

UN-REDD ZAMBIA NATIONAL PROGRAMME POLICY BRIEF

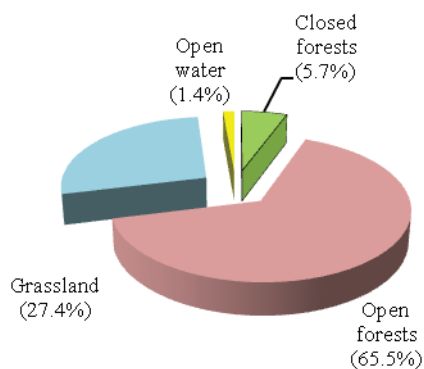


DRIVERS OF DEFORESTATION AND POTENTIAL FOR REDD+ INTERVENTIONS IN ZAMBIA

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Background

Deforestation and poor forest stewardship reduce carbon stocks and the capacity for carbon storage in Zambian forests. Forest loss is caused by a mix of factors that are not well understood, and their combined effects act to either directly drive forest cover loss or interact with other or influences. In order to understand the drivers and their interactions a study was commissioned to provide a preliminary understanding of drivers of deforestation and the potential for REDD+ in Zambia; to assess the extent of current consumption of forest products, forest production and development trends as well as potential future shifts in these patterns that may affect deforestation levels; to draw conclusions on which actions/trends would likely have the worst consequences in terms of causing additional deforestation and how these could be reduced in future; and finally to outline the potential for REDD+ in these circumstances. An interdisciplinary data gathering approach was adopted which integrated literature search, policy level consultancy, community level consultations, stakeholder interviews, courtesy calls and field visits. The results of the study are based on research in the Copperbelt, Central, Lusaka, Southern, North-western and Western provinces as they were assumed to be representative of diverse Zambian



forest types (Fanshawe 1971; White 1983); to differ substantially in the key drivers of deforestation (ZFAP 1998); and have diverse cultural and socio-economic settings. Sample selection of districts was based on review of statistics from isolated case studies and on analysis of land cover maps and satellite images.

Vegetation Types Of Zambia

Zambia has three major vegetation formations. The closed forests are limited in extent, covering only about 6% of the Country. The most extensive closed forests are *Cryptosepalum* and *Baikiaea* forests covering parts of North-Western and Western Province (MTENR, 2003). There are four types of woodlands in the country of which the most



extensive is Miombo woodland covering 42% and characterised by the following genera: *Brachystegia*, *Julbernardia* and *Isoberlinia* genera (MTENR, 2002). Anthill vegetation covers 3% and is present in all regions of the country except in areas of pure stands. It is classified according to association with other vegetation types; hence the classification: Miombo Termitaria, Kalahari Termitaria, Mopane Termitaria, Munga Termitaria, Riparian Termitaria and the Grassland Termitaria.

Deforestation Hotspots Of Zambia

A visible characteristic of the pattern of deforestation hot spots in Zambia is its close association with urbanization. The close link between urbanization and deforestation is confirmed by the hotspot analysis. The major corridor of deforestation hotspots is along the line of rail from Livingstone to Chililabombwe. This covers four key provinces (Southern, Lusaka, Central and Copperbelt). However, there are some growing hot spots in North-Western province which are potentially being driven by rapid urbanization and industrialization. A close association between urbanization and deforestation suggest that areas experiencing high population growth are also likely to be more severely affected by deforestation in the near future.

Historic, Current & Future Trends of Deforestation And Forest Degradation

The country's deforestation rate is estimated to be around 1.5% per annum and is internationally ranked among the countries with the highest rate of deforestation in the world (Henry *et al.* 2011). ILUA found that 250,000 to 300,000 ha are deforested annually. Even though the average deforestation rate during 1965-2005 was 0.81% per province, variable trends in deforestation occur during different periods (Chidumayo, 2012). The influences behind such trends are socio-economic. Luapula Province had the highest annual deforestation rate during the period 1965-1996 while Southern and Western had the lowest annual rate of deforestation during the period 1965-2005. Country-wide annual rate of forest area decline increased from -0.34% (or -157,300 ha) in the immediate past period 1965 – 1996 to -0.66% (or -307900 ha) for the maximum period of 1965 - 2005. Forest area declined for the minimum period of 1996 – 2005 at -1.99% (or -826,554 ha). Although figures for forest recovery are never reported, it is assumed that the rate of recovery is outpaced by the rate of forest cover loss. The trend analysis from 2000 to 2030 predicts an increase in deforestation rate with Copperbelt Province being the worst affected. Forest cover loss varies among the different simulation periods within the deforestation hot spots. Between the baseline year 2000 and 2010, the amount of forest cover loss is estimated at 890,400 ha and is projected to reach 1,358,200 ha in 2020. Forest cover loss between 2020 and 2030 is projected to decline from 1,358,200 ha in 2020 to 1,238,800 ha in 2030.



