaundi 2007
[147] USGS 2014
[148] World Bank and UKAID 2011
[149] USGS 2014
[150] Nyambe and Phiri 2009
[151] Ibid

- Soil contamination;
- Water pollution and siltation; and
- Air pollution.

Mining activities produce large volumes of waste materials, such as overburden, soils and rock removed in mining activities; waste rock, material with mineral concentrations that are too low to be valuable; tailings; finely ground rock from processing operations; and slags, non-metallic smelting by-products.[152] Large areas of land covered by waste materials are unusable for agriculture, forestry or other land use activities. Mining activity leads to metal accumulation in soil from smelting and dust emissions. Levels of lead can be as high as 26,000 mg/kg in areas with the greatest pollution. Crops and vegetation can be exposed to metals through soil, air and water.[153]

The Copperbelt Province in central Zambia is home to the many of the country's large copper mining and processing operations.[154] Mining operations are located within the Kafue River watershed and receive their water from the Upper Kafue. The Kafue River is the source of 40 percent of drinking water for nearby cities and is used for irrigation and fishing, so pollution can greatly impact environmental health.[155] Effluent and waste oil are often dumped directly into the water, contaminating both surface and groundwater.[156]

Additionally, mining activity increases siltation in Zambia's waterways. This siltation creates a continuous build up in the river, increasing the level of metal concentration. There is also erosion of river banks due to mining operations discharging materials directly into waterways. Furthermore, the Kafue River is at risk for contamination due to mining operations spills.[157] A 2006 leaching plant spill led to a complete water supply failure and a 2008 spill from a different leaching plant hospitalized at least 13 people due to drinking water contamination.

Research has found levels of dissolved copper to be significantly higher than standards set for protecting aquatic life, which are stricter than drinking water standards as aquatic biota are more sensitive to contamination. Fish from areas of the Kafue River near mining operations have been found to have elevated levels of copper and cobalt compared to fish from areas upstream of the mining operations.

Copper smelters and other mining activity contribute to over 98 percent of Zambia's sulfur dioxide emissions. High levels of sulfur dioxide causes poor air quality. Regular wind patterns carry sulfur dioxide in areas proximate to the Copperbelt. Measurements taken in these areas have shown concentrations between 500 and 1000 μg/m, exceeding the guideline of 50 $\mu g/m^3$.[158]

Some thirty years after Independence, mining productivity was declining and the government privatized the industry to stimulate foreign investment and productivity. However, 70 years of mining, beginning in the colonial era, left a huge environmental legacy for which investors were unwilling to accept liability, leading government to ignore this environmental debt. Many old tailing piles remain unmitigated, leading to extreme environmental pollution and exposure of pollution hazards to communities. A World Bank Copperbelt Environment Project (CEP) financed demonstrations of mine tailing remediation showing that risks to environment and human health could be reduced with proper removal and disposal of hazardous substances from mine sites, such as 150,000 m^3 of radioactive uranium tailings, 220 tons of poly-chlorinated biphenyls

[152] Mining Facts N.D.
[153] Lindahl 2014
[154] USGS 2014
[155] Lindahl 2014; Sikaundi 2007
[156] Ibid
[157] Lindahl 2014
[158] Ibid

and 56,000 m^3 of lead-laden soils in Copperbelt and Kabwe.[159] Community concern and risk awareness in Kabwe was limited. World Health Organization limit for blood lead level is 10 µg/dl, while the average of the exposed population in Kabwe was 30–70 µg /dl. Each 10 µg /dl in children represents a reduction of about two points in IQ. Children in Kabwe showed elevated levels of lead and consequent behavioral issues, reduced IQ, anemia, attention deficient disorder and other symptoms. Post-treatment lead testing of 5,000 children confirmed the reduction of lead levels below the treatment threshold in 2,822 of them.

Mining also has indirect environmental impacts, such as increased population in communities in close proximity to the mines. This population rise has led to increased deforestation, increased drinking water demand, and increased sanitation issues.[160] Inadequate handling of waste sewage is an additional threat to drinking water quality in the Copperbelt Province along with metal pollution from mining tailings dams.[161]

WATER QUALITY AND AVAILABILITY

WATER RESOURCES

Zambia's main water resources are the Zambezi and Congo rivers with their tributaries of Kafue, Luangwa, Luapula, and Chambeshi, and Lakes Tanganyika, Bangweulu, Mweru and Mweru wa-Ntipa, including the manmade lakes of Kariba and Itezhi-tezhi. Water resources are not evenly distributed between urban and rural populations or between men and woman. Only 47 percent of rural areas have access to improved drinking water sources compared to nearly 90 percent for urban areas. Common non-improved water sources in rural areas include unprotected dug wells (30 percent) and surface water (17 percent).[162] Water resources near mining operations experience a growing problem with water pollution.[163] Weak institutional framework has resulted in challenges such as poor coordination, poor reporting mechanisms for the water regulator, inadequate financial resources against high investment requirements and low staffing levels.

Zambia experiences an average of 1,020 mm annual rainfall. Southern Zambia receives the lowest rainfall, around 750 mm, and often experiences surface water shortages.[164] The northern regions experience the most, around 1,400 mm annual rainfall, and central Zambia gets between 900 and 1,200 mm annual rainfall.[165]

The main source of renewable water in Zambia is rainfall, however due to high temperatures and high evaporation rates, the country has a precipitation deficit of 100 to 1,100 mm. This can lead to high water losses especially from large reservoirs such as lakes. Therefore, only about 3 to 12 percent of the rainfall can be considered renewable water.[166] Groundwater resources are estimated to be 49.6 km^3, approximately one third of Zambia's total renewable water resources.[167] Groundwater use in Zambia is increasing. Around 9 percent of water usage is from groundwater and groundwater provides 28 percent of the domestic water supply.[168]

WATER USES AND INFRASTRUCTURE

Agricultural uses account for around 73 percent of Zambia's water use. Zambia is heavily dependent on rainfall for agriculture and, when droughts occur, there are reduced crop yields, which increases food

[159] World Bank N.D.
[160] Sikaundi 2007
[161] Lindahl 2014
[162] GRZ CSO 2014
[163] Nyambe and Feliberg N.D.
[164] Ibid
[165] UN Water N.D.
[166] Nyambe and Feliberg N.D.
[167] World Bank 2009a
[168] WaterAid 2001

insecurity. Inadequate irrigation infrastructure and water storage are the main challenges to irrigated agriculture.

Municipal uses, including hydropower, represent 19 percent of Zambia's water use. Competition and conflicts between hydropower and agriculture regarding water use are beginning to emerge. Currently, a low dam for energy development is being planned on the Kafue River.[169] Such developments are meant to address the current shortage, as seen in the rotational load shedding suffered by residents in Lusaka.

Industry represents approximately 8 percent of water withdrawals in Zambia. However, this percentage is increasing, largely due to the expansion of mining and manufacturing activities. Water-efficient industrial processes have not been actively adopted and there are water quality concerns in areas where there are mining and industrial activities.[170]

While not the largest river in Zambia, the Kafue River is one of the most heavily used and it is reaching the limits that can be sustained under its present capacity. The Kafue is used by the main economic water consuming sectors of Zambia: mining, agriculture and industry. It is also a source of domestic water supply to over 40 percent of the population.[171]

THREATS TO WATER RESOURCES

Decreasing surface and groundwater quality in Zambia are due to an increasing nutrient load, industrial and agricultural pollutants, and a falling groundwater table. Poor water quality is a growing problem in densely populated urban areas where there are sanitation and solid waste management issues posing a serious threat to groundwater quality, particularly in areas where the majority of the urban population resides.[172]

Deforestation and overgrazing in Zambia has resulted in localized flooding, increased erosion, reduction in surface and groundwater availability, and loss of aquatic life.[173]

IRS programs, which work to reduce malaria morbidity and mortality through insecticides, can contaminate surface water if the effluent is improperly disposed of in water sources. Drinking water can also be contaminated if there is insecticide in the soil.[174]

As noted in the mining discussion, the mining industry is a significant threat to water resources without proper controls and remediation. Zambia has a history of episodes of discharge and pollution of both groundwater and surface water from mining tailings, overburden, and rock waste. In the past, most effluent made its way to the Kafue River.[175] While procedures for EIA are in place, and the EPPCA (1990) puts in place a polluter pays principal, many liabilities still exist from current legacy projects primarily because of poor EIAs and the lack of implementation of regulations and controls.[176]

Climate change poses a significant threat to Zambia's water resources and there is already an increased water scarcity through disrupted rainfall patterns, increased evaporation loss, and rising water demands as the population explodes and urbanizes.[177] Climate change leads to more frequent and serious flooding and increases the lengths of droughts, which will result in reductions in crop yields. The water temperature in

[169] Tom Younger, developer, Oct., 2015. Pers. Comm.
[170] UN Water N.D.
[171] World Bank 2009a
[172] UN Water 2009
[173] Nyambe and Feliberg N.D.; UN Water 2009
[174] USAID 2011c
[175] Sikaundi 2007
[176] Lindahl 2014
[177] SADC N.D.

rivers and lakes will rise, impacting water quality and local ecosystems, fishery, and wildlife.[178] Zambia is advancing efforts to enhance food security and adaptation to the effects of climate change, including the development of dams and irrigation.[179]

5. ENVIRONMENTAL THREATS AND ROOT CAUSES

This section documents direct threats (i.e., primary threats) to the environment as it relates to USAID programming, biodiversity, and tropical forests. It also documents the drivers or root causes of environmental threats for the purposes of Foreign Assistance Act (FAA) 118/119 analysis. The threats and root causes were identified based on reviewed literature, stakeholder consultations, and the expertise of the Assessment Team and are intended to capture the recent, current, and reasonably foreseeable issues relevant to USAID's five year planning timeline. The threats and root causes include those that are ecological (e.g., climate change, and fire), related to human use (e.g., encroachment, fire, agriculture), or institutional (e.g., opaque policy, lack of capacity, poverty).

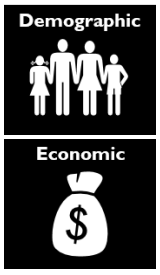
Table 11 describes the direct threats and their associated root causes or drivers to the environment that were most frequently cited by stakeholders and/or described in key literature reviewed by the Assessment Team. Categories are based on the five groups of generalized driver/root causes as described in the USAID Biodiversity Policy (2014). These threats are associated with human, ecological, institutional, and social and technological factors. While the threats are broad, there are numerous specific drivers, depending on the area of the country and the governance of that location, which play a role in perpetuating those threats. These threats are exacerbated by the lack of clear natural resource policy, climate change, land tenure, and a lack of capacity by authorities to enforce rules and regulations as well as actively manage the ecosystem for multiple uses.

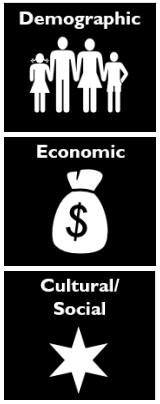
The overarching factor common to all threats, especially in rural areas, are those related to poverty where there is a lack of livelihood alternatives that either sustainably utilize natural resources or rely on other sectors, such as the service industry. Poverty is clearly a driver in unsustainable, consumptive natural resource use, deforestation, and poaching as a practice to supplement meager household incomes and respond to household food insecurity. One study found a negative relationship between deforestation and the use of farming inputs (e.g., fertilizer) in Zambia, with those inputs being beyond the reach of impoverished households.[180] The poor rely disproportionately on the environment for income generation and to meet basic needs, typically taking their income from sectors such as agriculture, forests, and fishing.[181] Alternatively, the influence of poverty on poaching is still an area being evaluated as there is indication that poaching, particularly for high value species such as rhino and elephant are actually driven by foreign wealth rather than the poverty of developing nations.[182] Regardless, the reliance of poor households on natural resources and the absences of resiliency strategies makes them more vulnerable to disasters, climate change, and shocks. Reversing negative environmental trends has been shown to achieve poverty reduction as income, health, and opportunities are influenced by ecosystem quality.[183] The poor's reliance on wildland use needs to be diversified and sustainable so communities have lasting benefits from income, protein, and employment while maintaining the natural assets of the land and improving resilience to climate change (by maintaining soil integrity, reducing erosion, and maintaining intact forests).

[178] Nyambe and Feliberg N.D.
[179] UN Water N.D.
[180] Liberty and Hongjuan 2008
[181] Lusigi 2008
[182] Duffy and St. John 2014
[183] Lusigi 2008

Table 11. Environmental threats and drivers by ecosystem

Ecosystem Key	
Forests and Grasslands	
Agricultural and Pastoral	
River, Lake, Wetlands	
Protected Areas	

THREATS	DRIVERS/ROOT CAUSES	CATEGORY	ECOSYSTEM
All Threats	• Inadequate organization and inadequately funded, resourced, and educated GRZ employees to carry out their roles in natural resources management (NRM) • Limited opportunities and alternatives livelihoods to replace consumptive ecosystem uses, particularly for the impoverished • Ineffective and inefficient engagement with community and traditional leaders • Lack of participatory land use planning and clearly established land tenure policies • Lack of integrated natural resource planning and implementation • Presence of an opaque and inadequate enabling environment for business development and investment • Missed opportunities to leverage new and innovative techniques • Lack of appreciation of the intrinsic value of ecosystems		
Agricultural land clearing (including contributions to climate change from deforestation, wetlands development, and burning)	• Agricultural expansion, particularly when spontaneous, into environmentally sensitive areas • Rural poverty from a reliance on maize-centered subsistence agriculture • Low productivity agriculture techniques, at least in part attributed to effects of climate change • Lack of diversification • Low adoption of climate smart agricultural systems and/or conservation agriculture, agroforestry and green manuring		

THREATS	DRIVERS/ROOT CAUSES	CATEGORY	ECOSYSTEM
	• Presence of an opaque and inadequate enabling environment for business development and private sector investment • High degree of government intervention in maize input and output systems • Nutritional vulnerability from a lack of diverse diet and protein • Lack of alternative livelihoods, other than agriculture, including game ranching, sustainable rotational coppicing of miombo for charcoal, etc. • Lack of business interest or economic diversity • Insufficient extension services • Inefficient or inappropriate agricultural practices and techniques working against intensified systems • Maladaptation to climate change (reliance on maize and inputs that are not climate appropriate) • Poor quantitative knowledge for informing land use decisions at the local level • Inadequate reward systems for officials or for community support, largely in the form of existing Community Resource Boards • Insecure and undocumented land tenure • New roads, (e.g., Link 2020 plans)		
Poaching	• Nutritional vulnerability from lack of food source diversity in the diet and protein • Availability of commercial and illicit markets for bush meat, rhino horn, and ivory, pangolins and other wildlife products • Rural poverty and lack of livelihood alternatives, especially those that are non-extractive • Climate variability reducing agricultural productivity and forcing communities into other activities to generate household income • Inability to address human-animal conflict • Lack of monitoring and poaching enforcement, especially during the wet season • Absent enforcement of useful regulations, absent technical assistance/extension, no cooperation with other government agency in system • Lack of required technology to collect and share monitoring data • Lack of basic data on animal and poaching travel patterns • Inadequate reward systems for officials or for community support		

THREATS	DRIVERS/ROOT CAUSES	CATEGORY	ECOSYSTEM
	• Lack of enabling environment for photographic tourism, game ranching, and benefit distributions systems, with community capacity and governance emphasized, that enable local populations to see benefits from wildlife • Communities do not see a value in wildlife except as meat • Inadequate regional engagement on wildlife trafficking • Inadequate resources (human and other) to address transit of wildlife products; low usage of intelligence-led anti-poaching • Proposed new roads (e.g., Link 2020 plans)		
Deforestation and forest degradation Examples: • Charcoaling (i.e., cooking fuel/energy) • Wild foraging • Illegal logging • Burning	• Lack of reliable energy sources to use for cooking fuel (both during daily operation and during scheduled load shedding) – Load shedding is partially due to low water levels from drought conditions contributed to by climate change. • Unstable prices of alternatives (e.g., cooking gas) • General lack of access to power • Lack of a managed resources to supply the need for household fuels • Lack of education and sensitization of communities • Lack of governance of land resources (honey collection, agriculture, and charcoal production) • Increase in the number of migrants seeking income and turning to marginal livelihoods • Poor infrastructure for patrols • Lack of required technology to collect and share monitoring data • Inadequate reward systems for officials or for community support • New roads		
Unprescribed fires on communal lands/villages (including threats from greenhouse gas emissions from fires)	• Youth hunting for small rodents • Arson with no intent • Clearing of the bush • Regeneration of grasses • Natural fires from extreme weather events • Farmers to fertilize fields or clear standing stocks • Wrong financial incentives/price signals for forest conservation • Lack of streamlined regulations tied to clear fire policy (e.g., of early versus late burning, fire breaks, fire communication) • Lack of fodder for livestock resulting in conversion of forest to grassland		

THREATS	DRIVERS/ROOT CAUSES	CATEGORY	ECOSYSTEM
	• Historical biases/practices by communities • Low productivity pastoralism/livestock management • Poor quantitative knowledge for informing land use decisions at the local level • Lack of monitoring systems • Customary land tenure systems that often encourage land clearing in order to "claim" land		
Fires in PAs (including threats from greenhouse gas emissions from fires)	• Ignition by poachers, fishers and charcoal producers • Loss of control of fires by game scouts and charcoal producers • Cooking fires • Forestry officer corruption • Lack of forestry officer capacity • Inadequate funds for paid professional forestry officers (accept bribes as an income supplement or lower capacity individuals applying for positions) • Lack of streamlined regulations tied to clear fire policy (e.g., of early versus late burning, fire breaks, fire communication) • Intact, pristine landscapes lack value in terms of alternative livelihoods • No ownership of a livelihood alternative that would render burning costly • Inability to control fires once they are started • Inadequate fire surveillance, lack of lookouts		
Overfishing and illegal fishing causing decline in fish populations	• Lack of development and implementation of management plans • Lack of locally managed processes (fishing committees) • Lack of diet diversity and protein • Unlimited open access to the resource • Weak enforcement of fishing bans • Inability to deter repeat offenders • Not addressing repeat offenders motivation • Use of inappropriate fishing materials (e.g., monofilament, repurposed mosquito nets) • Lack of human resources, technical capacity, and equipment to monitor the resource fish populations and fishing operations • Lack of access to information on the status of fish stocks, sustainable harvest targets, environmental variables, population dynamics		

THREATS	DRIVERS/ROOT CAUSES	CATEGORY	ECOSYSTEM
	• Limited connectivity of remote villages to administrative hubs and service centers • Lack of livelihood alternatives for the poor such as fish farming		
Invasive species	• Accidental release from aquaculture operations • Lack of natural grazers/predators to keep the invasive species under control • Ornamental use • Expansion of range with climate change • Difficulty in removal • Lack of economic or dietary uses for invasive species	 	
Pollution (i.e., inland surface, ground, and coastal water, and air) from: ○ Industry (e.g., mining, agribusiness, cotton) ○ Rapid population growth ○ Human and animal waste ○ Solid waste management systems ○ Medical waste and malaria vector control waste (insecticides) ○ GHG emissions ○ Smoke pollution from cooking	• Industrial development with few point discharge regulatory controls • Lack of technology for pollution monitoring • Deficiencies at the federal government level to enforce environmental laws • Increased development of agriculture and livestock sectors without clear regulations on waste disposal • Increased encroachment and human population densities in wildlands • Inadequate solid waste management systems • Inadequate hazardous waste management systems • Lack of guidance on handling of waste disposal • Unregulated mining and lack of mining mitigation • Cumulative impacts of infrastructure development (e.g., Link 2020) on natural resources – roads, transmission, hydro, tourism, etc. • Weak enforcement of emission standards	 	

Throughout the stakeholder consultation exercise and literature review, there were a number of key threats, which presented themselves as the primary issues in all ecosystems and applied across nearly the entire country. These key threats must be addressed in order to protect forests and biodiversity, and more generally, for Zambia to sustainably manage natural resources in the name of conservation, but also to promote economic development and well-being of its citizens. Notably, the root causes are highly interrelated with the causes often driving more than one threat and the drivers themselves being a threat themselves. The key threats have been distilled into seven primary issues briefly summarized below and examined in greater detail in Section 4.

Agricultural Land Clearing/Encroachment. Encroachment describes the spontaneous spread of human activity in previously protected natural areas, generally through settlement and subsistence agriculture. By 2011, less than half the national forest estate was free from encroachment. This process has been mapped in peri-urban Lusaka, but is occuring throughout the country. Six of the twenty national parks have suffered significant encroachment and degraded wildlife habitat.[184] Among the most damaging effects of encroachment is fragmentation and isolation of wild populations, cutting them off from seasonal resources and genetic infusion. Encroachment has also perpetuated human/animal conflict as communities settle closer to wildlife popluaiton, particularily elephants, which are then attracted to food sources in the agrictultural plots. Development-related fragmentation of habitat is a long-term threat to population viability of many species in much of the world.

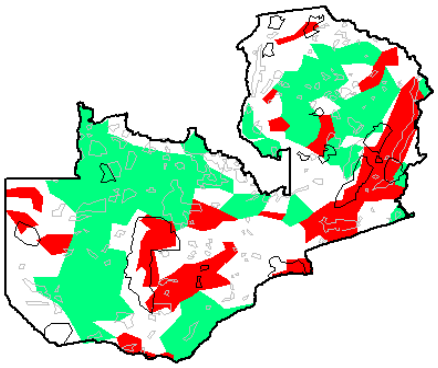
Poaching. Poaching and the degradation or loss of habitat are the major factors inhibiting growth of wildlife populations in Zambia. Unregulated hunting of bush meat is a major threat to biodiversity, as well as the lack of officials protecting wildlife and violence. The 2014 murder of the Head of Law Enforcement for Liuwa Plain National Park is just one case of violence against scouts and game officials. Poaching is not just an issue for high value species, such as ivory for international markets, but is also a localized problem with poaching for the bushmeat trade domestically. Generally, antelope populations have been decreasing in almost all areas of the country due to excessive, unregulated hunting and snaring. In areas where protein sources are limited, or where, for example, there is a large influx of labor for construction projects, the demand for protein exceeds the supply and many turn to bushmeat.

Deforestation. Deforestation issues are well documented in Zambia and addressing deforestation is the subject of one of USAID/Zambia's flagship programs, Community Forests Project. According to the UN-REDD Programme, Zambia has one of the highest deforestation rates in Africa, with a loss of 250,000–300,000 ha/year.[185] The UN identified charcoalling, agricultural encroachment, fuelwood collection, fires to stimulate pasture for livestock grazing, lack of enforecement, and expansion for settlement as being primary drivers contributing to deforestation. These same issues were identified in this ETOA and by stakeholders.

Setting of uncontrolled wildfires. Uncontrolled bush fires also contribute to forest degradation and deforestation. Repeated fire at all seasons will lead to a permanent alteration of the natural vegetation. For example, the repeated loss of termites and termitaria removes a distinct and important vegetation community and mineral resource for wildlife.[186] These fires are overwhelmingly anthropogenic. Annual burning is common (see Figure 12) in agro-ecological zone IIA (i.e., lower Zambezi floodplain and sandveldt), which includes major PAs like KNP where 90 percent of the enormous Park and GMA's totalling 68,000 km^2 are burned annually. Other studies show that about 25 percent of Zambia's total land area was burned annually from 2004–2008. Eastern Province has similarily 20 percent burned annually, 28 percent burned every 1.6 years, 37 percent of the area burned every 3.5 years, and 35 percent burned every 7 to 14 years.[187] Effects on biodiversity have not been well studied, but the effect on termites and termitaria alone could contribute to serious ecosystem changes. Hot, late fires can also retard regeneraton of fire-intolerant species changing species diversity.[188]

[184] Lindsey et al. 2013b
[185] UN-REDD Programme 2012
[186] Trapnell 1959; Chidumayo 2013
[187] Hollingsworth et al. 2015
[188] Eriksen 2007

Figure 12. Distribution of fire frequency



Source: Hollingsworth, et al. 2015.
Note: Red is burned annually, white is burned every 2–3 years, and green are areas burned once in 3–4 years

Overfishing. The World Bank conducted a study on the importance of fisheries in Zambia and its contribution to poverty reduction.[189] Zambia has 11 major fisheries. The study noted that fisheries accounts for 20 percent of protein in the Zambian diet with a production of 65,000 to 80,000 tons. However, the annual production has stagnated and, with the increase in human population size, the per capita output has gone from 11.4 kg in the 1970s to 6.4 kg in 2003. Stakeholders interviewed, including Department of Fisheries officials and commercial fisherman, noted that fish were increasingly harder to catch and that they were switching to smaller species as a primary source of income, anecdotally suggesting declines in fish populations. Stakeholders also noted that illegal fishing was taking place with beach seines made of mosquito nets, which could irreparably damage near shore nursery habitats where they are dragged. The fry nursery habitat is destroyed and the juvenile population is exploited, both by illegal capture and by exposure to pesticides. In quarterly surveys of catches in Itezhi-tezhi, officials also noted declining catches. The Food and Agriculture Organization of the United Nations (FAO) also notes that increased industrial operations, coming from Burundi and the Democratic Republic of the Congo, are operating and localized overfishing has been reported.[190] Studies are continuing to quantify the potential decline as it is a great concern, especially with the potential for fish to significantly contribute to the nutritional needs of the country.

Invasive species. Among the very aggressive invasive species are two weeds, *Lantana camara* (tickberry) and *Mimosa pigra* (bashful plant). Other alien plant species include the *Bidens pilosa* (a major crop weed), *Cyperus rotundus* (nutsedge) which is among the world's most disbursed weeds, water hyacinth, and the fire adapted invasive grass, *Cichornia crassipes*. Another serious invasive is a large crayfish (*Cherax quadricarinatus)* that is exploding in number behind the dams at Kafue and Kariba. The Nile tilapia (*Oreachromis niloticus)* escaped from aquaculture into the Kafue River in the 1980s and its population is now increasing at greater rates than the native tilapia, threatening to displace this species.

Pollution. There are three significant sources of pollution threats to Zambia: those originating from domestic households, those from industrial/mining operations, and those originating from medical sources. With increased development and the growth of population, waste management becomes increasingly important as the volumes of waste and ability to transport and store, treat, and dispose that waste safely is more and more difficult. In Lusaka alone, the Lusaka Waste Management Division reports that it collects 200,000 tons of solid waste every year. That waste is disposed of in a single sanitary landfill constructed by the Danish Government. Another 100,000 tons are either burned or dumped at illegal sites in the city of Lusaka. Additionally, without a hazardous waste facility, any hazardous waste associated with medical facilities, including incinerator flue ash, must be disposed of in the sanitary landfill. The final major contributor to pollution is mining waste, including lead mine waste in Kabwe, which has been

[189] World Bank 2009b
[190] FAO 2000

the subject of major news reports and studies by international donors. These legacy pollution issues are a distinct and daunting threat to the health of Zambia's ecosystems and people.

Water pollution has been quantified in a few studies. For example, a study in the Upper Kafue River in Chililabombwe district revealed that the concentration of heavy metals in fish was quite high.[191] Pollution often has lagged effects on species diversity. However, effluent from the mines discharged into the Kafue river system has been reported to negatively affect the diversity of butterflies, dragonflies, and other benthic invertebrates as a result of elevated levels of redox, electrical conductivity, and turbidity.[192]

Air pollution is also a threat to the health of Zambians and the environment. Fires, whether accidental or intentional, contribute to air pollution, especially during burning periods in July and August. Cooking fires using fuelwood and charcoal also are factors for respiratory disease and indoor air pollution. In rural areas, 82 percent use wood for cooking whereas in urban areas charcoal is most common (67 percent). Charcoal cooking has increased for all household since 2007 from 25 to 37 percent in 2013-2014.[193]

6. PRIORITY ACTIONS AND OPPORTUNITIES FOR CONSERVATION AND SUSTAINABLE DEVELOPMENT

This section addresses FAAs 118(e)(1) and 119(d)(1) by describing the actions necessary to conserve tropical forests and biodiversity. For long-term sustainable results, the root causes of the direct threats (from Section 5) must be addressed in terms of actions that:

- Conserve and sustainably manage tropical forests,
- Preserve biological diversity, and
- Ensure sustainable management of natural resources critical to the success of USAID programming.

Table 12 lists specific actions to address each of the root causes identified. The actions were developed based on fieldwork and observations, a desk review of literature, and input from stakeholders.

RECOMMENDED ACTIONS AND OPPORTUNITIES

Based on this analysis, the following twelve strategic recommendations were determined as necessary for addressing environmental threats in Zambia. These are strategic recommendations intended to provide general guidance as the mission prepares its CDCS. T**hese recommendations—by USAID, the Government of Zambia, or other parties—could significantly improve sustainable development in Zambia and, in doing so, promote the conservation of biodiversity and tropical forests**. Annex C also contains specific actions identified during the assessment that could be developed in support of each strategic recommendation. However, these specific actions might not be captured in the narrative of the highlighted opportunity; therefore, they are included in Annex C for full disclosure and to aid future programming decisions for the Mission.

STRATEGIC RECOMMENDATIONS

Twelve strategic recommendations, outlined in Table 12, stood out during the ETOA, many of which could offer USAID/Zambia multiple opportunities to address with programming, and, some of which, USAID/Zambia is already addressing with the current and near future programming. While there may be many complex options for engaging in the strategic recommendations, the highlighted opportunities exemplify ways in which these strategic recommendations can specifically contribute to programming to address forests and biodiversity threats in Zambia.

[191] Chidumayo 1997
[192] Chama and Siachoono 2015
[193] GRZ CSO 2014

Table 12. Root causes and key strategic recommendations

KEY ROOT CAUSES	STRATEGIC RECOMMENDATIONS
A. Lack of an organized, adequately funded, resourced, and educated GRZ staff to carry out their roles in NRM	**Highlighted Opportunity:** Extend support to Wildlife Management
	Build institutional capacity through training, knowledge sharing, financial support, and updated technological capacity for GRZ NRM agencies and offices
	Realign NRM policies and agency organization to make them more efficient and able to leverage private sector interests
	Improve the transparency of governance of natural resources and enforce policies and regulations
	Establish life cycle monitoring and enforcement of policies for pollution and hazardous waste management
B. Need for addressing rural poverty by generating opportunities and alternative livelihoods that can replace consumptive ecosystem uses	**Highlighted Opportunity:** Promote poverty alleviation through alternative income generation activities such as game ranching, eco-tourism, non-wood forest products, payment for ecosystem service **Highlighted Opportunity:** Invest in conservation, development and management of candidate PAs
	Focus interventions regionally to leverage unique opportunities for development (e.g., key PAs).
	Promote agricultural intensification, diversification, and climate-smart practices rather than expansion
C. Ineffective and inefficient engagement with community and traditional leaders	**Highlighted Opportunity:** Strengthening the community institutions
	Focus interventions regionally to leverage unique opportunities for development
	Develop local level NRM engagement through education, capacity building, and institutional controls
D. Lack of integrated natural resource planning and implementation	**Highlighted Opportunity:** Developing and implementing integrated NRM plans
	Develop integrated NRM plans that are cognizant of local economic, social drivers, climate change and support implementation
E. Presence of an opaque and inadequate enabling environment for business development and investment	**Highlighted Opportunity:** Enabling the business environment
	Create an enabling environment for business to engage in conservation and economic development of "green" or environmentally responsible projects
	Realign NRM policies and agency organization to make them more efficient and able to leverage private sector interests
	Encourage public private partnerships (PPPs) and private enterprise in waste management and control
F. Missed opportunities to address legacy environmental issues	**Highlighted Opportunity:** Addressing legacy mine pollution **Highlighted Opportunity:** Studying the impact of insecticide-treated nets (ITNs) and devise management and disposal plans **Highlighted Opportunity:** Improve pesticide handling and disposal
	Develop reliable forms of energy, alternative sources of energy, and put in place stop-gap energy delivery systems until the national energy infrastructure develops
	Develop donor led strategies that are integrated and sustainable at the national health care system level to handle wastes (management and disposal of pesticides and medical waste)

HIGHLIGHTED OPPORTUNITIES

Based on the actions identified as necessary to address environmental threats, as listed above, this section identifies some of the highlighted opportunities for USAID/Zambia that exemplify the strategic recommendations. "Opportunities" indicates that specific recommendations are proposed but not implied. These recommendations are intended to inform USAID/Zambia of the opportunities that respond to the threats indicated by the review, but they are not intended to solicit or commit to USAID funding or programming nor necessarily reflective of the opinions of the Mission. They constitute a menu of possible areas of investment from which the Mission could choose. The opportunities do not necessarily address a single driver of the environmental threats, but they often include multiple factors (e.g., game ranching opportunities could address encroachment, deforestation, forest degradation, and poaching). Potential collaborations where other donors are working are also noted in Annex E. It is clear that the threats in Zambia are complex and intertwined and, likewise, the solutions can be equally as complex. The highlighted opportunities identified by this ETOA are discussed below.

PROMOTE POVERTY ALLEVIATION THROUGH ALTERNATIVE INCOME GENERATION ACTIVITIES, SUCH AS GAME RANCHING, ECO-TOURISM, NON-WOOD FOREST PRODUCTS, PAYMENT FOR ECOSYSTEM SERVICE

Diversifying uses of wildlands, for household income generation in a non-destructive and sustainable way, is of significant interest for addressing poverty alleviation through alternative livelihoods while promoting conservation and supporting growth in biodiversity. The poor rely disproportionately on the environment for income generation and to meet basic needs, typically taking their income from sectors such as agriculture, forests, and fishing. This reliance also makes these populations more vulnerable to disasters, climate change, and shocks. Reversing negative environmental trends has been shown to achieve poverty reduction as income, health, and opportunities are influenced by ecosystem quality.[194] The poor's reliance on wildland use needs to be diversified and sustainable so communities have lasting benefits from income, protein, and employment while maintaining the natural assets of the land and improving resilience to climate change (by maintaining soil integrity, reducing erosion, and maintaining intact forests).

