SOCIO-ECONOMIC CONTEXT FOR PARTICIPATORY FOREST LANDSCAPE RESTORATION MONITORING IN MALAWI.

By

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ABSTRACT

SOCIO-ECONOMIC CONTEXT FOR PARTICIPATORY FOREST LANDSCAPE RESTORATION MONITORING IN MALAWI.

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Malawi aims to achieve 4.5 million hectares of restored landscapes by 2030. Using comprehensive approaches like Forest Landscape Restoration (FLR). Monitoring the progress of FLR is crucial for effective and efficient implementation with relevant information and feedback. Nonetheless, systems that encourage local participation in monitoring of FLR interventions are lacking. The study assesses the socio-economic context for sustainable and successful forest landscape restoration participatory monitoring. An understanding of this is part of creating an enabling environment for participatory monitoring in tracking the progress of the national forest landscape restoration strategy. Using Machinga district as a study site, evidence has been established for the consideration of socio-economic factors to encourage local participation in FLR monitoring. Participatory monitoring of FLR when designed to include local communities and adapted to diverse needs, opinions and conditions have the potential to complement highly technical monitoring of the National Forest Landscape Restoration Strategy. Therefore, to motivate local communities to participate in FLR monitoring, implementers will have to consider satisfying economic and welfare basic needs consistent with the physical, socio-economic environment. Otherwise, these needs left unaddressed may threaten the sustainability of forest and land restoration monitoring and implementation.

I dedicate this work to the only grandparent I was privileged to meet. Rest well, grandpa!

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KEY TO ABBREVIATIONS

ADC:	Area Development Committee
AFR100:	Africa Forest Landscape Restoration Initiative
BMC:	Block Management Committee
CBNRM:	Community Based Natural Resources Management
EPA:	Extension Planning Area
FAO:	Food and Agriculture Organization
FGD:	Focus Group Discussion
FLR:	Forest Landscape Restoration
GDP:	Global Domestic Product
MGDS III:	Malawi Growth and Development Strategy III
NFP:	National Forest Policy
NGO:	Non-Governmental Organisation
PERFORM:	Protecting Ecosystems and Restoring Forests in Malawi
RCMRD:	Regional Centre for Mapping of Resources for Development
REDD+:	Reducing Emissions from Deforestation and forest Degradation
ROAM:	Restoration Opportunities Assessment Methodology
SDG:	Sustainable Development Goal

UNFCCC: United Nations Framework Convention on Climate Change

USAID: United States Agency for International Development

VDC: Village Development Committee

VNRMC: Village Natural Resources Management Committee

CHAPTER I: INTRODUCTION

1.1 Forest Landscape Restoration as a Land and Forest Management Approach

Restoration of degraded land and forests using landscape approaches has gained momentum in recent years. Forest Landscape Restoration (FLR) is a site-level restoration approach that seeks to bring together stakeholders in the restoration of ecological functions by strategically targeting degraded areas as landscapes having a mosaic of land uses that includes forestry and agriculture (Lamb et al. 2012). FLR mainly deals with forest establishment, conservation, reforestation, and restoration of deforested lands (Chapman & Chapman, 1999; Borgmann & Rodewald, 2005).