Drivers of Deforestation

The proximate factors driving deforestation in Zambia can broadly be categorized in agricultural expansion (shifting agriculture, agriculture extensification), mining and infrastructure development, charcoal production and anthropogenic induced wild fires. These broad factors work in an interactive way to influence forest cover loss at different spatial scales. Proximate drivers of deforestation are influenced by underlying factors that include policy and legal framework, socio-economic factors, demographic changes, institutional framework and environmental factors.



Proximate Factors Driving Deforestation

(a). Agricultural expansion

Agriculture expansion makes a significant contribution to the loss of forest resources in Zambia given that the economy of Zambia is agrobased with the majority of the inhabitants practicing small scale farming. Agriculture provides the bulk of food and cash requirement in the majority of Zambian households (MTENR, 2002). With the increase in population coupled with low and inefficient crop production methods, there is mounting pressure to increase the area under agriculture to meet the increasing demand for food (MTENR, 2002; Campbell *et al.*, 2011). Clearing land for agricultural production may account for about 90% of forest cover loss in Zambia. Small-scale farming systems and shifting cultivation are the major causes of forest cover loss in Zambia (Campbell *et al.*, 2012). Cut and burn semi-shifting cultivation practices in areas where population densities are high (e.g. Southern and Northern Provinces), results

in slow regeneration processes and effected forest recovery. The recent political upheavals in Zimbabwe have seen movement of commercial farmers from Zimbabwe to mostly Central Zambia. This development has potential of reducing forest cover as the newly settled farmers open up new land for crop production. The concentration of grazing in localized and unmanaged areas has resulted in over-grazing in most of these areas. Impacts of overgrazing are apparent in Lusitu (Southern Province), Katete-Kagoro (Eastern Province) and Luangwa, (Lusaka Province) (MTENR, 2002). The problem of over-grazing has also been observed in wildlife areas in the past, especially in Luangwa Valley due to high densities of elephants in the 1970s and hippos along the Luangwa River stretch (Caughley, 1975; Jachmann, 1994). Overgrazed areas are often associated with bare land with gully formations and sometimes compacted soils which make it difficult for natural recruitment to occur.

(b) Mining and infrastructure development

Urbanization and industrialization, such as green site development during mine development, are among the drivers of deforestation in Zambia. Notwithstanding the potential socio-economic benefits from urbanization and industrialization, the two processes contribute to forest degradation and deforestation. Firstly, these are followed by clearing of land to pave way for buildings and road infrastructure. An example of the sector that has greatly contributed to forest cover loss is the mining sector. Large tracts of land are cleared to provide space for mining infrastructure. For example, in Kalumbila Mining Concession alone, the mining will result in the loss of over 7,000 ha of land before it is fully operational to pave way for the necessary



infrastructure development. Secondly, mining infrastructure development is often followed by development of settlements and increased demand for construction timber. This is further pushing up the demand for timber which is already high in local and international markets.

(c) Wood extraction

The majority of rural dwellers use firewood while urban dwellers mostly use charcoal. The per capita annual consumption of firewood in Zambia is estimated at 1,025 Kg in rural areas and 240 Kg in urban areas (Kalumiana, 1996). The contribution of fuel wood consumption to tree removal varies from province to province with Southern and North-western provinces having the highest wood consumption rates. Tobacco curing in Southern Province is the main indirect driver of fuel wood collection while clay brick manufacturing is the factor in Eastern Province (Campbell *et al.*, 2011) and in North-Western province. Charcoal production is by far the most frequent driver of deforestation in nearly all the seven provinces sampled for this study. Although Central and Copperbelt provinces are the main charcoal hot spots in Zambia, there are worrying signs of emerging hot spots in North-Western and Western provinces. Generally, the increase in charcoal production is being propelled