Many activities already supported by USAID/Zambia have examined and implemented some of these alternatives. COMACO has explored and created successful enterprises in non-timber forest products through a specialty food market. The CFP flagship project for USAID/Zambia is also already engaged in alternative livelihoods on existing lands, including honey production and mushroom collection, with potential components that include game ranching. These are not discussed here further as they are already engaged and developed portions of the USAID/Zambia portfolio. Ecotourism is discussed further in relation to CRB participation later in this section.

PAYMENT FOR ECOSYSTEM SERVICES

An additional form of alternative use of sensitive ecosystems includes the concept of payment for ecosystem services. Section 2 describes the concept of ecosystem services more closely. While this is an interest, few studies have demonstrated quantitatively the benefits for biodiversity and rural communities from payment for ecosystem services.[195] There has been almost a decade of discussion on payment for ecosystem services with USAID and United Nations Environment Programme (UNEP) issuing a start-up guide as early as 2008 and implemented the TransLink Project.[196] The carbon market and water quality and quantity are places where successful schemes have been established (REDD+ being a preeminent example), but the market for other aspects in rangeland preservation and soil nutrient cycling are much less well established.

Latin America has typically been the leader in the area of payment for ecosystem services. Colombia has recently put into place a law pertaining to recovery efforts for mining operations using payment for ecosystem services. In 2014,

[194] Lusigi 2008
[195] Ingram et al. 2014
[196] UNEP and Katoomba Group 2008

Peru's National Congress passed a Payment for Ecosystem Services Law, one of the first of its kind.[197] The Center for International Forestry Research has five projects on payments for ecosystem services in Colombia, Venezuela, Ecuador, Bolivia, and Vietnam.[198] Montane forests in Bolivia have been the target of pilot projects that protect watersheds by providing alternative income generating activities (e.g., beehives) through international finance mechanisms. In turn, migratory bird habitat is protected.[199] In Ecuador, the Socio Bosque program also paid landowners to conserve montane forests.

There are serious challenges in developing a payment for ecosystem services programs and, particularly, in scaling the project. First, there must be a clear definition of the services that are being provided and an agreed upon valuation of those services. Second, the project must find buyers and be able to assure buyers and local participants that a framework will deliver both incentives (monetary or in-kind) and ability to monitor the outcome (preservation or improvement of services). Also, finding land and cooperative organizations to participate on a grand level scale can be challenging as more value is in generally preserving entire watersheds, for example, rather than disjointed parcels. Learning from these projects have also been slow in that the experiences have not been found to be translatable from one area to another, an indication that scalability will be challenging as well. While payment for ecosystem services may not be a singular solution to conservation in rural areas, it can be considered as part of the toolkit in overall conservation efforts.

GAME RANCHING

Game ranching has not yet been developed thoroughly in the USAID/Zambia portfolio and is highlighted here as a potential opportunity to be fully explored. Game ranching may potentially provide household incomes while meeting dietary requirements in the face of increasing temperatures and declining water availability for rain-fed agriculture. Thirty years ago, concerns about the apparent lack of benefits from development interventions in African pastoral systems were confounding USAID and other donors, and they were in the process of retreating from rangeland assistance programs. But with Zambia's growing population and increasing income levels, the need and desire for protein resources are also growing. Donor commitments to range and livestock projects, which would at least partially meet the demand, fell from 3.5 percent of all agriculture, forestry, and fisheries in 1977–1979 to 2.0 percent in 1983–1984 and the trend continues to decline. This is an unfortunate response in a continent with 30 percent of the world's rangelands, housing 250,000 stock keepers, and a unique wildlife resource.[200]

However, game ranching in the private sector is on the rise in Zambia by about 6 ranches per year. A 2012 study identified 200 game ranches with 49% being ornamental (safari operations or large estates), 38% large ranches, and 14% game farms.[201] Across Southern Africa, game ranches are estimated to generate U.S.$400 million per year through live auctions and trophy hunting. For some species, ranches have also increased the number of total animals in the region compared to a century ago. Success stories in Zambia include the leopard tortoise (*Stigmochelys pardalis*) bell's hinged (*Kinixys belliana*) and pancake tortoise *(Malacochersus tornieri*). Tortoise farming has, in particular, offered an interesting entry into the conservation and combating trafficking space. CITES had imposed a moratorium on live exports of tortoises from Zambia in response to fears that the pancake tortoise was being smuggled through Zambia from Tanzania. GRZ established the presence of the tortoise in northeastern Zambia and then began breeding programs on farms under the oversight of CITES. Now, trade has resumed as a number of game farms have ventured into tortoise production.

Game ranching generates more income per kg of biomass than livestock farming, allows for the utilization of marginal lands, and provides a buffer against drought and climate change. Ranchers who utilized wildlife in addition to crop farming and/or livestock farming boosted their income by an average of 23 percent. The game ranching results in significant foreign currency inflows due to the sale of hunting and tourism experiences to foreign visitors. Other

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[197] See http://www.ecosystemmarketplace.com/articles/peruvian-congress-passes-historic-ecosystem-services-law/
[198] See http://www.cifor.org/pes/_ref/projects/index.htm#scaling for more information.
[199] Asquith et al. 2008
[200] Western and Finch 1986
[201] Chomba et al. 2014

studies indicate that game ranching has also been successful with crocodile farming and the game capture and trading industries having a combined turnover of approximately $15.7 million USD per annum.[202] This figure does not include the benefits for related industries such as hotels and air travel. By contrast, GMAs (which cover an area ~29 times larger) generated approximately $16 million USD in 2012.

An important outcome of incorporating game ranching, either in a mix with traditional livestock production, or as a stand-alone enterprise, is the conservation of native biological diversity due to the increase in the number of forage species consumed by wild herbivores, thereby spreading the impact of forage use and realizing enhanced productivity of harvestable game. A typical suite of harvestable wildlife on a game ranch in southern Africa will consume over 20 forage species, while cattle will take fewer than five,[203] often leading to the over-use and disappearance of palatable, deep rooted perennials to be replaced by less palatable annual plants that do not bind, hold, nor nourish the soils (Figure 13).

Modelling suggests that the development of wildlife sections on mixed game ranches are worthwhile investments, projected to generate a 20-year financial rate of return of 15–31 percent (depending on the extent of existing infrastructure and status of pre-existing wildlife populations). A drawback for prospective investors is that capital start-up costs are high, reaching $2 million on large, unfenced properties. However, projected economic returns from such game ranching ventures are strongly positive, with an estimated 20 year economic rate of return of 28 percent. This suggests that there is a strong case for government to invest in the sector, such as through subsidies or tax exemptions for start-up costs, or through the provision of cheap loans.

The game ranching industry results in the direct employment of 1,200 people (not including jobs created in support industries), with a further ~1,000 individuals employed through crocodile farming. Some game ranchers invest heavily in outreach projects and provide an array of benefits to impoverished rural communities. Game ranches generate significant quantities (295,000 kg/annum) of meat, of which 30,000 kg of meat is given or sold to local communities and 36,000 kg is allocated to staff.

A critical caveat to the development of game ranching is ownership of game. At present, the environmental regulations for game ranching are untested due to the promulgation of the Zambia Wildlife Act of 2015. Animals that are not game or protected animals may still be owned, but all game and protected animal takes must be accompanied by a license, permit, concession, or other authority granted by the Director of National Parks and Wildlife. The director may also grant harvesting rights for animals found on certain lands. The implications of these provisions, especially in unfenced areas, are yet to be tested and precedence has not yet been set for granting rights to harvesting. Lack of ownership removes incentives to protect and invest in game. Where landowners are given legal ownership of game, the development of viable game ranches has been seen. This is especially true in Namibia and South Africa where there are more than 9000 game ranches occupying 250,000 km^2 and an additional 15,000 mixed game and cattle ranches. The process of game ownership or leasing currently operates in the following manner. Upon receipt of annual estimates or surveys of the wildlife resource, ZAWA issues certificates of ownership to land owners with fenced game. Unfenced properties cannot obtain certificates of ownership and must apply for hunting quotas and pay license fees. The Wildlife Act enables private individuals to apply (a three-month process costing $350) to become Honorary Wildlife Police Officers empowered to carry arms and arrest poachers.

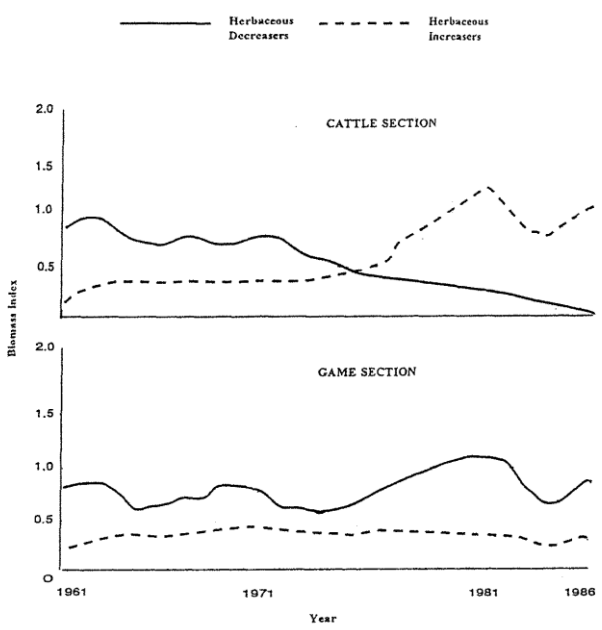
Game can contribute significant amounts of protein, foreign currency, employment, and ecosystem benefits. The opportunity in Zambia resides largely in the GMAs that are contiguous with 64,000 km^2 of national parks. None of these areas are adequately protected or managed because of deficient resources of the controlling agency, ZAWA. In the absence of capacity, control is attempted through stifling regulations and an inadequate policy framework.

The lack of existing game ranches in high rainfall and remote provinces of Northwestern, Luapula and Northern Province indicate other obstacles that must be considered when promoting ranches. First, these areas are extremely remote, so without a good road network and, in the case of trophy hunting, access to the big game hunting, in addition to the "soft skin" hunting offered by the ranches, the foreign market would be required to base their hunting excursions and add-on sightseeing excursion (e.g., Mosi-oa-Tunya) in two different areas. Additionally, the transport

[202] Lindsey et al. 2013a
[203] Berwick and Faeth 1995

facilities for moving stock in or for moving game meat out to market is difficult in these areas, making game ranching a less profitable exercise. Another disincentive in these areas is that these provinces are also in Agroecological Zones II and III and II with dystrophic soils and hence poor pasture. Coarse grass dominates the pastures and are of low nutritional value, resulting in a lower carrying capacity in these locations. The preferred areas for ranching include the portions of Agroecological Zones I and II where the soils are eutrophic and can support the preferred "sweet veld" grass species.[204]

Figure 13. Simulated changes in herbaceous plant biomass under cattle and game use in different ranch management areas at Buffalo Range Ranch, Zimbabwe. Effects of overgrazing accumulate in wet and dry years causing a shift in composition from nutritious perennials to annual increasers.



Source: Berwick and Faeth 1995

Specific recommendations:

Based on issues explored and on models in other parts of Southern Africa, the following are specific recommendations for game ranching. While game ranching is explored as another alternative livelihood option, the future of the industry is partially dependent on evolving policy from GRZ, especially relating to the ownership of game. Without ownership rights, these recommendations will be significantly challenged and should be caveated as such.

- The establishment of game operations must be accompanied by careful siting based on vegetation composition, total land area available, and access to markets, be it tourism, hunting, or grocery outlets.
- The complexity of establishing and marketing these ventures will likely require local communities to partner with knowledgeable private enterprises. Communities will need support to understand and contribute to the business plan for their lands.
- A cross-linked issue is the current business enabling environment in Zambia for investment, especially in natural resources. Incentives for investment and ease of establishing and running a business will need to be improved for game ranching to be successful, both for domestic and foreign investors.

[204] Chomba et al. 2014

ADDRESSING LEGACY MINE POLLUTION

Many measurable liabilities and risks have increased due to degeneration of exposed tailing dams or residential encroachment onto contaminated land. There is a legacy of ignoring environmental liabilities with private mining operations, as well as historic public mining by Zambia Consolidated Copper Mines prior to privatization, which was completed by 2000. Disconnecting the legacy pollution from the responsibility for waste cleanup was essentially an incentive for private development in the industry. It is estimated that tens of thousands of residents of Kabwe, including at least 3000 children are still affected by high lead levels in the soil. These public health risks fall disproportionately on the poor who live in degraded and abandoned mine areas.

There is an opportunity to address mining-related environmental issues by improving accountability and responsibility for mining-associated risks. These include remediation of known hotspots, and improved institutional capacity to monitor and enforce regulations by ZEMA, the Mine Safety Department, and the Kabwe and Kitwe municipalities. Education and empowerment of communities at risk should lead to improving their participation with government and through alternative livelihood opportunities for affected people.

The World Bank is planning on addressing mining pollution from several sources in Zambia in the next few years and has also done so in the Copperbelt Environmental Project, but these issues are assuredly too large for one organization to address fully. Kabwe is considered one of the world's 10 most polluted sites from lead contamination, and Kitwe also has excessive uranium and heavy metal pollution. The World Bank is planning a three-phased approach to remediate risks, build the capacity of ZEMA, and stimulate livelihoods that limit contact with contaminated sources. The Japan International Cooperation Agency (JICA) conducted the initial testing of blood lead levels, and a full human health risk assessment is planned along with remediation of the top 20 cm of topsoil.

USAID/Zambia has the opportunity to contribute to these efforts and help guarantee healthy communities and healthy lives in these growing industrial centers. Without addressing lead and heavy metals pollution sources, health program outcomes can be undermined. USAID/Zambia has opportunities to coordinate with ZEMA and other donors on monitoring contamination near mines. Donors, including USAID, could also support efforts to characterize, delineate, and remediate contamination, or at the very minimum, put in place institutional controls to limit exposure, such as in-situ capping. These are examples of important efforts, but, assuredly, further coordination with the World Bank, JICA, the GRZ, academia, and other donors is necessary.

Specific recommendations:

- Cooperate with other donors on the remediation of known hotspots.
- Improve the institutional capacity to monitor and enforce regulations by ZEMA, the Mine Safety Department, and the Kabwe and Kitwe municipality.
- Education and empowerment of communities at risk to improve their participation in cleanup and monitoring efforts.
- Contribute to the development of alternative livelihood opportunities for affected people in mining areas to reduce their contact with contaminated soils.

INVEST IN CONSERVATION, DEVELOPMENT AND MANAGEMENT OF CANDIDATE PROTECTED AREAS

Consultation during this assessment was conducted in a sample of rural communities selected to reflect the variety of issues facing Zambian development and its relation to the natural environment. The ETOA was designed to be inclusive of current areas of USAID regional strategic focus (such as Eastern Province), but it also targeted potential future opportunities across the country noted in the tabular review of national park characteristics in Table 2 and GMAs in Table 8. Recommendations that can be drawn more broadly from the KNP experience are also detailed after examination of the Kafue case study.

These recommendations are not a bandage for the PAs in Zambia, but are directed approaches for the renovation and reinvigoration of the sector through phased steps that involve changes at the highest policy level, restructuring and support to oversight and management, and integrated investment from sectors with overlapping interests. These recommendations are a start.

KAFUE NATIONAL PARK CASE STUDY

When considering where to encourage a meaningful and decisive action to conserve Zambia's natural ecosystems, it is logical to select an area with characteristics like high endemism, exceptional diversity, size, and importance, locally as well as internationally. With its combination of serious threats and uniqueness of its natural attributes, Kafue embodies the challenges and opportunities to the PA system in Zambia to its extreme.

Kafue National Park Characteristics and Status

- Luangwa and Kasanka are certainly worthy of support -- and both have enjoyed it to date, with 40 years of good research at Luangwa, a lot of NGO attention (Frankfurt Zoological Society, Wildlife Conservation Society, The Nature Conservancy) and some years of USAID attention. Kasanka has the PPP efforts that clearly augment ZAWA's forced management anemia, and at ~2% the size of Kafue, it is small enough to actually enjoy a degree of management coverage. If there was no further USAID investment in Luangwa, that place will still continue to exist, unlike the current situation in Kafue.

- Kafue is bracketed by international access 3 hours by car from Livingstone and Lusaka. That gives it a huge unrealized ecotourism development potential, which is something the USAID/Zambia Mission Director said he would like to encourage at the in-briefing. By contrast, both Luangwa and Kasanka are full day drives (or more) or an extra flight away.

- Kafue is one of the largest PAs in the world and the key to the international KAZA Transfrontier Conservation Area, which would make it the jewel in the crown of the largest PA in the world. This is really unique.

- Biologically, it is one of the only, if not the only, place the once resident, critically endangered black rhino can be introduced. In a paper reviewed for the Journal of Wildlife Management, the authors documented the mortality caused by areal restriction of rhinos on what appeared to be large ranches, but weren't big enough to keep the mutually lethal male rhinos from killing each other. The future of Kafue could hold the answer to their survival or extinction. This again makes Kafue unique, as extinction is a serious concern.

- Again, biologically unique, Kafue has the highest diversity of antelope in the world. It also has one of the highest concentration of wild dogs to be found anywhere. Again, this is unique and seemingly supportive of the need for wildlife inventory and research of the kind mentioned in the ETOA text (movements, population dynamics, predator-prey relationships, trophic webs, and the rest of the information needed to manage not just Kafue, but the game ranches we have advocated as an alternative enterprise on GMAs).

- Another fact is the lethal degree of poaching and associated documented burning of 90% of the area about the size of Ireland. This will change (degrade) the ecosystems at Kafue so that it will cease to function as a part of Kavango–Zambezi (KAZA) Transfrontier Conservation Area, rhino rehabilitation zone, source for game ranches, or an attractive ecotourism development area. The text mentions some of the fairly predictable vectors of loss - e.g. of termitaria and their meaning for ecosystem maintenance. Again a unique characteristic of a salvageable situation. It is truly in desperate need of management and protection.

- With regard to the poaching and burning, the adjacent GMAs are important in stopping detrimental actions to the park, both internally and along its boundaries. Coordination with those communities is critical to solving nation-wide issues of poaching and burning that bring harm to the environment in general and effectively congest ZAWA's ability to place attention on management rather than purely enforcement. This would be a great contribution.

- Kafue is the centerpiece of the singular KAZA endorsed and co-managed by five countries.

- KNP covers more than 25% of the Kafue River catchment and 256 km of the Kafue River flow through the park. Investment in management, mainly technical assistance for maintaining the river's streamflow, is vital for:

    a) all the communities who depend upon it;

    b) water regulation for Itezhi-tezhi dam and hydro scheme and the Kafue Gorge hydro dam;

    c) the Kafue Flats grassland IIa pastoralists;

    d) fisherpersons of one of the largest wild fisheries in the country;

    e) the massive Nakambala sugar estates (second largest south of the Sahara);

    f) providing water for Kafue Town and Lusaka;

    g) and the river, fed by 14 tributaries with the KNP, a major tourist attraction in its own right.

These nine points are empirical facts. The entries in the comparative table of national park attributes (Table 2) reflect educated opinion that support what the facts point to: KNP is the linchpin of an international effort resulting in the largest PA of the world and the focus of protection is the endemic biological diversity contained in the KNP and the adjacent PAs of four adjacent countries. This makes KNP a unique reservoir of biodiversity. Because of this remarkable attribute, rescuing the KNP commands the attention of the ETOA team which is charged with responding to the requirements of sections 118 (e) and 119(d) of the FAA of 1961, as amended and ADS 201.3.5.2(a) regarding tropical forestry and biodiversity analyses for country strategic plans.

While the KNP has fallen behind, since 2004, the park has been on the road to recovery. It is the centerpiece of the singular KAZA Transfrontier Conservation Area endorsed and co-managed by five countries (Angola, Botswana, Namibia, Zambia, and Zimbabwe). This, at 400,000 km^2, is in the process of becoming the largest PA in the world. And while PAs of Zambia constitute over 30 percent of the area of the country, Kafue represents over 40 percent of that total. In other words, if local uses of KNP's resources lead to their virtual loss, much of Zambia's natural diversity goes with it and its function as a vital source and movement corridor for the wildlife of the KAZA TFCA will be lost. In this respect, it functions much like the Luangwa and Lower Zambezi anchor of an important corridor providing connectivity from the Nika Vwaza Plateau in Malawi to Mana Pools NP in Zimbabwe. This corridor is also vital to allow a movement of wildlife in the face of climate change and increased variability in water availability - similar to the Kavango-Zambezi Transfrontier Conservation Area.

Kafue is where the challenge for biodiversity protection is greatest, but the potential return in overall biodiversity and the potential for domestic and international development around a green economy are equally as great. In fact, GRZ applied to the Millennium Challenge Account (MCA) to fund the GKNP Economic Development Project estimated at $160 million USD.[205] The MCA/Millennium Challenge Corporation (MCC) GKNP compact certainly did fail ostensibly because of a low economic return rate and this came about for two reasons; 1) the huge over-emphasis on road infrastructure (85 percent of the total projected budget) and 2) under-resourced ZAWA not being in a position to effectively engage with such a large program. The final GKNP budget indicates the spread of planned costs that in the short term could not be justified in purely economic terms, despite perceived needs, since it was impossible to gauge the impact that the massive investment in roads would have on economic activity.

While these issues are serious considerations, in the long term, with incremental investments, they may be overcome. The KNP is close to both Lusaka and the international tourism hub of Victoria Falls/Livingstone so that given adequate infrastructure and good management, tourism would certainly be able to flourish. The shortfall of ZAWA's capacity is a circular argument, which contributed to the loss of the GKNP compact, but in itself is the factor that justifies support. This was badly needed at the time the compact was proposed, and happened concurrently with the closure of other donors' and cooperating partners' 2004-2010 support (largely Norway, Denmark, World Bank and UNDP/GEF SEED project of ~$23 million USD) for assisting KNP development and operations. The failure of the

[205] GRZ Ministry of Environment, Tourism, and Natural Resources 2010

MCA/MCC GKNP compact should not justify removing KNP from recommendations for support, but quite the opposite. Under the prevailing challenges facing ZAWA, KNP (described by some as being in "crisis management"), as well as the SNDP's call for diversification of the faltering national economy, the discontinuation of the GKNP compact should, in fact, be taken as the precise reason that KNP should receive investment and support now.[206]

What are the opportunities to support KNP, learning from the previous failures and taking from more recent successes in Luangwa and Lower Zambezi? Kafue's needs are largely driven by the needs of ZAWA and other GRZ entities that are charged with its protection and promotion of tourism in the area. The needs of these agencies cannot be decoupled from the needs of the park itself as is discussed in this ETOA. KNP and the nine GMAs constitute 40 percent of the country's wildlife estate. ZAWA KNP operates with around 15 percent of the required staff and without adequate infrastructure, equipment, and financial resources to effectively manage such a vast area. Clearly, it is an iconic national asset in vital need of further donor support.

Beyond additional government support and oversight, Kafue is also burdened by a stifling business framework environment, which needs to be addressed. From the perspective of tourism operation, Zambia currently has restrictive processes and policies in place to sustainably develop its natural resources-based tourism. Only one new private enterprise has been developed in Kafue NP in the last 5 years, despite broader interest. Business development offices need to be consolidated and the process of obtaining licenses and operating in the parks needs to be written and distributed so that there is a transparent system with clearly identified fees and timelines. Additionally, the fee structure, once operational, is counterproductive for business and for targeting local tourism, as well as middle-income tourists. Currently, bed levee fees and park entry fees alone mean that a family of four are paying $295 a day in Kafue even before lodges or safari operators take their fees. The park itself is therefore missing out on a huge base of potential customers that would entice further investment.

Also hindering development and business interest is the infrastructure for tourism, which is poorly maintained or non-existent. Currently, Kafue has a very limited road network and facilities (i.e., gas stations, toilets, and repair shops), which are necessary for independent and lower to middle-income tourism. Road improvements are happening and stakeholders reported a positive impact on tourism. While these are specific examples, they are indicative of the need for integrated planning for the park which must address maintenance, infrastructure improvements, and a means for revenue generation from tourism that would then serve as funding sources for poaching patrols, maintenance of infrastructure, and conservation efforts– a common interest of officials, tourists, and investors alike.

For a comparative analysis of the attributes, threats, and opportunities of all twenty national parks in Zambia, refer to Table 2 and Table 8. The rationale behind support for recovery and management of KNP is offered.

RECOMMENDATIONS FOR OTHER PAS BASED ON THE KAFUE CASE STUDY

The challenges for managing and promoting KNP are in many ways unique, but, in other ways, exemplify challenges across the entire PA system in Zambia. Improvements need to be made to the functioning and sustainability of the PAs system to preserve the unique biodiversity and forest ecosystems of Zambia. Some of these challenges, such as engaging CRBs and integrated land use planning, are discussed separately, but are reiterated here for completeness of thought and vision. A more detailed analysis of KNP is provided in Annex F.

- PAs are lacking integrated planning and funding for implementation of management plans. Detailed studies with long-term hard data on wildlife population counts, movements, and habitat quality are generally lacking for most parks. While South Luangwa has been the subject of study for many years, the other 19 National Parks, numerous GMAs, and gazetted forests lack sufficient data upon which to base management plans. By drafting clear management plans, budgets to support wildlife and park management can also be developed. There is clearly a shortfall in funding necessary to meet the needs of parks, but the exact gap in available funding is unknown without having fully functioning plans. Aa needs assessment should be conducted first to characterize the biology of the park, the status of the surrounding social environment, and the economic factors. Then, as scientific studies and census' begin, the drafting of interim integrated NRM plans can commence. These plans must include considerations of fire regimes, sustainable and multiple uses (e.g.,

[206] GRZ 2011

hunting, timber production, safari operations, non-timber forest products, etc.), and, of course, critical wildlife habitat.

- All planning, especially in GMAs must include social communication plans and assessments of local needs and views in order for the plans to be sustainable. GMAs are in fact multiple use areas, but efforts to make the multiple uses work in harmony have not yet been successfully identified. It is acknowledged that there will always be differing motivations, but social contracts and mutual understanding for appropriate uses must be gained in order to make management mutually beneficial and sustainable.

- Profitability schemes must be developed for all PAs. Funding from central sources is inadequate for the critical functioning of parks. If GRZ is going to maintain such a large area under protection (inclusive of all its GMAs, forests, and National Parks) and focus on quantity rather than quality, then a fund sharing scheme must be developed for those parks that offer critical habitat, but are less attractive to development interests. Without a clear finance strategy inclusive of all parks, it is inevitable that many, except the top tier of PAs, will not have sufficient funds for operation and management. Prioritizing the existing PAs for investment and privatization should be considered.

- PAs lack monitoring schemes that are efficient for tracking poachers, identifying and fighting fires, conducting wildlife census, or even for ensuring that conflicting uses are well separated spatially. Both simplistic tools, as well as advanced remote monitoring, could contribute to the effort and a one-size fits all approach is not necessary. Simple surveys and aggregation of data from observed poaching kill sites collected from scouts could help map zones of most concern for wildlife trafficking. Overlaying those areas with wildlife trails and grazing areas can help to prioritize the areas most important for patrols. Increasing the ability of ZAWA to conduct and report on censuses is also important as the ban on hunting has been lifted in 2015 and the census data is critical for sustainable management.

- Private enterprise must be encouraged rather than discouraged from participating in PA management and development. The parks, as they exist, are faltering and GRZ clearly cannot sustain them on their own. GRZ has made development of GMAs by private enterprise easier than development in National Parks, but the process in all PAs is confusing and decentralized. Leases must be longer than 5 to 7 years (i.e., in National Parks) for enterprises to accept the risk of investment in the challenging climate and to have time to build their client base. The GMA investment is challenging because of land tenure issues with chiefdoms in GMAs and the coordination and operational authority over management of those lands between the private enterprise, ZAWA, and chiefdoms. Mutually beneficial users schemes for all residents must be transparently identified and mapped.

DEVELOPING AND IMPLEMENTING INTEGRATED NRM PLANS

The many instances of agricultural expansion in PAs, poverty, illegal exploitation of fish, wildlife, and forests; and related threats to the environment are closely linked with land tenure also playing an important role as a driver. These issues should be considered as integrated system issues with one sector determining the outcomes in another. Wildlife abundance influences tourism receipts and is influenced by habitat fragmented and spontaneous agricultural incursions that depress wildlife populations. Droughts reduce water availability, which, in turn, concentrates wildlife around watering holes earlier in the dry season, giving poachers more time and an easy opportunity to kill the animal. The solution here is not to have separate agriculture, wildlife, and tourism marketing activities, but to routinely, as a matter of policy, insist on planning together and employing an objective integrated model of the particular system interventions being planned. Such a model is constructed by both the sectoral experts and beneficiaries in all groups including the extreme poor and most vulnerable. An integrated approach can also foster teams from different agencies and ministries of government as was seen with fisheries enforcement at Lake Itezhi-tzehi where local police, ZAWA guards, and fisheries enforcement combined on patrols to leverage what would have been otherwise inadequate resources. In practice, integration should flow from planning through execution. Integrated NRM plans have been conceived, but wither during execution.

This is not a unique insight. Integrated NRM plans exist for fisheries management and are a target of ZEMA and ZAWA, but exist in name only. These plans often lack integrated planning that includes land use, environmental

resources protection, land tenure, and generation of alternative livelihoods that address environmental issues affecting the broader population as well as the poor. They have yet to result in explicitly linked variables, feedbacks, and supporting data to holistically and objectively address environmental threats and vulnerabilities to climate change. The latest progress report on achieving Zambia's Millennium Development Goals[207] noted that to address environmental sustainability, Zambia must:

> "*Involve the private sector and communities in the management of natural resources, with an emphasis on community-based natural resource management. Utilize innovative public-private partnerships to re-generate and manage protected areas, bringing in new financing to sustain this effort*."
>
> As well as,
>
> "*Revise the Wildlife, Lands and Forestry Acts to take an integrated ecosystems approach encompassing sustainable land use and forest management, and the conservation of waters, fisheries and wildlife*."

Although some plans have been developed, many also need updating, but, most importantly, the implementation of the plans is seriously impeded by lack of coordination at the government, local, and community levels. To implement plans, responsibilities could be allocated through a community resource enhancement project or CCP that employs the support of traditional and religious leaders, uses integrated planning to include villagers and sectoral professionals, possibly through VAGs, and involves both conservation agriculture and sustainable game utilization. In the vicinity of, or contiguous with, a national park, plans could be supported by a trained and resourced ZAWA staff targeted to the project and area. Ideally, the process begins with an initial model building exercise to capture knowledge and foster ownership at the village level.[208] The diagrams generated are inputs to further elaboration at district and agency levels. After local coordination, and at least some tentative buy-in tenured with realistic objectives and a willingness to compromise, local plans should be aggregated and vetted at the chiefdom and district levels where ZAWA, the Forestry Department, and Ministry of Agriculture can review and endorse the plans. This stepped vetting and refinement process, with frequent check-in of local focus groups, may be time consuming but allows for the appropriate opportunity to build consensus.

Other specific options for integrated planning needs appear in this ETOA. For example, an outstanding source of expertise and support for anti-poaching and trafficking resides in the special agents of USFWS. While not often appreciated, wildlife enforcement differs significantly from military and police work. Wildlife law enforcement that does not first utilize force is a tenet of their success. USFWS has international experience with the use of ICS (Integrated Command Structure), working with Interpol, local-level public relations, and technology for apprehending poachers. Sharing of these experiences and training in-country, as well as in the U.S., and other locations for GRZ NRM staff both builds long term capacity, bolsters legitimacy of the participating GRZ organizations, and is an incentive for recruitment and retention of staff.

Specific recommendations here are the same as those noted for support to ZAWA and to support the PAs as planning based on defensible and timely data is critical to the development of plans. After planning, implementation will fall on a host of entities that include GRZ, CRBs, or other associate VAGs, donors, and the private sector. Caring through the implementation plans, prioritizing efforts, and monitoring the results will build upon the foundation that the integrated plans create.

EXTENSIVE SUPPORT TO WILDLIFE MANAGEMENT

ZAWA, as the essential and indispensable agency for protecting biodiversity and its habitats, is under-resourced. For example, ZAWA has 1000 employees to address over 40 percent of Zambia's landscape. The former director of commercial activities for ZAWA notes that the entire agency had about $400,000 (excluding salaries) to operate each

[207] UNDP Strategy and Policy Unit 2013
[208] Berwick and Faeth 1995

of the past several years (*Chivumba, pers. comm.*) This is inadequate to manage the twenty national parks, conduct research, plan, and engage in enforcement.

In looking at the problems at ZAWA, two basic root causes of under-resourcing are the lack of political will at the higher levels of government and declining funding. The decline in government revenues is largely due to the energy crisis in Zambia that has resulted in decreased tax revenues from the industrial and commercial sectors, coupled with a decline in copper prices, which has decreased economic output (contributed to by energy shortages) and led to a near 50 percent depreciation of the Kwacha. The net result is that ZAWA is unlikely to see an increase in funding levels and inflation has rendered its existing funding less effective.

The new draft National Parks and Wildlife Policy (*unreleased*) states (Sec. 7.14) that "law enforcement will aim at achieving an operational staff density of one wildlife scout to 23 km² for PAs with elephants and rhinos and one wildlife scout to every 40 km² of PA elsewhere." This would, for example, compute to about 1000 scouts for Kafue (that now has about 160, which is illustrative of the current shortfall) as enforcement staffing. In reality, park staffing patterns are more complex because each park differs in its needs based on terrain and threats, but the staffing levels in the Wildlife Policy provide a starting point for ZAWA. Surveys of each PA would be needed to yield estimates of staffing requirements. In setting these staffing levels, the policy establishes an unfunded mandate for ZAWA and, while it could greatly increase the effectiveness of the organization, without adequate resources, its mandate will not be fulfilled (i.e. funding must be assured concurrent with the new levels of staff anticipated).

USAID has a unique opportunity to support ZAWA through government-to-government agreements and mentoring support, such as stated earlier with mentoring from the USFWS or with an embedded advisor, much like USFS is doing in ZEMA to build the capacity of ZAWA scouts, inspectors, and prosecutors, as part of its biodiversity programming in its EDEV portfolio (2.3.2 Community and Partnership-based NRM strengthened for Forests and Wildlife, 2.3.3 Policies, Legal Framework, Strategies, and Plans strengthened, particularly for Forests and Wildlife, and 2.3.4 Science, Technology, Research, and Innovation Improved, particularly for Forests and Wildlife). ZAWA is also in need of material support to combat wildlife crime, such as improved communications equipment, data analysis, and case management systems. These efforts will need to be augmented through the support for operational expenses, like fuel, airtime, and data, for key ZAWA units crucial to fight against wildlife crime.

