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Drivers of Deforestation and Forest Degradation in Dzalanyama Forest Reserve in Malawi

Nameka Katumbi[1], Jabulani Nyengere[2], Elina Mkandawire[3]

[1, 2, 3]Lilongwe University of Agriculture and Natural Resources, Department of Forestry, Bunda Campus, P.O. Box 219 Lilongwe, Malawi

Abstract: ***This research was carried out with the aim of assessing the drivers of deforestation and forest degradation in Malawi. Particularly the research aimed at identifying what is driving deforestation and forest degradation in Dzalanyama forest reserve and analyzing the impacts of degradation on the livelihoods of the rural communities in Malawi. Data collected from households in villages bordering Dzalanyama forest was analyzed using SPSS to come up with frequency tables, pie charts and hectographs. The study revealed that charcoal production (40%); firewood production (32%); infrastructure development (13%); timber production (11%) and agricultural expansion (4%) are the main driving forces to deforestation and forest degradation in Dzalanyama forest reserve. Degrading of Dzalanyama forest reserve has affected the communities negatively evident in climate change (57%), soil degradation (37%) and biodiversity loss (6%). Therefore, reducing dependency of households on fuelwood will save most of the forests in Malawi.***

Keywords: Drivers, Deforestation and degradation, impacts

1. Introduction

The transformation of forested lands by human actions represents one of the great forces in global environmental change and one of the great drivers of biodiversity loss. Forests are cleared, degraded and fragmented for timber harvest, conversion to agriculture, road-construction, mining industries, human-caused fire, and a myriad of other ways. The impact of people on Forest degradation has been and continues to be profound (FAO, 2010). In the year 1975, 47% of the land in Malawi was classified as forest. Nonetheless as of today, the country only has 36 % of the total land categorized as forest (FAOSTAT, 2010). Out of this forest area, 15 % is under natural woodlands on customary lands, 11 % is under national parks and game reserves and 10 % only is under forest reserves and protected hill slopes. Malawi registers the highest forest degradation rate in the SADC region, representing a net loss of 30,000 to 40,000 hectares per year of (mostly miombo) woodland. Mauambeta*et al* (2010) reported that Malawi has lost 2,501,571 hectares of both Indigenous and plantation forests and much higher values after this period between 1972 and 1990. During the last decade, overall forest cover has declined by 41% at the rate of 2.3% per annum. Much of the current forest degradation pressure occurs in indigenous forests due to increased demands for farmland and wood and other human pressures.

Dzalanyama Forest Reserve is one of the most threatened natural ecological systems in Malawi due to tobacco curing, brick burning, firewood and charcoal selling that has intensified in the rural communities surrounding it. The forest degradation pressures are exceeding the regenerative capacity of the forest reserve (Murayama & Munthali, 2012). People in surrounding communities are felling trees for timber, firewood, poles and charcoal. The 20,000-hectare forest covers three districts: Mchinji, Lilongwe and Dedza. The reserve is well known for being sources of three important rivers; Bua, Diamphwe and Lilongwe. Lilongwe city, relies on these rivers for its water supply and the city is at a risk of having water problems in future if Dzalanyama reserve is not saved from degradation.

2. Objectives and Methods

The study was done to identify driversand analyze their contribution to deforestation and forest degradation in Dzalanyama forest reserve. It also conducted to assess impacts of forest degradation on rural communities in Dzalanyama Forest Reserve. While the activities may be specific to the study area, the basic interactions and subsequent impacts are endemic to most protected areas in Malawi. Data was collected using a household questionnaire, key informant interviews and a check list. Data was analyzed using descriptive analysis to come up with the means, standard deviations, percentages and frequencies in using Statistical Package for Social Scientists (SPSS) version 20.0.

