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Key drivers of biodiversity loss in Zambia

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Key Points & Recommendations

- a) Biodiversity loss has reached unprecedented levels in Zambia mainly due to anthropogenic activities in pursuit of economic gains. The sectors most affected by biodiversity loss are forestry, fisheries, wildlife and water.
- b) Economic drivers form a larger share of factors that affect biodiversity loss in Zambia, with agricultural expansion alone accounting for 90% of forest cover loss due to subsistence and commercial agriculture production. There is need to ensure that agriculture sector is compelled to collaborate with other biodiversity sectors such as forestry and wildlife. Extensive clearing of forests and woodlands for agriculture, use of wood in tobacco curing (e.g.in Eastern Province), require collaborative engagements with the forestry sector over sustainable utilisation of wood.
- c) Annual deforestation rate in Zambia is in the range of 79,000 to 270,000 ha of the total forest cover largely due to an increase in the urbanization rate of 3.2% per annum which is likely to compound the deforestation rates as the need to develop infrastructure in such areas such as housing, energy, transport and irrigation increases.
- d) Threats to forest resources are exacerbated by policy and regulatory factors such as the recent degazettement of six (6) forest reserves, predominantly for infrastructural development purposes. There is need for government to avoid this continued degazettement of forests. This also calls for the Government to extensively engage different stakeholders on potential impacts of such policy pronouncements.
- e) Apart from being the main polluters of Zambia's ground and surface water, some of the mining companies conduct illegal mining activities in game management areas and national parks without carrying out environmental impact assessments. As a result, this disrupts animal populations in the protected areas, hence the need to ensure adherence to the provisions of the law before commencement of such activities.
- f) Key biodiversity sectors such as forestry, wildlife and fisheries have inadequate funding with total funding to environmental protection less than 50 percent of the budgeted amounts. Inadequate funding limits the sectors' capacity to effectively carry out monitoring and control activities.
- g) Inadequate staffing is another issue affecting key biodiversity sectors i.e. the fisheries department had 18 percent (430 out of 2437 in 2014) of the total staff establishment while the Department of National Parks & Wildlife had a staff establishment of 76 percent of the total staff establishment which also limits the effectiveness of these departments to carry out monitoring and control activities

1.0 Introduction

Zambia is abundantly endowed with natural resources and biological diversity (GRZ, 2015). The importance of biodiversity cannot be

overemphasized. Biodiversity is an essential source of food, nutrition and vitamins, especially to the rural households (Mofya-Mukuka and Simoloka, 2015). However, anthropogenic activities have

contributed to unprecedented levels of biodiversity loss in the last few decades (Burkmar and Bell, 2015; Millennium Ecosystem Assessment, 2007). Zambia's quest to ensure sustainability in biodiversity management is evident by its commitment to international frameworks such as the United Nations Convention on Biological Diversity (CBD) as enshrined in the Strategic Plan on Biodiversity 2011-2020 and its Aichi targets, as well as the Sustainable Development Goals (SDGs) which came into effect in 2016.

The formulation of the National Biodiversity Strategic Action Plan II (NBSAP-2) is testament to the strides that the country has taken to domesticate the broader international conventions in line with the national development strategic plans notably the Seventh National Development Plans (7NDP) and Vision 2030 that stress the importance of development consistent with sustainable management of the environment and natural resources. In line with Strategic Goal A of the Aichi Biodiversity targets, one of the goals of the NBSAP-2 is to 'address the underlying drivers of biodiversity loss by mainstreaming biodiversity across government and society' and this is reflected in the number of diverse policies that have been devised in different biodiversity-loss affected sectors (GRZ, 2015). Understanding and identifying the key drivers of biodiversity loss can assist in initiating and applying appropriate finance solutions that can mitigate biodiversity loss to safeguard the future and well-being of the earth (Burkmar and Bell, 2015).

This policy brief therefore seeks to identify the key drivers of biodiversity loss in Zambia. It must also be noted that this policy brief is an abridged version of the bigger paper, the Policy and Institutional Review of Zambia's biodiversity by Mwitwa (2017).

2.0 Data and Methods

A desk review of secondary literature that included national development strategies, public and private sectors' annual reports and documents, pieces of Zambian legislation and selected internet sources was conducted. Key informant interviews were also conducted with various stakeholders and institutions that are engaged in biodiversity activities.