The **specific recommendations** to support ZAWA include:

- Closely monitor the move of ZAWA into the Ministry of Tourism and Arts. If the move is still ineffective, or if it is clear that ZAWA funding is being directed elsewhere, advocate to re-locate ZAWA planning into the Ministry of Planning where it is less vulnerable to losing funding to other priorities than the MOTA.

- Increase wildlife enforcement skills with participation in USFWS' Special Agent training program.

- Upgrade the wildlife curricula at a selected university to foster a regional center of excellence for the topic. As opposed to the field-oriented curriculum, as is being practiced in Tanzania, such an upgrade would integrate the latest concepts of ecological science so graduates acquire not only the ways of using relevant tools, but an appreciation of why they are needed. Such a science-based background is the only way to ensure appropriate, innovative, informed, and anticipatory interventions in the management of wildlife and its habitats. Such a center would be able to accommodate in-service training for ZAWA staff, establishing a feedback relationship with the users of such science, and a likely increase in recruitment into the profession.

- Develop a Research Institute to attract Zambian and international scientists working on vital social and biological unknowns (counts and trends of harvested and park populations, natural fire regimes, system drivers and feedback loops like termitaria) to conduct the basic research needed to support management by ZAWA. Particularly, information on poaching routes, location of snares, and wildlife trails integrated into maps that factor in typography, weather, and vegetation are needed to generate movement patterns of poachers and wildlife to focus patrols in the areas of greatest need.

- Develop communication and outreach plans for ZAWA regarding rules and regulations of parks, fire control and back burning efforts, and poaching information.

- Support a clear reward system for ZAWA and Forest Department staff (e.g., salary raises, study tours, graduate work at centers of excellence in the U.S.).

- Develop alternative livelihoods compatible with initiatives to establish game ranches on selected GMAs in coordination with ZAWA – to include cooperation with organizations like the Grassroots Trust (crop selection, manure handling, use of coppiced miombo spp.) and the U.S. Peace Corps (agroforestry). Develop a reward system for community participants and for measurable reductions in adjacent NP burning and poaching. By decreasing poaching and encouraging engagement of others, the full burden is lifted from ZAWA.

ENABLE THE BUSINESS ENVIRONMENT

Natural resource protection needs to recruit additional resources. One way to leverage additional resources is to engage private investment. There are multiple reasons for the underwhelming current investment rate. Investors are clearly distracted by the labyrinth of entities, paperwork, fees, and waiting times needed to operate. Once operational, there is little cooperation among interested investors to spur business development. The supporting infrastructure and government services that underlie successful ecotourism are usually lacking or underperforming as was discussed with investors regarding the needs in KNP and in South Luangwa. Safari operations in national parks, GMAs, and even in some open areas, are actively engaging traditional leaders and community members, but their capacity to do so is limited by the local capacity, willingness of the chiefs, and available resources. The resources to start community development projects are obviously limited for most new small investors. Public private partnerships could substantially benefit local communities and their internal development structures, such as VAGs and CRBs, as well as ZAWA, cooperating governmental bodies, and other businesses involved in ecotourism.

Investing in GMAs, or on traditional lands where business development is more open than national parks, still poses significant barriers to investment. The typical process of investment, as was communicated during the South Luangwa site visits by investors, exemplifies the challenges facing private enterprise investment. In GMAs, investors must separately negotiate with chiefs on concessions to obtain a lease or a title for the land. GRZ is currently promoting only leases. Then a stakeholder meeting is called for all the area's interested parties (this is after paying a lease fee) to ask if the applicant should be allowed to invest in the area. A determination is made based on the consultation, but typically is based on the politics of the area and preference of the chief. With all of the stakeholders, including ZAWA, the land is then surveyed with the consultation committee and the investor paying all per diems, food, and transport, for all parties involved. Although they have already paid for an agreed number of hectares based on the handshake agreement with the chief, the consultation group can reduce the amount of land the applicant is allowed to lease and there is not necessarily a refund in lease fees. So there is a potential for an investor to believe they will operate on 16 ha of land and, after the survey, only be allotted 7 ha. Cases are also reported where one investor was denied operation in an area and soon after a second investor was allowed to sign the lease. This process is breeding corruption in the system and, because of that, small investors who do not have exceptionally liquid assets for tributes to officials, chiefs, and other stakeholders experience extreme challenges with investing. The process is limiting the development of Zambia's wildlife tourism so that only the extremely rich and powerful investor can engage, while the middle and lower end markets for tourism are ignored. A diversified and transparent tourism marketplace would increase the total tourism revenue in Zambia and for ZAWA, but assuredly would reduce the amount of funds going to tributes, per diems, and bribes. Streamlining these processes, reducing fees, and encouraging diversification and transparency would benefit all stakeholders in conservation and tourism.

Support is also needed to form strong business associations among the lodges, tour operators, hunting operations, community leaders, and VAGs/CRBs. Lodges need to form a unified body instead of fighting each other for business in the market where currently only two niches are viable (i.e., high end photography tourism and trophy hunting). In some cases, adjacent lodges coordinate with each other, but they are not coordinating across the entire park. For example, in Luangwa, there are competing Conservation Associations with competing interests that sometimes try to exclude each other from projects. It would benefit the lodges to coordinate on their patrols, community support, and conservation plans. Also hindering cooperative business associations are the secret processes involved in obtaining favor with chiefs. Recent discussions in Luangwa indicated that communities did not understand or see where money raised and paid by lodges was being invested into their community. Sometimes, this is due to a lack of communication

on the services they are providing, but it is also due to handling of the money first by traditional leaders, and then by the CRBs, so little is left for community members and their associated VAGs. There is a definite lack of communication and transparency between lodges, conservation societies, CRBs and chiefs in handling funds going to community development projects.

Specific Recommendations:

- Work with the GRZ to streamline the business licensing and investment process by clearly identifying, in writing and publically made available, the process for obtaining licenses to invest and operate, procedures for negotiating with traditional leadership, gazetting of investments, and paying fees and taxes.
- Consolidate business development offices into a single location or open regional offices where developers could file most of their paperwork, pay fees, and document their investment.
- Provide matching services between interested investors and community organizations and work with communities to ensure fair and transparent representation and investment.
- Build a sense of entrepreneurship in communities by creating youth education and investment curriculum on business administration and accounting starting with elementary-aged children through high school.
- Conduct a business development assessment to identify areas where the eco-tourism market can be diversified, as only high end tourism and "overlander" self-catering markets are supported. Tourism supporting nationals and the middle-income foreign markets are nearly non-existent.

STRENGTHENING COMMUNITY NRM INSTITUTIONS

Zambia has a number of community-based groups established for the purpose of sector-specific NRM. VAGs are community structures comprised of elected members of multiple households that forms a broader CRB, which is then registered with ZAWA. Forest Trusts are formed as part of a Joint Forest Management Unit, which can include NGOs and private enterprises, as well as the Forestry Department. As part of the trust, village members and other stakeholders form the Village Resource Management Committee for management of local forests. Likewise, the Fishery Management Committee is also comprised of community-appointed members, local authorities, and, in some cases, private enterprises.

With the importance that these NRM institutions play in PAs, the ETOA focused on opportunities to strengthen CRB institutions and their associated VAGs, rather than examining Forests Trusts, although a number of recommendations identified for CRB engagement can also be extended to Forest Trusts, as well, since the structure is similar.

Based on observations during the site visits for the ETOA, CRBs are crucial, but generally mal-functioning pieces of NRM in GMAs and adjacent open areas. The CRBs are established as community bodies elected by representatives of VAGs, typically with the chief or his/her appointee as a patron, who in partnership with ZAWA, assist with planning of the hunting concessions. The CRBs are intended to be advocates for wildlife protection, collaborate on anti-poaching, and coordinate with local tourism and hunting operations in the area in exchange for a portion of the fees paid for the hunting and licensing (50 percent). The CRBs are also intended to act as a focal point for communication between these entities and as the community spokespeople for wildlife-based tourism in the GMAs.

In fact, what has been found during the field mission and reported in other places,[209,210] is that, in reality, CRB functioning is low with little capacity to adequately fulfill their role and, in many cases, are bureaucratic entities that actually hinder environmental protection and contribute to the opaqueness of governance in GMAs. This is especially true in GMAs depleted of wildlife. CRBs require vetting by ZAWA upon formation, but their membership after establishment is not monitored. Many CRBs lack funding because they only receive funds once hunting permits are

[209] Dixey 2005
[210] Lindsey et al. 2014

purchased. If a hunting operation does not approach a CRB, the CRB does not receive any funds. Active hunting concessions are noted in Table 8. Many CRBs do not actively seek out hunting parties and the chronic lack of funding is a disincentive to do so. Additionally, without the funds, the CRBs do not find it in their best interest to protect wildlife from poaching or to engage the VAGs to actively manage their lands to make them attractive to wildlife. The lack of funds means that, generally, interested and qualified community members do not participate on the CRB. When there are funds, the VAGs and CRBs are often more beneficial to the non-poor.[211] In depleted areas, the CRB members are often youth, appointed by the chief, who have no other work opportunities and have no training in NRM. In cases where hunting is thriving, well-off community members are most heavily engaged and, therefore, benefit the most. This is a barrier to environmental management that needs to be rectified.

CRBs also require a course correction because when tourism operations, such as lodges, want to work with the community, they typically work through the CRB, as would be expected. However, numerous interactions with CRBs during this assessment indicated that between the chief and the CRB, any funds coming into the community for a project essentially fall into a black hole. Across all CRBs interviewed, there was a lack of transparency on how the money was managed and spent. Few knew how much money was coming in from bed levees given by safari or hunting operations and there was a lack of understanding how much went directly to the chief and how much to the VAGs and the community. Safari operations, who are notably contributing to communities, are not doing a sufficient job of promoting how they contribute to benefit all members of a given community. Many times, it comes to pleasing the chiefs first before the community is considered. There is a lack of accounting for this money and secrecy around payments as a standard of business in the villages. In the end, this leads to communities thinking they are getting nothing from their partnerships through VAGs and CRBs, but they do not realize when schools are refurbished or when clinics are assisted because they do not actually question where the money originates. It is just perceived that it comes from the government. During a recent meeting in Luangwa, communities complained that almost $900K that was intended to go into the communities had disappeared. Although it is likely that projects were actually implemented with these funds, the project funding from the donors was not clearly communicated to the community, so the perception was that the communities were not benefiting. However, this is not to say it is always the case, as some communities have found paths to mutually beneficial and open sharing of revenue. Improving financial transparency should be a main goal of work with CRBs by accounting more closely for resources and communicating how resources are being spent through the VAGs.

Community-based NRM probably needs an organized point of contact in the community to effectively identify priorities and implement projects. It takes an organized effort from a large number of people, rather than just the interest of a few, to manage. The most logical intervention point with CRBs is to use them to encourage community-based tourism. But, in fact, this has proven to be a difficult prospect for CRBs to participate directly in tourism outside of hunting concessions because CRBs cannot own assets, they have low capacity for business management, and the elite of the community are often the only ones who benefit. USAID-supported PROFIT conducted an assessment on community-based tourism and noted that the lack of poor to middle income tourists in Zambia was a major issue with CRB involvement in tourism because the products that they could produce were of lower interest to the high-end tourists that Zambia currently supports.[212]

With tourism being a challenging opportunity, where else can VAGs and CRBs be utilized? In some areas, such as GMAs and open lands with formerly abundant wildlife, game ranching can be the best use of the natural landscape and VAGs on the village level and CRBs across the entire GMA would be instrumental in promoting and managing ranching, whether for meat or for trophy hunting, because relatively large aggregated land holdings would be necessary. This is under the assumption that current policies would change as to the ownership of animals with CRBs being allowed to own assets in the future. Game ranching and trophy hunting can yield significant sustainable income if done correctly. Both Chief Chipepo and Chief Chitambo (at Lower Zambezi and Kasanka, respectively) believe that game ranching in their areas is desirable and it is also appropriate in GMAs surrounding other national parks. With resumption of licensed hunting, the technology behind ensuring a sustainable yield (surveys, seral stage definition, habitat enhancement, etc.) will be critical; however, the capacity of ZAWA to manage these resources as the lead

[211] Development Services and Initiative (DSI) 2008
[212] Ibid

authority is suspect and needs greater coordination with CRBs. The conduct of surveys for both numbers and trends in game species, the calculation of sustainable harvests, the identification, inventory, management and improvement of habitat (use of fire, water development, rotational use, etc.), the seasonal use and movements of wild species in an area, the harvest and care of game, marketing of products, and other technical requirements can serve as a basis for training at VAG-level, the contents of a business plan, and a source of employment. For example, the harvest of selected age classes will reflect decisions to support meat production or trophy hunting. The absence of such inventories and management are evident in the current depleted state of many GMA's (such as Bilili – see Table 8).

One suggestion to utilize the GMAs better for benefits for the local community are to convert some GMAs to community conservation parks (CCPs) with the communities, safari operators and others as principals in the GMA management. Currently GMAs, whose total area exceeds that of the National Parks (Table 2 and 8), are being abused into functional extinction. USAID can make a contribution in GMAs where the influence of ZAWA is limited. PPPs and CCPs can encourage multiple uses, and communities can be deflected from poaching in parks with better engagement of the CRB. This solution was also proposed by Lindsey et al. (2014). CRBs in cooperation at the local level with VAGs could also function as the main promoter and organizer for private enterprise investment in agriculture. COMACO has shown that sustainable products can coexist with protection of natural resources. Many VAGs currently lack a sense of how to form cooperatives to transport, sell, and market products. They also are lacking members able to work for the collective good to bring in private parties interested in the community and who can vet business plans for fairness and implementability. Rather than waiting for enterprises to come to them, the CRGs could benefit first from entrepreneurship skills development and then from matching programs between private enterprises and the CRB. With volume being an incentive, marketing plans should likely target the CRB level, rather than creating business agreements between private enterprises and VAGs. These partnerships, of course, could not take place without transparent systems of accounting and allocation of assets.

The challenges of these organizations are examined in a 2008 UNDP/GRZ joint assessment, which arrived at similar conclusions to this study.[213] While the UNDP/GRZ study is nearly 8 years old, the same conditions described therein exist. **Specific recommendations** for work with community based NRM institutions identified in both this ETOA as enumerated above and identified in the 2008 study include:

- Formation of a single management structure for multiple NRM rather than the stove-piped divisions that currently exist among the different resources.
- Support for the development organizations, or modification of existing organization, to be more inclusive, which are representative of the community as a whole rather than skewed toward the non-poor.
- Engaging and incentivizing community NRM groups so that they are committed.
- Providing and ensuring that members of the group are adequately trained for addressing integrated NRM issues.
- Allowing for the NRM groups to have a formal relationship with stakeholders through contracts and charters (this would require policy work with GRZ).
- Providing an avenue for the groups to exploit opportunities for economic development.
- Encourage policy that grants clear and concise rights to natural resources in a manner that is sensitive of traditional values, but that promotes realistic and sustainable management.
- Promote governance and accounting structures that are transparent and fair.

STUDY THE IMPACT OF ITNS AND DEVISE MANAGEMENT AND DISPOSAL PLANS

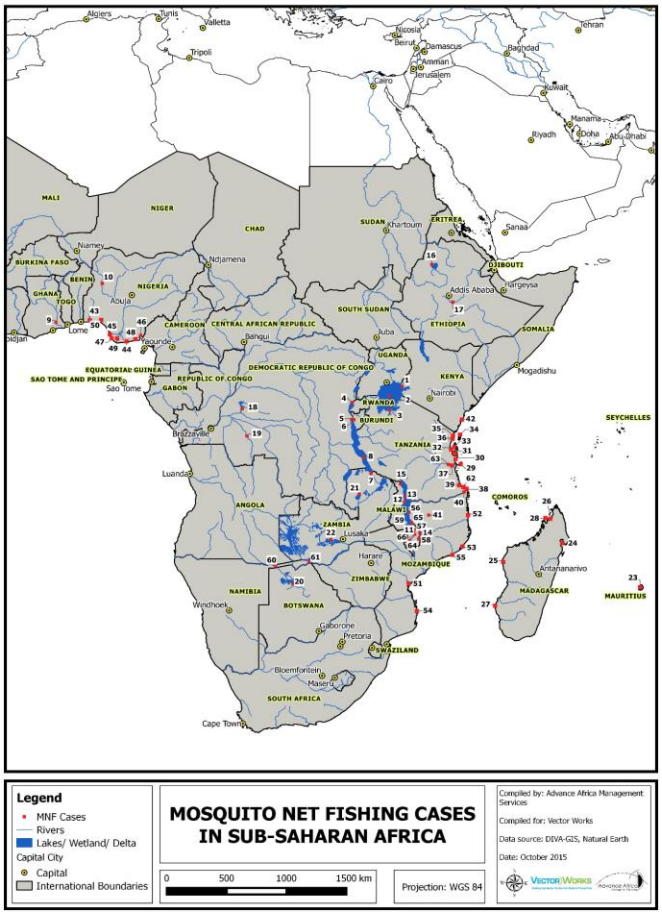
The study confirmed that ITNs are being used for fishing. The Department of Fisheries thinks illegal offtake is primarily responsible for dramatic fish declines. However, stopping ITN distributions could have significant impacts

[213] DSI 2008

on malaria prevalence and mortality. Despite this dilemma, there is still the need to quantify the impact of ITNs on fish populations and design and implement programs that minimize ITN misuse.

Vector Works, implemented through John Hopkins University and supported by PMI, has begun to investigate the misuse of ITNs for fishing with the goal of quantifying the problem and providing guidance on the topic (http://ccp.jhu.edu/projects/malaria-vector-control/#). Beginning in FY15, there are three concurrent projects for USAID/Zambia to collaborate on that address some of the ITN misuse issues identified for Zambia.

Figure 14. Records of mosquito net fishing in sub-Saharan Africa from the scientific and grey literature

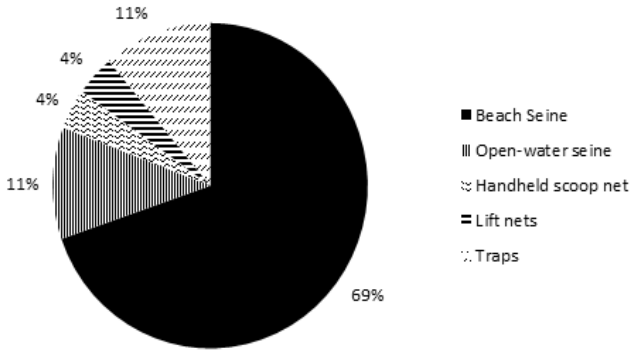


Source: Advance Africa 2015

Figure 14 summarizes the alternative uses for ITNs, as determined by a literature review by Advance Africa.[214] Advance Africa estimates that net misuse may be as high as 87 percent around fishing areas and that up to 96 percent of the nets were obtained for free from NGOs.[215] In Zambia, most stakeholders confirmed that the nets were typically received during universal coverage campaigns, or as part of targeted distributions, but it should be noted that non-treated nets could also be purchased in the local market and that communities were buying them for fishing purposes. Distinguishing between treated and untreated nets by sight at a distance is nearly impossible. Entrants, including vulnerable groups, are the most frequent adopters of mosquito nets for fishing because they have little means for proper tackle or the skills or boats to use it.[216] Methods of net use also vary (Figure 15).

[214] Gurung 2015
[215] McLean et al. 2014
[216] Barr 2010; Jiddawi and Ohman 2002

Figure 15. Mosquito net fishing gear recorded in sub-Saharan Africa by type from the scientific and grey literature



Source: Advance Africa 2015

Vector Works is using models and a literature review to quantify the leaching potential and chemical loading of 14 types of ITNs on the market made of 3 different types of materials with 3 different chemicals (i.e., deltamethrin, alpa-cypermethrin, and permethrin). The teams are assembling this data, which may be used to develop risk assessment models for fishing nets, depending on the use scenario and type of net to calculate acute and chronic doses. The key questions are whether there are differences between nets in their leaching potential to characterize the exposure of the chemical to different types of water body receptors (fish and invertebrates) and to model off-rates and calculate the expected lifetime for leaching and impact on aquatic organisms. The future needs are to conduct actual leaching tests using parameters that mimic real world scenarios for fishing, such as no-soap soaking, to conduct in-situ field studies to assess potential for bioaccumulation in different sizes of water bodies, as well up the food chain, and to consider effects on macroinvertebrates that are representative of African species.

Finally, Vector Works is developing protocols for toolkits for net distributors for appropriate reuse scenarios of ITNs, as well as appropriate disposal. PMI has some recommendations that nets could actually continue to repel insects by reusing the nets for such things as window screens or underbedding. Vector Works will work on developing and issuing this sort of specific reuse guidance in 2016. Global Environmental Management Support (GEMS) is also contributing through the Malaria Vector Control Programmatic Environment Assessment revision and update where they will make end of life recommendations for net disposal (burning or burial) and updating risk assessment findings for new products including new ITNs.

In the past, a number of organizations have attempted to reduce the use of ITNs for fishing. These are captured in the Gurung (2015) report, including enhancing enforcement and punishment, establishing hotlines for tips (and rewards), education on proper use of nets and importance for malaria prevention, fines, change in color of the net to make detection easier (although this was proven ineffective), improve stock monitoring of fish to tell if the ITN use, whether present or not, is impacting populations, community shaming, and confiscation of property.

Opportunities for USAID/Zambia to contribute to the efforts to quantify and reduce the misuse of ITNs include:

1. **Vector Works study.** USAID Zambia could discuss a collaborative study with Vector Works in Zambia to set up monitoring systems for net misuse, to track incidences of misuse with officials, and to study site specific exposure factors for net misuse (e.g., how long are fisherman using nets, characteristics of the water bodies, which types of nets specifically, the types of fish present in the affected systems). Vector Works is looking for a pilot project location to validate their literature research and modelling. USAID/Zambia could assist with planning, potentially link Vector Works with other partners in the field who could assist with monitoring, and help aggregate data. USAID/Zambia could play a critical role in communicating the results to GRZ and other donors working with net distributions and finding a plan to reduce illegal uses.

2. **Management Plan.** The Department of Fisheries conducts monitoring every 4 months on fish populations, takes, the number of fisherman, and water quality, but they lack an ability to use that data to manage those

populations. There is little evidence that this data is being used, either in real time or to prepare management plans, for multiple uses including fishing, recreation, and as a water management structure for downstream hydropower schemes. Data must also be collected on fish stocks to inform fish ban timing and length (there is now a fishing ban during the breeding season). USAID/Zambia could provide additional support to assist the Department of Fisheries with monitoring fish stocks, provide training and software for analyzing the data, and in broader efforts, help the Department of Fisheries engage with ZAWA and other ministries to include the data in integrated NRM plans.

3. **Increased Monitoring**. The Department of Fisheries, ZAWA, and the police are coordinating closely on monthly patrols (approximately three times per month). During these patrols, they will arrest any illegal fishermen, but because the fishermen are connected by cellular networks and radios, they often inform each other of the patrols. Patrols will continue to be necessary to ensure all takes are legal. USAID Zambia could contribute to enforcement, along with data collection, by providing hard goods, such as boats and recording equipment, as well as help in the development of innovative remote sensing techniques. The Mission could also support communication efforts to relay the potential fines for patrols.

4. **Alternative livelihoods.** Much of the illegal fishing is being conducted by community members who see a demand for fish and need alternative livelihoods. It is believed that the illegal fishing is contributing to stock declines, and with the declines, there are reports that traditional fishermen are fishing illegally as well. The system is clearly in a downward spiral. Alternative livelihoods must be supported, as USAID is doing in a number of areas, such as wild products and conservation agriculture, so that fishing is no longer an attractive options for the masses, but is instead left to experienced fisherpersons following the regulations. Fishing permits and access to permits must be reasonable (permit offices must be locally based) so there are incentives to continue legal fishing. Accessibility to fishing permits could be improved through support by USAID for establishing public private partnerships to sell fishing licenses so they are more accessible. This would provide a small means of income for retail outlets as well as take the burden away from fisheries staff for issuing the permits.

5. **Alternative, Sustainable, and Legal Protein Source.** Protein requirements for a growing population, as well as a migrant construction operation, are some of the main drivers for the interest in fishing. As fish becomes less readily available, the bushmeat trade increases. Both the growing communities and the influx of migrants seeking opportunities in Zambia are driving this demand. New protein sources must be explored that will allow fish stocks to recover and to prevent illegal bushmeat trade. One opportunity is to use the invasive crayfish that are now found at the base of the dam spillway and in Lake Itezhi-tezhi. The crayfish were accidently released from an aquaculture farm. Currently, some locals are capturing them and selling them to the construction workers (although they are using nets instead of pots, which destroy their fishing nets). Construction workers also catch them on their own. Local people do not eat the crayfish, but it could be an important food source nonetheless. Another opportunity is to change the current policy toward sale of cattle and ranched game meat from GMAs, which is currently prohibited. USAID/Zambia could help meet some of the demand for meat by promoting aquaculture of fisheries, clams, and crayfish and/or helping change the policies on the sale of legally obtained game meat from GMAs.

6. **Change ITN distribution practices.** Multiple respondents stated that there were more nets given to each family than they could use and that they had both enough to sleep under and enough for fishing. Families were not making a choice of health over harvest, as has been a concern raised by the malaria control donors. There are so many nets that the excess are even being sold on the market for illegal fishing. Additionally, the communities are receiving the LLINs versus the older style ITNs. The LLINs, as intended, are much stronger than the standard bednet, and, therefore, they are also more attractive for fishing. The LLINs are expected to last about 3 months for fishing while the ITNs last only a few uses. Provision of the type of net should be considered in areas where fisheries are particularly important. USAID/Zambia could contribute to a controlled study of whether the type of ITN alters the use of ITNs for fishing, essentially a preference study.

7. **Education.** There are a number different stakeholders who would be targets of a campaign to stop illegal fishing. One target would be children, teaching them the impact on fisheries and biodiversity, but also to

appropriately link the impact to future livelihood opportunities. The goal would be for this message to follow them through to adulthood and foster a feeling of stewardship. The second stakeholder group would be to target adult illegal fisherpersons. Some community members do not understand the detrimental impact on the local economy and ecosystem, but a larger number understand and ignore it for one reason or another. These adults would be better suited to be educated about the penalties for poaching and would be a target for alternative livelihood development through training in other fields. The third target group would be migrant workers, addressing the penalties for conducting illegal fishing. USAID Zambia could contribute to education campaigns and curriculums to engage children early in natural resource conservation. The Mission could also support anti-poaching communication campaigns and rehabilitation of repeat offenders.

8. **Require business to address the issue internally**. Construction camps are clearly contributing to the fishing (and bushmeat) pressure in areas where they exist. It is unclear if employees are being provided adequate resources in camp. Construction and investment projects must adequately supply workers with provisions to ensure that their workers are receiving nutritious and balanced diets. By doing so, and sourcing locally from reliable and legal traders, the workers will be less likely to turn to illegal sources. USAID/Zambia could engage with GRZ authorities, particularly ZEMA, to review the environmental impacts associated with camps, particularly focusing on illegal bush meat trade. The development and implementation of mitigation measures for these camps to reduce illegal wildlife trade could be strengthened through USAID support.

IMPROVING PESTICIDE HANDLING AND DISPOSAL

Very early in the ETOA assessment, the team met with ZEMA to discuss needs. Among them were implementing their mandate from the Environmental Management Act of 2011. One of the issues was the challenges ZEMA is having in managing their monitoring data on pesticide use, poisoning instances, and pollution. There are opportunities for USAID to engage in pesticide monitoring and the pesticide supply industry to make it safer and more closely monitored. To some extent, PROFIT+ and CASH are already working to improve the practices of suppliers and agrodealers, as well as educate the community. Additional work at the top level could be supported.

ZEMA reports a rising number of cases of poisoning from pesticides. Farmers, especially with the expansion of cotton, are receiving pesticide inputs on loan. This is a new crop and they are not generally knowledgeable about the pesticide application for this crop, especially in Eastern Province. While some companies are investing in education of the community around pesticides, the enforcement and engagement varies between companies. Cargill is said to be providing personal protective equipment (PPE) along with inputs to their farmers; however, Chipata Cotton is said to not be supplying PPE. ZEMA is concerned that the lack of PPE and training may be related to the rise in poisonings. They have not been able to monitor what types and how many pesticides are going into the rural areas by private companies and what mitigation measures are being used.

Additionally, several cases of accidental poisoning have been reported (*M Nkoya, personal communication*). In one case, a child was carrying a pesticide in a typical bottle used for local beer. An adult took a drink and died. In other cases, people have used rinsed bottles previously containing pesticides and have been poisoned. Also, suicide cases from pesticides have risen. ZEMA would like to have a database that tracks these incidents and identifies the specific pesticides involved so they could begin messaging campaigns for safety. Especially with the cases of accidental poisoning with bottle reuse, it could be an interesting opportunity to explore labelling of pesticide bottles so the label cannot be removed, while also making the bottles unattractive for drinking water purposes (explore preferences for color, opaqueness, neck and opening design, etc.). This may help address demand for reusing these bottles.

At the very highest level, ZEMA is hindered because their systems for tracking pesticides are obsolete and based on hardcopies. ZEMA indicated that they had a great need to move the operations, and pesticide monitoring in particular, to a modern advanced system. There were several reasons why ZEMA felt that upgrading their monitoring systems, primarily through IT improvements and databases, would be beneficial. The approved list of pesticides is hard for agro-dealers to report and for ZEMA to monitor. If ZEMA could track which chemicals were being used for which purposes they could also track sales and target appropriate use of the most dangerous pesticides. They also may be able to engage more fully with dealers on recommendations for PPE and mitigation measures.

ZEMA needs a database system that is transparent and accurate for pesticide purchase, use, and misuse. This is timely, as USAID has formed a Working Group on pesticides to revise pesticide strategies in the Agency. With the Agency reevaluating its pesticide procedures, a co-developed database that paralleled each other (i.e., U.S.-approved versus ZEMA approved) would allow for ease of comparison between ZEMA-approved and USAID-approved pesticides. Harmonizing standards for mitigation measures through a database would also be useful so different mitigation practices can be harmonized. This is an excellent opportunity for USAID/Zambia to engage in a pilot project to support development of a pesticide database in Zambia with ZEMA that could parallel a trial USAID system to streamline approvals and potentially replace Pesticide Evaluation Report Safer Use Action Plans (PERSUAPs).

7. LINKAGES TO USAID STRATEGY AND PROGRAMS

This section describes the extent to which the existing programs and potential new activities meet (or do not meet) the necessary actions for conservation (sec. 118(e)/119(d) mandatory analysis), environmental management, and efforts to address new initiatives and USAID Forward. The section begins with summary overviews of the USAID/Zambia program areas and links to needs and opportunities. This is followed by an analysis of the extent to which USAID's activities are meeting the needs.

This assessment was conducted prior to USAID/Zambia having their new strategy spanning from 2017–2022 developed. Therefore, only active and near future projects were considered as part of this analysis. Besides being retrospective in reviewing existing efforts to address environmental threats, this assessment also identifies opportunities to address the strategic recommendations.

PROGRAM SUPPORT FOR KEY RECOMMENDATIONS

For ease of discussion, and because the DOs are highly integrated and cross-cutting, the links to needs and opportunities are discussed by program area below. Although the Economic Development Office (EDEV) covers programs in multiple areas, for ease of discussion, their projects are allocated among the other sectors.

PROGRAM AREA: DEMOCRACY AND GOVERNANCE

The Democracy and Governance (DG) Office coordinates with other offices to support varied activities, which contribute to improved planning, land tenure policies, community engagement, and policy on multiple levels. Additionally, other offices also incorporate democracy and governance activities into their work. Promotion of governance structures that are consultative, integrative, and environmentally sound create the critical underpinning for all conservation activities. While these cross-cutting aspects of democracy and governance are discussed in the other sections where they are relevant, there are opportunities discussed specifically here targeting democracy and governance that could be utilized to support a number of the strategic recommendations.

The DG Office targets structural reforms to reduce public sector abuse and corruptions, improve accountability, and strengthen institutional governance. These are all issues in the management of natural resources that directly threaten the status of the environment in Zambia. The expertise in the DG Office could be engaged to help analyze the needs within the GRZ ministries responsible for NRM to improve overall transparency of the organizations and to eliminate corruption. Additionally, there is a need to develop clear mandates for each ministry to help eliminate overlapping and sometimes competing priorities. Further, the DG team has also worked at the local levels with improving civil society participation. Natural resource policies need local level buy-ins and champions. Therefore, improving civil society participation, particularly by engaging traditional leaders, would strengthen enforcement of laws and regulations, as well as provide opportunities for sustainable utilization of natural resources while increasing household incomes.

One other key recommendation is to reform and enable the business development processes in Zambia. The DG Office with its policy experts would be uniquely positioned, in coordination with the EDEV Office, to reform the investor licensing and vetting process in Zambia in targeted sectors, which currently is prohibitive of legitimate foreign investment.

PROGRAM AREA: EDUCATION

The Education Office supports four Sub-IRs that primarily deal with strengthening educational systems, school performance and access. These areas have no impact on the environment and, therefore, do not affect biodiversity or forests. However, the office does also support water and sanitation projects by constructing water points and latrines at schools, among other projects. These projects have a positive environmental impact, as they properly capture human waste, preventing pollution of surface and groundwater and preventing the spread of disease.

Under the current activities of the office, there are only a few areas where the office is currently contributing to the key recommendations. Continued efforts in constructing high quality sanitation facilities will contribute to needs for monitoring and enforcement of waste management standards identified as a potential threat to the environment in Zambia.