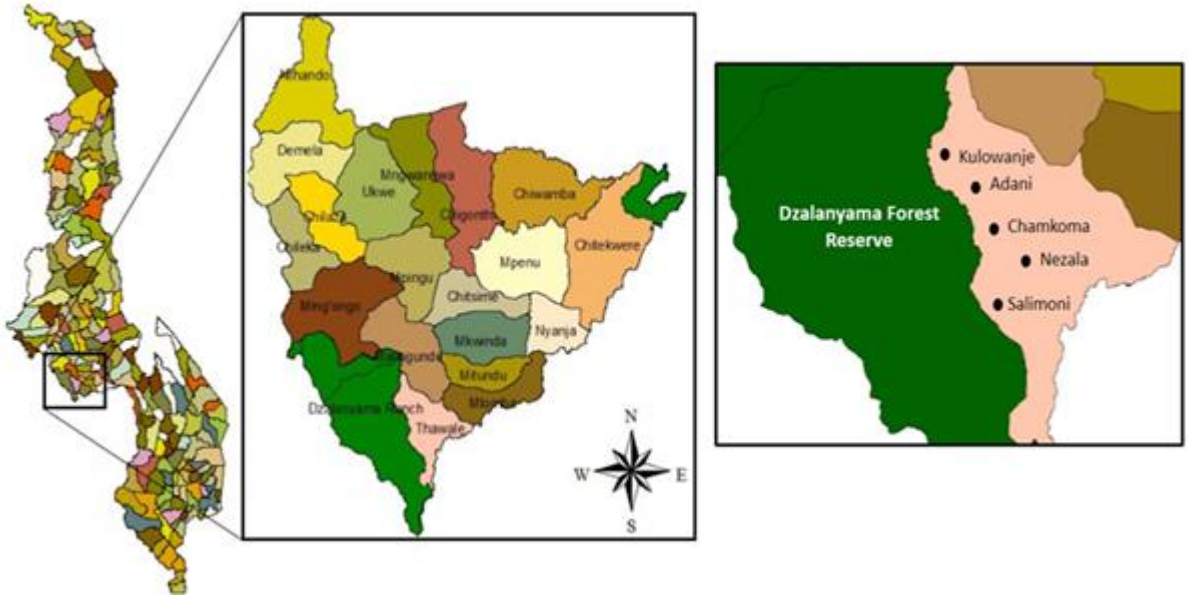

Figure 1: Map of Lilongwe showing study area

3. Review of Literature

3.1 Deforestation

The cause of forest degradation can be loosely divided into the categories of anthropogenic and natural, although there is no clear demarcation between them. But natural causes would be considered exogenous and uncontrollable, and policy instruments would not help to control those (Acharya, *et al.*, 2011). The sources of degradation are commonly referred to as "drivers" of degradation. Drivers of degradation usually correlated to the anthropogenic category can be viewed as direct or indirect. Direct drivers could include, but are not limited to, over-extraction of forest resources, intentional fires during hunting, free grazing, targeting of high-quality commercial tree species, illegal logging, encroachment, and brick burning and farming. Indirect drivers might include market failure, unplanned development, policy failure, weak tenure rights and capacity gaps.

3.2 Causes of deforestation in Malawi

Livelihood activities are known and believed to cause most of the forest loss in Malawi. Agricultural expansion has a visibly negative impact on forest cover, however the process of agricultural expansion can only be understood in the context of population growth. Moreover, population fluctuation alone is not evident enough to explain the encroachment onto forest land. The situation in Malawi has been linked with a failure to intensify agricultural production on existing land (Kerr, 2005). The highly unequal distribution of Malawi's land accelerated the displacement of farmers into marginal areas, and the loss of traditional land tenure rules left communal forests, including vulnerable to encroachment and exploitation. With so few opportunities to earn cash incomes, rural Malawians have understandably turned to whatever options are available, even at the expense of the country's environmental health.

3.3 Energy consumption in Malawi

Charcoal is a vital energy source for the urban poor. Low-income households have a higher per capita charcoal consumption, and with charcoal and/or fuel-wood accounting for three-quarters of their total household energy expenditure. Charcoal is produced mainly for the urban areas, and it is unlikely that urban consumers can manage without charcoal as a source of energy in current conditions. Urban poor, who spend a larger proportion of their household income on charcoal and who have no other affordable energy options, particularly feel fluctuations in the price of charcoal.

Overall, 38% of people said electricity is the main source of energy for cooking, but in the more affluent (low-density) areas 83% of households cooked mainly with electricity, using charcoal as an alternative (for example during power cuts). In medium-density areas, 68% of households cook mainly using electricity while 19% take firewood as the main energy source for cooking (Kambewa *et al*, 2007).

3.4 Effects of forest degradation

Soil erosion is probably the most often-cited negative effect of Malawi's deforestation. The average annual rate of soil erosion in Malawi could be as much as 20 tons per hectare; the Government of Malawi (2001) estimates 29 tons, and claims this is equal in value to 8% of Malawi's GDP.

Deforestation also has other negative effects on soil quality; for example, lack of trees forces people to use maize stokes for fuel instead of returning it to the soil to replenish nutrients (Park, 1997). These processes are of great concern in a country where yields are already low and declining.