by the high charcoal demand levels in the urbanized centers, particularly Lusaka district. Wood fuel production is an economic activity estimated to contribute at least 3% to the country's GDP, and accounts for approximately 80% of the total energy household balance in the economy (Kalinda *et al.*, 2008). Charcoal use, therefore has socio-economic benefits for numerous actors along the value chain from producers in rural areas to the consumers in urban areas (Malimbwi *et al.*, 2010; Mwitwa and Makano, 2012). Its production, distribution and marketing employs more than 500, 000 people (Kalinda *et al.*, 2008; Mwitwa and Makano, 2012). Low domestic earnings are forcing most rural households to intensify non-agricultural income generating activities as a risk avoidance strategy. Charcoal production has been observed to have increased per capita income even when other sectors are not doing well in rural areas. For example, the study of the contribution of charcoal to per capita income revealed that although the rural per capita income from forestry and crop agriculture declined from US\$37.07 in 1990 to US\$17.33 in 2000, the contribution of charcoal had increased from 65% to 83% (Chidumayo *et al.*, 2001). Additionally, the proportion of city dwellers is also on the increase pushing charcoal demand up due to no corresponding expansion of electricity supply services. Charcoal production alone does



not necessarily lead to permanent loss in vegetation unless it is followed by cultivation and recurrent late bush fires it may negatively impact on forest regeneration (Chidumayo 1997).

(d) Wild or forest fires

Climate change will likely interact with human drivers such as deforestation, unplanned development, and wildfire to adversely affect ecosystems and biodiversity (Campbell *et al.*, 2011). This will affect the populations and distribution of endemic species, which in turn will impact tourism as well as ecosystem services. Wild fires may also cause a high attrition rate in farming seems if they are not controlled and occur late in the dry season, and significantly alter the soil seed bank thus affecting the normal regenerative potential of the majority of species in the Miombo woodlands. Setting of fires for all sorts of reasons is a common practice among many Zambians to facilitate vegetation control, clearing of fields for cultivation, provision of potash (Chitemene system), visibility improvement during hunting as well as pasture management. Experimental evidence has demonstrated that fire, if not well managed, has the potential to directly contribute to forest cover loss (Bond 2009; Lawton 1978; Trapnell 1959). Wild fires, especially late dry-season fires have been observed to reduce the productivity of miombo woodland across the ecoregion (Grundy, 1995). Most of the miombo woodland trees once burnt tend to produce significantly less basal area than unburnt trees of the same age (Grundy, 1995).



is driven by lack of political will, low support to implementation, and inconsistencies in both policy and legislation. National policies have resulted in the forest sector being regulated in a compartmentalized manner with distinct regulatory and monitoring institutions that result in varying levels of conflicts and overlap. Additionally, the legislation also lacks provisions for dealing with conflict resolution and disputes among competing interests such as priorities awarded timber and mining concessions compared to the rights of forest based communities. Current CBNRM approaches lack clear guidelines on cost and benefit-sharing mechanisms between GRZ and the participating communities (Bwalya, 2007; Phiri, 2009). Furthermore, communities have not received the necessary technical assistance to independently manage their activities and environmental resources. **Land tenure and property rights:** The relevance of tenure security to forest governance lies in its role in shaping the set of incentives in forest management. Periods of insecure tenure have led to widespread overexploitation and destruction of forests. Conversely, tenure security is known to be a necessary condition for sustainable forest management. Strong tenure security coupled with other enabling conditions (market access, forest value, effectiveness of local institutions) can enable local forest users to invest in long-term over immediate returns from forests. When systems of rights are unclear or unenforced, as is the case in Zambia, open-access regimes may result in quick resource degradation and depletion. Most of the land in Zambia is open access without clearly defined property rights. **Socio-economic factors:** Income poverty is perhaps the most immediate

Underlying factors that influence drivers of deforestation

Policy and legal framework: A large number of policies exist in Zambia. However, their positive contribution to sustainable natural resources management is characterized by widespread implementation and enforcement failures. This



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factor that undermines household capacity to contribute towards environmental management and sustainability. Extreme income poverty has consistently been high in rural and peri-urban areas and continues to fluctuate due to economic instability. Low domestic earnings coupled with a high demand for woodfuel has all worked to exert pressure on forest resources in rural Zambia.

Demographic changes: In-migrations have been observed to contribute to deforestation in some areas. For example, out-migrations from Southern Province into Lusaka and Copperbelt Provinces due to shortage of land and persistent droughts is causing areas such as Chongwe, Lufwanyama and Masaiti Districts to be opened up for new settlements and agriculture. Annual deforestation rates of up to 400 ha and massive encroachment of the lower Zambezi National Park has arisen from new settlements and in-migrations into the area (Kalumba 1997).