However, there are numerous opportunities for the Education Office to contribute to opportunities that support conservation efforts and promote biodiversity. The Education Office could contribute more significantly to the key recommendations by developing and promoting educational opportunities for natural resource professionals. Curriculums in natural resources and continuing education for environmental professionals continues to be a need at the local level. These curriculums could also be expanded with education through extension services for VAGs and other community members living near PAs. Additionally, working at the elementary and high school level, the team could also promote entrepreneurship skills development, which are completely lacking in most rural areas. These linkages are not, however, reflected in Table 13 because addressing them would require a significant shift in the current objectives of the office.

PROGRAM AREA: AGRICULTURE AND ECONOMIC DEVELOPMENT

USAID/Zambia has a thriving agricultural development and economic development program with no less than ten active or upcoming activities. With any agricultural program, there is a risk of promoting the clearing of land and significantly contributing to deforestation on a landscape level and climate change at the global scale. Additionally, biodiversity can be impacted as well by the use of pesticides often accompanying agricultural activities, which can pollute waterways and affect non-target organisms critical to the healthy functioning of an ecosystem. Pesticide use is carefully evaluated by USAID through its PERSUAP process, which, for example, in Zambia approves for use 2, 4-D ethylhexyl ester, bromoxynil octanoate, glyphosate, mesotrione, metolachlor, s-metolachlor, and terbuthylazine (Siaoma PERSUAP).

Agricultural programs supported by USAID/Zambia generally target increased efficiency and productivity, rather than expanding the area under cultivation. The agricultural programs are also integrating climate-smart agricultural techniques, improved access to inputs, and conservation farming, where such enhanced cultivation can sufficiently increase crop yields at the smallholder level. The expanded but judicious use of agro-inputs as part of agricultural activities should be viewed as an important aspect of helping to limit deforestation, mitigate climate change, and increase the productivity and value of Zambia's agriculture sector.

USAID/Zambia FTF programs are already supporting key recommendations identified during the ETOA. The agricultural projects work with local organizations and communities to build their capacity for agricultural intensification and improved productivity through inputs and use of irrigation, which limit agricultural expansion. The projects have largely focused on Eastern Province where there is significant interest in economic development through agriculture diversification. The projects also target public private participation to improve sustainability and reach of the programs. The Policy Strengthening Project will also help fight detrimental policies that perpetuate land degradation and agricultural expansion, such as maize subsidies, an important climate change adaptation measure. Their work could play critical roles in diversifying the agricultural sector in Zambia.

There are a few areas where USAID/Zambia has the opportunity to support agricultural policy and sustainability of agricultural programs. Generally, agricultural programs could identify opportunities to encourage the development of environmentally sound agricultural policies and incentives offered by the GRZ. Regional development plans should focus on engaging communities in GMAs, possibly through VAGs, to improve their agriculture practices to be more environmentally responsible and climate sensitive. Cotton is being targeted by private enterprise as a cash crop, especially in Eastern Province, and cotton requires heavy inputs, including pesticides. While there are opportunities to

support safe and effective pesticide use and to promote standards for provision of protective equipment, cotton is an environmentally destructive crop. Cotton should not be encouraged and, when input packages are provided, they should also include education on pesticide use and protective equipment necessary to safely apply the pesticides.

PROGRAM AREA: CLIMATE CHANGE AND FORESTS

USAID/Zambia is specifically targeting program areas that address climate change mitigation and adaptation, as well as protection of forests through REDD+ programming. These projects are designed specifically to build capacity for communities to manage forests in a sustainable way. The VIGOR and CFP projects directly contribute to forest protection, which also preserves critical habitats supporting biodiversity. The Mission is also building GRZ capacity for low emissions development. The lack of reliable energy supply was identified during this ETOA, and during the previous ETOA, as a primary driver of deforestation due to charcoal production. Overall, USAID/Zambia programming in these areas are beneficial for promoting forest protection and conservation of biodiversity.

The climate change projects are already significantly contributing to the key recommendations discussed as part of this assessment. The climate projects appear to be very well targeted to address some of the most pressing needs, but they have not yet been operating long enough to determine what impact they have had to date. The flagship CFP project works with building capacity of government and local organizations for monitoring, delineating, and eventually, protecting forests. CRBs are an important implementing tool and partner for the project. The research built into the CFP project to map forests will be critical in developing regionally based integrated NRM plants. Additionally, the USFS, through the PAPA, is addressing fire management across Zambia. Current fire practices and policies are extremely threatening to forests and biodiversity of the area, as well as the safety of Zambia's citizens, and serves globally as a contributor to climate change.

USAID/Zambia's involvement in climate change and biodiversity could help to strengthen policies on forest use and enforcement of laws on illegal timber trafficking. Additionally, and partially being addressed by CFP, USAID projects should consider enforcement of regulations around fees, licenses, and permitting of charcoal as well. Currently, fees are not being paid in the charcoal trade because agents do not have the resources to conduct adequate patrols and to staff checkpoints. Putting in place structures to monitor and enforce regulations in the timber industry, as well as addressing illegal trading of forest and forest products, would help reduce the threats to forests and biodiversity in Zambia.

PROGRAM AREA: BIODIVERSITY

Biodiversity programming is a new addition to the Mission portfolio, so actual implementation of biodiversity projects is forthcoming. Directly targeting wildlife trafficking and encouraging shared responsibilities for wildlife management is an important need. These activities are designed to improve outcomes in the biodiversity of Zambia, support critical areas of need identified in this ETOA, and are expected to have positive impacts.

USAID/Zambia plans to address needs identified in the key recommendations. Specifically, government-to-government support to ZAWA for wildlife protection, could be an important aspect of support. Interventions that target training of officials and skills development will contribute to needs for improved capacity and transparency improvement. GDAs or PPPs may be options to improve PA management and decrease public costs to develop and maintain wildlife estates, while improving the economic well-being of wildlife dependent communities. This effort could address critical threats related to poaching because they would improve local capacity for wildlife management and assist in the development of alternative livelihoods that are not consumptive or detrimental to wildlife populations. The development of entrepreneurship skills to promote tourism growth in GMAs will also be important to stop poaching and encourage habitat preservation.

Moving forward with established relationships with ZAWA and the Department of Forestry, the biodiversity portfolio has tremendous opportunity to help create an exemplary PAs network that focuses on integrated planning to benefit both local communities, adaptation to climate change, and biodiversity in a sustainable way. ZAWA and the Department of Forestry have integrated management plans for some areas, but they struggle to implement those plans. Support with training and resources (e.g., fuel, vehicles, equipment, monitoring tools) will help them maintain park and protected forest infrastructure and conduct patrols. These aspects are critical for promoting tourism to the

area. Additionally, with the hunting ban being lifted in September 2015, ZAWA will continue to need support to conduct wildlife surveys, which help justify quotas in hunting concessions.

With biodiversity efforts also targeting CRBs and VAGs, USAID programming could help diversify their roles so that they not only manage wildlife, but also function as an economic growth community body focused on promoting diversification of the agricultural sector and encouraging private investment in the area. USAID could help to train VAGs to establish cooperatives to move products to markets or to develop value added processing of local goods. CRBs are not being utilized to their full potential to support sustainable resource use since their primary funding source is only from hunting licenses. CRBs need to be encouraged to find sustainable and non-consumptive ways of promoting economic development of the community.

PROGRAM AREA: ENERGY

USAID/Zambia is considering programming in the energy sector, which is one of the major factors in deforestation in Zambia. Energy supplies are extremely unreliable in Zambia, as the country is subject to extended load shedding, especially during the dry season. Power Africa may focus on transactions promoting solar projects, as well as transactional assistance with non-solar projects, which would also partially mitigate GHG emissions from charcoal and fuelwood fires. Technical support would also target transmission and distribution projects. These efforts would help relieve market demand for charcoal in urban areas, therefore limiting deforestation, since charcoal is used largely for cooking, especially during load shedding in urban and peri-urban areas of Lusaka.

There is one regionally supported renewables project in Zambia, Elephant Energy. Elephant Energy targets rural off-grid areas with solar powered devices (e.g., cell phone chargers, lamps, light bulbs). Not only do these efforts help alleviate poverty and keep remote communities connected to important agricultural markets and weather information, they also could support anti-poaching efforts in extremely remote areas. These types of privately driven, "green" projects may offer solutions for areas not likely to be added to the grid in the near future. However, any developments in energy solutions typically require some form of battery storage. Battery disposal is a challenge in Zambia as there are no hazardous waste facilities to handle battery disposal. Support on how to safely handle the end of battery life should be included in programming efforts.

The opportunity to support the key recommendations and address environmental threats in Zambia will depend on which level of the energy sector is targeted. Support for an energy strategy that is resilient to climate change and can effectively supply communities should be a major objective in order to curb deforestation. Until that time when the larger issues are addressed, energy programs can encourage technology development and solutions that come from the local level. Additionally, energy needs should also be included in integrated NRM plans since charcoaling and also collection of wood for cooking could undermine any sustainability efforts.

PROGRAM AREA: MALARIA CONTROL

PMI operates programs, in coordination with the GRZ, for control of malaria vectors and treatment of malaria. The activities include two components that are potentially impactful to biodiversity and environmental health in general, management of pesticides, including their disposal and dissemination, and treatment of insecticide treated mosquito nets. The AIRS program has been very mindful of potential environmental impacts of indoor residual spraying, as well as disposal of pesticide containers, and the program has implemented mitigation measures according to guidelines in their Environmental Mitigation and Monitoring Plan. Without appropriate management, pesticides could cause pesticide resistance, and they may also harm non-target organisms. In this case, bees, aquatic organisms, and soil invertebrates could significantly be harmed. These are critical components of a healthy functioning ecosystem.

The AIRS program could address issues of pesticide disposal in future programming by contributing to building infrastructure for hazardous waste treatment in Zambia. The program does not necessarily need to support construction of facilities but could contribute to incentives or capacity building for public private partnerships, or private enterprise alone, to address the problem. Hazardous waste currently is transported out of the country, typically to South Africa.

PMI may also unwillingly contribute to environmental threats through the illegal use of ITNs for fishing. Mosquito net fishing may contribute to fish population declines, and, therefore, loss of biodiversity both by removing juveniles from the population, as well as destroying littoral habitats. Additionally, other aquatic organisms may be affected by

leaching of pesticides from the nets into the water column and sediment. This aspect was investigated as a potentially serious threat in Zambia, and questions still exist as to whether there is an impact on fish populations and whether USAID is contributing to the problem.

PMI has opportunities to contribute directly to address these issues by putting in place policies and guidance for both beneficiaries and distributors on how to dispose of used nets appropriately. Other PMI supported projects, such as Vector Works with John Hopkins University, are currently attempting to address the breadth of net misuse while looking for pilot locations for quantifying net misuse and attempting to determine the impact on fish populations. More details on opportunities to address net disposal and to quantify whether ITNs are contributing to declines are narrated in Section 6.

PROGRAM AREA: HEALTH

Health programs comprise the largest proportion of USAID/Zambia's budget. Health programs generally impact the environment through the generation and disposal of healthcare wastes. These impacts do not directly serve as a threat to forests or biodiversity, but burning of waste, leaching of contaminants, or general pollution of waterways can have a detrimental impact on the quality of natural resources. Pollution, through these means, is a serious threat to environmental health.

There are numerous opportunities that exist for USAID/Zambia programs to contribute to environmental protection by establishing policy and infrastructure to handle healthcare waste. There is a significant need for additional healthcare waste treatment facilities that can adequately handle waste generated by large hospitals, as well as small clinics. There is also no hazardous waste facility in the country that can handle highly hazardous waste such as laboratory chemicals, large quantities of expired pharmaceutical or chemotherapy products. While the health programs are typically based around strengthening of government systems, the close relationship with GRZ could be leveraged to improve policies on the handling of healthcare waste. Additionally, policies could be developed that would be responsive to local conditions to dispose of healthcare waste. Both policy and direct support is needed and could be a target of future health programs. Broadly addressing these wastes will protect both human and environmental health.

EXTENT TO WHICH THE ACTIONS PROPOSED BY USAID MEET THE NEEDS

Sections 118 and 119 of the FAA require an articulation of "the extent to which the actions proposed for support by the Agency meet the needs thus identified." The following table (Table 13) suggests which of the current and proposed programs at USAID/Zambia (i.e., actions) are contributing, or could contribute, to the key recommendations (i.e., needs identified).

Table 13. Extent to which proposed and current USAID program actions are addressing gaps

Key:

O = Opportunity for USAID, activities are not currently supporting the necessary action, but could in future programs

+ = Existing programs and identified new activities support the necessary action

Blank = no or minimal relationship

	USAID/ ZAMBIA PROGRAMMING AREAS							
STRATEGIC RECOMMENDATIONS	DEMOCRACY AND GOVERNANCE	EDUCATION	AGRICULTURE	CLIMATE CHANGE AND FORESTS	BIODIVERSITY	ENERGY*	MALARIA CONTROL	HEALTH
1. Build institutional capacity through knowledge sharing, financial support, and updated technological capacity for GRZ NRM agencies and offices			O	+	+			
2. Focus interventions regionally to leverage unique opportunities for development (e.g., selected PAs)			+	+	+	O	O	
3. Develop local level NRM engagement through education, capacity building, and institutional controls	O	O	+	+	+	O	O	O
4. Develop integrated NRM plans that are cognizant of local economic, social drivers, and climate change and support implementation			O	+	O	O		
5. Create an enabling environment for business to engage in conservation and economic development of "green" or environmentally responsible projects	O		+	O	O	+		
6. Realign NRM policies and agency organization to make them more efficient and able to leverage private sector interests	O		O	O	O			
7. Improve the transparency of governance of natural resources and enforce policies and regulations	O		O	O	O			

	USAID/ ZAMBIA PROGRAMMING AREAS							
STRATEGIC RECOMMENDATIONS	DEMOCRACY AND GOVERNANCE	EDUCATION	AGRICULTURE	CLIMATE CHANGE AND FORESTS	BIODIVERSITY	ENERGY*	MALARIA CONTROL	HEALTH
8. Promote agricultural intensification, diversification and climate-smart practices rather than expansion			+	+	+			
9. Develop reliable forms of energy, alternative sources of energy, and put in place stop-gap until the national energy infrastructure develops				+		+		
10. Establish life cycle monitoring and enforcement of policies for pollution and hazardous waste management	O	+	O			O	O	O
11. Encourage PPP and encourage private enterprise in waste management and control			+				O	O
12. Develop donor led strategies that are integrated and sustainable at the national health care system level to handle wastes							O	O

* Energy policy and Power Africa are still evolving aspects of Mission interest. Generally, strategies have been identified as potential future Mission activities, yet the details are unavailable. Therefore, the mission engagement on the strategic recommendations in this sector is noted as an "identified new activity", which may or may not be taken up in the course of development.

8. RECOMMENDATIONS AND CONCLUSIONS

The purpose of this assessment is to analyze environmental threats and their root causes and then identify opportunities for environmental conservation, protection, and improved NRM— specifically as it relates to USAID/Zambia programming. By doing so, this assessment also complies with sections 117, 118 (c), and 119 (g) of the FAA of 1961, as amended.

Over the course of three weeks in Zambia, and while traveling the country to meet individuals in four communities (i.e., Mumbwa, Kasanka, Kafue, Luangwa) and numerous agencies of government, NGOs, development donors, farmers, fisherpersons, and community leaders, the ETOA team heard a diverse array of accounts related to biodiversity and forest threats and opportunities. The threats and their drivers all clearly had nuanced ties and interactions among each other, making recommendations difficult but necessarily integrated.

The immediate large-scale direct environmental threats are similar to those identified in the previous 2010 ETOA posed by agricultural land clearing, poaching, deforestation, forest degradation, fire, over-fishing, and pollution with the exacerbating factors such as poverty, environmental degradation, land tenure, climate change, and inadequate government support. However, the playing field around those threats and the actors behind them have changed somewhat— ZAWA is being integrated into the Ministry of Tourism and Arts, poaching is on the rise, climate change is receiving greater attention with the Zambia National Climate Change Response Strategy,[217] copper prices have fallen, and Zambia is facing load shedding on a daily basis. And since the last ETOA, USAID/Zambia is supporting one of the largest REDD+ programs in Africa and has received funds to combat wildlife trafficking and has also made additional contributions to sustainable agriculture, water and sanitation, and health. These are all players in the changing landscape of biodiversity, forests, and conservation needs in Zambia.

Twelve strategic recommendations outlined in Table 12 stood out during the ETOA, many of which could offer USAID/Zambia multiple opportunities to address with programming and, some of which, USAID/Zambia is already addressing with the current and near future programming. While there may be many complex options for engaging in the strategic recommendations, the highlighted opportunities exemplify ways in which these strategic recommendations can specifically contribute to programming to address forests and biodiversity threats in Zambia. These strategic recommendations respond to the issues and changes noted above and are:

1. Build institutional capacity through knowledge sharing, financial support, and updated technological capacity for GRZ NRM agencies and offices.
2. Focus interventions regionally to leverage unique opportunities for development. These might, for example, include propagation of rotational coppicing of miombo forest species used for charcoal production.
3. Develop local level NRM engagement through education, capacity building, and institutional controls.
4. Develop integrated NRM plans that are cognizant of local economic and social drivers, climate change, and support implementation.
5. Create an enabling environment for business to engage in conservation and economic development of "green" or environmentally responsible projects.
6. Realign NRM policies and agency organization to make them more efficient and able to leverage private sector interests.
7. Improve the transparency of governance of natural resources and enforce policies and regulations.
8. Promote agricultural intensification, diversification, and climate-smart practices, rather than expansion.

[217] GRZ Ministry of Environment, Tourism, and Natural Resources 2010b

9. Develop reliable forms of energy, alternative sources of energy, and put in place stop-gap until the national energy infrastructure develops.
10. Establish life cycle monitoring and enforcement of policies for pollution and hazardous waste management.
11. Encourage PPP and encourage private enterprise in waste management and control.
12. Develop donor led strategies that are integrated and sustainable at the national health care system level to handle wastes.

These strategic recommendations are provided for each root cause (twelve unique recommendations) and at least one highlighted opportunity for each root cause is provided. Highlighted opportunities are intended to be very specific examples of how to utilize the strategic recommendations. The strategic recommendations and the highlighted project opportunities for USAID to consider would promote overall health and wellbeing of the Zambian environment while contributing to economic development and the improvement of daily life for the Zambian people. These are discussed in detail in the body of document, but, in summary, they require integrated and thoughtful approaches that are not quick fixes, but rather issues that need incremental and sustained support.

EXTEND SUPPORT TO WILDLIFE MANAGEMENT

ZAWA, as the essential indispensable agency for protecting biodiversity and habitats, is under-resourced and lacks transparency. USAID has a unique opportunity to support ZAWA through government-to-government agreements and mentoring support so that ZAWA can act as an effective, well-staffed, transparent, and fully functioning steward of Zambia's natural resources. ZAWA is an important target of capacity building for scouts and inspectors for investigating and prosecuting poaching as well as improving field tactics. Training and retention of those trained officials is a critical need for ZAWA. Any projects using donor funds will also have to make stressed institutions like ZAWA work smarter through technology (e.g., data collection, mapping, trained dogs, and drones) and augmented basic resources like vehicles and fuel.

PROMOATE POVERTY ALLEVIATION THROUGH ALTERNATIVE INCOME GENERATION ACTIVITIES, SUCH AS GAME RANCHING, ECO-TOURISM, NON-WOOD FOREST PRODUCTS, PAYMENT FOR ECOSYSTEM SERVICE

Diversifying uses of wildlands, for household income generation in a non-destructive and sustainable way, is of significant interest for addressing poverty alleviation through alternative livelihoods while promoting conservation and supporting growth in biodiversity. The poor rely disproportionately on the environment for income generation and to meet basic needs, typically taking their income from sectors such as agriculture, forests, and fishing. The poor's reliance on wildland use needs to be diversified and sustainable so communities have lasting benefits from income, protein, and employment while maintaining the natural assets of the land and improving resilience to climate change (by maintaining soil integrity, reducing erosion, and maintaining intact forests).

Many activities already supported by USAID Zambia have examined and implemented some of these alternatives. COMACO has explored and created successful enterprises in non-timber forest products through a specialty food market. The CFP flagship project for USAID Zambia is also already engaged in alternative livelihoods on existing lands, including honey production and mushroom collection, with potential components that include game ranching. Therefore, other opportunities were explored.

An additional form of alternative use of wildlands includes the concept of payment for ecosystem services. While this is of interest, few studies have demonstrated, quantitatively, the benefits for rural communities from payment for ecosystem services. There are serious challenges in developing a payment for ecosystem services programs, particularly in scaling the project, to which USAID/Zambia would need to respond for successful implementation of payment for ecosystem services schemes. There must be a clear definition of the services and there must be buyers linked to a framework for reimbursement and monitoring. While payment for ecosystem services may not be a singular solution to conservation in rural areas, it can be considered as part of the toolkit in overall conservation efforts.

Game ranching is another option for diversifying household incomes in a less consumptive manner. Game ranching generates more income per kg of biomass than livestock farming, allows for the utilization of marginal lands and

provides a buffer against drought and climate change. Ranchers who utilize wildlife, in addition to crop farming and/or livestock farming, boosted their income by an average of 23 percent. The game ranching results in significant foreign currency inflows due to the sale of hunting and tourism experiences to foreign visitors. However, at the present time, the regulatory environment for game ranching is confused with the Wildlife Act of 2015, potentially banning the private ownership of wildlife, but this has yet to be determined. Regardless, this is an example of wildland use, in addition to eco-tourism, non-wood forest products, and payment of ecosystem services, that offers USAID an opportunity to sustainably support communities by putting in place programs that could generate profits, protein, and employment, while maintaining the natural assets of the land and improving resilience to climate change.

INVEST IN CONSERVATION, DEVELOPMENT, AND MANAGEMENT OF CANDIDATE WILDLIFE PROTECTED AAREAS

The challenges for managing and promoting KNP were explored in a case study in this report. The Kafue case exemplifies challenges across the entire PA system in Zambia. Improvements could be made to facilitate the functioning and sustainability of the PA system to preserve the unique biodiversity and forest ecosystems of Zambia. Some of these challenges, such as engaging CRBs and integrated land use planning, are discussed elsewhere, but are reiterated here for completeness of thought and vision in their context for PAs. PAs need the following:

1. Detailed studies with long-term hard data on wildlife population counts, movements, and habitat quality is needed, but generally lacking for most PAs.
2. All planning, especially in GMAs, must include social communication plans and assessments of local needs and views in order for the plans to be sustainable.
3. Financial management plans must be developed for all PAs so that there is less reliance on central GRZ funding.
4. Monitoring schemes must be developed that are efficient for tracking poachers, identifying and fighting fires, conducting wildlife census, or even for ensuring that conflicting uses are well separated spatially.
5. Private enterprise must be encouraged rather than discouraged from participating in PA management and development.

STRENGTHENING COMMUNITY INSTITUTIONS

CRBs and VAGs are crucial in GMAs and adjacent open areas. Based on observations during the field visits, the CRBs are generally non-functional actors in NRM for a number of reasons, including the lack of funding. VAGs are organized at a more local level and have proven effective, particularly when supported by effective environmental NGOs. Studies suggest that communities participating in either CRBs or VAGs tend to be non-poor and that this group benefits more from these institutions than do the poor. In some areas, game ranching can be the best use of the natural landscape, and CRBs and VAGs could be instrumental in promoting and managing ranching, whether for meat or for trophy hunting, although there are numerous challenges to overcome, such as ownership of property by CRBs and the right to game species. Alternatively, CRBs and VAGs could together also function as the main promoter and organizer for private enterprise investment in agriculture.

DEVELOPING INTEGRATED NATURAL RESOURCE MANAGEMENT PLANS

The many instances of agricultural expansion in PAs, illegal exploitation of fish, wildlife, and forests, and related threats to the environment are closely linked with land tenure also playing an important role as a driver. They should be considered as integrated system issues with one sector influencing the outcomes in another. Although some plans have been developed, many also need updating, particularly for climate vulnerabilities and the inclusion of participatory planning. Implementation of the plans is seriously impeded by coordination at the government, local, and community level, and the unresolved issues behind land tenure and the multiple systems of land tenures further confound implementation. To implement plans, an initiative to divide responsibilities could be used through a community resource enhancement project or CCP that employs the support of traditional and religious leaders, includes participation of villagers and sectoral professionals, and involves both conservation agriculture and sustainable game utilization.

ENABLE THE BUSINESS ENVIRONMENT

Natural resource protection is in need of additional resources and one way to leverage additional resources is to engage private investment. There are multiple reasons for the underwhelming current investment rate. Investors are clearly distracted by the confusing, and dispersed labyrinth of entities, paperwork, fees, and waiting times needed to operate. Once operational, there is little cooperation among investors to spur business development and the supporting infrastructure and government services that underlie successful ecotourism are usually lacking or underperforming. Support is also needed to form strong business associations among the lodges, tour operators, hunting operations, community leaders, CRBs, and VAGs. A diversified and transparent tourism marketplace would increase the total tourism revenue in Zambia and for ZAWA. Streamlining these processes, reducing fees, encouraging diversification, and developing transparent processes would improve the investment process, benefiting all stakeholders in conservation and tourism.

ADDRESSING LEGACY MINE POLLUTION

Some thirty years after independence, mining productivity was declining and the government privatized the industry to stimulate foreign investment and productivity. However, 70 years of mining, beginning in the colonial era, left an extensive environmental legacy of contaminated sites and abandoned mines for which investors were unwilling to accept liability for remediation and closure, leading to the government ignoring this environmental debt. There is an opportunity to address mining-related environmental issues by improving accountability and responsibility for mining-associated risks with current mining projects, as well as legacy sites.

STUDY THE IMPACT OF INSECTICIDE-TREATED NETS (ITNS) AND DEVISE MANAGEMENT AND DISPOSAL PLANS

There are ongoing USAID projects through which the Mission could collaborate to address some of the specific mosquito net fishing issues identified for Zambia. USAID/Zambia could contribute to information gathering and proactively address mosquito net fishing by participating in cooperative studies with the PMI Vector Works Project; providing additional support to the Department of Fisheries for monitoring and data collection; promoting alternative sources of protein (e.g., fish or game farms); providing additional educational support for beneficiaries of ITNs; and by addressing the demand for bushmeat from influxes of construction labor in communities.

IMPROVE PESTICIDE HANDLING AND DISPOSAL

There are opportunities for USAID to engage in monitoring the safety of pesticide supply and use. ZEMA needs a database system that is transparent and accurate for pesticide purchase, use, and tracking the misuse of pesticides registered in Zambia. This is timely, as USAID has formed a Working Group on pesticides to revise pesticide strategies in the Agency. With the Agency reevaluating its pesticide procedures, a co-developed database that paralleled each other (i.e., U.S.-approved vs ZEMA approved) would allow for ease of comparison between ZEMA and USAID pesticide procedures. Harmonizing standards for mitigation measures through a database would also be useful so different mitigation practices do not exist for different users across different regions. This is an excellent opportunity for USAID/Zambia to engage in a pilot project to support development of a pesticide database in Zambia with ZEMA that could parallel a trial USAID system to streamline approvals and potentially replace PERSUAPs.

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ANNEXES

ANNEX A. CLIMATE CHANGE RISK ANALYSIS

OBJECTIVES AND SCOPE

The intent of this section of the ETOA is to help the Zambia Mission identify climate risks for biodiversity and tropical forests and help inform how to address climate risk in the Zambia CDCS currently being prepared, as well as later in the program cycle.

The Scope of Work calls for the ETOA to discuss climate change as a factor in existing and future environmental threats and opportunities in Zambia, but cautions that it will not serve as a Climate Change Vulnerability Assessment (CCVA) or similar and is not intended to meet the criteria for complying with Executive Order 13677 on Climate-Resilient International Development. These qualifications were confirmed in a meeting with the Africa Bureau climate change specialist on September 21, 2015.

METHODOLOGY

Based on input from USAID Headquarters, the ETOA should have a specific section addressing climate change vulnerabilities, i.e., the topic should not just be embedded in other sections of the ETOA report. Further, the ETOA climate change analysis should:

- Present current and projected climate change data.
- Identify vulnerabilities and risks by country sector and region, in two directions, i.e., the impacts of climate change on USAID development programs, including those addressing forestry, biodiversity and the environment, as well as the impacts of the development programs on climate change.
- Map those vulnerabilities and risks onto current and planned USAID-Zambia development programs.
- Identify options for adaptation and resilience in key USAID-Zambia development programs where vulnerabilities and risks are significant.

Climate change trends in Zambia that are of significance to USAID development programs include increased temperatures, the El Nino effect (drought), long-term variations in rainfall (annual and seasonal), and flooding events. The Annotated Bibliography at the end of this Annex lists and evaluates the primary sources used for data on climate change trends.

The ETOA climate change analysis should address key USAID-Zambia Mission development sectors, including: economic development, health, food security, and environment. Less emphasis should be given to education, and democracy and governance.

At the time of preparing this ETOA, USAID guidance was still being developed that specifically addresses how contractors should evaluate climate change risks and vulnerability in ETOAs. Consequently, the authors have consulted several other USAID climate change guidance documents and held discussions with relevant USAID Headquarters staff. In particular, any CCVA or ETOA climate change analysis needs to provide information on climate change in a way that is useful for later "risk screening" in: (a) CDCS planning, which is why the risk screening references below have been consulted for relevant context; and (b) program design, which is why the program integration documents listed below are also helpful. USAID guidance for these two phases of risk screening are discussed separately below.

RISK SCREENING IN CDCS

FAA 117/118/119 assessments and ETOAs are intended to inform CDCSs. The just-released Climate Change Risk Screening Tool is a "living document" to be applied mainly by the Mission itself early in the development of a strategy, including CDCSs, ETOAs and FAA 117/118/119s, the output of which should be annexed to the CDCS. However, the tool will also be useful for guiding the Zambia ETOA team's climate change analysis. Therefore, while more specific contractor guidance is still being developed, it is assumed here that the most appropriate methodology to use

is the new climate risk screening tool for strategies. The ETOA team will therefore be among the first to test the new guidance, while staying within the context and scope of the Zambia ETOA climate change risk analysis.

The new climate change risk analysis tool and guidance includes three documents, which can be accessed at https://www.climatelinks.org/integration/climate-risk-management/resources:

- Climate Change in USAID Strategies: ADS 201 Mandatory Reference
- Climate Change Risk Screening CDCS Matrix
- Climate Change Risk Screening Tool: Facilitators' Guide

According to *"Climate Change in USAID Strategies: ADS 201 Mandatory Reference"*, the climate risk screening method at the strategy level entails four basic steps:

- **Review the country or regional climate information factsheet** and, as available, other climate information such as existing analyses. The factsheet provides a summary of current and projected climate conditions for the country or region. *A regional climate information factsheet covering Southern Africa was available; no Zambia-specific climate information factsheets were available.*

- **Conduct screening.** To support screening, USAID has developed a climate risk screening tool (https://programnet.usaid.gov/library/climate-risk-screeningtool) that will help staff consider potential climate impacts in each of the sectors in which USAID works. *The screening tool was used to inform and structure our research and analysis.*

- **Incorporate findings into development of the strategy.** Missions should incorporate a discussion of current and future climate risks to the sectors and geographies in which the Mission is working. The development hypothesis and results framework should take into account the results of the climate risk screening. Consideration of climate change risks should also be incorporated elsewhere in the strategy, as appropriate. *This is beyond the scope of our work but will be carried out by the Mission at a later date.*

- **In the Climate Change Annex, document climate risks and how they are addressed in the strategy.** Missions are required to document the level of climate risk of each DO or IR, how the moderate or high risk was addressed in the strategy, and next steps. *This is beyond the scope of our work but will be carried out by the Mission at a later date.*

RISK SCREENING IN PROGRAM DESIGN

The following guidance from the USAID program, African and Latin American Resilience to Climate Change (ARCC), was provided to the ETOA team by USAID Headquarters as being critical to factor into a successful ETOA:

- ARCC Guidance: Integrating Climate Change Adaptation into Biodiversity and Forestry Programming: http://community.eldis.org/.5b9bfce3/AAP%2000-02%20Adaptation-Biodiversity%20Program%20_DRAFT_CLEARED.pdf and complementary documents,

- Integrating Biodiversity and Climate Change Adaptation in Activity Design, http://pdf.usaid.gov/pdf_docs/PA00KKNX.pdf.

- ARCC papers and other CVAs, available here: https://www.climatelinks.org/resources?f[0]=field_resource_keywords%3A104

RISK ANALYSIS USED IN THE ZAMBIA ETOA

Utilizing the recently released USAID risk screening tools described above to inform the risk analysis process, climate change impacts on current USAID programs were analyzed in a two-step process. The first step was the selection of USAID programs via date and subject matter. Programs ending in 2015 were not analyzed, and the sectoral focus was limited to the four key sectors for the overall ETOA (economic development, food security, health and the environment). Due to the overlap between programs addressing economic development and those addressing food

security, these two sectors were combined for the purposes of this analysis. In the second step, individual programs were reviewed, and the impact of climate change on the programs was analyzed. Adaptation measures were then suggested. For relevant programs, the programs' impact on climate change (in terms of GHG emissions) was analyzed, and mitigation measures suggested where appropriate.