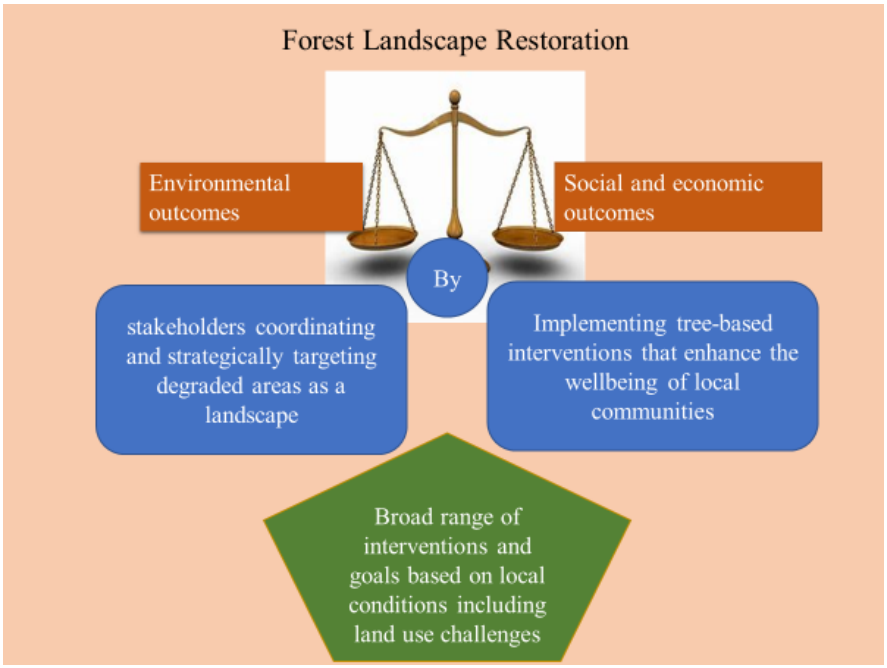


Figure 1. 1 Illustration of FLR

FLR intertwines with forest restoration, the body of practices aimed at restoring the structure and function of a forest stands (Evans & Guariguata, 2016). As observed by Maginnis and Jackson (2007), FLR aims to regain ecological integrity and enhance human wellbeing in a deforested or degraded forest landscape. FLR incorporates the human aspect to broaden Forest restoration from simply planting trees to a scope that includes human needs and goals through the means of

deliberate landscape-wide restoration. FLR intends to focus on restoring landscapes rather than a site while balancing environmental and socio-economic dimensions. Through multi-stakeholder engagement in planning and decision making, restoration activities are strategically planned and implemented using a range of interventions. The success of FLR is therefore linked to the success of those interventions that stakeholders implement on the degraded land and forests (Stanturf 2015). By considering local conditions and focusing on socio-economic outcomes, FLR also increases the potential for addressing the causes of forest and land degradation.

According to Djenontin et al. (2018), the emphasis on ensuring that environmental or ecosystem restoration enhances local human interests and needs goes back to 2000. Chazdon and Guariguata (2018) describe FLR as an approach for implementing restoration that results in environmental outcomes and sustainable rural livelihoods thereby building the resilience of both the environment and human communities. FLR considers the restoration of landscapes with different land uses, focuses on getting multiple benefits through a range of interventions ensure as necessary per local conditions, and stakeholders coordinating and strategically targeting degraded areas to address ongoing forest and land degradation (IUCN and WRI 2014). The guide that the International Union for Conservation of Nature (IUCN) and the World Resources Institute (WRI) developed for identifying restoration opportunities also includes the specification that implementation of FLR should allow adaptive management so that ways of restoring degraded landscapes can change as conditions change (IUCN and WRI 2014). The above principles for FLR add value to current land and forest management approaches. Two other land management frameworks pre-date FLR, Sustainable Land Management (SLM) and Community Based Natural Resource Management (CBNRM). SLM has over time been advocated by agriculturists to address declining land

productivity, while CBNRM has mainly focused on sustainable forest management. FLR brings these two land management practices together by enhancing the role of trees and forests to achieve sustainable agriculture and forest landscapes. SLM in FLR will ensure food security and sustainable livelihoods when land degradation is addressed (Djenontin et al. 2018).

To ensure that restoration strategies are adapted and suited to local conditions, FLR relies on active stakeholder participation and involvement. However, a challenge remains outstanding on how to set up coordination from the national to the local community level especially in circumstances where conservation of trees and forests is outweighed by demand (Reinecke and Blum 2018).