3.0 Key Findings

There are 5 major categories of key drivers of biodiversity change in Zambia which emerged during the data analysis. These are economic; policy and regulatory; social, environmental, cultural and demographic; political and scientific and technological as highlighted below.

3.1 Economic Drivers

The nexus between economic drivers and biodiversity loss stems from utilization or consumption of the natural resource capital for economic gains. Some of the key economic drivers are highlighted below.

3.1.1 Agricultural expansion

There is growing consensus that agriculture, both subsistence and commercial scale, is the main driver of not only habitat loss but also biodiversity loss (Slingenberg *et al.*, 2009; Habibullah *et al.*, 2016; Burkmar and Bell, 2015). In Zambia, agriculture expansion is estimated to account for 90% of forest cover loss (Mwitwa *et al.*, 2003; Campbell *et al.*, 2012), due to shifting cultivation and extensification by smallholder and commercial farmers. The rising incomes and population growth exacerbates the status quo by exerting pressure on scarce resources. For instance, the increase in the urbanization rate of 3.2% per annum (Gumbo *et al.*, 2013) is likely to compound the deforestation rates as the need to develop infrastructure in such areas as housing, energy, transport and irrigation increases (Campbell *et al.*, 2012). The annual deforestation rate in Zambia is 276,021 ha per annum or 6% of the total forest cover (GRZ *et al.*, 2017). Harmful and conventional agricultural practices that encourage mono-cropping, burning of bushes during land preparation, extensive use of synthetic fertilizers, disposal of herbicides and insecticides degrades the land and contaminates the sources of food for animals, birds and other creatures that are found in water bodies.

3.1.2 Illegal abstraction of forest, fisheries and wildlife resources

The threats to forestry resources emanate from increasing demand for timber. Extraction of the Mukula tree ('Green gold'), Mukwa/Kiaat (*Pterocarpus angolensis*), Muzauli/African rosewood (*Guibourtia coleosperma*) and Zambezi teak (*Baikiaea plurijuga*) has been on the increase driven largely by foreign demand, and locally due

to expanding construction activities (Gumbo *et al.*, 2013).

Use of unsustainable harvesting methods has the potential to wipe away fish stocks in water bodies. According to the 2015 Auditor General's report on Sustainable Fish Management, fishermen have continued to use illegal fishing methods such as mosquito nets, potato sacks and poisons that kill fish and disrupt breeding sites. In addition, fishers do not adhere to the fishing ban and continue to operate without licenses and settle in breeding sites despite them being gazetted (GRZ, 2015).

Poaching has also been on the increase, a situation that has seen a significant proportion of elephants and black rhinos being decimated due to increasing demand for game meat, the Rhino horn and ivory. A total of 24 out of 36 game management areas covering 170,000 Km² (Lindsey *et al.*, 2013) are 'under-stocked' or 'depleted', due to illegal hunting for game meat. Also, threats to wildlife are likely to emanate from trade policies that encourage trading of trophies such as the reversal of the ban on elephant trophies sourced from Zambia and Zimbabwe by the United States when evidence shows that elephant populations have declined¹.

3.1.3 Mining operations

Discharge of effluents by mining companies has resulted into negative impacts on terrestrial as well as ground and surface water sources (e.g. the Kafue River and the Mushishima stream). Monitoring the impacts of mining operations is challenging due to limited spatial spread of Zambia Environmental Management Agency (ZEMA). The growing metal demand in Asian markets is likely to aggravate biodiversity loss in Zambia and other mineral rich countries in the region. In North-Western Province, about 350,000 hectares (ha) of Protected Forest Areas (PFAs) have been converted to mining concessions since mining started in 2005 and is likely to deteriorate with the opening of new mines (Matakala *et al.*, 2015).

¹ According to the Great Elephant Census Report (2016), elephant populations in both countries are still declining with Zimbabwe having carcass ratios¹ of 8 percent with overall population declining by 6 percent while carcass ratios for Zambia are 3 percent with some National Parks like Sioma Ngwezi National Park recording as high as 85 percent decline (Allen, 2016).

3.2 Policy and Regulatory Drivers

In this section, drivers affecting biodiversity loss bordering on policy changes/incentives as well as institutional challenges that pose threats to biodiversity conservation are discussed.

3.2.1 Institutional Incapacity

Lack of institutional structures by government or traditional leadership that can empower protected areas to generate sufficient revenues potentially contributes to biodiversity loss. There are also conflicting mandates among institutions with some providing legitimacy to adverse biodiversity activities (e.g. trade policies in the external sector that allow duty-free importation of fishing gears and issuing of mining operation licenses by the Ministry of Mines and Minerals Development in protected areas (Matakala *et al.*, 2015).