PART I: CLIMATE RISK

FACTORS INFLUENCING VULNERABILITY TO CLIMATE CHANGE

Zambia is a land-locked country in the tropics, with a warm climate. It contains five watersheds (the Zambezi, Kafue, Laungwa, Laupula, Chambeshi and Tangayika), as well as several wetlands (e.g., the Bangweulu and Barotse flood plains).[218]

The population of Zambia is currently 14 million people, an increase of 7 million from 1994. It is projected to be 22 million by 2030.[219] Poverty levels are high—currently estimated at 60 percent. While political stability and strong growth in some sectors enabled 5 percent growth per annum over the last decade, urban areas benefitted more than rural ones, where poverty rates have hovered around 80 percent over the past 20 years.[220]

This combination of geographic characteristics and high poverty levels, along with high dependence on climate-sensitive sectors such as agriculture, mining and forestry, renders the country and its inhabitants highly vulnerable to climate change.[221] For instance, approximately two-thirds of the population depends on rain-fed agriculture for their livelihoods.[222] The low adaptive capacity of Zambian institutions is an additional challenge.[223]

CLIMATE VARIABILITY ALREADY AFFECTING ZAMBIA

Zambia's Intended Nationally Determined Contributions (2015) report noted, "climate variability and change has become a major threat to sustainable development in Zambia," indicating that climate variability is already having an impact on the country.[224] The last few decades have seen an increase in the frequency and intensity of climatic extremes, including dry spells and droughts, seasonal and flash floods, extreme temperatures.[225] These events exert stress on the vulnerable sectors like agriculture, resulting in significant adverse impacts on Zambians' lives and livelihoods.[226]

This is especially true for vulnerable social groups and communities living along river edges. For the millions of people living in these areas, economic isolation adds to the challenge of living in a geographic area prone to floods and droughts. Compounding this vulnerability, economic isolation has spurred the migration of the area's youths to cities, leaving the elderly behind to fend for themselves.[227]

In addition to contributing to water and food insecurity, Zambia's climate insecurity significantly undermines critical infrastructure, such as roads, of which less than 10 percent are paved.[228]

ZAMBIA'S CLIMATE AND PROJECTED CHANGES

Zambia has a sub-tropical climate with three distinct seasons: a hot and dry season between mid-August and November, a cool dry season from May to mid-August, and a rainy season from November to April.[229]

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[218] World Bank 2015b
[219] World Bank 2015b
[220] USAID 2012c; 80 percent live under UN defined levels of poverty.
[221] World Bank 2015b; GRZ 2015; Climate Investment Funds 2012
[222] USAID 2012c
[223] Climate Investment Funds 2012
[224] GRZ 2015; USAID 2012b
[225] World Bank 2015b
[226] Climate Investment Funds 2012
[227] Ibid
[228] Ibid
[229] Climate Service Center 2015; USAID 2012c

Projected climate change impacts for the country—while dependent on the region, model and assumptions—generally include rises in temperature, shifts in precipitation, and possible increases in the frequency and intensity of weather events.[230]

TEMPERATURE

The elevation of Zambia (typically 1,000–1,300 m) modifies temperatures, which are lower than for areas of the same latitude: the daily minimum temperature is 5°C in winter, and the daily maximum temperature is 35°C in the hot months towards the end of the dry season.[231]

Historic trends: Recent climate trends based on records from 1960 to 2003 indicate that mean annual temperature has increased by 1.3ºC, an average rate of approximately 0.3ºC per decade.[232] Zambia's Second Biodiversity Strategy and Action Plan: 2015–2025[233] notes that temperature increases have occurred in all the parts of the country. There has been a significant decrease in the frequency of cold days and nights and cold spells, as well as a significant increase in the temperature of hot days and nights as well as in their frequency, and in the duration of warm spells.[234]

Future trends: Future trends in the country are towards a higher average temperature.[235]

- *2035*: Projected increases in mean annual temperature for the southern African region are between 0.8°C and 1.00°C by 2035.[236] There is high confidence for these projections.[237]
- *2050 and beyond*: The majority of southeastern Africa is expected to experience an increase in annual average temperature of 1.5 to 2°C by 2050.[238] Projected increases in mean annual temperature for the southern African region are 1.5°C to 2.1°C by 2065.[239] The region is very likely to exceed the 1986 to 2005 baseline by 3 to 6°C by century's end.[240] By mid-century, projections indicate 1 to 4 fewer days below freezing during each winter month.

For Zambia in particular, a majority of climate models suggest annual temperature increases, above the 1970-1999 average, of 1.2–3.4°C by 2060 and 1.6–5.5°C by 2090.[241] Hot days are projected to increase 15–29 percent; hot nights are projected to increase 26–54 percent (by 2060).[242] Furthermore, a strong increase in the duration of heat waves as well as a strong reduction in cold spell length is projected. The median projection of change in the duration of long-lasting heatwaves is for an increase of 22 days by 2100, with projected change very likely to fall in the range from 7 to 61 days. Confidence in these figures is medium. This change in the duration of long-lasting heatwaves can be considered to be strong. The median projection of change in the duration of long-lasting cold spells is for a decrease of 8 days by 2100, but some projections show a slight increase. Projected change is very likely to fall in the range from

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230 USAID 2012b
231 Climate Service Center 2015
232 GRZ 2015; According to Climate Service Center data from 2015, mean annual temperature has slightly increased by approximately 0.6 °C since the beginning of the 20th century.
233 GRZ Ministry of Lands, Natural Resources, and Environmental Protection In Press
234 Climate Service Center, 2015
235 GRZ 2015
236 IPCC 2015; RCP4.5 mean model ensembles 25th, 50th, and 75th percentiles
237 USAID 2015
238 Under the B1 and A2 scenarios (compared to the 1961 to 1990 baseline), respectively (The Nature Conservancy, Climate Wizard N.D.).
239 For the RCP4.5 mean model ensembles 25th, and 75th percentiles; they are 1.7 for the 50th percentile.
240 IPCC 2015; Under RCP8.5
241 USAID 2012b; According to the Climate Service Center 2015 data, the median projection of change in annual mean temperature is for an increase of 3.3°C by 2100, with projected change likely to fall in the range from 2.4 to 4.3°C, and very likely to fall in the range from 1.9 to 4.8°C. Confidence in these figures is high. The change in temperature can be considered to be strong. The median projection of change in maximum and minimum temperatures is for an increase of 3.1°C each by 2100.
242 World Bank 2015b

-12 to -4 days. Confidence in these figures is high. This change in the duration of long-lasting cold spells can also be considered to be strong.[243]

RAINFALL AND FLOODING

Across the southern Africa region, seasonal rainfall commences around September, October, or November, and ceases around March, April, or May. December to February is the peak of the rainfall season, while June, July, and August are typically dry (less than 1 mm day).[244] In Zambia in particular, rainfall is extremely variable from year to year. The annual mean precipitation is between 600 mm in the south and 1,400 mm in the north.[245]

Historic trends: Since 1960, there has been an average decrease in annual rainfall of 1.9 mm per decade.[246] Conversely, flooding events have increased in frequency and intensity. For example, from 2000–2007, with an increasing number of floods, the size of the affected area and population also increased.[247]

Future trends: A majority of climate models suggest that the decrease in annual rainfall and increase in the frequency and intensity of heavy rainfall events during the rainy season will continue.[248] The proportion of rain from heavy events is expected to increase.[249] Despite model projections, Zambia's Second Biodiversity Strategy and Action Plan: 2015–2025 points out that variability in annual rainfall remains high and this is likely to continue during most of this century.[250]

- *2035:* Projected reductions in mean annual rainfall for the southern African region are -5 percent, -2 percent, and 0 percent, depending on the climate model, by 2035.[251] Uncertainty for precipitation projections is high.[252]

- *2050 and beyond:* Mean annual rainfall is projected to increase in parts of Northern Zambia before 2050.[253] Many models project that by 2050 the interior of southern Africa will experience decreased rainfall during the growing season due to reductions in soil moisture and runoff. The general conclusion from most studies is that streamflow is projected to decrease by 2050.[254] The median projection of change in the intensity of heavy rain events is for an increase of 8 percent by 2100, but some projections show a decrease. Projected change is very likely to fall in the range from -3 to +19 percent. The median projection for the frequency of heavy rain events is for an increase of 17 percent by 2100. Confidence in these figures is medium. The change in the intensity and frequency of heavy rain events can be considered to be weak.[255]

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[243] Climate Service Center, 2015
[244] Shongwe et al. 2009; USAID 2015
[245] Climate Service Center, 2015
[246] World Bank 2015b; According to the Climate Service Center 2015 data, no clear region-wide trend has been observed in the past for annual total rainfall. Zambia's Second Biodiversity Strategy and Action Plan: 2015–2025 (GRZ Ministry of Lands, Natural Resources, and Environmental Protection. In press) also states that there has been little consistent change (trend) in annual rainfall in Zambia.
[247] World Bank 2015b
[248] USAID 2012b; Climate Service Center, 2015; According to the Climate Service Center 2015 data, climate models do not project a clear trend in precipitation amounts. For the end of the century, a change in annual total precipitation in the range of -6 to +5 percent (compared to the reference period from 1961 to 1990) is likely. The median projection of change in annual total precipitation is for no substantial change until 2100, with some projections showing an increase and some a decrease. Projected change is very likely to fall in the range from -10 to +11 percent. The projected change in precipitation is for almost no change during the second half of the wet season (December to April), but for a decrease during the dry season and the beginning of the wet season (up to -43 percent in September). Confidence in these figures is low. The change in annual total precipitation can be considered to be weak.
[249] World Bank 2015b
[250] GRZ Ministry of Lands, Natural Resources, and Environmental Protection, In Press
[251] For the RCP4.5 mean model ensembles 25th, 50th, and 75th percentiles.
[252] World Bank 2015b; IPCC 2015; USAID 2015
[253] Under the A2 and B1 median scenarios.
[254] Kusangaya et al 2013; USAID 2015
[255] Climate Service Center, 2015

DROUGHTS

Historic trends: Disaggregated information for this climate condition in the southern Africa region is sparse. A drying trend has been observed for many countries in the region—some evidence suggests a spatially coherent increase in consecutive dry days over much of southern Africa in the last decades of the twentieth century.[256] There has been an increase in the frequency and intensity of dry spells[257] and droughts since 1979.[258] The 1991/1992 drought was the most severe in the last century[259]; there have also been droughts within the rainy seasons, particularly in 2000/01, 2001/02 and 2004/05.[260]

Future trends:

- *2030:* Evidence points to an increased inter-annual variability (changes in rainfall timing, intensity and frequency), which may result in more—and more intense—droughts, as well as longer periods between rainfalls.[261]

- *2050 and beyond:* There is medium confidence that droughts will intensify in the 21st century in some seasons, due to reduced precipitation and/or increased evapotranspiration in southern Africa.[262] Consistent with the IPCC 4th Assessment Report, drier winters are projected over a large area in southern Africa by the end of the century. River runoff and water availability are projected to decrease by 10–30 percent in the dry tropics.[263] In Zambia in particular, the median projection of change in the duration of long-lasting dry spells is for an increase of 5 days by 2100, but some projections show a decrease. Projected change is very likely to fall in the range from -2 to +29 days. Confidence in these figures is also medium. The change in the duration of long-lasting dry spells can be considered to be moderate.[264]

WINDS AND OTHER STORMS

Historic trends: Disaggregated information for this climate condition in the southern African region is also sparse.[265]

Future trends: The Indian Ocean High southeast of the African continent is projected to strengthen, on average, during this century. This strengthening displaces tropical lows in a northward direction. This could be responsible for a portion of the projected increase in heavy rainfall events, but heavy winds do not appear to be of particular significance.[266] Large uncertainties surround projected changes in tropical cyclone landfall from the southwest Indian Ocean that have resulted in intense floods during the 20th century.[267]

IMPACTS OF CLIMATE CHANGE FOR ZAMBIA

Zambia is already constrained by a high rate of population growth, the spread of HIV/AIDS, and environmental issues such as air and water pollution, substandard sanitation, wildlife depletion, land degradation and biodiversity loss.[268] Climate change is likely to exacerbate these existing development challenges.[269] Implications for four key sectors (economic development, health, food security and environment) are discussed below:

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256 Kusangaya et al 2013; USAID 2015
257 IPCC 2015
258 USAID 2012b; USAID 2015
259 Sikaundi, G. 2007
260 World Bank 2015b; USAID 2015
261 IPCC 2015; USAID 2015
262 IPCC 2015
263 Kusangaya et al 2013; USAID 2015
264 Climate Service Center, 2015
265 USAID 2015
266 Republic of South Africa Department of Environmental Affairs 2013
267 IPCC 2015; USAID 2015
268 USAID 2012c
269 USAID 2012b

IMPACTS BY SECTOR

Economic Development

The adverse impact of climate change on food and water security, water quality, energy and the sustainable livelihoods of rural communities limits economic development.[270] According to the Pilot Program for Climate Resilience, droughts, floods, and other extreme weather and climate events inflict annual damages of around 0.4 percent GDP. Without adaptation measures, these events are expected to consume around 1 percent of Zambia's annual GDP in the future.[271]

Further studies have estimated GDP loss over a 10–20 year mid-term planning horizon for agriculture productivity and its associated effects on poverty levels, the potential impact of an energy crisis, the higher cost of treating climate related diseases such as malaria and malnutrition, and the loss of natural resources which provide critical ecosystem services to urban, peri-urban and rural communities. The aggregated estimated total GDP loss by sector was in the range of USD 4,330–5,440 million with the following sector GDP losses: Agriculture (2,200–3,130), Energy (270–450), Health (460), and Natural Resources (1,400).[272]

Health

Climate variability is already impacting health in Zambia. Increasing temperatures, droughts and floods will likely result in even more severe impacts. Malaria, diarrhea, cholera, dysentery and respiratory infections, which have increased mortality and morbidity rates in Zambia, are all climate-sensitive diseases.[273] The 2007 National Adaptation Program of Action notes, "These diseases are more pronounced in the provinces that are most vulnerable to climate change/variability in agro-ecological regions I and II. The target provinces are, therefore, Central, Southern, Eastern, Lusaka and Western."

Among them, malaria is the most common.[274] It is a source of even greater concern in light of increases in heavy rainfall events and rising temperatures, which facilitate mosquito breeding and may cause the areas inhabitable by mosquitoes to expand.[275] Increases and changes in the geographic coverage of mosquito populations may put a greater percentage of the population at risk. Cholera outbreaks have also been shown to be associated with increased precipitation. Additional contributing factors, for both cholera and diarrhea outbreaks, include poor drainage systems, contaminated water, and lack of access to potable water.[276] Zambia's Second Biodiversity Strategy and Action Plan: 2015–2025 also predicts that the projected changes in regional rainfall and temperature will combine to cause a significant widening of the distribution within Zambia of a tick vector species responsible for spreading East Coast Fever.[277]

Beyond disease, an increase in the number and severity of droughts could cause crop failures, potentially leading to malnutrition. Similarly, increased flooding may lead to water pollution, exacerbating health and sanitation problems.[278]

Non-climate stresses, such as inadequate health care facilities and providers, high poverty levels, poor water supply and sanitation, food insecurity, and poor nutrition, exacerbate the impacts of climate change on public health. Zambia's high rate of HIV/AIDS places further strain on individual health and livelihoods, the provision of public health services, and food demand, as the disease raises the nutritional requirements of those affected, increasing the need for food, even as climate change impacts increase pressure on crop yields and livestock.[279]

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[270] World Bank 2015b
[271] Climate Investment Funds, 2012
[272] GRZ 2015
[273] USAID 2012b; GRZ Ministry of Tourism, Environment, and Natural Resources 2007
[274] USAID 2012b
[275] USAID 2012c
[276] USAID 2012b
[277] GRZ Ministry of Lands, Natural Resources, and Environmental Protection In Press
[278] USAID 2012c
[279] USAID 2012b

Food Security

Agriculture in Zambia accounts for 18–20 percent of the country's GDP, employs approximately two-thirds of the country's labor force, and is a key source of livelihoods for 50 percent of the country. Approximately 12 percent of total land area is suitable for arable use and over 80 percent of the country's farmers are subsistence farmers.[280]

As agricultural and livestock production are largely dependent on rainfall, the country's high rainfall variability and limited irrigation capacity make them vulnerable to climate change. Low, unpredictable and unevenly distributed rainfall over the last two decades has led to increasing crop loss and food insecurity.[281]

Increased frequency of droughts and shorter rainy seasons can truncate the growing season.[282] For instance, the 2007 National Action Plan for Adaptation (NAPA) refers to studies that show that key crops, such as maize, would not mature due to a shortened growing season.[283] On the flip side, excessive precipitation resulting from climate change can cause flash floods and lead to the destruction of crops and cultivatable land, as well as soil erosion.[284] Flooding has been an issue particularly in northern Zambia.[285]

These results of climate change can also degrade grazing land, leading to loss of livestock.[286] Studies on the predicted impact on climate change referred to in the 2007 NAPA indicate that for livestock, as temperatures and rainfall rise, the cattle population will decrease, and as they fall, the population will increase. Rainfall is key to healthy pastures; healthy pastures enable good nutrition, which in turn enhances immunity and productive capacity. Lower rainfall has also been found to reduce nutrient levels in rivers and lakes, in turn impacting fish breeders and leading to the depletion of vulnerable fish species like bream and sardine.[287]

Environment

Water Resources: Zambia has a relatively abundant supply of surface water and groundwater. However, surface water is unevenly distributed throughout the country, and the southern region often experiences water shortages during the summer.[288]

Non-climate stresses already affecting water resources include pollution from mining, industries, and households; inadequate sanitation facilities, particularly in cities; and increased demand for water sources for household, agricultural, and industrial use.[289] Moreover, population increases in urban centers have also put pressure on groundwater through mismanagement of this scarce resource.[290] These stressors exacerbate the impacts of climate change-induced droughts and floods on agriculture, livestock and fisheries, as well as on health and sanitation.[291] Hydroelectric power, not previously discussed, is also affected, particularly by droughts and temperature increases that lead to increased evapotranspiration.[292] The Climate Investment Fund (2012) notes, "Drought has had devastating effect on the hydropower generation in Zambia with significant economic reduction in the power potential."

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280 USAID 2012b
281 USAID 2012b
282 USAID 2012c
283 USAID 2012b
284 USAID 2012b; USAID 2012c
285 USAID 2012b
286 USAID 2012c
287 GRZ Ministry of Tourism, Environment, and Natural Resources 2007
288 USAID 2012b; Climate Investment Funds, 2012
289 USAID 2012b
290 Climate Investment Funds, 2012
291 USAID 2012b
292 USAID 2012c

Grasslands and Forests: Shrublands, savannas, and grasslands comprise about 49 percent of the country, while forests account for another 16 percent.[293]

The main climatic hazards that threaten the forestry sector are extended droughts, which lead to loss of vegetation, land degradation and diminished soil fertility, as well as forest fires.[294] Warmer temperatures also bring a range of pests and pathogens, which can impact tree growth and survival. More intense rainfall and flooding events can cause land and soil erosion.[295] The 2007 NAPA cites studies indicating that drought and high temperatures are already jeopardizing regeneration of Miombo forest. Others have concluded that the Kalahari and evergreen forest may disappear.[296] Zambia's Second Biodiversity Strategy and Action Plan: 2015–2025 predicts that the projected changes in regional rainfall and temperature will combine to fragment what is now a continuous distribution range of baobab trees in Zambia into four isolated areas.[297]

Non-climate stresses that further exacerbate the effects of climate change on forests and grasslands include increasing demand for fuelwood and charcoal for heating and cooking, clearing of forestland for agricultural expansion, greater demand for timber, and unsustainable land use practices. As evidenced by these non-climate stresses, much of Zambia's rural population depends on grasslands and forests for food, fodder, fuel, and medicinal products. The country's wildlife also depends on forests for habitat. Both groups would be negatively affected by forest loss.[298]

Wildlife: Over 30 percent of Zambia's land is managed in PAs. The park system and the wildlife it supports is a major draw for foreign tourism, which is an important source of livelihoods and economic growth in the country. Changes in precipitation, temperature, and forest fires may reduce wildlife diversity and abundance, and alter the ecosystems and habitats they depend on for survival. Droughts and decreases in rainfall may increase water scarcity, and reduce the quality of fodder that wildlife populations depend upon for survival.[299] Under excessive rainfall, wetland animals like the Lechwe and Puku would be adversely affected.[300] Both droughts and flooding events may force or enable animals to migrate uncontrolled into human settlements, increasing the potential of conflict.[301] Non-climate change factors, such as increased agricultural activity near rivers and unprotected wildlife habitats, greater demand for timber, and unsustainable land use practices, affect animal populations and also increase the likelihood of human/wildlife conflict.[302]

Zambia's Second Biodiversity Strategy and Action Plan: 2015–2025 notes that temperature increases have "resulted in higher rates of potential evapo-transpiration and because there has been no corresponding increase in annual rainfall the country has been experiencing dry spells whose effects on biodiversity have been amplified, especially in years of below average rainfall. Agro-ecological Zone I has been severely affected by warming in terms of effective rainfall and surface water sources for agricultural production and wildlife. Agro-biodiversity and wildlife will increasingly be more negatively affected in future by the recurrent warming and drying in the country".[303]

IMPACTS OF CLIMATE CHANGE FOR ZAMBIA BY USAID PROJECT

This section outlines the potential impact of climate change on several USAID projects, as well as the potential impacts of USAID projects on climate change. Though the section discusses project-specific impacts, projects with similar objectives (e.g., increasing agricultural productivity) are grouped together. Due to the number of projects addressing both food security and economic development, these two sectors have been merged into one category for the purposes of this section.

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[293] USAID 2012b; A potentially conflicting source indicates that the Zambia's vegetation is primarily savannah woodlands, dominated by Miombo woodlands, which cover about 50 percent of the country.
[294] USAID 2012b; GRZ Ministry of Tourism, Environment, and Natural Resources 2007
[295] USAID 2012b
[296] World Bank 2015b
[297] GRZ Ministry of Lands, Natural Resources, and Environmental Protection. In press.
[298] USAID 2012b
[299] USAID 2012b
[300] GRZ Ministry of Tourism, Environment, and Natural Resources 2007
[301] USAID 2012b; GRZ Ministry of Tourism, Environment, and Natural Resources 2007
[302] USAID 2012b; USAID 2012c
[303] GRZ Ministry of Lands, Natural Resources, and Environmental Protection. In press.

ECONOMIC DEVELOPMENT AND FOOD SECURITY

Current USAID projects in this sector that either aim to improve agricultural productivity or depend on sustainable agricultural production include: CASH, PROFIT+, ZERS–Mawa, FTF Zambia Policy Strengthening Project, DCA, U.S. African Development Foundation (USADF) Participating Agency Partnership, and PPPs to Scale up FTF and Integrate GCC and Biodiversity into Agricultural Development in Eastern Province. For these projects, climate change could negatively impact outcomes, as increases in temperature, droughts and decreases in precipitation, as well as floods could all harm crops. The resulting decrease in agricultural activity would harm farmers (CASH), local trade and markets (PROFIT+, USADF), vulnerable households and agricultural value chains (ZERS), and overall national productivity (Feed the Future). In most cases, selecting crops and varieties of crops that are drought resistant to promote or fund (DCA) will help to ensure that climate change does not adversely affect project impacts. Some projects, like Feed the Future, are already integrating climate change considerations.

HEALTH

The potential impacts of climate change on food security may have knock-on effects for projects tackling health issues. HIV prevention and care projects such as ZPCTII and PEPFAR may be impacted by, for instance, 1) decreased nutrition negatively contributing to outcomes for HIV/AIDS-infected people, and 2) climate change-induced migration changing geographic patterns of infection. These programs can avoid negative consequences for their results by taking these potentialities into consideration.

Malaria-related programs, such as the PMI (including ITNs and AIRS), may also be impacted by climate change. Changes in temperature and rainfall patterns may alter the geographic shape/size/location of breeding areas for mosquitoes carrying malaria. These projects can maintain the potential for good results by allowing flexibility in the geographic distribution of nets and spraying. An increase in both may be necessary, if a large increase in the number of people affected occurs.

Lastly, sanitation and hygiene projects like SHIELD can be negatively impacted by climate change via the impact of flooding on sanitation infrastructure. This infrastructure facilitates hygiene in many ways, so both may be at risk.

ENVIRONMENT

Temperature and rainfall changes can negatively impact forests and wildlife; over longer periods of time forests may deteriorate, and wildlife food security and habitat may suffer. Natural resource and wildlife management and conservation projects like the CFP, G2G Support, VIGOR, PAPA, Althelia Climate Fund, and GDA may face an extra challenge if climate change leads to the deterioration of forests, thus impacting the communities that depend on them. Some of these projects, like the Althelia Climate Fund and PAPA, also promote "sustainable landscape projects" or small-scale agriculture, for example, the planting of fair trade coffee, which are susceptible to the agriculture-specific impacts described in the Economic Development and Food Security section above. Furthermore, decreases in food security due to the negative impacts of climate change on agriculture may prompt local communities and vulnerable households to rely increasingly on forest products and wildlife.

For projects aiming to protect species biodiversity and wildlife populations (GDA, VIGOR), Conservation Biogeography summarizes recent thinking about the effects of climate change on biodiversity.[304] Paraphrasing the book, the main conclusions are that:

- PAs cannot stop the climate change threat; rather PAs can be made obsolete by climate change. The key is how to deliver species persistence in the face of climate change.
- One approach is protect individual species throughout their respective present and predicted future ranges; however, to address uncertainty over where those ranges extend, and to ensure continuity between the present and predicted future ranges, may require potentially infeasible investments in very large PAs or corridors.

[304] Ladle, R. and J. Whittaker, eds., 2011

- It is difficult to compare the costs and benefits of investing in one large range, for example, a continental corridor, and many smaller and more scattered investments in PAs. Factors that should be considered include: (1) what climate parameters are changing; (2) how other threats will change with climate change; (3) what PA will most likely succeed for social, economic and political reasons; (4) what PA will best leverage the available financing; (5) what PA will achieve the highest benefit to cost ratio; (6) what monitoring will be required to ensure effectiveness; and (7) what will happen to these areas if nothing is done?

IMPACTS OF USAID PROJECTS ON CLIMATE CHANGE

The USAID Zambia portfolio includes a number of projects that specifically address climate change, through the funding of renewable energy or low-emission energy generation (Power Africa, EC-LEDS, USADF), as well as through REDD+ and Althelia Climate Fund. There are also several forest management projects that indirectly address GHGs, including the CFP, G2G, VIGOR, and PAPA. These projects should all have a positive or neutral impact on climate change, as they either avoid an increase in GHG emissions from the combustion of fossil fuels (though they do not necessarily *reduce* the level of GHG emissions from existing traditional energy sources), or reduce the rate at which sequestration of CO2 by forests is declining (though not necessarily *increasing* the overall level of sequestration).

CHALLENGES

GRZ and the donor community have initiated activities to help determine priority climate impacts and vulnerabilities, adaptation strategies, and means to integrate this knowledge into development and sectoral planning. Despite these efforts, a number of challenges and needs remain. These include collecting additional climate-related data, monitoring climate change impacts, improving training for policymakers and other relevant stakeholders, moving from the development of adaptation plans to their implementation by the line ministries, addressing capacity and financial constraints to adaptation, increasing public awareness on climate change issues, and developing a legal and policy framework to help direct adaptation planning.[305]

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ANNOTATED BIBLIOGRAPHY

SOURCE	AUTHOR/ ORGANIZATION	DATE	METHODOLOGY	SCOPE	RELEVANCE
Pilot Program for Climate Resilience: Zambia	Climate Investment Funds (CIF)	2012	N/A	Covers basic contextual information pertaining to current climate, infrastructure conditions, GDP, etc.	Low

[305] USAID 2012b; USAID 2012c

SOURCE	AUTHOR/ ORGANIZATION	DATE	METHODOLOGY	SCOPE	RELEVANCE
				The rest is specific to the CIF pilot program, e.g., investment focus areas and expected achievements.	
National Adaptation Program of Action (NAPA)	Government of Zambia	2007	Zambia has developed its NAPA by evaluating the impacts of climate change on the relevant sectors and using Multi-Criteria Analysis, has ranked the identified most urgent needs to prioritize ten immediate adaptation interventions.	Assessment of climate change/variability for Zambia's three ecological regions, in particular, precipitation for both baseline (1970-2000) and projected (2010-2070) scenarios covering agriculture and food security, human health and natural resources and wildlife. Sectors analyzed are agriculture and food security (livestock, fisheries and crops), energy and water, human health, natural resources and wildlife.	High
Zambia Intended Nationally Determined Contributions	Government of Zambia	2015	Method for estimating emissions was based on the Revised 1996 IPCC Guidelines and 2000 Good Practice Guidance.	Covers both mitigation and adaptation. Sectors covered include energy, agriculture, waste, and land use/land change/forestry	High
Climate Change Adaptation in Zambia	USAID	2012	Sources include several key documents published by the Government of Zambia: the National Climate Response Strategy (2010), Formulation of the National Adaptation Programme of Action on Climate Change Report (2007), National Water Resources Report (2008). The UNDP Climate Change Country Profile for Zambia was also used, among other resources.	Covers climate impacts and vulnerability; key sector vulnerabilities; key ecosystem vulnerabilities, national strategies; plans and institutions relevant to climate change, government adaptation priorities, key players and initiatives; and priority challenges and constraints for addressing vulnerability and increasing resistance.	High
Zambia Climate Vulnerability Profile	USAID	2012	Sources are primarily other USAID documents pertaining to Zambia. The Government of Zambia's 2007 National Adaptation Programme of Action and the Central	Covers projected weather and climate changes, key climate impacts and vulnerabilities, key USAID program	High

SOURCE	AUTHOR/ ORGANIZATION	DATE	METHODOLOGY	SCOPE	RELEVANCE
			Intelligence Agency World Factbook were also used.	vulnerabilities, actions underway and challenges to adaptation.	
Climate Information Factsheet: Southern Africa	USAID	2015	The information contained in this factsheet is a summary of information and data from several sources, including: the World Bank Climate Change Knowledge Portal, the CSAG Climate Tool, Climate Wizard, IPCC AR4 and AR5, and the Köppen-Geiger climate classification world map, among others.	Covers four climate zones within the Southern Africa region. Zambia lies within the Central/Southeastern zone. Information is given for five groups of variables: temperature, precipitation and flooding, drought, sea level rise and storm surge, and wind and other storms. Current conditions are described, as well as predictions for the future, both 2030 (generally 2020–2049) and 2050 (generally 2040–2059).	Medium
World Bank Climate Change Knowledge Portal—Zambia Data	World Bank	2015	For Global Climate Model (GCM) data: the climate science community sources a suite of models to inform decision makers on future climate. Among the most widely used are GCMs that capture the non-linear complexity of the Earth to represent changes across the climate system for key processes and contexts. The collection of models presented here represents the best-presently-available-data to outline likely future changes in the climatologies of temperature and precipitation across the globe. For downscaled data: The dataset presented here was developed in a collaborative effort between The World Bank, The Nature Conservancy, Climate Central, and Santa Clara University to	This climate change knowledge portal contains 4 sections: climate data, impacts (agricultural, natural hazards and water), vulnerabilities and country adaptation profiles. The climate data section presents data from future GCM and downscaled predictions. In addition, it presents historical data in a tool that allows you to view historical variability. Finally, it also allows for the comparison of information from different models, scenarios, time periods and climate variables. For GCM data: CIMP3[307] and CMIP5[308] datasets available, including data	High

[307] IPCC 2015; The standard for raw GCM data distribution from the IPCC Fourth Assessment Report
[308] IPCC 2015; The standard for raw GCM data distribution from the IPCC Fifth Assessment Report

SOURCE	AUTHOR/ ORGANIZATION	DATE	METHODOLOGY	SCOPE	RELEVANCE
			produce the first standardized set of daily downscaled GCM projections that span the entire globe. This includes all terrestrial daily data archived in Coupled Model Intercomparison Project (CMIP)3: nine different GCMs, some with multiple model runs, across three different GHG emissions scenarios (SRES A2, A1b, B1), totaling 53 future projections, all downscaled to a 0.5 degree resolution (~50 km) for the time periods of 1961–1999, 2046–2045, and 2081–2100.[306] The downscaling method used was a daily-timescale variant of a method known as Bias Correction/Spatial Downscaling that has been widely applied to produce monthly downscaled quantities based upon monthly GCM results. The monthly version of the method is described by Wood et al. (2002 and 2004). The downscaling and bias-correction was done using historical observed daily gridded observations. The base meteorological data consists of daily time-series for the period of 1950 through 1999 of precipitation, maximum temperature and minimum temperature. Monthly station data from a variety of sources (including	for rainfall, temperature, maximum temperature and minimum temperature. Time periods available are 19-year increments starting in 2020, 2040, 2060, and 2080. Mean and change are available. Scenarios RCP2.6, 4.5, 6 and 8.5 and 16 different models are available.[309] For downscaled data: temperature and rainfall data available for two time periods (2046–2065 and 2081–2100) under three scenarios (A1B, A2 and B1). Statistics available include maximum and minimum temperatures for the month, percent of very warm and very cold days, growing degree days > 10°C, heating degree days and cooling degree days.	

[306] Special Report Emissions Scenarios. A1 Storyline: Describes a future world of very rapid economic growth, global population that peaks in mid-century and declines thereafter, and the rapid introduction of new and more efficient technologies. A2 Storyline: Describes a very heterogeneous world, in which communities display self-reliance and preserve local identities. B1 Storyline: Describes a convergent world with the same global population that peaks in midcentury and declines thereafter, as in the A1 storyline, but with rapid changes in economic structures toward a service and information economy, with reductions in material intensity, and the introduction of clean and resource-efficient technologies. B2 Storyline: Describes a world in which the emphasis is on local solutions to economic, social, and environmental sustainability.

[309] Representative Concentration Pathway (RCP): Scenarios that include time series of emissions and concentrations of the full suite of GHGs and aerosols and chemically active gases, as well as land use/land cover. RCPs usually refer to the portion of the concentration pathway extending up to 2100, for which Integrated Assessment Models produced corresponding emission scenarios. RCP4.5: Generally, moderate emissions. One of two intermediate stabilization pathways in which radiative forcing is stabilized at approximately 4.5 W m–2 after 2100; RCP8.5: Generally, high emissions. One high pathway for which radiative forcing reaches >8.5 W m–2 by 2100 and continues to rise for some amount of time (IPCC 2015).