Other effects of deforestation can be seen in Malawi across multiple scales. At the household level, negative social outcomes can result (for example, women spend more time gathering fuelwood; (Brouwer, *et al*., 1997). On a regional

basis, deforestation is thought to contribute to flooding (GoM, 2001), which may have been the cause of the 2002.

4. Findings and Discussions

Dzalanyama forest reserve is under massive demolition. It is discovered however that the rate of occurrence of the forest loss as perceived by the local people varies greatly. This confirms the claim by Adams (2009) that, though there is no doubt about forest cover changes in many humid and sub-humid tropical areas, there remains much debate on the rate and extent of deforestation. However as for Dzalanyama, a lot of people living in communities adjacent to the reserve are aware of the situation. The majority of the respondents (68.9%) around Dzalanyama strongly agreed that deforestation is being witnessed in Dzalanyama forest reserve, 29.1% of the respondents agreed that indeed the forest is degrading and only 2% disagreed. A total of 73 respondents reported to having access to different forest resources from the forest, with 57.4% indicating that they go into the forest without permission while 15.8% cited that they acquired permission from forest guards in their communities and the remaining 27% do not access forest resources from the reserve.

Drivers of deforestation and forest degradation

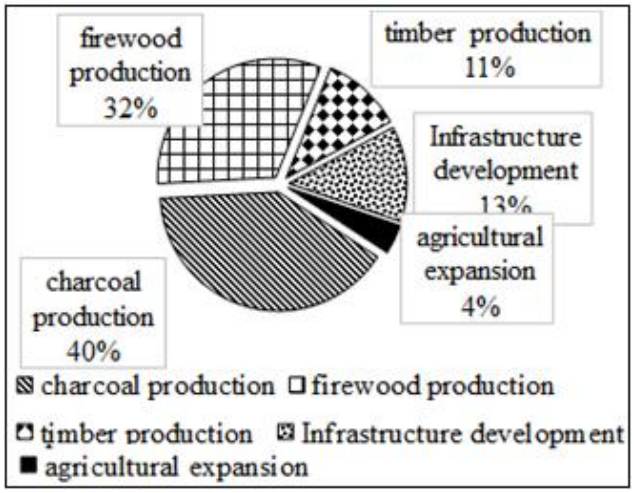

Figure 2: Drivers of deforestation and Forest Degradation

These study results in figure 2 above show that deforestation and forest degradation is as a result of directly and indirectly from livelihood activities of the local people. A total of 72% of respondents indicated fuel production as the major activity influencing deforestation and forest degradation in Dzalanyama forest reserve. This is followed by 13% who named infrastructure development as an activity affecting the forest followed by 11% cited timber production and only 4% cited agricultural expansion as a driver of deforestation and forest degradation in Dzalanyama forest reserve.

From the above observed results, fuel production is the most common cited driver of deforestation and forest degradation in Dzalanyama forest reserve, followed by logging for poles and few on agriculture though the impacts from the other activities are recognizable. Furthermore,people from sorounding communities argued that charcoal and firewood production destroy forests much more than other livelihood activities as it occurs deep in the core of the forests as compared to the othersoccuring on the fringes of the forests. Charcoal and firewood producers always go for species such as*Brachystegiaboehmii, Acacia polyacantha, Julbernardiaglobiflora,* and *Pericopsisangolensis.* These tree species have high calorific value, high biomass, and low moisture content among others. High demand for charcoal and firewood in urban and sub-urban communities make the marketing of fuel-wood products cost-effective. As such, a lot of people in Dzalanyama have abandoned farming and started this business. These finding agrees with what Miya *et al* (2012); Tindan, 2013 reported that agricultural expansion, wood extraction and infrastructure development are the main drivers of deforestation and forest degradation in most Miombo woodlands.

Much of the tree logs cut from the forest reserve are converted to charcoal for sale. Charcoal production is one of the strategies rural people use as a means of reducing their poverty since charcoal production is perceived as a quick and easier way of earning money. This agrees with what Kerr (2005) reported that charcoal production, despite its destructive effects on most miombo woodlands in Malawi, form the lifeblood of Malawi's meager cash economy. Kambewa*et al* (2007) also reported that charcoal making requires minimal financial and human capital, and is therefore attractive to people with few assets. In addition to that, charcoal constitutes the primary source of domestic energy in both urban and suburban areas. As such, there is a lot of demand on the markets as compared to other products.