3.2.2 Weak enforcement of laws

While there are existing laws aimed at conserving biodiversity, enforcement has been weak. For instance there have been reported cases of people sneaking in the night to fish and sell their catch in the morning (Times of Zambia, 2014). In addition, the abolishment of key positions that enforce the Forest Act such as Forest Guards and Forest Rangers through the Public Sector Reform Programme of 1997 has left the Forestry Department with a lean staff culminating in poor enforcement (GRZ, 2014b).

3.2.3 High maintenance costs/Inadequate funding

Biodiversity management is hampered by lack of investment and funding in human resource and physical infrastructure. Key biodiversity sectors such as forestry, wildlife and fisheries that fall under environmental protection² in the national budget are underfunded. Actual allocations to environmental protection has been less than 50 percent of the budgeted amounts over the last decade (GRZ, 2006-2017). As Table 1 shows, despite the increase in the amount allocated to environmental protection over the last eight (8) years, its share of the total budget over the last

²Concerned with policies and procedures aimed at conserving the natural resources, protecting the current state of the natural environment and where possible, reversing its degradation (<http://www.mof.gov.zm/index.php/budgetdata>)

decade has been less than 1 percent (GRZ, 2006-2017).

Table 1: Expenditure Allocations to Environmental Protection

Years	Environmental Protection Budget Allocation (ZMK)	Total Budget (ZMK)	Environmental Protection as a % of National Budget
2010	87,858,340	16,717,800,000	0.5%
2011	148,792,296	20,537,400,000	0.7%
2012	154,695,622	27,698,200,000	0.6%
2013	27,398,351	32,212,200,000	0.1%
2014	127,434,390	42,682,000,000	0.3%
2015	174,963,252	46,666,560,000	0.4%
2016	149,406,460	53,135,825,364	0.3%
2017	557,855,823	64,510,300,000	0.9%
2018	951,352,080	71,662,385,976	1.3%
		Average	0.6%

Source: Authors computation based on data from Ministry of Finance.

The inadequate funding has resulted into labor constraints, for instance, the Department of Fisheries which only receives a budgetary allocation of less than 50 percent (World Bank and WorldFish Center, 2009) has 18 percent (430 out of 2,437 in 2014) of the total staff establishment (Chinet *et al.*, 2014; GRZ, 2015) while the Department of National Parks and Wildlife has a staff establishment of 76 percent (GRZ, 2014a).

3.2.4 Under-pricing of biodiversity resources

Capacity of forest reserves and Game Management Areas to broaden the revenue base is inhibited by under-pricing of biodiversity resources in concession agreements. Concession rates are too low and do not reflect the true value of wildlife that is hunted hence the need to revise them so that they reflect the true opportunity costs of consuming such natural resources. Low concession rates are a recipe for acquisition of large areas, hence may exacerbate biodiversity degradation (Bagri, Blockhus and Vorhies, 1999)

3.2.5 Inadequate Investment/Incentives

The level of investment in some biodiversity sectors such as aquaculture fisheries that provide alternative sources of fish is insufficient hence putting pressure on capture fisheries. Despite aquaculture production increasing by 340%

between 2006 and 2015 (GRZ, 2017b), growth in the sector is threatened by some of the regulatory changes. The Fisheries Act No. 22 of 2011 requires potential aquaculture farmers to pay license fees, inspection fees and the need to conduct environmental impact assessments. This has a potential to stifle investment in the sector, especially for the small-scale fish farmers.

Like the fisheries sector, investment in the wildlife sector is impeded by prevailing disincentives. According to the Wildlife Producers Association of Zambia (WPAZ) (2013) report, the tenure of hunting concessions is too short³ to allow for private operators to invest in restocking, park infrastructure and park management while returns are slow to accrue (higher financial returns are only realised 40 years after the initial investment) hence such short term leases disincentivizes investment in the wildlife sector as it is not sufficient to recoup the costs (Lindsey *et al.*, 2013).

3.2.6 Degazettion of forests

The recent degazettion of forests in Zambia is expected to put pressure on forest resources and further cause forest degradation. Over the past decade, between 6 and 12 forest reserves (more than 280, 000 ha) have been degazetted from Copperbelt, Southern and Eastern Provinces⁴ (Mwitwa *et al.*, 2012). The most recent degazettion was Local Forest No. 27, a move that was widely condemned by environmental pressure groups stating that such a move would lead to deforestation and disrupt supply of fresh water in Lusaka (DW, 2017). Table 2 shows a detailed analysis of other forests that have been degazetted in Zambia in recent years.