SOURCE	AUTHOR/ ORGANIZATION	DATE	METHODOLOGY	SCOPE	RELEVANCE
			the Global Historical Climatology Network (GHCN) version 2 data) were compiled and gridded over all global land areas. The daily variability of precipitation, maximum and minimum temperature was constructed using other global daily datasets, which were scaled to match the monthly values.		
UNDP Climate Change Country Profile for Zambia	C. McSweeney, M. New, and G. Lizcano for UNDP	2012	Unspecified.	Covers general climate, recent climate trends (temperature and precipitation), GCM projections of future climate (temperature and precipitation), and other regional climate change information. Visuals given for all categories of information.	High
African and Latin American Resilience to Climate Change (ARCC) data repository website	USAID	N/A	N/A	Portal for the ARCC project containing links to all publications, including climate change vulnerability assessments (see above) and technical reports. There were no technical reports pertaining to Zambia.	Low
Climate Systems Analysis Group (CSAG) Climate Information Platform (CIP)	Cape Town University	2015	Two datasets are available: "Africa merged stations CMIP3" and "Africa merged stations CMIP5." CMIP3 is a merged set of stations sourced from the GHCN and World Meteorological Organization (WMO). The dataset contains both observed and downscaled time series for each station location. Only stations that include all three primary variables (rainfall, min/max temperatures) are included. Currently the downscaled projections are based on the CMIP3 models for the A2 and B1 emissions scenarios for the two time	Shows historical rainfall information from satellites by month, starting in 1998 and ending in 2012. The website indicates that other kinds of data, including future climate predictions and information about temperature, may be available but it did not appear to be at the time the website was visited.	Low

SOURCE	AUTHOR/ ORGANIZATION	DATE	METHODOLOGY	SCOPE	RELEVANCE
			periods of 2046–2065 and 2081–2100. This is a merged set of stations sourced from the GHCN, WMO and country Met. Services. Time series from stations common to both the WMO and GHCN datasets have been merged provided the data in the overlapping period is identical. The dataset contains both observed and downscaled time series for each station location. Only stations that include all three primary variables (rainfall, min/max temperatures) are included. The downscaled projections are based on the CMIP5 models for RCP 4.5 and RCP 8.5.		
Climate Service Center Climate Fact Sheet: Zambia	Climate Service Center (Germany)	2015	All projections (except information on the sea level) are based on the results of the GCM projections, which are the base of the Fourth Assessment Report of the IPCC (AR4: www.ipcc.ch). Information on current climate and historical trends, as well as the climate diagrams, are based on the available global data set compiled by the Climatic Research Unit from the University of East Anglia. Also data from the so-called Water and Global Change Programme (WATCH) forcing data (compiled within the EU-project WATCH - Water and Global Change) has been used. Data on evaporation, wind speed and solar irradiance has been taken from reanalyses data (ERA-interim) compiled by the European Centre for Medium-Range Weather Forecasts. All projected changes presented in the Climate-Fact-Sheet are with respect to the	Historical climate data and future projections for Zambia covering temperature, heatwaves, cold spells, solar irradiance, precipitation, evaporation, water balance, dry spells, heavy rains, wind speed.	

SOURCE	AUTHOR/ ORGANIZATION	DATE	METHODOLOGY	SCOPE	RELEVANCE
			reference period from 1961 to 1990. The evaluation of the signal strength includes not only the actual climate change signal but also the statistical significance of the projected change. The assessment of the confidence in the climate model projections is based on the models' performance in simulating today's climate as well as on the bandwidth of projected climate change. This bandwidth results from the fact that every climate model projects a slightly different climate change signal.		

ANNEX B. STAKEHOLDERS CONSULTED

WASHINGTON DC

Pre-field Consultations

21 and 22 September, 2015

Walter Knausenberger— Senior Regional Environmental Policy Advisor, AFR

Mary Rowen, DFED— Senior Biodiversity Policy Advisor, E3/FAB

Kirstin Siex— Senior Biodiversity Policy Advisor, AFR

Tegan Blaine— Senior Climate Change Advisor, USAID AFR

Andrew Tobiason — Sr. Biodiversity Advisor, E3/FAB

Karl Fickenscher— Deputy Coordinator, Power Africa, USAID/Southern Africa

Michelle Gadd– USFWS, Elephants and Rhinos Program

Lauren Chitty— Africa and Middle East Program, USFS International Programs

Megan Fotheringham— Public Health Advisor PMI

James Deutsch– Formerly Wildlife Conservation Society, Presently COMACO and Vulcan

MUMBWA TOWN, (adjacent to KAFUE NATIONAL PARK)

12 Workshop Attendees

14 October, 2015

Chief Chibuluma

Chieftainess Kabulwebulwe

Chief Kaindu

F. Mulungushi

R. Mutekele

A Chipindu

Teddy Bwalyua—ZAWA

P. Moonge—ZAWA

B. Chinyama

A Chipasu

Edjan van der Heide—Dir., Mukambi Safari Lodge

Charlotte McBride— KPOA and McBrides' Camp

Derick Kandundwe— Itumbi/Kaingu Trust

NANZHILA, KAFUE NATIONAL PARK

14 Workshop Attendees

15 October, 2015

Vaughan Humphrey— Kaingu Lodge and Nsonga Safaris Ltd.

Sport Beattie—Game Rangers International

Andy Wilson—Kasabushi Camp

Elizabeth Wilson—Kasabushi Camp

Mubita Kaongolo—Shezongo CRB Chair

Chief Shezongo—Luchena Palace

Francis Kafuku—Shezongo CRB

Chief Musungwa— Musungwa Palace

Chimama Everlyn— Musungwa CRB Chair

Faula Namalongo— Chief Musungwa Retainer

Given Namalongo— Musungwa Palace

David Chirwa— Nanazhila Plains Safari Camp

Kennedy Mwetwa— ZAWA

Lewis Daka— ZAWA

Victor Bwalinde— Fisheries Officer, Itezhi-Tezhi

Gilbert Chiluba— Fisheries Officer, Itezhi-Tezhi

Norris Mapeta— Fisheries Officer, Itezhi-Tezhi

Derick Kandundwe— Trustee, Itumbi/Kaingu Trust

Steve Smith— Nanzhila Plains Safari Camp, MD Sicaba Ltd.

Cindy Smith— Nanzhila Plains Safari Camp

ZAWA H.Q. Chilanga

7 Workshop Attendees

19 October, 2015

Harris Phiri— Department of Fisheries

Edward Chilufya— Department Head ZAWA

Jarton Shawa— ZAWA Forestry

Chipo Nchimumya— ZAWA

Chabala Chiyaze— ZAWA

Geofrey Siulemba— ZAWA

Sitali Liwena— ZAWA to KAZA Transfrontier Conservation Area

Chaka Kaumba— ZAWA, GIS officer

KASANKA TRUST

22 Workshop Attendees

21 October, 2015

Chief Chitambo— Chief's Palace

Leah Mulenga— Crops, MoAg

Judith Mumbwa— Fisheries, MoAg

Lucy Haguyu— MoAg

Mbwainga Mbwainga— Dir. of Works

Maambo Coillard— Forestry

Phiri Chiudzu— Forestry

Alfeto Nyirenda— Supervisor, MoAg

Jason Mutoya— Councillor

Muzuwa, Winten— Chief's Advisor and Farmer

Mwati Abify— Community Police Officer

Roger Monde— ZAWA

Tryveen Banda— Chief's Advisor

Robert Kulofwa— Head Teacher

Elam Chiwila— Headman

Patson Mwila— Secretary, Community CRB

Alfred Mwemba— Park Ranger, ZAWA

Jonathon Yamba— Community outreach, Kasanka Trust

Kebby Kunda Chanda— Chair, Chitambo CRB

Carl Huchzermeyer— Fisheries manager, Bangweulu Wetlands

Chris Meyer— Tourism Director, Kasanka Trust

Lazarus Mfula— Environmental Education Officer, Kasanka Trust

SOUTH LUANGWA

27 Workshop/meeting Attendees

20, 21, 21 October, 2015

Godfrey Mwanza— Scout

Megan Parker— U.S. trainer

Chris Kenyon— Veterinarian

Victory Wallace— Foundation member/Safari operator

Juno Ragna Bos— Safari operator

Jailiius Jailius Muchenga— Registered wildlife guide

Zick Kolala— Registered wildlife guide

Finnias Malagala— Park manager, ZAWA

Emmanuel Banda— Village scout

Gastor Zimba— Chief's representative

Manda Roger— Headman

Phiri Mendrickson— CRB officer

Matthews Gashim— CRB bookkeeper

Benny Simonda— Wildlife post officer

Thomas Gowenda— Village scout

Kelvin Sakala— Village scout

Steve Zulu— Community representative

Love Delongu— CRB chairperson

Jonathon Kachikoti— CRB NRM

Chief Nsefu— Senior Chief

Paul Manda— Founder

Collins Lungu— Board member

Ponde Mecha— Deputy COP

Sam Lungu— Environmental specialist

Grantham Chilimina— Marketing manager

Joe Munalula— Input marketing manager

Sinyanda Mwendabai— Productivity manager

MISSION CONSULTATIONS

13-29th October, 2015

Michael Yates— Mission Director

Debra Mosel— Senior Program Officer

Chris Foley— Project Development Officer

Anna Toness— Office Director EDEV

Mwewa Katongo— Mission Environmental Officer

David Rush— Regional Legal Advisor

Frank Monticello— Financial Management Officer

Stella Mutale— Deputy Team Lead

Richard Musukuma— Senior Budget Specialist

Kevin Chilemu— Gender Specialist

Patricia Sitimela— Deputy MEO

Carrie Nielsen— CDC Officer

Chomba Sinyangwe— Activity Manager AIRS

NGO, OTHER DONORS, INDEPENDENTS

13-29th October, 2015

Karl Pfeffer— Project Director, Zambia Green Jobs Program, UN International Labor Organization (ILO)

Tapera Muzira— Technical Officer, Zambia Green Jobs Program, UN ILO

Maxwell Nkoya— Acting Director General, ZEMA

Michwe Kabwe— Climate Change Specialist, ZEMA

Darren Jones— Climate Change Specialist, USFS

Mwansa Lukwesa—Environmental Specialist, World Bank

Ian Stevenson— Conservation Lower Zambezi

Godfrey Mwanza— Scout, South Luangwa Conservation Society

Megan Parker— U.S. Trainer, Working Dogs for Conservation

Chris Kenyon— Veterinarian, Working Dogs for Conservation

Paul Manda— Founder, SlyPaul Foundation

Collins Lungu— Board Member, SlyPaul Foundation

Ponde Mecha— Deputy COP, PROFIT+

Sam Lungu— Environmental Specialist, PROFIT+

Grantham Chilimina— Marketing Manager, PROFIT+

Joe Munalula— Input Marketing Manager, PROFIT+

Sinyanda Mwendabai— Productivity Manager, PROFIT+

James McCafferty, Fred Formanek — Advance Africa

Andrea Brown, Matthew Lynch, Ciaran Harman, Ed Bower, Jessica Lawson, Hannah Koenker— John Hopkins, VectorWorks

Andrew Parker— African Park Foundation

Luke Chirwa— Manager, Musungwa Lodge. Itezhi-Tezhi

Victor Shibomba— Head Safari Guide, Mukambi Lodge, Mumbwa GMA.

Ms. Jun Yamazaki— Embassy of Japan

Royal Norwegian Embassy— Hans Peter Melby Deputy Head of Mission

Dr. Victor Siamudaala— Country Director

Tom Snitch — University of Maryland

Rolf Shenton— Grassroots Trust

Global Community Concerned— Pastor Kennedy Nyendwa

His Royal Highness Chief Chipepo of Southern Province

Francois D'Elbee— Environmental and culture art, Wildlife SU specialist

Robert Liebenthal— Consultant Economic Development EAZ

ANNEX C. KEY RECOMMENDATIONS FOR USAID PROGRAMMING TIED TO SPECIFIC ACTIONS

For each of the strategic recommendations, the assessment identified specific actions that may inform future USAID/Zambia program design, but may not have been captured as part of the highlighted opportunities. In an effort for full disclosure and to provide USAID/Zambia with information that is as complete as possible, specific actions or specific opportunities are capture here in Annex Table C1.

Table C1. Key strategic recommendations and specific actions

STRATEGIC RECOMMENDATIONS	SPECIFIC ACTIONS
General cross-cutting considerations to be integrated into all target areas	• Develop and leverage relationships with traditional leadership
	• Create non-monetary reward systems and incentives for GRZ officials, traditional leadership, and communities (e.g., education opportunities, farm to market access, tax incentives, etc.)
	• Provide vocational training and/or entrepreneurship training to diversify livelihoods
	• Encourage research engagement and public private partnerships with international and domestic entities to promote science and technology initiatives and business development to drive sustainable NRM, energy production, and agriculture
TARGET AREAS: CONSERVATION, ECOTOURISM, NRM, BIODIVERSITY	
1. Build institutional capacity through knowledge sharing, financial support, and updated technological capacity for GRZ NRM agencies and offices	• Encourage transparent, adequate, and timely compensation mechanism for GRZ authorities to address corruption, complacency, and challenges recruiting.
	• Provide institutional support to GRZ to monitor and fight forest fires and to investigate and prosecute illegal fires.
	• Support climate change research and policy efforts within ZEMA, which currently lack funding.
	• Connect ZAWA to USFWS enforcement agents for free training that transcends complete emphasis on punishment.
	• Examine the generation of revenue from licenses, taxes on aquaculture enterprises, and tourism to support a fully functioning Department of Fisheries.
2. Focus interventions regionally to leverage unique opportunities for development	• Develop fire management plans for ecologically important regions of the country addressing the multiple needs of stakeholders and addressing unique and key areas of endemic, threatened or irreplaceable natural resources.
	• Promote legal, sustainable alternative protein sources through increasing aquaculture, game ranching or the consumption of invasive species (e.g., crawfish).
3. Develop local level NRM engagement through education, capacity building, and institutional controls	• Educate CRBs on sustainable NRM (e.g., fire management) and develop their capacity for entrepreneurship to service the community more broadly and obtain funding by means other than hunting fees.
	• Provision/stimulation of alternative income-generation activities of poachers—game ranching, value-added products (from skins, forest) study tour, seed aquaculture and bee-keeping

STRATEGIC RECOMMENDATIONS	SPECIFIC ACTIONS
	• Promote agricultural techniques which are climate sensitive and contribute to community resiliency
	• Develop an education plan for communities on appropriate and inappropriate fire management.
	• Promote legal use of fisheries by engaging commercial fisherman, making licenses affordable and obtainable, and encouraging reporting on illegal uses.
4. Develop integrated NRM plans that are cognizant of local economic and social drivers, climate change and support implementation	• Assist Department of Fisheries in the development and implementation of integrated fisheries management plans.
	• Assist GRZ in implementation of existing integrated wildlife management plans and project implementation plans (e.g., those that already exist for Kafue National Park). Reevaluate these plans to ensure climate change analysis have been included.
	• Develop rural and urban development plans that include local business development and linkages of villages to administrative centers. Consider redistricting if needs to provide better service to remote villages.
	• Conduct an assessment to evaluate the reasons for burning and develop coping mechanisms that do not require burning.
	• Conduct research on natural fire-return intervals, research on GMA community decision-making (by village) and needs analysis
	• Develop an integrated systems model to address key questions about engaging in a multiple resource mix.
5. Create an enabling environment for business to engage in conservation and economic development of "green" or environmentally responsible projects	• Create a clear and transparent means of starting a business and engaging local communities by consolidating and streamlining the permits and licenses process, fees structure, and due diligence investigations.
	• Encourage cooperative economic development plans for GMAs and National Parks
	• Develop the fodder market as an alternative livelihood so fires are not started for grazing purposes only.
6. Realign NRM policies and agency organization to make them more efficient and able to leverage private sector interests	• Examine where responsibilities of ZAWA could be reasonably out-sourced to the private sector and foster and enabling environmental for business development and public private partnerships in the conservation sector.
	• Put ZAWA planning into Fin. Min. Planning Dept. (e.g., with Climate Change Secretariat foresters)
	• Provide legal and technical assistance to co-manage land uses with PPP and CCP.
	• Set-up secure international trusts with NGOs and bilateral donors to perform or assist some functions that are current under GRZ
7. Improve the transparency of governance of natural resources and enforce policies and regulations	• Delimit the boundaries of national parks and protected forests to prevent encroachment.
	• Strengthen resource governance by GRZ with data collection, analysis, and monitoring of natural resources with a modern IT system, databases, and remote sensing.

STRATEGIC RECOMMENDATIONS	SPECIFIC ACTIONS
	• Put in place staff, structures, and resources to enforce regulations, licensing, and fee collection on timber and charcoal
	• Communicate when back burning is being conducted particularly in national parks as it threats business and lives without proper communication.
	• Improve enforcement of regulations such as fishing bans and appropriate tackle through patrolling and education.
TARGET AREA: AGRICULTURAL DEVELOPMENT/ECONOMIC DEVELOPMENT	
8. Promote agricultural intensification, diversification, and climate-smart practices rather than expansion	• Promote climate smart agriculture and adoption of innovative technologies and proven solutions (demos, small-holder credit, and training in alternative crops, manure treatment, training on coppicing) to improve yields, particularly in resource limited villages.
	• Diversify agricultural services sector, particularly in regions with adequate rainfall and private interest through public private partnerships and trainings
	• Conduct analyses of climate change impacts on agriculture and water availability and develop a national adaptation strategy.
	• Provide vocational training or entrepreneurship training to diversify the jobs available to youth and subsistence farmers.
	• Support extension services from both government and private sector particularly for agriculture and entrepreneurship skills.
TARGET AREA: ENERGY	
9. Develop reliable forms of energy, alternative sources of energy, and put in place stop-gap until the national energy infrastructure develops	• Promote fuel efficient cookstoves, biochar, or other technologies that will limit the need for charcoal or timber as cooking fuel.
	• Support a national energy plan with targets on renewable energy and providing consistent clean power.
	• Issue reliable notices and schedules for load shedding to allow for households, particularly in urban areas to plan.
TARGET AREA: COMBATING POLLUTION	
10. Establish life cycle monitoring and enforcement of policies for pollution and hazardous waste management	• Support the enforcement of standards for emissions to air, surface water, and groundwater at the federal and local level.
	• Provide a link between local monitoring and oversight/reinforcement of penalties.
	• Facilitate tracking of long-term pollution, including contributions to climate change, by providing IT and database support to modernize ZEMAs systems.
	• Develop an integrated and coherent national strategy for the scale-up of the livestock industry and its waste as well as the inputs associated with the agricultural sector (e.g., cotton inputs).
11. Encourage PPP and encourage private enterprise in waste management and control	• Considering coordinating or working with the UN International Labour Organization (ILO) through a public international organization grant to make solid waste management a profitable, self-sustaining business in urban areas. Link rural waste disposal networks to those of urban areas using a profitable cost-sharing model.

STRATEGIC RECOMMENDATIONS	SPECIFIC ACTIONS
	• Support business development and construction of a privately run hazardous waste facility in the country.
12. Develop donor led strategies that integrated and are sustainable at the national health care system level to handle wastes	• Further investigate the off-uses for fishing with mosquito nets during blanket leverage campaigns.
	• Support the enforcement of standards for emissions to air, surface water, and groundwater at the federal and local level.
	• Consider cost sharing for the incineration of medical wastes as an integral part of health programs.
	• Support higher education and training initiatives for professionals in occupational safety and health.

ANNEX D. THREATENED AND ENDANGERED SPECIES

KINGDOM	SCIENTIFIC NAME	COMMON NAME	RED LIST STATUS*	YEAR ASSESSED	TREND
Animalia	Acinonyx jubatus	Cheetah, Hunting Leopard	VU	2015	Decreasing
Plantae	Aeschynomene venulosa		NT	2012	Unknown
Animalia	Agapornis lilianae	Nyasa Lovebird	NT	2012	Decreasing
Animalia	Agapornis nigrigenis	Black-cheeked Lovebird	VU	2013	Decreasing
Plantae	Aldrovanda vesiculosa	Waterwheel, Common Aldrovanda	EN	2012	Decreasing
Animalia	Altolamprologus calvus		NT	2006	Unknown
Plantae	Anagallis elegantula		NT	2010	Unknown
Plantae	Anagallis kochii		NT	2010	Unknown
Animalia	Anax bangweuluensis	Swamp Emperor	NT	2010	Unknown
Plantae	Ansellia africana	Leopard Orchid, Monkey Sugarcane, African Ansellia, Mopane Orchid, Tree Orchid	VU	2013	Decreasing
Animalia	Aonyx capensis	African Clawless Otter, Cape Clawless Otter	NT	2015	Decreasing
Animalia	Aquila nipalensis	Steppe Eagle	EN	2015	Decreasing
Animalia	Ardeola idae	Madagascar Pond-heron, Madagascar Squacco Heron, Malagasy Pond Heron	EN	2012	Decreasing
Animalia	Ardeotis kori	Kori Bustard	NT	2013	Decreasing
Plantae	Baikiaea plurijuga	Rhodesian-teak, Zambesi Redwood	NT	1998	
Animalia	Balaeniceps rex	Shoebill, Whale-headed Stork	VU	2015	Decreasing
Animalia	Balearica regulorum	Grey Crowned-crane, Southern Crowned Crane	EN	2013	Decreasing
Plantae	Baphia speciosa		NT	2012	Stable
Plantae	Barleria aenea		VU	2015	Unknown
Plantae	Barleria richardsiae		VU	2015	Unknown
Animalia	Bathanalia howesi		EN	2010	Unknown
Animalia	Bellamya crawshayi		EN	2010	Stable
Animalia	Bellamya mweruensis		CR	2010	Decreasing
Animalia	Bellamya pagodiformis		CR	2010	Decreasing
Plantae	Brachystegia bakeriana		VU	1998	

KINGDOM	SCIENTIFIC NAME	COMMON NAME	RED LIST STATUS*	YEAR ASSESSED	TREND
Plantae	Brachystephanus coeruleus		NT	2015	Unknown
Animalia	Brazzaea anceyi		VU	2010	Unknown
Animalia	Bridouxia praeclara		NT	2010	Unknown
Animalia	Bucorvus leadbeateri	Southern Ground-hornbill	VU	2012	Decreasing
Animalia	Bugeranus carunculatus	Wattled Crane	VU	2013	Decreasing
Plantae	Bulbostylis clarkeana		NT	2010	Unknown
Plantae	Bulbostylis pseudoperennis		VU	2013	Unknown
Animalia	Calidris ferruginea	Curlew Sandpiper	NT	2015	Decreasing
Plantae	Cassipourea fanshawei		VU	1998	
Animalia	Chambardia nyassaensis		VU	2010	Unknown
Animalia	Chetia mola		EN	2010	Unknown
Animalia	Chiloglanis elisabethianus		VU	2010	Unknown
Animalia	Chiloglanis macropterus		VU	2010	Unknown
Plantae	Chionanthus richardsiae		VU	1998	
Animalia	Chloropeta gracilirostris	Papyrus Yellow Warbler, Yellow Swamp-warbler, Thin-billed Flycatcher-Warbler	VU	2012	Decreasing
Animalia	Circus macrourus	Pallid Harrier, Pale Harrier	NT	2015	Decreasing
Animalia	Clarias submarginatus	Blotched Catfish	VU	2010	Unknown
Animalia	Cleopatra mweruensis		EN	2010	Unknown
Animalia	Clypeobarbus pseudognathodon		NT	2010	Unknown
Animalia	Crocidura ansellorum	Ansell's Shrew	EN	2008	Decreasing
Plantae	Dalbergia melanoxylon	African Blackwood, Mozambique Ebony	NT	1998	
Animalia	Diceros bicornis	Black Rhinoceros, Hook-lipped Rhinoceros	CR	2012	Increasing
Animalia	Dinotopterus cunningtoni		NT	2006	Unknown
Plantae	Drosera bequaertii		VU	2010	Unknown
Animalia	Egretta vinaceigula	Slaty Egret	VU	2013	Decreasing
Animalia	Eidolon helvum	African Straw-colored Fruit-bat, Pale Xantharpy, Straw-coloured Flying Fox, Straw-colored Fruit Bat	NT	2008	Decreasing

KINGDOM	SCIENTIFIC NAME	COMMON NAME	RED LIST STATUS*	YEAR ASSESSED	TREND
Plantae	Embelia upembensis		VU	1998	
Plantae	Encephalartos schmitzii	Schmitz's Cycad	VU	2010	Decreasing
Plantae	Entada nudiflora		NT	2012	Stable
Plantae	Eragrostis muerensis		CR	2013	Unknown
Animalia	Eretmodus cyanostictus	Tanganyika Clown	NT	2006	Unknown
Animalia	Erikssonia acraeina		VU	1996	
Animalia	Falco concolor	Sooty Falcon	NT	2014	Decreasing
Animalia	Falco fasciinucha	Taita Falcon, Teita Falcon	VU	2014	Decreasing
Animalia	Falco vespertinus	Red-footed Falcon, Western Red-footed Falcon	NT	2013	Decreasing
Animalia	Fukomys anselli	Zambian Mole Rat, Zambian Mole-rat	NT	2008	Decreasing
Animalia	Fukomys kafuensis		VU	2008	Decreasing
Animalia	Gallinago media	Great Snipe	NT	2015	Decreasing
Animalia	Glareola nordmanni	Black-winged Pratincole	NT	2015	Decreasing
Animalia	Gyps africanus	White-backed Vulture	CR	2015	Decreasing
Animalia	Haplochromis moeruensis		VU	2010	Unknown
Animalia	Hippopotamus amphibius	Hippopotamus, Large Hippo, Common Hippopotamus	VU	2008	Decreasing
Animalia	Hipposideros vittatus	Commerson's Leafnosed Bat, Commerson's Roundleaf Bat, Commerson's Rhinolph, Giant Leaf-nosed Bat	NT	2008	Decreasing
Animalia	Hirthia littorina		EN	2010	Unknown
Animalia	Hirundo atrocaerulea	Blue Swallow	VU	2012	Decreasing
Animalia	Hydrictis maculicollis	Spotted-necked Otter, Speckle-throated Otter, Spot-necked Otter	NT	2015	Decreasing
Plantae	Hygrophila albobracteata		EN	2015	Decreasing
Plantae	Hygrophila hippuroides		NT	2015	Unknown
Plantae	Isoglossa mbalensis		VU	2015	Unknown
Plantae	Justicia mariae		EN	2015	Decreasing
Plantae	Justicia obtusicapsula		EN	2015	Decreasing
Plantae	Khaya anthotheca	African Mahogany, White Mahogany	VU	1998	

KINGDOM	SCIENTIFIC NAME	COMMON NAME	RED LIST STATUS*	YEAR ASSESSED	TREND
Animalia	Kobus vardonii	Puku	NT	2008	Decreasing
Animalia	Lates angustifrons	Tanganyika Lates	EN	2006	Decreasing
Animalia	Lates mariae	Bigeye Lates	VU	2006	Decreasing
Animalia	Lates microlepis	Forktail Lates	EN	2006	Decreasing
Animalia	Lavigeria coronata		NT	2010	Unknown
Animalia	Lepidiolamprologus attenuatus		NT	2006	Unknown
Animalia	Limosa lapponica	Bar-tailed Godwit	NT	2015	Decreasing
Animalia	Limosa	Black-tailed Godwit	NT	2015	Decreasing
Animalia	Loxodonta africana	African Elephant	VU	2008	Increasing
Animalia	Lybius chaplini	Zambian Barbet, Chaplin's Barbet	VU	2012	Decreasing
Animalia	Lycaon pictus	African Wild Dog, Painted Hunting Dog, Cape Hunting Dog	EN	2012	Decreasing
Animalia	Mecistops cataphractus	African Slender-snouted Crocodile	CR	2014	Decreasing
Animalia	Melanoides admirabilis		NT	2010	Unknown
Animalia	Melanoides crawshayi		EN	2010	Unknown
Animalia	Melanoides mweruensis		VU	2010	Unknown
Animalia	Mertensophryne nyikae	Nyika Dwarf Toad	NT	2015	Unknown
Plantae	Mitragyna stipulosa		VU	1998	
Animalia	Mweruella mweruensis		VU	2010	Unknown
Animalia	Necrosyrtes monachus	Hooded Vulture	CR	2015	Decreasing
Animalia	Neolamprologus christyi		VU	2006	Unknown
Animalia	Neolebias lozii	Banded Neolebias	CR	2007	Unknown
Animalia	Neotis denhami	Denham's Bustard, Stanley Bustard	NT	2015	Decreasing
Animalia	Nothobranchius polli		EN	2010	Unknown
Animalia	Nothobranchius rosenstocki		EN	2010	Unknown
Animalia	Nothobranchius symoensi		EN	2010	Unknown
Animalia	Numenius arquata	Eurasian Curlew, Curlew	NT	2015	Decreasing
Plantae	Nymphoides tenuissima		NT	2010	Unknown
Plantae	Ophrestia unicostata		EN	2012	Unknown

KINGDOM	SCIENTIFIC NAME	COMMON NAME	RED LIST STATUS*	YEAR ASSESSED	TREND
Animalia	Oreochromis andersonii	Threespot Tilapia	VU	2007	Decreasing
Animalia	Oreochromis macrochir	Greenhead Tilapia	VU	2007	Unknown
Animalia	Oreochromis mortimeri	Kariba Tilapia, Mozzie	CR	2007	Decreasing
Animalia	Oreochromis mossambicus	Mozambique Tilapia	NT	2007	Unknown
Animalia	Orthochromis luongoensis		EN	2010	Unknown
Animalia	Otomops martiensseni	Large-eared Free-tailed Bat, Martienssen's Free-tailed Bat, Large-eared Giant Mastiff Bat, Giant Mastiff Bat, Martienssen Bat, Martienssen's Big-eared Bulldog Bat	NT	2008	Decreasing
Animalia	Otomys lacustris	Tanzanian Vlei Rat	VU	2008	Decreasing
Animalia	Panthera leo	Lion, African Lion	VU	2015	Decreasing
Animalia	Panthera pardus	Leopard	NT	2008	Decreasing
Animalia	Paragomphus cataractae	Cataract Hooktail	NT	2010	Unknown
Animalia	Phataginus tricuspis	African White-bellied Pangolin, Tree Pangolin, Three-cusped Pangolin	VU	2014	Decreasing
Animalia	Phoeniconaias minor	Lesser Flamingo	NT	2015	Decreasing
Animalia	Ploceus olivaceiceps	Olive-headed Weaver	NT	2015	Decreasing
Animalia	Poecilothrissa moeruensis	Lake Mweru sprat	VU	2010	Unknown
Animalia	Polemaetus bellicosus	Martial Eagle	VU	2013	Decreasing
Animalia	Prisodontopsis aviculaeformis		EN	2010	Unknown
Plantae	Prunus africana	Red Stinkwood, African Cherry, African Almond	VU	1998	
Plantae	Pterocarpus angolensis	Bleedwood Tree, Kiaat, Mukwa	NT	1998	
Animalia	Rhynchocyon cirnei	Checkered Sengi, Checkered Elephant-shrew	NT	2008	Unknown
Animalia	Rynchops flavirostris	African Skimmer	NT	2012	Decreasing
Animalia	Sagittarius serpentarius	Secretary Bird	VU	2013	Decreasing
Animalia	Smutsia temminckii	Temminck's Ground Pangolin, Steppe Pangolin, Scaly Anteater, South	VU	2014	Decreasing

KINGDOM	SCIENTIFIC NAME	COMMON NAME	RED LIST STATUS*	YEAR ASSESSED	TREND
		African Pangolin, Ground Pangolin, Cape Pangolin			
Animalia	Stephanoaetus coronatus	Crowned Eagle, Crowned Hawk-Eagle	NT	2012	Decreasing
Animalia	Tanganyicia michelae		VU	2010	Unknown
Animalia	Tanganyicia rufofilosa		NT	2010	Unknown
Animalia	Terathopius ecaudatus	Bateleur	NT	2012	Decreasing
Animalia	Torgos tracheliotos	Lappet-faced Vulture	EN	2015	Decreasing
Animalia	Trigonoceps occipitalis	White-headed Vulture	CR	2015	Decreasing
Animalia	Trithemis aequalis		NT	2010	Unknown
Animalia	Trithemis brydeni		NT	2010	Unknown
Animalia	Tropheus duboisi		VU	2006	Unknown
Plantae	Utricularia bracteata		NT	2010	Unknown
Animalia	Xenotilapia burtoni		VU	2006	Unknown

Source: IUCN Red List, accessed November 2015.