Malakini*et al* (2014) reported that firewood use is one of the major reasons of forest degradation. Its high demand cannot be covered sustainably by the available supply. While some tree logs are converted to poles for infrastructure development, very few are used in tobacco curing. There is low utilization of biomass in tobacco as most of the farmers in tobacco industry go for species that sundry. This agrees with what Sacchetto (2012) who documented that in Malawi, 90% of the total production is burley tobacco, which does not need fuel for curing and uses only a very small amount of wood to build curing sheds.

Impacts of deforestation & forest degradation

Impacts of deforestation and forest degradation manifest in in so many ways. However, in Dzalanyama, they are mainly categorized in the following three major impacts. Most of the respondent (57%) shared their knowledge on the relationship between forest loss and climate change. About 37% of the respondents could point out that the forest loss has led to soil degradation and only 6% expounded on biodiversity loss.

These experiences are built on their understanding of the local climate and which in turn are related with a respondent's age, livelihood and probably length of stay in the community. With this information, it is identified that the local people have their own parameters and techniques to identify the manifestations of these effects of climate change, soil degradation and biodiversity loss. A higher proportion of the households reported on changes in rainfall patterns, abrupt temperature changes, the drying and dying state of crops on their farms and reduced soil moisture.

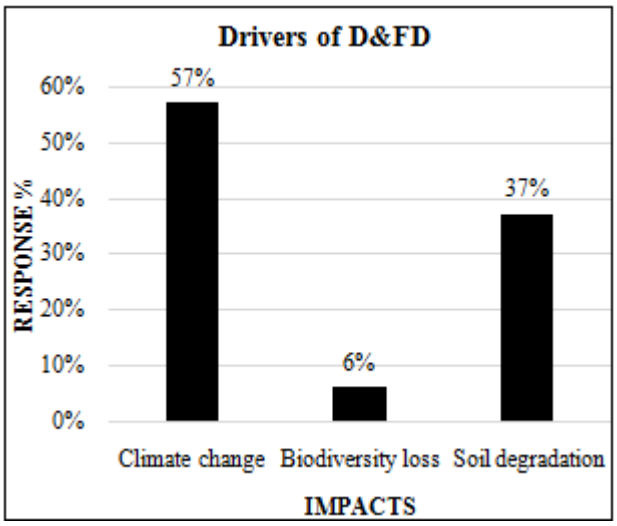

Figure 3: Impacts of Deforestation and Forest Degradation in Dzalanyama

5. Conclusion and Suggestion

Though a lot of people rely on crop production for food and household income, they find the forest to be a very good source of income by engaging in charcoal, firewood production and timber production. Most of the farmers have abandoned farming as it has proven to be less profitable than marketing of fuelwood. Not only has that driven deforestation and forest degradation, but also extraction for infrastructure development. People fell trees for poles to construct houses, kraal and fencing in rare cases.

Most of the trees cut from the forest reserve are converted to charcoal, firewood, poles and for tobacco curing. The research findings revealed that there are various negative effects of deforestation in communities surrounding Dzalanyama forest reserve. Changes in temperatures and rainfall patterns are the major signs of local level climate change and these effects are evidently visible and are known to affect local livelihood activities particularly agriculture. There is also increased soil degradation as evidenced by low crop yields and gully erosions especially in sloppy areas.

5.1 Suggestions

Much as it is impossible to completely stop deforestation in Dzalanyama forest reserve, this study, therefore, proposes regulation of the charcoal production to increase both revenue collected by government and cash inflow accruing to the producers. In this way, charcoal prices will rise and consumers will be forced to hunt for alternative sources of energy. This would imply possibilities to invest in more sustainable Forest interventions while significantly reducing household dependency on charcoal production and recommending efficient charcoal production methods to sustain the household's needs.

Reducing dependency of households on forests for meeting their energy and timber demands should be an important strategy to reduce deforestation and forest degradation in Dzalanyama forest Reserve. This, among others, will involve:

1) Development and promotion of nonconventional energy sources (such as biogas and solar energy);
2) Promotion of alternatives to construction poles (e.g. bamboo, steel, aluminum);
3) Promotion of agroforestry and private forestry where feasible, and
4) Improving access to technologies that enhance wood fuel efficiency (e.g. bio-briquettes, improved cooking stoves).

Forest service beneficiaries and all stakeholders i.e. Lilongwe water board should intensify afforestation approach for catchment conservation in all catchment areas within the reserve. This may be achieved through community participation.

Above all, there is a need to do further studies in sub urban communities in Lilongwe district as regards to consumption and charcoal and fire wound, and how that is contributing to the degradation and deforestation of Dzalanyama forest reserve.

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