Table 2: Summary of Degazetted Forests in Zambia

Forest Code	Description	Size of Degazetted Area
F27	A local forest in Lusaka East degazetted for construction of projects and sewer systems through SI No. 62 of 2017 (DW, 2017; Tembo, 2017)	1,697 ha
F22	Local forest in Livingstone degazetted for residential plots through SI No. 28 of 2017 (Mulenga, 2017)	1,000 ha

³ Leases are granted for 10 years but exceptionally granted for 15 years for depleted blocks

⁴ Recently degazetted forests include F22, F8, F38 and F29

Forest Code	Description	Size of Degazetted Area
F8	Ichimpi forest reserve in Kalulushi degazetted to offer 400 farm plots to squatters through SI No. 2 of 2007 (Lusaka Times, 2016)	2,147 ha
F38	Dola Hill forest in Ndola degazetted through SI No. 17 of 2015 for construction of an industrial park and a residential area (Munambeza, 2015)	511 ha
F29	A local forest in Chisamba degazetted for developmental purposes through SI No. 2 of 2015 (GRZ, 2016)	5,789 ha

3.3 Social, Environmental and Cultural Drivers

This section highlights some of the social, environmental, cultural aspects that drive biodiversity degradation in Zambia.

3.3.1 Encroachment

Encroachment into Game Management Areas (GMAs) and national parks through human settlements and search for agricultural land has culminated into habitat degradation and depletion of wildlife in Zambia. Currently, encroachment has occurred in all GMAs with areas such as Bilili Springs and Mukungule being the most encroached primarily for settlement purposes (Lindsey *et al.*, 2013) while Mumbwa has also witnessed an increase in encroachment due to agricultural activities which has resulted into degradation of GMAs by 25 percent (UNDP/GEF, 2014). National parks have also not been spared from encroachment. A total of six⁵ out of the 20 national parks have been encroached thereby degrading wildlife habitats (Lindsey *et al.*, 2013).

3.3.2 Inequitable Benefit Sharing

There is also a lack of an equitable benefit-sharing mechanism that is at variance with the Nagoya Protocol which implies that revenues raised from concessions and hunting licences are not sufficient to sustain their operations. While the Wildlife Act of 1998 provides incentives⁶ for community engagement in Wildlife management through Community Based Natural Resource Management (CNBRM), The 2014 Auditor General Report highlights irregular flows of funds from the Department of National Parks and Wildlife to the Community Resource Boards (CRBs). Despite the

majority of land under wildlife being customary, communities receive less benefits than the required proportion (45%) (Lindsey *et al.*, 2013).

3.3.3 Consumption of Non-Timber Forest Products (NTFPs)

The dependency of a significant proportion of rural households on Non-Timber Forest Products (NTFPs), especially for food, income generation, housing and medicinal purposes has been one of the major contributors to biodiversity loss through cutting down of trees when harvesting (e.g. Caterpillars and Masuku (*Uapaca kirkiana*), uprooting of tubers such as Munkoyo (*Rhynchosia venusola*) and Chikanda (*Disa bracteatas*) and honey extraction, which risks causing bush fires. Other NTFPs such as bamboo and thatching grass face higher demand for housing purposes. In addition, there is a lack of awareness by communities on the value of biodiversity due to traditional and cultural beliefs as people believe that natural resources are God given (GRZ, 2009).

3.4 Political Drivers

Local politics play a role in biodiversity change. There has been lack of transparency in awarding concessions with cancellation of tenders (Zambia Daily Mail, 2015) without prior consent of the Zambia Public Procurement Authority. There are also drastic decisions and uncertainties surrounding pronouncements of certain policies (Lusaka Times, 2015) such as hunting moratoria in 2002 and 2013 due to purported corruption in the tender process for allocation of GMAs to operators (Lindsey *et al.*, 2013). The Auditor General Report of 2014 highlights that there are illegal mining activities that are underway without Environmental Impact Assessments (which should take into account conservation and protection of biodiversity) and mining licenses in nine (9) National Parks and Game Management Areas (GMAs) despite causing serious damage to the ecosystem by disrupting animal populations in the national parks and causing pollution to ground and surface water (GRZ, 2014).