Institutional framework: The institutional framework is characterised by inadequate institutional capacity, unplanned developments, inadequate enforcement of environmental laws, lack of transparency, inadequate coordination across sectors and inadequate monitoring reporting and verification (MRV). Inadequate staffing in government departments that deal with natural resources management related issues has greatly contributed to the downward trend in forest and natural resources sustainability in the country. Inadequate staffing coupled with poor funding makes it difficult for the department to implement and monitor sustainable forest

management programmes throughout the country. A number of forest reserves have been degazetted and excised to provide access to land to illegal squatters. Currently, out of 489 forest reserves in the country, 170 are heavily encroached while 109 are partially encroached (Forestry Department, 2005). For example, between 6 and 12 forest reserves have been degazetted since 2000 in each of the following provinces, Copperbelt, Southern and Eastern. **Environmental factors:** Environmental factors that influence drivers of deforestation include climate change which is an environmental threat magnifier (Campbell *et al.*, 2011). Increasing temperatures and unpredictable rainfall (amount and timing), frequent extreme weather and higher severity of pests and diseases are common phenomena not only in Zambia but throughout Southern Africa (Lobell *et al.*, 2008). These tend to impact severely on smallholder farmers and further increase poverty levels in the region. Climate has been observed to exert some negative impacts on agriculture through increased drought frequency and intensity in the last 20 years in Zambia. The droughts of 1991/92, 1994/95 and 1997/98 resulted



in a sharp drop in maize yield from above 500,000 metric tons in 1988 to about 10,000 metric tons in some parts (e.g. Southern Province) of Zambia (de Wit, 2006). In 2004/2005 agricultural season, two thirds of Zambia, namely Eastern, Southern and Western experienced a prolonged drought spell, that resulted in irreversible damage to most crops, including drought-tolerant crops such as cotton and tobacco. These areas experienced cereal production losses of about 56% and over one million people needed food assistance up to June 2006 (de Wit, 2006). Generally failure in the agricultural sector due to adverse weather patterns leads to resource-poor rural communities to engage in off-farming activities such as charcoal production. Its influences on wildfire extent, severity and frequency depend on interactions among several factors which include forest management history, drought frequency and severity and many others.

Challenges for Reducing Deforestation

Reducing deforestation and forest degradation is faced with many daunting challenges which include: poor linkage and coordination among relevant institutions; non-availability of updated information on the status of forests in the country; non-complementarity of relevant policies and institutions; non-supportive and inclusive natural policies; infrastructure development and forest conservation; political interference; insecure land tenure system and lack of benefit sharing mechanism.

Potential For REDD+

Zambian forests and woodlands are capable of recovering virtually unchanged following clearing for either charcoal production and slash and burn agriculture (Fanshawe, 1971). Zambian forests also hold a considerable amount (90%) of total



above ground biomass for the entire country adding up to approximately 4.7 billion metric tonnes. Belowground biomass is estimated at 932 million tonnes while deadwood accounts for an additional 434 million metric tonnes biomass (ILUA, 2005-2008). Several studies have reported rapid development of re-growth in many parts of the Southern African savannas (Syampungani and Chirwa, 2011). The re-growth stands have been reported to be of higher stocking than mature woodlands (Syampungani, 2008). Additionally, higher values of stand basal areas of between 30 and 50 m² ha⁻¹ have been recorded in wet Miombo and dry Miombo of Zambia and Zimbabwe respectively, in small sized plots (Grundy, 1995; Chidumayo, 1985) compared to only up to only 22 m² in old even stands. The recovery of the woodland savannah after clearing is possible because most of the woodland species have both vertically and extensive root systems that facilitate recuperation after cutting (Mistry, 2000). Additionally, the growth rates have also been observed to be high (4.4-5.6 mm) in re-growth stands compared to 2.3-4.8 mm in uneven-aged stand. The re-growth stands are said to be of very high productive ecosystems. The high productive ecosystems tend to have high rates of photosynthetic processes and therefore high uptake of carbon dioxide. This therefore implies that even with high levels of deforestation in Zambia, degraded sites may still be managed for carbon sequestration through coppice or regeneration management. Data on primary production and soil carbon availability specific to Miombo woodland indicate that 900-1600 gm⁻² yr⁻¹ is sequestered (Frost, 1996). In principle, if Miombo woodland is to be managed for maximizing carbon storage, a similar amount of carbon could be sequestered and stored over the area of the same size.

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