Notes: * CR = critically endangered, EN = endangered, NT = near threatened, VU = vulnerable

ANNEX E. STAKEHOLDERS: ANALYSIS OF ACTIVITIES IMPLEMENTED IN ZAMBIA BY NGOS, OTHER DONORS, AND INTERNATIONAL ORGANIZATIONS

OVERVIEW OF OTHER DONORS

Table E1. Relevant Projects Being Implemented by INGOs and MDOs in Zambia

Organization **(Zambia Office Contact Information)**	**Key Projects**	**Climate Change (Adaptation & Mitigation)**	**Biodiversity & Species Conservation**	**Eco-tourism & Livelihoods**	**Environmental Conservation & Protection**	**Education**
African Biodiversity Collaborative Group Secretariat now at WWF: Plot 4978 Los Angeles Boulevard, P.O. Box 50551 RW, Long acres, Lusaka, Zambia Tel: +260 211 250404 Fax: +260 211 253749 Email: wwfzam@zamnet.zm	• There are too many projects to list here and the website is not organized by project, but rather by theme, and only achievements are presented, rather than ongoing work.					
African Wildlife Foundation Plot No. 29 John Hunt Way P.O. Box 61087 Livingstone, Zambia Tel: +260 213 321 516 Fax: +260 213 321 517 africanwildlife@awf.org	• Lupani Primary School: Education for Conservation in Zambia • Mwandi Fish Farm • Zambia Rhino Relocation • Zambezi Elephant Conservation • Chiawa Cultural Village		X	X	X	X
Birdlife International	• Important Bird Areas Program • Civil Society Environment Fund - National Biodiversity and Species Protection Project	X	X	X		

Organization **(Zambia Office Contact Information)**	**Key Projects**	**Climate Change (Adaptation & Mitigation)**	**Biodiversity & Species Conservation**	**Eco-tourism & Livelihoods**	**Environmental Conservation & Protection**	**Education**
c/o BirdWatch Zambia 25, Joseph Mwilwa Road, Rhodes Park, Lusaka, ZM Postal address: P.O Box 33944 T: 211 239420 Email: birdwatch.zambia@gmail.com Web: www.birdwatchzambia.org	• Support for Mutulanganga IBA Conservation and Mutulanganga Community Eco-tourism initiatives • West Lunga Conservation and People Centered Project • Zambian Barbet Conservation Centred Project					
Conservation International No apparent office in Zambia.	• No apparent projects in Zambia					
Jane Goodall Institute No apparent office in Zambia	• No apparent projects in Zambia.					
The Nature Conservancy No apparent office in Zambia	• Building Capacity for Protected Areas				X	
UNDP	• Low Emission Capacity Building Project • UN-REDD Program – Zambia Quick Start Initiative	X			X	

Organization **(Zambia Office Contact Information)**	**Key Projects**	**Climate Change (Adaptation & Mitigation)**	**Biodiversity & Species Conservation**	**Eco-tourism & Livelihoods**	**Environmental Conservation & Protection**	**Education**
P.O. Box 31966 Alick Nhata Road Lusaka, Zambia Phone: +260 211 250 800/254 586 E-mail: registry.zm@undp.org Mr. Moses Zangar, Jr. Communications Officer Tel: +260 96 760 5747 Email: moses.zangar@undp.org	• Adaptation to the Effects of Climate Change and Variability in Agro-Ecological Regions I and II • Lake Tanganyika Integrated Management Program – Zambia Component (Catchment management through sedimentation control) • United Nations Joint Program on Climate Change and Disaster Risk Reduction					
Wildlife Conservation Society Dale Lewis, Country Director Post Net P/Bag E8912 No. 397 Manda Hill Lusaka, Zambia wcszambia@wcs.org Tel: +260 1 226 082 James Deutsch, former WCS VP for Conservation Strategy and COMACO Board Member, now at Vulcan Inc. 505 5th Ave S #900, Seattle, WA 98104	• Poachers-Turned-Protectors in Zambia • WCS and COMACO (same as program above?) • AHEAD Initiative in the Kavango-Zambezi (KAZA) Transfrontier Conservation Area (TFCA)		X	X	X	

Organization **(Zambia Office Contact Information)**	**Key Projects**	**Climate Change (Adaptation & Mitigation)**	**Biodiversity & Species Conservation**	**Eco-tourism & Livelihoods**	**Environmental Conservation & Protection**	**Education**
Tel: +1 206 342 2000						
World Bank Pyramid Plaza Church Road, PO Box 35410 Lusaka, Zambia 10101 Main Office Contact: +260-211-373200 +260-211-252811 Zeria N. Banda Communications Officer Tel: +265-943223 Email: zbanda@worldbank.org	• Zambia COMACO Landscape Management • Zambia Strengthening Climate Resilience (PPCR Phase II)	X		X		
World Resources Institute No apparent office in Zambia	• Adaptation Finance (Accountability Initiative)	X				
World Wildlife Fund Plot 4978 Los Angeles Boulevard, P.O. Box 50551 RW, Long acres, Lusaka, Zambia Tel: +260 211 250404 Fax: +260 211 253749 Email: wwfzam@zamnet.zm	• Joint Zambezi River Basin Environmental Flows (E-Flows) Program • Zambia Wetlands Program • Various - thematic area of "Species and Protected Areas"		X		X	

DETAILS ON OTHER DONORS WORKING IN ZAMBIA

AFRICAN BIODIVERSITY COLLABORATIVE GROUP

ABCG comprises seven international conservation NGOs (African Wildlife Foundation, Conservation International, the Jane Goodall Institute, The Nature Conservancy, Wildlife Conservation Society, World Resources Institute, and World Wildlife Fund) with the goal of working collaboratively and efficiently and effectively to further a sustainable future for the African continent. Funding has been generously provided by The John D. and Catherine T. MacArthur Foundation, the Critical Ecosystem Partnership Fund, the U.S. Agency for International Development, the U.S. Fish and Wildlife Service, and our members.

GLOBAL OFFICE	ZAMBIA
Jocelyn Ziemian, Coordinator Email: jziemian@abcg.org Phone: 202-495-4688 Kamweti wa Mutu, Program Officer: Email: kmutu@abcg.org The ABCG Secretariat rotates locations among its member NGOs. It is at WWF until the end of the current agreement in 2015.	None.

There are too many projects to list here and the website is not organized by project, but rather by theme, and only achievements are presented, rather than ongoing work.

AFRICAN WILDLIFE FOUNDATION

USA	ZAMBIA
1400 Sixteenth Street, N.W. Suite 120 Washington, D.C. 20036, USA Tel: +1 202 939 3333 Toll free: +1 888 494 5354 Fax: +1 202 939 3332 africanwildlife@awf.org	Plot No. 29 John Hunt Way P.O. Box 61087 Livingstone, Zambia Tel: +260 213 321 516 Fax: +260 213 321 517 africanwildlife@awf.org

PROJECT TITLE	LUPANI PRIMARY SCHOOL: EDUCATION FOR CONSERVATION IN ZAMBIA
Purpose or Objective	African Wildlife Foundation built the brand-new Lupani Primary School as an incentive for the establishment of a community-protected wildlife area and the protection of valuable wildlife dispersal corridors. The 20,000-hectare Sekute Conservation Area is home to two important wildlife movement corridors that pass from community areas in Botswana, Namibia, and Zimbabwe into community lands on the Zambian side of the Zambezi river corridors.
Source and Amount of Funding	No information provided
Start and Finish Dates	Start: Finish: 2011?
Partner Organizations / Individuals Involved	No information provided

Activities and Methods Involved	Officially opened February 11, 2011, the Lupani Primary School replaced the formerly dilapidated structure with a modern facility that includes six classrooms, several offices, and five houses for teachers.
Findings and Recommendations	The promise of a modern school nearby is indeed exciting. Since the Lupani Primary School has brought education closer to eager minds and excited families, classes are full—with 125 students enrolled, and the Zambian government has provided seven trained teachers to instruct classes. Parents are thrilled: The school boasts an involved and passionate parent-teacher association (PTA) and, recently, men and women have registered for adult literacy classes.
Follow-on Work Planned	No information provided
Contact information	
Notes	

PROJECT TITLE	MWANDI FISH FARM
Purpose or Objective	Protecting the environment and providing livelihoods through fishing. Wildlife Foundation, together with the local community and other partners, is simultaneously protecting the ecology of the Zambezi River and providing alternative livelihoods through the Mwandi Fish Farm, a sustainable aquaculture enterprise.
Source and Amount of Funding	No information provided
Start and Finish Dates	Ongoing? No information provided
Partner Organizations / Individuals Involved	No information provided
Activities and Methods Involved	Fish native to the Zambezi River are bred in ponds, and some are farmed and sold while others are released into the river to replenish diminished fish populations. This will result in greater food security, economic opportunities, and biodiversity in this region. As of September 2012, 13 fish ponds had been built. Water pumps have been installed and villagers can now access water from taps instead of from the river, which reduces injuries due to conflict with crocodiles. Other enterprises, such as chicken farming, have been incorporated into the overall project. For example, waste from the poultry is used as fertilizer to speed the growth of plankton and as feed for fish, while the poultry is sold for profit. And, since Mwandi began operations, 50,000 fingerlings have already been released into the Zambezi. Additionally, AWF helped the fish farm sell an additional 50,000 for a state prison fish farm and is locating other interested customers.
Findings and Recommendations	No information provided
Follow-on Work Planned	No information provided
Contact information	

Notes	

PROJECT TITLE	ZAMBIA RHINO RELOCATION
Purpose or Objective	Relocating rhinos for conservation
Source and Amount of Funding	No information given
Start and Finish Dates	No information given – though sounds like the project has been completed
Partner Organizations / Individuals Involved	Zambia Wildlife Authority
Activities and Methods Involved	With Zambia's rhinos near extinction, African Wildlife Foundation partnered with Zambia Wildlife Authority to settle four white rhinos from South Africa to Mosi-oa-Tunya National Park. Since the relocation, there have been four births in the park, bringing the total population count up to nine. With rhinos having long gestation and nursing periods and birthing a calf once every two to four years, these births are a significant marker of the project's success. In addition to relocating rhinos, AWF worked with Zambia Wildlife Authority to better protect and monitor the rhinos. Anti-poaching patrols as well as careful health monitoring (MOU1) has ensured the continued safety of these young rhinos and gives many hope for the future.
Findings and Recommendations	No information given
Follow-on Work Planned	No information given
Contact information	
Notes	See also USFWS call notes

PROJECT TITLE	ZAMBEZI ELEPHANT CONSERVATION
Purpose or Objective	Create an elephant management strategy
Source and Amount of Funding	U.S. Fish and Wildlife Service and other donor partners
Start and Finish Dates	No information given – but judging from the description it was completed long ago
Partner Organizations / Individuals Involved	"all stakeholders in Mozambique, Zambia, and Zimbabwe" (see below)
Activities and Methods Involved	To answer the call of 40,000 elephants across three countries… African Wildlife Foundation has brought together all stakeholders in Mozambique, Zambia, and Zimbabwe to develop a Heartland-wide management strategy for the elephants. In 2003, AWF completed the first-ever coordinated, cross-country aerial survey in this landscape. AWF's conservation work in the Zambezi Heartland landscape was then adjusted to more appropriately focus on securing additional habitat for elephants and other large herbivores.

	These plans designate zones for wildlife movement corridors, biodiversity conservation/wilderness areas, agriculture and human settlement, tourism development, and fishing and non-fishing.
Findings and Recommendations	No information given
Follow-on Work Planned	No information given
Contact information	
Notes	See also USFWS call notes

PROJECT TITLE	CHIAWA CULTURAL VILLAGE
Purpose or Objective	Ensuring locals receive the benefits of tourism.
Source and Amount of Funding	No information provided
Start and Finish Dates	No information provided – guessing it started before 2008 and is ongoing
Partner Organizations / Individuals Involved	Chiawa community; other partners (not specified).
Activities and Methods Involved	African Wildlife Foundation established a long-term relationship with the Chiawa community. Together with partners, AWF facilitated the establishment of the cultural village, which began operations in 2008. This enterprise leverages the existing tourism in the area for the benefit of the local community and the conservation of the nearby Mugurameno Area. During its first year, the enterprise made substantial progress. AWF is now engaging the private sector to build the business management and tourism marketing skills of the village's employees to make the village a more economically viable enterprise. Not only will the continued support of Chiawa Cultural Village contribute to improved livelihoods, but it will also encourage the local communities to work for the conservation of local species, which is attracting the tourists in the first place.
Findings and Recommendations	No information provided
Follow-on Work Planned	No information provided
Contact information	
Notes	

BIRDLIFE INTERNATIONAL – BIRDWATCH ZAMBIA*

GLOBAL OFFICE	AFRICA REGIONAL OFFICE	ZAMBIA*
Wellbrook Court, Girton Road, Cambridge, CB3 0NA UK T:+44 (0)1223 277 318	Volkers Garden on Terrace Close, Off Rhapta Road Westlands, Kenya Postal address: P. O. Box 3502-00100 GPO, Nairobi, Kenya	BirdWatch Zambia 25, Joseph Mwilwa Road, Rhodes Park, Lusaka, ZM Postal address: P.O Box 33944

F:+44 (0)1223 277 200 birdlife@birdlife.org	T: +254 020 8068314 T: +254 020 2473259 F: +254 020 8068315 M: +254 722 200538, M: +254 734 600905 birdlife-africa@birdlife.org	T: 211 239420 Email: birdwatch.zambia@gmail.com Web: www.birdwatchzambia.org

*Birdlife International does not have a direct presence in Zambia but rather operates through a partner organization there, called Bird Watch Zambia.

PROJECT TITLE	IMPORTANT BIRD AREAS PROGRAM
Purpose or Objective	Aimed at bringing 15 IBAs to a higher conservation status by the end of 2010. From 2011 the Norwegian Ornithological Society supported BirdWatch Zambia consolidate and sustain local site support groups and environmental education programs, and further develop avian ecotourism.
Source and Amount of Funding	Source: NORAD Amount: No information provided
Start and Finish Dates	Start: Aug 2005 Finish: Dec 2013
Partner Organizations / Individuals Involved (esp. Local Partners)	Launched with the help of the BirdLife Africa Secretariat and the Norwegian Ornithological Society. Implemented through "selected Schools and Site Support Groups"
Activities and Methods Involved	No information provided.
Findings and Recommendations	No information provided.
Follow-on Work Planned	No information provided.
Contact information	
Notes	

PROJECT TITLE	CIVIL SOCIETY ENVIRONMENT FUND - NATIONAL BIODIVERSITY AND SPECIES PROTECTION PROJECT
Purpose or Objective	This was a short project with support of the Zambia Civil Society Environment Fund (CSEF). The goal was to intensify biodiversity monitoring, bridge knowledge and information gaps and enhance partnerships that contribute to management of the country's rich biodiversity within the protected area systems. The project focused on detailed assessment of important bird/biodiversity areas with the view of using the results for improved site management and advocacy work.
Source and Amount of Funding	Source: Zambia Civil Society Environment Fund, funded by Denmark and Finland Amount: No information provided
Start and Finish Dates	Start: May 2012 Finish: Oct 2013
Partner Organizations / Individuals Involved	Zambia Wildlife Authority, the Forestry Department and Zambia Environmental Agency

Activities and Methods Involved	CSEF project was implemented in five of Zambia's forty-two IBAs. These being Lukanga Swamps, Kafue Flats, Chisamba, Machile and Bangweulu Wetlands. Over a period of 18 months, BWZ worked hard to enhance its presence in these IBAs and scale-up biodiversity monitoring in collaboration with other key institutions such as the Zambia Wildlife Authority, the Forestry Department and Zambia Environmental Agency. A Species Conservation Strategy for five trigger species in these IBAs was developed. The species are: Zambian Barbet, Wattled Crane, Grey-crowned Crane, Shoebill and Black-cheeked Lovebird. An Advocacy Strategy on the conservation of these species and protection of IBAs was also developed.
Findings and Recommendations	No information provided.
Follow-on Work Planned	No information provided.
Contact information	
Notes	

PROJECT TITLE	SUPPORT FOR MUTULANGANGA IBA CONSERVATION AND MUTULANGANGA COMMUNITY ECO-TOURISM INITIATIVES
Purpose or Objective	This project aimed at poverty reduction through livelihood enhancement activities. The project aims at developing eco-tourism in the IBA as well assisting the local industries of fishing and traditional crafts (pottery and basketry).
Source and Amount of Funding	Source: Global Environment Fund Small Grants Program, funded by GEF and UNDP Amount: No information provided
Start and Finish Dates	No information provided, but sounds like it has finished.
Partner Organizations / Individuals Involved	The Mutulanganga community
Activities and Methods Involved	The Community with support of UNDP-SGP and BWZ have built an Eco-tourism Camp that will in future be able to fund further activities in the area. Community Bird Guides have been trained in the IBA. In addition to the camp, a local women's group in the project area has built a craft centre where local crafts in the form of pottery and reed baskets are being made and sold. At the 2013 Zambia GEF-SGP Best Practice and Knowledge Fair, this project received an award for under the category Best Sustainable Community Based Initiative Award.
Findings and Recommendations	No information provided.
Follow-on Work Planned	No information provided.
Contact information	
Notes	

PROJECT TITLE	WEST LUNGA CONSERVATION AND PEOPLE CENTRED PROJECT

Purpose or Objective	The project has been designed to contribute towards improving biodiversity conservation, increasing people's resilience to climate change, reducing anthropogenic pressures on West Lunga National Park IBA and giving the local people an opportunity to fight poverty through viable but sustainable enterprises.
Source and Amount of Funding	Source: Global Environment Fund Small Grants Program, funded by GEF and UNDP; DANIDA/Danish Government Amount: No information provided
Start and Finish Dates	No information provided, but sounds like it is ongoing.
Partner Organizations / Individuals Involved	No information provided.
Activities and Methods Involved	The project is a capacity building project, specifically, support for beekeeping and fish farming initiatives is being provided. So far, over 100 beekeepers and 120 fish farmers have been trained and given business start up materials. By the end of the project, 700 beehives will have been supplied and 30 group owned fish ponds will have been constructed and stocked. Two cycles of Biodiversity monitoring have been conducted in West Lunga National Park in collaboration with ZAWA staff.
Findings and Recommendations	No information provided.
Follow-on Work Planned	No information provided.
Contact information	
Notes	

PROJECT TITLE	ZAMBIAN BARBET CONSERVATION CENTERED PROJECT
Purpose or Objective	BirdWatch Zambia received funding from the Isdell Foundation in USA to implement a project focused on a single species; the Zambian Barbet. The Zambian Barbet (Lybius chaplini); formerly known as Chaplin's Barbet is Zambia's only endemic bird species and is categorized as 'Vulnerable' in the IUCN Red List. It is a localized breeding resident known from a relatively small area with occurrence confined to a few sites in Central and Southern Provinces. The Zambian Barbet is known to occur and breed in five Important Bird Areas; namely: Chisamba, Nkanga River Conservation Area, Kafue Flats (Blue Lagoon), Kafue National Park and probably Lukanga Swamps. The project is therefore confined to these IBAs. Lack of quantitative data on the actual population size and trends of the Zambian Barbet is by far the greatest challenge to instituting informed and effective action planning aimed at adequately conserving and protecting this bird. This inadequacy makes it very difficult to set quantitative population goals for this species. The long-term conservation goal is to attain substantial increase in the wild populations and down-listing of the Zambian Barbet from Vulnerable to Locally Common. Although the actual population status of the Zambian Barbet is unknown, change in the species threat status from Near Threatened to Vulnerable calls for urgent conservation actions.

Source and Amount of Funding	Source: Isdell Foundation
Start and Finish Dates	No information provided, but sounds like it is ongoing.
Partner Organizations / Individuals Involved	No information provided.
Activities and Methods Involved	No information provided.
Findings and Recommendations	No information provided.
Follow-on Work Planned	No information provided.
Contact information	
Notes	

CONSERVATION INTERNATIONAL

HEADQUARTERS	ZAMBIA
2011 Crystal Drive, Suite 500 Arlington, VA 22202 1.703.341.2400 1.800.429.5660 community@conservation.org	They do not have an office in Zambia. They have offices in DRC and Botswana, and some other African countries. Contact information available here: http://www.conservation.org/about/pages/global-offices.aspx

Currently no work in Zambia. Source: http://www.conservation.org/where/pages/sub-saharan-africa.aspx.

JANE GOODALL INSTITUTE

GLOBAL OFFICE	ZAMBIA
1595 Spring Hill Rd, Suite 550 Vienna, VA 22182 Telephone: (703) 682-9220 Fax: (703) 682-9312	JGI does not have an office in Zambia.

Currently there are no projects in Zambia.

THE NATURE CONSERVANCY

HEADQUARTERS	AFRICA REGIONAL OFFICE
4245 North Fairfax Drive, Suite 100 Arlington, VA 22203-1606 (703) 841-5300	Bella-Villa-Brookside Grove, Westlands P.O. BOX 19738-00100 GPO Nairobi, Kenya +254 (0) 786 650 650

PROJECT TITLE	BUILDING CAPACITY FOR PROTECTED AREAS
Purpose or Objective	The Conservancy is focusing initially around Kafue National Park, aiming to strengthen management across this ecosystem through the following actions (see Activities and Methods Involved below)

Source and Amount of Funding	No information provided
Start and Finish Dates	No information provided
Partner Organizations / Individuals Involved	Zambia Wildlife Authority (ZAWA), U.S. Forest Service
Activities and Methods Involved	• Piloting successful community-led conservation models in a few communities and sharing lessons-learned from similar programs in Kenya, Namibia and Tanzania • Training conservation partners and local people in conservation planning and protected-area management • Bolstering anti-poaching security, including hiring and equipping wildlife scouts and rangers • Implementing alternative fire management plans that mimic natural burn patterns • Reducing threats from new tourism and agricultural development • Working with partners to protect lands adjacent to the parks and maintain intact wildlife travel corridors • Improving park infrastructure such as ranger housing, communications networks, roads and culverts, and safe water sources
Findings and Recommendations	No information provided
Follow-on Work Planned	No information provided
Contact information	
Notes	

UNDP

HEADQUARTERS	ZAMBIA
United Nations Development Program One United Nations Plaza New York, NY 10017 USA Mr. Nicolas Douillet Communication Specialist UNDP Africa, New York Tel: +1 212 906 5937 nicolas.douillet@undp.org	P.O. Box 31966 Alick Nhata Road Lusaka, Zambia Phone: +260 211 250 800/254 586 E-mail: registry.zm@undp.org Mr. Moses Zangar, Jr. Communications Officer Tel: +260 96 760 5747 moses.zangar@undp.org

PROJECT TITLE	LOW EMISSION CAPACITY BUILDING PROJECT
Purpose or Objective	The aims of the Low Emission Capacity Building (LECB) Project are to develop the capacities (institutional, financial, human, research) required for articulation of a low carbon, climate resilient development pathway.

	The project, coordinated by the Ministry of Lands, Natural Resources and Environmental Protection aims to create a more sustainable greenhouse gas inventory system which In addition to fulfilling national UNFCCC reporting obligations for National Communications is a valuable tool for developing policies and programs that address climate change and economic development. The project further aims to support development of Nationally Appropriate Mitigation Actions (NAMAs) as means to reducing emissions from selected sectors.
Source and Amount of Funding	Source: UNDP and EU Amount: $642,000
Start and Finish Dates	Start: March 2012 Finish: June 2014
Partner Organizations / Individuals Involved	Ministry of Lands, Natural Resources and Environmental Protection
Activities and Methods Involved	No information provided
Findings and Recommendations	The USD 642,000 EU/UNDP funded project which was signed on the 20th of July 2012 has contributed to raising awareness among stakeholders on the importance of having a sustainable National Greenhouse Gas Inventory System in responding to the climate change challenge as well as a number of other benefits to the country in areas related to NRM (forest management, food production, agricultural development), climate change planning (NAMAs development, LEDS development, REDD+ activities, climate financing) and economic development (energy/industrial efficiency, land use planning, international financing).
Follow-on Work Planned	No information provided
Contact information	
Notes	

PROJECT TITLE	UN-REDD PROGRAM – ZAMBIA QUICK START INITIATIVE
Purpose or Objective	Aims to prepare Zambian institutions and stakeholders for effective nationwide implementation of the REDD+ mechanism. As a pilot country, Zambia is expected to develop a National Strategy (an Action Plan) to reduce deforestation. Furthermore, the country has to develop a national forest reference emission level; a robust and transparent national forest monitoring system for the monitoring and reporting of the REDD + activities; and a system for providing information on how local community and forest biodiversity safeguards are being addressed during the implementation of the REDD+ activities.
Source and Amount of Funding	It is funded through the Multi-Donor Trust Fund. The fund management is a pass-through mechanism, which distributes technical and financial responsibilities among the participating UN Organizations (UNDP, FAO and UNEP).
Start and Finish Dates	No information provided
Partner Organizations / Individuals Involved	The National Joint Program is facilitated by the Forestry Department within the Ministry of Mines and Natural Resources.

Activities and Methods Involved	No information provided
Findings and Recommendations	Awareness raising/convening/brokering: The REDD+ Readiness process in Zambia has placed emphasis on developing local-level structures for awareness raising, capacity development and dialogue. Review meeting and training sessions have been conducted in 9 provinces of Zambia. The training of provincial officials and local practitioners in broad REDD+ issues led to the, crafting of 'provincial facilitation teams for climate change and REDD+' in each of the country's provinces, allowing Zambia to be an innovative pioneer of a decentralized approach to REDD+. Implementation for inclusive development: Capacity to manage REDD+ Readiness has been strengthened through the establishment of a National REDD+ Coordination Unit. Four National officers have been seconded to the Unit; an international MRV Technical Advisor; an Administrative Assistant and the International REDD Technical Advisor (TA) have been recruited. The Common Steering Committee and Technical Committee for two major UN programs related to the forest (namely ILUA-II and UN-REDD), have been established in order to enhance the collaborative approach. Coordination/collaboration between the two programs has been enhanced, and as a result duplication has been reduced. Support to national assessment, budgeting, planning and policy making: The proposed forest bill and the revised forestry policy which the UN-REDD program has supported have pro-participatory approaches in sustainable forest management. The strategies for the National Forestry Policy encourages partnerships between state agencies, local communities and individuals in order to resolve natural resource conflicts through dialogue among key stakeholders and to enhance ownership, governance and equitable benefit sharing arising from the sustainable management of forest resources.
Follow-on Work Planned	Studies: The program has conducted studies on forest management practices with potential for REDD+ in Zambia, stakeholder assessment and engagement and Preliminary study on drivers of deforestation. The reports will be used for training and development of strategic options for REDD implementation.
Contact information	
Notes	

PROJECT TITLE	ADAPTATION TO THE EFFECTS OF CLIMATE CHANGE AND VARIABILITY IN AGRO-ECOLOGICAL REGIONS I AND II
Purpose or Objective	The project emanates from the National Adaptation Plan of Action, which highlights the vulnerability of Zambian farmers to the effects of climate hazards, such as, drought, flooding, extreme temperatures and prolonged dry spells. The project aims to mainstream adaptation measures into planning at all levels and test adaptation interventions, such as, water management (water harvesting) to protect and improve agricultural incomes from the effects of climate change.

	Sites located in: Lusaka, Southern, Western and Eastern Provinces of Zambia Its expected results include: • Climate change risks integrated into critical decision-making processes for agricultural management at the local, sub-national and national levels • Agricultural productivity in the pilot sites made resilient to the anticipated impacts of climate change • National fiscal, regulatory and development policy revised to promote adaptation responses in the agricultural sector • Knowledge and lessons learned to support implementation of adaptation measures compiled and disseminated
Source and Amount of Funding	No information provided
Start and Finish Dates	Start: January 2010 Finish: December 2013
Partner Organizations / Individuals Involved	Ministry of Agriculture and Livestock
Activities and Methods Involved	Accomplishments to date: Weather monitoring for climate-risk management at local level is now possible because each of the Project's 8 sites has been equipped with sets of automatic weather equipment. In addition, local agricultural extension staff have been trained, and these have in turn been training local farmers and communities in climate change adaptation techniques, including: crop diversification, conservation agriculture, and non-farming livelihood systems such as bee keeping and mushroom production. Furthermore, after a delayed start, progress has been made towards the enhancement of water supply sources (earth dams, boreholes and water canals from perennial rivers). Progress across the project sites varies from the award of a construction contract to the completion of preparatory work for invitation of applications for construction contracts.
Findings and Recommendations	No information provided
Follow-on Work Planned	No information provided
Contact information	
Notes	

PROJECT TITLE	LAKE TANGANYIKA INTEGRATED MANAGEMENT PROGRAM – ZAMBIA COMPONENT (CATCHMENT MANAGEMENT THROUGH SEDIMENTATION CONTROL)
Purpose or Objective	The project strengthens the enabling frameworks and capacities for managing the National Protected Areas system in Zambia and recommends appropriate policy, regulatory and governance frameworks in order to provide new tools for public-private-community-civil society management partnerships. It also aims at strengthening and enhancing existing institutional capacities for improved protected areas monitoring and evaluation and business investment planning.

	Location: Lake Tanganyika, Mpulungu and Kaputa Districts in Northern Provinces
Source and Amount of Funding	No information provided
Start and Finish Dates	Start: May 2008 Finish: June 2013
Partner Organizations / Individuals Involved	Ministry Lands, Natural Resources and Environmental protection
Activities and Methods Involved	Key accomplishments: To date the project's achievements include the following: • Project's 11 communities trained in alternative income generating activities, business management, processing of agricultural and non-timber forest products, sustainable farming practices and forest management, water quality monitoring, leadership and capacity building for local governance structures, furrow maintenance and irrigation methods that do not promote sedimentation, tree selection and management (World Agro forest Centre, ICRAF), and identification and management of invasive species (IUCN) • Community natural resources management plans and by-laws prepared and enforced • Community commercial woodlot production along supporting woodlot nurseries; including 10 schools now cultivating woodlot nurseries • Establishment of a revolving fund designed to promote environmentally-friendly income generating activities among the project's target communities; the revolving scheme has been transferred to a local institution in the project area
Findings and Recommendations	No information provided
Follow-on Work Planned	No information provided
Contact information	
Notes	

PROJECT TITLE	UNITED NATIONS JOINT PROGRAM ON CLIMATE CHANGE AND DISASTER RISK REDUCTION
Purpose or Objective	As part of the United Nations Development Assistance Framework (UNDAF), and within the context of delivering as "One UN", the United Nations in Zambia developed the Joint Program on Climate Change and Disaster Risk Reduction (CCDRR), whose objective is to improve institutional and individual capacities at national and local levels for an effective multi-sectoral and multi-level response to climate change. The Joint Program focuses on improving governance for effective response to climate change at national level, but it will seek to improve service delivery at different levels in order to ensure long-term sustainability of its results. At local level, the Joint Program will for

	example promote water supply to poor rural communities, low-cost, energy-efficient technologies in agriculture and the use of renewable energy sources such as solar for lighting and heating. Certain interventions may also be targeted at specific geographical areas or populations due to the cross-sectoral nature of climate change, as a higher impact will be achieved by targeting the combined efforts of different institutions towards the same population, with each bringing their own comparative advantage. Furthermore, the Joint Program will build upon interventions already underway in various parts of the country.
Source and Amount of Funding	Source: The Joint Program brings together seven agencies (FAO, UNDP, UNIDO, WFP, UN-HABITAT, UNICEF and the Global Mechanism of the United Nations Convention to Combat Desertification (UNCCD) that have complimentary competencies necessary for supporting efforts addressing aspects of various responses to the climate change challenge in the country. Amount: $20,150,500
Start and Finish Dates	Start: Sep 2012 Finish: Dec 2015
Partner Organizations / Individuals Involved (esp. Local Partners)	The main partners for the Joint Program include the Ministry of Local Government and Housing; Ministry of Finance; Ministry of Agriculture and Livestock; Ministry of Lands, Natural Resources and Environmental Protection; Ministry of Mines, Energy and Water Development; Ministry of Transport, Communications, Works and Supply (Zambia Meteorological Department, ZMD); Ministry of Commerce, Trade and Industry; Ministry of Justice; Ministry of Chiefs and Traditional Affairs; Ministry of Gender and Child Development; and the Office of the Vice President (Disaster Management and Mitigation Unit, DMMU). Others are local communities in selected sites and Civil Society Organizations (CSO) such as the Zambia Climate Change Network (ZCCN), international organizations such as CIFOR, and from the private sector - Lloyds Financials and the African Carbon Credit Exchange.
Activities and Methods Involved	Accomplishments: The UN Joint Program on Climate Change and Disaster Risk Reduction which is coordinated by UNDP has been instrumental in supporting Government in the implementation of the Least Developed Countries Fund (LDCF)-funded adaptation project in the agricultural sector, the development of the draft National Climate Change Response Strategy (NCCRS) towards the ongoing development of the draft National Policy on Climate Change. The program has also raised awareness on climate change issues especially among the youths through the Climate Change Youth Ambassadors program.
Findings and Recommendations	No information provided
Follow-on Work Planned	No information provided
Contact information	
Notes	

WILDLIFE CONSERVATION SOCIETY

HEADQUARTERS	ZAMBIA
2300 Southern Boulevard,	Dale Lewis, Country Director

Bronx, New York 10460 (718) 220-5100 membership@wcs.org (probably not the best address to contact but this is what was on their website	Post Net P/Bag E8912 No. 397 Manda Hill, Lusaka, Zambia wcszambia@wcs.org Tel: +260 1 226 082 James Deutsch, former WCS VP for Conservation Strategy and COMACO Board Member, now at Vulcan Inc. 505 5th Ave S #900, Seattle, WA 98104 Tel: +1 206 342 2000 See also COMACO project contact information below.

PROJECT TITLE	POACHERS-TURNED-PROTECTORS IN ZAMBIA
Purpose or Objective	• Halt poaching for meat in Zambia's wildlife-rich Luangwa Valley by training former poachers in sustainable farming practices and other skills that benefit their livelihoods. • Improve the local economy by bolstering the community members' business skills in creating and selling valuable products. • Build prosperous trading relationships with rural communities in exchange for learning and applying better farming and land-use practices.
Source and Amount of Funding	No information provided
Start and Finish Dates	Start: 2002 Finish:
Partner Organizations / Individuals Involved	No information provided
Activities and Methods Involved	Since 2002, WCS scientists have been training former poachers in trades that include farming, beekeeping, chili-blasting, and carpentry. In exchange, the poachers have turned in more than 800 firearms and 40,000 snares. About 90 percent of the participating poachers graduate the program and find alternative livelihoods. Firearm regulations require the collected guns be handed over to the Zambian government. With the help of a Zambian traditional jeweler, a group of women were recruited to turn the piles of snare wire into jewelry. They handpick the wires and adorn them with "beads"—seeds from local trees. The recycled snare-wire jewelry is capturing the attention of villagers and tourists passing through the COMACO store at Mfuwe Airport. Communities are hiring a growing number of reformed poachers to patrol rice fields with muzzle-loaders packed with chili powder, in a non-lethal approach to repel elephants from crops. From about 100 feet away, the guards blast clouds of chili smoke into the air. The elephants make a hasty retreat, hopefully leaving with a strong lesson not to venture into those fields again.