3.5 Scientific and Technological Drivers

The last few decades have witnessed scientific and technological advancements. However, their

⁵ These include: Lukusuzi, Mweru-Wantipa, Nsumbu, Isangano, Sioma Ngwezi and Lower Zamb ezi national parks

⁶ In June 2002, the communities

and ZAWA agreed that communities would receive 45% while the Chiefs who are Patrons would receive 5% from revenues generated from wildlife utilisation (GRZ, 2014).

impacts on biodiversity are little known. This section therefore discusses how the changing scientific and technological landscape impacts on biodiversity in Zambia.

3.5.1 Invasive alien species

Invasive alien species have been cited as the second most important driver of biodiversity loss after agricultural expansion (Slingenberg *et al.*, 2009). Typical invasive species in Zambia include, inter alia, the Water Hyacinth (Kafue weed), and *Salvinia molesta* (Kariba Weed). Other weeds such as *Tithonia diversifolia* damage native species by outgrowing them as they compete for food, water and nutrients and may accelerate their local extinction (Nelson *et al.*, 2016). The Lantana weed poses threats to forestry plantations on the Copperbelt province as well as on the Victoria Falls in Livingstone (GRZ *et al.*, 2016).

3.5.2 Effects of climate change

The effects of climate change have been evident on certain water bodies such as Lake Bangweulu with its depth reducing by 0.66 m between 1974 and 2011 which has the potential to exacerbate the current overfishing being experienced (Chin *et al.*, 2014). Globally, Emerging Infectious Diseases (EIDs) such as chytridiomycosis has resulted into a decline in population and extinction of amphibian species by 43% and 34% respectively (Lips *et al.*, 2006).

3.5.3 Inefficient technology

The increase in demand for charcoal, especially from the urban households, has culminated into increased use of inefficient production techniques to meet this demand, such as earth kilns, that require more wood biomass per unit of charcoal (Matakala, W.P., Kokwe, M. and Statz, 2015). It is estimated that 8 tonnes of wood are required for every 1.3 tonnes of charcoal produced, which is the annual urban demand per household (UNDP/GEF, 2017).

4.0 Conclusions and Recommendations

Empirical evidence reviewed shows that biodiversity loss is on the increase. While economic drivers contribute a larger portion to biodiversity loss, emerging issues such as climate change, invasive alien species and EIDs pose future threats for sustainable biodiversity management. In view of the foregoing, future biodiversity loss can be

abated if proposed measures posited below are put in place.

4.1 Improve funding to key biodiversity sectors

Funding to key institutions that monitor and enforce biodiversity legislations should increase to ensure that they carry out their mandate without staff and monitoring equipment constraints. In the forestry sector, the department should be re-capitalised to resume the Local Supply Plantation programme in regional centres to reduce the pressure for timber being exerted on indigenous plantations.

4.2 Decentralize management of biodiversity dependent revenues

Reform legislation of depositing all monies collected from biodiversity sectors into the Government consolidated account. This can be done by empowering the different departments through Appropriation in Aid and apportioning at fixed percent of the collected revenue into a local account upon receipt of revenues and for use at local level for biodiversity management.

4.3 Management of the Environmental Protection Fund

Funds in the EPF are unavailable to address any immediate negative impacts of mining hence they need to be invested in trusts and bonds after which the earnings can be channelled to biodiversity conservation. This fund may possibly be merged with other non-operational sector specific biodiversity conservation funds to a national biodiversity conservation fund.

4.4 Increased awareness

Government, through improved extension services, should increase awareness on the diffusion of technologies that increase efficiency and productivity such as conservation agriculture (CA) without overutilization of water, fertilizers and pesticides or other inputs that have adverse effects on biodiversity, Adam Retort kilns for production and harvesting of charcoal, and fishing nets with regulated mesh sizes.

4.5 Encourage community participation

As a way of promoting collaborative management, there is need to engage traditional leaders to provide for volunteer inspectors of illegal fishing

activities (with logbooks) in all designated entry points to fishery areas and introduction of temporal fishery closures managed locally. In the forestry sector, the existing arrangements should allow equal sharing of benefits between concession holders and the local people if effective CBNRM is to be realised.

4.6 Promote use of renewable energy sources

Government should scale up delivery of renewable energy sources, for instance use of solar which has remained stagnant at 0.06MW for the last 4 years. This requires deploying derisking instruments to attract investments into the country which have eluded renewable energy sub sector for over a decade.

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