1.1.1 The Global Context, History, and FLR Opportunities

Minnemayer et al. (2011) published that more than 2 billion hectares worldwide offer opportunities for restoration and close to 800 million hectares are in Africa, making it a continent with the greatest land area with forest and landscape restoration opportunities. The main drive for advocating for a landscape scale approach in restoration has been the magnitude of degraded and deforested landscapes globally. Despite the complexities that arise due to the inclusion of multiple land uses, tenure and governance, FLR is still being considered the best approach (Lamb et al. 2012). Reinecke and Blum (2018) acknowledge the potential presented by the FLR approach in achieving what they referred to as "quadruple wins" including climate change mitigation and adaptation, sustainable development for local communities while addressing various losses from degraded landscapes. According to Laestadius et al. (2015) FLR was defined in 2000 by considering work done in the 1990s by advocates of a landscape approach to restoration, IUCN and World Wildlife Fund (WWF). The Global Partnership on Forest Landscape Restoration

(GPFLR) was established in 2002 to provide a learning platform for landscape across the globe. At one of its meetings in 2011, the Bonn Challenge was launched with the aim of restoring 150 million ha of degraded land by 2020 (Laestadius et al. 2015). The Bonn Challenge puts into perspective the magnitude of degradation and has become an implementation modality for commitments made by various governments. So far, the Bonn Challenge is part of the New York Declaration on Forests and Paris Agreement on climate change because of its expected contributions to carbon sequestration, climate change mitigation, and climate change adaptation.

The international environmental policy community has promoted several frameworks related to land and natural resources restoration that can benefit from the FLR. In the Convention on Biological Biodiversity, the Aichi Biodiversity Target 15 refers to achieving ecosystem resilience by 2020 through the restoration of 15% of degraded ecosystems for climate change mitigation and adaptation and to combat desertification. The United Nations Convention to Combat Desertification (UNCCD) as agreed at during the Rio+20 Summit has a global goal of zero net land degradation. The threat of climate change on the environment and livelihoods has stimulated international and national policy measures for mitigation and adaptation. Two prominent actions are ensuring a reduction in emissions of greenhouse gases and restoring degraded natural landscapes through reforestation, reducing deforestation, and sustainable forest and land management. The United Nations Framework Convention on Climate Change (UNFCCC) encourages countries to restore forests with the bid to increase carbon stocks and reduce human-induced impacts on the ecosystems. The Africa Forest Landscape Restoration Initiative (AFR100), an adaptation of the Bonn Challenge in Africa in line with The Agenda 2063, aims to restore 100 million hectares of deforested and degraded land. It is important, therefore, to view

FLR as a component of a broader international policy agenda, (Chazdon et. al. 2017: Laestadius et al. 2015: FAO 2015).

FLR is linked to and has an important role in, the achievement of national development goals while contributing to regional and international development and environmental goals. At the national level, governments are now moving to adopt development goals that require a balance between environmental, social and economic outcomes. Malawi has district development plans and sector-wide development plans that contribute to the national development agenda. As demand for food, water, and energy continue to drive development priorities, forests are often caught between competing needs for economic, social and environmental goods. In a country with seriously constrained resources, developments in sectors outside of forestry have a direct impact on landscapes with important tree and forests complexes. At the same time, the contribution of forests through sustainable forest management can offer many positive contributions and solutions for development objectives in other sectors. The country's guiding policy documents, the Vision 2020 and Malawi Growth and Development Strategy III (MGDS III) for example aspire for "*a well conserved and managed land; zero percent deforestation; restored and well conserved biodiversity and ecosystems; contributing to global efforts to managing climate change and other global environmental issues*" as quoted from the Vision 2020 policy document.

Malawi has committed to pursuing policies and measures to reduce GHG emissions from deforestation and forest degradation and increase removals through afforestation. FLR can help Malawi to achieve its target of 2% increase in forest cover nationally to sequester approximately 2.6 million tCO2e by ensuring protection and conservation of existing forests; and afforestation