Findings and Recommendations	No information provided
Follow-on Work Planned	No information provided
Contact information	
Notes	

PROJECT TITLE	WCS AND COMACO (SOUNDS LIKE SAME AS PROGRAM ABOVE)
Purpose or Objective	• Survey and assess household income and food security, and help those families in need • Formulate community plans that promote better farming methods and land-use practices, based on decisions made by local villages to eliminate key threats to natural resources in their area • Deliver favorable prices to COMACO producers by linking a network of rural trading depots to a regional community trading center • Develop improved market opportunities at the national and international levels in exchange for long-term commitment to conservation guidelines
Source and Amount of Funding	No information provided
Start and Finish Dates	Start: 2002 Finish: ?
Partner Organizations / Individuals Involved	No information provided
Activities and Methods Involved	Through COMACO, WCS has helped spawn *It's Wild*–a brand of eco-friendly products and services that range from rice and peanut butter cultivated without pesticides or fertilizers, to Snarewear recycled jewelry, to fully catered eco-tours in South Luangwa National Park. WCS has brought the new markets directly to the participants' doorsteps, helping the local people break from former agricultural practices that wreaked havoc on the soils and denuded the landscape of its trees and wildlife. Simple adjustments in land-use practices, such as crop rotation, composting, and animal husbandry, have helped rural people become better stewards of one of East Africa's most fragile landscapes. In addition to improving the local economy and environment, COMACO has also improved governance and created new partnerships.
Findings and Recommendations	No information provided
Follow-on Work Planned	No information provided
Contact Information	COMACO Head Office: Light Industrial Area Plot No: 7223, Kachidza Road Lusaka, Zambia. Tel: +260-211-226082

	Fax: +260-211-234-286 Email: sales@itswild.org www.itswild.org James Deutsch, former WCS VP for Conservation Strategy and COMACO Board Member, now at Vulcan Inc. 505 5th Ave S #900, Seattle, WA 98104 Tel: +1 206 342 2000
Notes	Notes of Conference Call, with James Deutsch, COMACO and Vulcan (and former WCS VP for Conservation Strategy), October 2, 2015 COMACO – Grown and matured through various stages since established 13 years ago; JD is on board; food security and environmental results very solid, but wildlife impact/causality very difficult to prove; Dale Lewis (see WCS summary) Africa Elephants Survey – Vulcan-funded aerial survey, census, database of elephants by TNC, World Bank report, Save the Elephants in Kenya, Chris Thoules, thouless@africaonline.co.ke South Luangwa – South Luangwe Conservation Association (or Organization?) North Luangwa – Frankfurt Zoological Society, Rob Muir, Africa Director, based in Tanzania, rdjmuir@gmail.com USAID REDD Policy Program, Eastern Provinces – Techno Serve is implementing partner, NY-based, deforestation focus, contact??? Kovango/KAZA (5-country international park) – WCS has a very small role through their AHEAD project which focuses on veterinary fencing to reduce disease transmission; there is also the Elephants without Borders project (same as Vulcan-TNC project?), contact Mike Chase, but the project is focused more on Botswana, Angola and Zimbabwe

PROJECT TITLE	AHEAD INITIATIVE IN THE KAVANGO-ZAMBEZI (KAZA) TRANSFRONTIER CONSERVATION AREA (TFCA)
Purpose or Objective	(The AHEAD program of WCS) is focused on problems facing biodiversity conservation and development in large, transboundary landscapes from the critically important perspective of the linkages among wildlife health, domestic animal health, and human health and livelihoods. The area of focus is one of southern Africa's major transfrontier conservation areas – the Kavango-Zambezi Transfrontier Conservation Area (KAZA TFCA), at the verge of becoming perhaps the world's largest conservation-oriented landscape. The development of TFCAs to further the conservation of biodiversity and sustainable development through the harmonization of transboundary NRM is a priority for SADC (the Southern African Development Community) and the five countries that encompass the KAZA TFCA: Angola, Botswana, Namibia, Zambia and Zimbabwe. The importance of this TFCA to the region was evidenced by the signing of an international MoU to establish the KAZA TFCA by the five nations in 2006. Agreement has been reached on creating a transfrontier area spanning approximately 400,000

	km² (more than 1.5 times the size of Great Britain) and encompassing more than 60 national parks, game reserves, community conservancies and game management areas. The area will include, for example, the Caprivi Strip, Chobe National Park, the Okavango Delta (the largest Ramsar site in the world) and the Victoria Falls (World Heritage Site). However, the management of wildlife and livestock diseases (including zoonoses – diseases transmissible between animals and people) within the envisaged larger transboundary landscapes remains unresolved and an emerging policy issue of major concern to livestock production, associated access to export markets, and other sectors, including public health, in the region. Livestock farming is, of course, an important traditional way for communities in sub-Saharan Africa to build and maintain wealth, not to mention attain food security. Essentially, the TFCA concept and current internationally accepted approaches to the management of transboundary animal diseases (TADs) are largely incompatible. The TFCA concept promotes free movement of wildlife over large geographic areas, whereas the present approach to the control of TADs (especially in respect to directly transmitted infections) is to prevent movement of susceptible animals between areas where TADs occur and areas where they do not, and to similarly restrict trade in commodities derived from animals on the same basis. In short, the incompatibility between *(a) current regulatory approaches for the control of diseases of agro-economic importance* and *(b) the vision of vast conservation landscapes without major fences* represents one of the key threats to transboundary conservation success and thus risk-diversification of land-use options and livelihood opportunities. These represent a suite of issues that WCS and partners have been focusing on through the Animal & Human Health for the Environment and Development (AHEAD) program, which has worked to facilitate transparent, multidisciplinary policy dialogue and planning at various scales in the region since 2003.
Source and Amount of Funding	Source: USAID Amount: No information provided
Start and Finish Dates	No information provided
Partner Organizations / Individuals Involved	No information provided
Activities and Methods Involved	No information provided
Findings and Recommendations	No information provided
Follow-on Work Planned	No information provided
Contact information	For questions and comments about the AHEAD program, please contact: Shirley Atkinson, MSc Wildlife Conservation Society Assistant Director, Wildlife Health & Health Policy satkinson@wcs.org Dr. Steve Osofsky Wildlife Conservation Society

	Executive Director, Wildlife Health & Health Policy WCS AHEAD Coordinator sosofsky@wcs.org
Notes	

WORLD BANK

HEADQUARTERS	ZAMBIA
1818 H Street, NW Washington, DC 20433 (202) 473-1000 Contact for Zambia: Ivan Velev Country Program Coordinator +1-202-473-0814 Ivelev@worldbank.org	Pyramid Plaza Church Road, PO Box 35410 Lusaka, Zambia 10101 Main Office Contact: +260-211-373200 +260-211-252811 Zeria N. Banda Communications Officer +265-943223 zbanda@worldbank.org

PROJECT TITLE	ZAMBIA COMACO LANDSCAPE MANAGEMENT (P144254)
Purpose or Objective	Agriculture Land Management/ Afforestation, Reforestation and Revegetation; To increase food production and farm-gate export income per unit area by expanding legume-based agroforestry systems with demonstrated higher sustainable crop yields, and important firewood, materials and tradable carbon production compared to the baseline of traditional smallholder agriculture; Energy Demand: To move household energy supply to a sustainable basis by promoting use of fast-growing coppicing leguminous trees in agroforestry systems, establishment of firewood woodlots and other plantings, control of destructive charcoal production in natural forests, and introduction of clean and efficient wood stoves to replace open fire cooking and use of charcoal; Reduced Emissions from Deforestation and Degradation (REDD): To protect and expand areas under natural forest and conserve biodiversity through the intensification of food production on existing farm plots by adoption of legume-based agroforestry with in-built firewood fire wood production and avoidance of fallows, which will replace the need for further forest clearing as part of slash and burn agriculture, firewood and charcoal production.
Source and Amount of Funding	Amount: $1.33 million

Start and Finish Dates	Start: 27 Apr 2015 Finish: 30 Jun 2019
Partner Organizations / Individuals Involved	Implementing agency: COMACO
Activities and Methods Involved	Conservation farming, reduced till agriculture, other sustainable agriculture, REDD, improved fire management, alternatives to fuel wood for forest protection.
Findings and Recommendations	No information provided
Follow-on Work Planned	No information provided
Contact Information	World Bank Contact: Indira Janaki Ekanayake (Senior Agriculture Economist) Tel: 458-4821 Email: iekanayake@worldbank.org Borrower/Client/Recipient COMACO Contact: Dr. Dale Lewis (President) Tel: 260-211-2260082 Email: dlewis@itswild.org

Key Documents

DOCUMENT TITLE	DATE	REPORT NO.	DOCUMENT TYPE
Zambia - COMACO Landscape Management Project : resettlement policy framework (English)	March 1, 2015	RP1708	Resettlement Plan
Zambia - COMACO Landscape Management Project (English)	November 17, 2014	92757	Integrated Safeguards Data Sheet
Project Information Document (Appraisal Stage) - Zambia COMACO Landscape Management - P144254 (English)	October 28, 2014	PIDA11653	Project Information Document

	Zambia - Community Markets for Conservation (COMACO) Landscape Project : environmental assessment (Vol. 2) : Draft pest management plan (English)	August 1, 2014	E4683	Environmental Assessment
	Zambia - Community Markets for Conservation (COMACO) Landscape Project : environmental assessment : Draft environmental and social management framework (English)	August 1, 2014	E4683	Environmental Assessment
	Integrated Safeguards Data Sheet (Concept Stage) - Zambia COMACO Landscape Management - P144254 (English)	April 22, 2014	ISDSC6288	Integrated Safeguards Data Sheet
	Project Information Document (Concept Stage) - Zambia COMACO Landscape Management - P144254 (English)	February 4, 2014	PIDC2444	Project Information Document
Notes				

PROJECT TITLE	ZAMBIA STRENGTHENING CLIMATE RESILIENCE (PPCR PHASE II)
Purpose or Objective	The development objective of the project is to strengthen Zambia's institutional framework for climate resilience and improve the adaptive capacity of vulnerable communities in the Barotse sub-basin.

Source and Amount of Funding	Source: World Bank Amount: $36 million
Start and Finish Dates	Start: May 9, 2013 Finish: December 31, 2019
Partner Organizations / Individuals Involved	Government of Republic of Zambia Ministry of Finance
Activities and Methods Involved	Strategic National Program Support, aiming to strengthen the national institutional and financial framework for climate resilience, by (a) providing institutional support to the national climate change program; and (b) strengthening climate information Support to Participatory Adaptation, through strengthening of the adaptive capacity of vulnerable rural communities in the Barotse sub-basin Pilot Participatory Adaptation, through the funding of actual participatory adaptation investments in the Barotse sub-basin, including (a) community adaptation sub-grants; (b) establishment and operation of an adaptation contingency fund; and (c) rehabilitation and strengthened management of traditional canals.
Findings and Recommendations	No information provided
Follow-on Work Planned	No information provided
Contact Information	Team Leader: Iretomiwa Olatunji or Sofia U. Bettencourt World Bank Contact: Sofia U. Bettencourt Title: Lead Operations Officer Tel: 5338+3218 Email: sbettencourt@worldbank.org Borrower/Client/Recipient Name: Government of Republic of Zambia Implementing Agencies Name: Ministry of Finance and National Planning Contact: Mr. David Kaluba Title: National Coordinator, PPCR Tel: 260-979403037 Email: dckaluba@juno.com

Key Documents	DOCUMENT TITLE	DATE	REPORT NO.	DOCUMENT TYPE
	Zambia - Zambia Strengthening Climate Resilience (PPCR Phase II) : P127254 -	June 29, 2015	ISR19337	Implementation Status and Results Report

	Implementation Status Results Report : Sequence 04 (English,)			
	Zambia - Second Phase of Strengthening Climate Resilience Project (English)	April 15, 2013	73982	Project Appraisal Document
	Project Information Document (Appraisal Stage) - Zambia Strengthening Climate Resilience (PPCR Phase II) - P127254 (English)	March 25, 2013	PIDA809	Project Information Document
Notes				

WORLD RESOURCES INSTITUTE

GLOBAL OFFICE	ZAMBIA
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PROJECT TITLE	ADAPTATION FINANCE (ACCOUNTABILITY INITIATIVE)
Purpose or Objective	The initiative's purpose is to examine how climate adaptation and resilience finance is delivered at the local level, pilot new tracking and monitoring tools to improve finance transparency, and press for strengthened accountability for adaptation and resilience finance. Building on ongoing work at national, regional, and global levels to monitor and strengthen accountability for adaptation finance, the initiative will initially focus on Nepal, the Philippines, Uganda, and Zambia in collaboration with civil society groups there. We will also collaborate at the regional and global level to share civil society lessons of adaptation finance monitoring and advocate for increased transparency and accountability, including with international institutions and donors.

Source and Amount of Funding	Source: UNDP, UNEP No information provided
Start and Finish Dates	No information provided
Partner Organizations / Individuals Involved	In the Accountability Initiative: Oxfam, the Overseas Development Institute, and the World Resources Institute – together with civil society groups in developing countries
Activities and Methods Involved	Our work focuses on building capacity in national governments to manage and channel adaptation funds to those countries that need it most, and increasing the ability of civil society organizations to hold governments accountable for this spending. We explore ways to improve the ability of governments to mobilize domestic funding sources and use innovative financial instruments to support adaptation initiatives. WRI's adaptation finance program focuses on two challenges: 1. Preparing countries to access and effectively manage adaptation finance 2. Ensuring transparency and accountability in the use of adaptation funds at the national and sub-national level 1. Accessing financing • Offer support for countries to directly or indirectly access the GCF, taking into account the access requirements of other funds and facilities such as the Adaptation Fund and the Global Environment Facility (GEF). • Help develop project pipelines based on national climate change strategies, plans, and policies in order to facilitate increased investment of the private sector in climate-relevant areas. • Assist in setting up in-country monitoring tracking systems for climate finance and its effectiveness. • Disseminate lessons learned in the course of the implementation back to the GCF Board in order to support its work in designing the GCF operations. 2. Accountability • Develop tools to enable civil society and other stakeholders to track and monitor adaptation finance flows from a multitude of sources down to the local level. • Identify institutional constraints to the effective delivery of climate finance to poor and vulnerable groups, and opportunities to empower local civil society to overcome these constraints. • Support national and local civil society capacity to advocate for improved transparency, coherence and alignment of climate finance, and increased accountability to citizens for the use of this finance. • Develop opportunities for South-to-South learning by enabling civil society groups across a number of Asian and African countries to

	share insights, exchange experiences, and jointly develop advocacy strategies. • Distill lessons from piloting monitoring tools and advocacy to improve transparency and accountability in climate finance delivery. • Influence global efforts to mobilize and manage climate finance, including the oversight under the UNFCCC, the operationalization of the Green Climate Fund, and bilateral institutions delivering climate finance.
Findings and Recommendations	No information provided
Follow-on Work Planned	No information provided
Contact information	
Project Documents	Relevant publications, blog posts and visuals/presentations are available at: http://www.wri.org/our-work/project/adaptation-finance#project-tabs
Notes	

WORLD WILDLIFE FUND

HEADQUARTERS	ZAMBIA
1250 24th Street, N.W. Washington, DC 20037 P.O. Box 97180 Washington, DC 20090-7180 (202) 293-4800	Plot 4978 Los Angeles Boulevard, P.O. Box 50551 RW, Long acres, Lusaka, Zambia Tel: +260 211 250404 Fax: +260 211 253749 Email: wwfzam@zamnet.zm

PROJECT TITLE	JOINT ZAMBEZI RIVER BASIN ENVIRONMENTAL FLOWS (E-FLOWS) PROGRAM
Purpose or Objective	Aims to restore the natural flow of the rivers in the wake of dam constructions along the main rivers for the benefit of the environment, and the people.
Source and Amount of Funding	No information given
Start and Finish Dates	No information given – though sounds like the project is ongoing
Partner Organizations / Individuals Involved	Partners listed for both freshwater projects (see the other below): • National Heritage and Conservation Commission (NHCC) • Zambezi River Authority • Ministry of Energy and Water Development • Department of Water Affairs (DWA) • Fisheries Department (Ministry of Agriculture) • Zambia Electricity Supply Corporation (Zesco) • Zambia Environmental Management Agency (ZEMA) • WWF Netherlands (Funding partner)

	• Universities in Zambia, Zimbabwe and Mozambique
Activities and Methods Involved	No information given
Findings and Recommendations	No information given
Follow-on Work Planned	No information given
Contact information	
Notes	

PROJECT TITLE	ZAMBIA WETLANDS PROGRAM
Purpose or Objective	WWF Zambia is committed to ensuring that wetlands as important sources of clean water and habitats for important species are well managed for the benefit of local communities and ecosystems.
Source and Amount of Funding	No information given
Start and Finish Dates	No information given – though sounds like the project is ongoing
Partner Organizations / Individuals Involved	Partners listed for both freshwater projects (see the other below): • National Heritage and Conservation Commission (NHCC) • Zambezi River Authority • Ministry of Energy and Water Development • Department of Water Affairs (DWA) • Fisheries Department (Ministry of Agriculture) • Zambia Electricity Supply Corporation (Zesco) • Zambia Environmental Management Agency (ZEMA) • WWF Netherlands (Funding partner) • Universities in Zambia, Zimbabwe and Mozambique
Activities and Methods Involved	No information given
Findings and Recommendations	No information given
Follow-on Work Planned	No information given
Contact information	
Notes	

PROJECT TITLE	VARIOUS - THEMATIC AREA OF "SPECIES AND PROTECTED AREAS"
Purpose or Objective	WWF Zambia collaborates with ZAWA to address various challenges and threats facing the wildlife sector in Zambia such as poaching, illegal wildlife trade and human wildlife conflicts. Zambia's biodiversity is managed mainly within a network of three types of protected areas. The first consists of 19 national parks, 39 Game Management Area (GMAs) and 8 Ramsar sites, which are administered

	by the Zambia Wildlife Authority (ZAWA). The second type consists of national heritage sites that are managed by the National Heritage Conservation Commission (NHCC) while the third type comprises the forest reserves, which are over 450 and managed by the Forestry Department. There are also a significant number of game ranches scattered across the country managed by private land owners.
Source and Amount of Funding	No information given
Start and Finish Dates	No information given – this may be more of an ongoing general program than a specific project or projects
Partner Organizations / Individuals Involved	Partners listed for both freshwater projects (see the other below): • Zambia Wildlife Authority (ZAWA) • Forest Department • National Heritage Conservation Commission (NHCC) • Ministry of Lands, Environment and Natural Resources • Zambia Environmental Management Agency (ZEMA) • African Parks Network • Zambia Carnivores Project • Peace Parks Foundation (Fundraising partner) • NORAD (Funding partner) • WWF Norway (Funding partner) • WWF Netherlands (Funding partner)
Activities and Methods Involved	No information given
Findings and Recommendations	No information given
Follow-on Work Planned	No information given
Contact information	
Notes	

ANNEX F. KAFUE NATIONAL PARK BACKGROUND INFORMATION 2015

Zambia rightly takes pride in the amount of land that it has set aside in wildlife conservation areas and Kafue National Park is the oldest and by far the largest of these.

Kafue is one of the world's great national parks and as a major part of Zambia's natural heritage it deserves to be better known. It is located in the center of south-western Zambia about **two hours' drive from Lusaka the capital, and from Livingstone/Victoria Falls, the tourism hub of the country.**

The country has an area of 752,614 km² and about 30% of this is allocated to wildlife protected areas consisting of 20 National Parks (NPs) and 36 Game Management Areas (GMAs). The national parks total 63,647 km² and the GMAs cover some 167,557 km² – 8.5% and 22.3% of Zambia's land respectively. This is roughly four times the national average for Africa as a whole.

The national parks were established to preserve representative examples of the country's "indigenous environments" for the enjoyment and education of the general public, and a policy of "no major developments inside the parks" was adopted with the exception of roads, rest areas and other non-permanent structures. KNP retains these values by careful zoning and sensible land use planning.

The GMAs which surround the national parks are intended to act as buffer zones against destructive environmental practices. These were instituted to conserve wildlife at optimum variety and abundance commensurate with other land uses, and to allow for a harvest to be culled annually on a sustained yield basis. In effect, they were created to integrate wildlife management into the rural economy.

Responsibility for the entire wildlife protected area system was vested by the Government in the Zambia Wildlife Authority (ZAWA) by the Zambia Wildlife Act, No 12 of 1998, which was superseded on 14 August 2015 with Wildlife Act No 14 of 2015. The new act provides the foundation for the **Department of National Parks and Wildlife (DNPW), which** will soon replace ZAWA. The DNPW will be administered in the Ministry of Tourism and Arts (MTA) and will "control, manage, conserve, protect and administer National Parks, Community Partnership Parks, bird and wildlife sanctuaries and Game Management Areas and coordinate activities in these areas".

KAFUE NATIONAL PARK AND ITS GMAS

KAFUE NATIONAL PARK (KNP) covers an area of 22,480 km². It is situated between 14°03'S and 16°43'S and 25°13'E and 26°46'E in the Central African Plateau biome within the Miombo Ecoregion. The **9 GMAs** that surround it support about 200,000 people, most of whom live well below the national poverty line. Clearly, efforts are required to improve livelihoods for poverty reduction, better NRM and good governance.

The GMAs add a further 45,406 km² thereby forming a contiguous conservation area of 67,886 km². **The KNP area encompasses nearly 40% of the national protected area estate, over 25% of the Kafue River's catchment** from the upper reaches to Itezhi-Tezhi dam and is more than twice the size of Belgium. It is the fifth largest national park in the world and is larger than both Kruger and Etosha with which it is often compared and sometimes referred to as "Zambia's huge hidden gem".

The Park derives its name from the Kafue River, which flows through it for 256 kilometers. Over half of this stretch forms part of the Park's eastern boundary. Much of the western boundary follows the watershed between the Zambezi and Kafue Rivers and approximates the boundary of Western Province with Central and Southern Provinces. **The entire 1012 km park boundary has been protected successfully from encroachment by ZAWA, despite limited manpower and resources, right up to the present day**.

The Park contains 20 vegetation types, mainly extensive floodplain and Dambo grassland, Miombo(about 50%) and Mopane woodland, thickets and riparian forest and deciduous Teak forest. **It protects examples of 16 of the country's 24 natural habitats (66%)** including large areas of characteristically very high biomass, notably edaphic grassland (1005±315 kg per km^2 and termitaria vegetation (490±50 kg per km^2); it provides sanctuary for 161 species of mammal; 515 of birds including the GMAs; 70 of reptiles; 36 of amphibians and 58 species of fish. **It is classified as having more antelope species (21) than any other park in Africa and it is also rated as one of Zambia's "Important Bird Areas".**

Threats

The two serious threats to the Park's ecological integrity are widespread annual bush fires, up to 90% of the area in most years, and poaching. Poaching is driven by both poverty and greed. **Where poaching has been brought under control the recovery of natural succession and wildlife populations has been remarkable,** mainly in areas to the north-east, north-west, in the south around Lake Itezhi-Tezhi and in the Chunga area and in the Kaingu area of the Namwala GMA and around Nanzhila and Kalenje further south. All that areas far from the ZAWA Management Units of Chunga and Ngoma and away from lodges and camps present the biggest challenge. Prime examples of success and failure are, the successful recovery of the Busanga lechwe (*Kobus leche leche*) population from less than 100 in 1950 at the time the Park was formed (71 in 1948) to an estimated population of 5,817 in 2006, contrasted with the heavy degradation of the internationally renowned Ngoma Teak (*Baikiaea plurijuga*) Forest through inability to control widespread annual burning and the impact of a growing elephant population. The GMAs are being degraded not only from bush fires and illegal offtake of wildlife but above all by rapid human population growth, encroachment of illegal settlers, uncontrolled low yielding agriculture, unmanaged logging and fuelwood harvesting, charcoal production and disregard for closed seasons in wild fisheries of the Kafue River and Lake Itezhi-Tezhi.

BIODIVERSITY AND ECOSYSTEM SERVICES

The value and importance of KNP is measurable in terms of providing sanctuary for indigenous flora and fauna in an unfenced wilderness area together with protection of all biodiversity and **ecosystem services** in this part of the Kafue River's watershed, offering many conservation benefits as well as development opportunities:

1. Providing sanctuary for indigenous flora and fauna in a secure wilderness area.
2. Protection of biodiversity and genetic material.
3. Watershed protection and maintenance of stream flow.
4. Water supply, storage and provision (Lake Itezhi-Tezhi and off-takes from the Kafue River for urban and agricultural use).
5. Increasing carbon sequestration through fire control.
6. Climate regulation through retention of vegetative cover.
7. Erosion control through soil and sediment retention.
8. Soil formation and nutrient cycling in natural succession.
9. Maintenance of culture and traditions amongst riverside and lakeside communities.
10. Nature-based tourism as an increasing source of employment and income for local communities and national economy.

From the socio-economic point of view the park's size and location (only two and a half hours from Lusaka), attractive and varied landscapes and abundant wildlife, contribute to its rising importance for ecotourism (consumptive and non-consumptive) which in turn is an increasing source of employment and income for the communities that reside in the GMAs as well as much-needed revenue for the ZAWA.

The Park's wide and gently undulating landscape is shaped by the Kafue River and several perennial tributaries that intersperse extensive woodlands, forest and grassland. **It has far more to offer the tourist by way of recreation and special interest attractions than simply animal watching.** Unspoilt wilderness without crowds or pollution is diminishing worldwide thereby underling KNP's value as an outstanding natural asset. The whole area offers many

opportunities for investors and tourism developers but chronic under-funding and under-valuing by society remain over-riding constraints to development.

ZAWA – THE MANAGEMENT AGENCY

In the hubbub of daily life where pressures of the economy and survival, especially for the many who live at the subsistence level, takes up so much of people's concern and time so that it is only too easy to overlook and misunderstand the enormity of the task which ZAWA staff face.

Management of the Park and the GMAs is carried out through the Western Region Office based in Mumbwa and by field staff stationed in two area management Units: one at Chunga for the northern sector and the other at Ngoma for the southern sector. There is a total ZAWA KNP staff of 264 (in 2011) of whom 176 are Wildlife Police Officers (WPOs) who conduct field patrols and the remaining 88 being responsible for revenue collection (25) and management support (63). This complement of staffing equates to one officer per 257km^2 which when measured against the Grant Thornton estimate indicates that **the Park currently operates with less than 20% of staff needed** or that can be afforded. This of course places an enormous burden of responsibility and workload upon all staff at all levels.

Among the many quantifiable duties, such as those mentioned above, that are carried out over the vast management area, ZAWA is entrusted also with less easily valued tasks including public relations, attending to human/wildlife conflicts which sometimes entail taking great personal risk when dealing with dangerous or wounded animals, facing groups of better armed and mobile poachers, long periods away from home and families and extended and often inadequate lines of communication and support.

This aspect of the work of ZAWA is unfortunately something which is seldom acknowledged by civil society or the media.

To help ameliorate this difficult situation ZAWA received donor financial support from the World Bank and Norway under the Support for Economic Expansion and Diversification IDA-GEF Project known as SEED, which closed at the end of 2011. In addition, financial support was provided by the Royal Danish Embassy and WWF in some of the GMAs. These interventions set the foundation for a good recovery.

Specifically, until the introduction of the SEED programme in 2004, KNP was to a large extent isolated from land use plans and economic development programmes. For example until satellite imagery became commonplace details of parts of the Park were excluded from the National 1:50,000 scale map coverage and insufficient direct expenditure was made for over 25 years on maintenance of infrastructure leading to the total demise of Ngoma Lodge (once a 38 bed lodge of international standard) and the collapse of the main Park road (the so-called "Spinal Road") that was reopened in 2014 to link the north to the south and in particular the management centers of Chunga and Ngoma.

Unfortunately, protected area management and funding mechanisms continue to remain weakly linked to the full range of protected-area functions. Current legislation and ZAWA management practices at Chunga and Ngoma are helping reduce conflicts with local people but enforcement of laws in much of KNP remains inadequate and there is little or no coordination with other economic sectors leading to deterioration in much of the area of key ecological issues such as climate regulation, watershed protection, erosion control and biodiversity conservation, quite apart from the **unrealized potential for tourism earnings.**

Together these undoubtedly cost Zambia many millions of U.S.$ in potential revenue and social benefits. Whilst tourism appears to be growing at the rate of about 12% per annum the industry still only contributes about 2% to the country's GDP compared with 15% in South Africa. Furthermore the diverse functions of protected areas on which much of the industry depends remain poorly understood by the general public, including those who make decisions affecting their viability and it is on this account that ZAWA and its partners are currently focusing their efforts towards realizing the real asset value of national parks through direct investment in infrastructure and tourism, public-private partnerships and joint ventures.

TOURISM AND THE PRIVATE SECTOR

The invaluable role of the private sector is increasingly recognized and sought, this being reflected in a growing number of co-management partnerships and the forming recently of the Kafue Park Operators' Association (KPOA). The park's Business Plan 2008 stated that "…KNP has the potential for generating a net taxable income by the private sector of about U.S.$38 million per annum within 12 years from non-consumptive tourism-based business activities" by increasing occupancy from the current average of 30% to over 60%. For tour operators there are many avenues for new enterprises:

1. Wildlife viewing, walking safaris, boating and canoeing can be conducted in an uncrowded, **outstandingly diverse,** natural environment.
2. Abundant scope for special interests such as bird watching, fishing, botanical tours, photographic holidays, visits to important historic and sites and cultural events.
3. The Busanga and Nanzhila Plains which offer exceptional opportunities for viewing uncommon species such as sitatunga, roan and sable antelope, large prides of lion, cheetah and herds of buffalo, red lechwe and Black-cheeked Lovebird.
4. The Park has several hot springs mostly in a line from the Lubungu Pontoon to the Kafue-Lufupa confluence but also in the Bilili Springs GMA.

The magnitude of the opportunity for development of tourism can be measured by the fact that of the 204,000 holiday-making tourists who visited Zambia in 2006 only 1955 "international" and 2563 "resident" tourists visited KNP where there are 36 approved lodges and camps with a total of about 600 beds that are either within or close to the Park. **There are thus many opportunities and many challenges, such as the urgent need for better road infrastructure, especially the southern access routes; bush fire control and removal of poaching which must be achieved for the Park can to attain its potential.**

The Park enshrines superb wilderness values (space, limited physical alteration to the environment, clean air, unpolluted water and general tranquility except during the season of bush fires) set within landscapes dominated by the Kafue River which unlike parts of the Luangwa and Zambezi, is at its base level thereby retaining a stable course that is not subject to destructive changes in direction and flow. **KNP offers a pristine destination of huge tracts of unspoiled natural habitats.** These increasingly sought-after qualities place the **Park high amongst Zambia's priceless natural assets that remain chronically under-resourced**.

OPPORTUNITY, NEEDS AND POTENTIAL

The Park **needs** further support so that it can become a major springboard in the national effort to promote and diversify the national economy. The Fifth and Sixth National Development Plans (FNDP/SNDP) require diversification away from copper production by placing more emphasis upon tourism. Given adequate backing, this is an attainable goal in which ZAWA plays a vital role but, like the KNP itself, it is under-resourced, often poorly understood and frequently goes unappreciated by society. Further investment is now required to build upon past efforts so that it can realize its full **potential**

Summary: why support KNP?

1. Large size – c.40% of the national wildlife PA estate and more than 25% of the Kafue River catchment and 9% of Zambia's total area.
2. KNP's size creates many challenges and many opportunities.
3. KNP is a major part, c.25%, of the new 5-country Kavango-Zambia Transfrontier Conservation Area (KAZA-TFCA).
4. Located in the center of south-western Zambia only about two hours' drive from both Lusaka and Livingstone.
5. Outstanding biodiversity – more than any other PA in the region – wide range of vegetation and wildlife habitats; 79% of all mammals in Zambia and 67% of birds with 21 species of antelope recorded more than any other NP in the world.

6. The KNP area provides for numerous ecosystem services (carbon sequestration, streamflow, biodiversity conservation etc.) that are seriously under-valued requiring better recognition and much more investment in management.
7. Unable to reach conservation and economic potentials on account of unsustainable use of natural resources in all the 9 GMAs where there is a rapidly growing human population, at least 3.07% in 2014 (WB).
8. Encroachment of illegal settlers in all the GMAs is placing an **impossible** management burden for ZAWA, the Traditional Leaders (chiefs) and the Community Resource Boards.
9. Human-wildlife conflict is increasing and requires more management for which ZAWA is ill-equipped at the moment.
10. ZAWA is the park's management authority under the Wildlife Act 2015 but has always been hindered in carrying out its responsibilities through lack of resources of all kinds e.g. currently **operates with less than 20% of required staff**, few vehicles, inadequate road maintenance equipment etc.
11. Road infrastructure has improved through donor support during the period 2004-2011. Without further support for regular maintenance, infrastructure and equipment will again deteriorate, (borne out in the recent USAID ETOA field visit – October 2015).
12. Access routes from the tourist hub of Livingstone and Victoria Falls, essential to the development of KNP tourism, are maintained by the Roads Development Agency (RDA) and are in a lamentable state of disrepair hindering tourism development. This long-standing issue requires urgent attention at the highest level. ZAWA needs independent support for the necessary negotiations.
13. 60% of ZAWA's income for KNP is normally derived from safari hunting in the GMAs but this has declined through depletion of game stocks, closure of hunting in 2013-15 and lack of management.
14. Most lodges have low occupancy rates, less than 50%, that could be raised considerably if management and infrastructure are improved. KNP has unrivalled potential for tourism development on account of abundant wildlife, attractive landscape, good climate, wide range of leisure-based, nature-based and adventure recreational activities and proximity to Lusaka and Livingstone. KNP Tourism requires further investment and professional support for product development and marketing etc.
15. More internal roads must be upgraded to all-weather standard to extend the tourism season and therefore lodge economic viability. This is feasible but requires investment.
16. After a long period of neglect due to lack of resources for management, KNP benefitted greatly from donor support (CPs) but this closed in 2011. Since then closure of hunting and decline in the price of copper has again led to an urgent need for additional investment to build on the recovery process and enable KNP to take its rightful place as a world-class national park and destination of first choice for local and international tourists.
17. KNP clearly **needs** capital investment in infrastructure and management to build on past donor interventions. The **park's size, location and assets** show that it has **unrivalled potential** to contribute to the national development strategy of economic diversification (**FNDP, SNDP,** Vision 2030) through tourism. Further support and technical assistance will also enhance the park's vital contribution to climate change adaptation, poverty alleviation and realization of the economic value of natural resource conservation by civil society in general.

KNP is the priority site for reasons 1-17 above. Without continuing to develop KNP there will be a huge lost OPPORTUNITY especially for biodiversity conservation, ecosystem services, tourism, and poverty reduction. Its future must build on the foundation made by SEED and CPs 2004-2011, otherwise KNP could revert to the pre 2004 state. The Block Tourism Concessions Report 2007, KNP Business Plan 2008, KNP Game Management Plan (GMP) 2011-2020 and GMP Implementation Project 2012-2016 all provide essential implementation and budgetary guidelines.