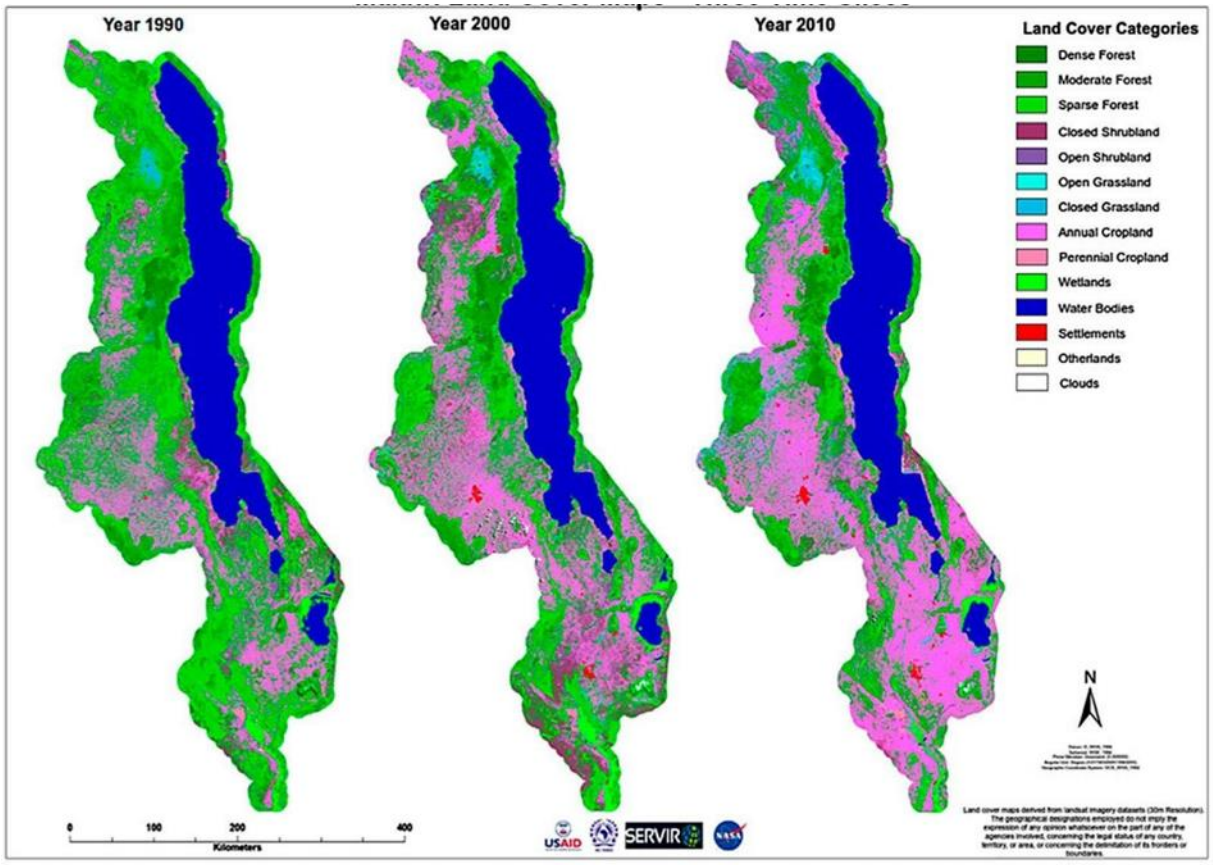
through tree planting and natural regeneration management. The planting of nitrogen-fixing plants has the potential to reduce fertilizer usage and dependence among farmers. The Agenda 2063 strives for improvements in the agriculture sector; environmental sustainability; climate-resilient communities and economies in Africa (African Capacity Building Foundation 2016). This concurs with the Sustainable Development Goals (SDGs). Both documents are emphasizing environmental sustainability as the platform for sustainable development and improving livelihoods. A such, FLR directly contributes to achieving SDGs since its implementation calls for simultaneously increasing food production, improving livelihoods, enhancing ecosystem services and protecting biodiversity.

1.1.2 FLR in Malawi

The importance of FLR for Malawi as a country can be seen from the efforts being pursued and implemented to restore degraded areas across the country. Forest and land degradation exacerbated by unsustainable natural resources management and impacts of climate change are a threat to important ecological functions of land and forests. The economy of Malawi is heavily dependent on land-based livelihoods such as agriculture, with about 80% of the population living in rural areas and agriculture accounting for a 1/3 of the country's Gross Domestic Product (GDP) (Government of Malawi.2016). With 98% of rural people in Malawi relying on rain-fed subsistence farming, increased rainfall variability (where rain falls below or in excess within short periods of time) can adversely affect harvests and the local and national economy. Longer dry seasons and dried up water reservoirs are impacting the supply of clean water to Malawians.

Forests and tree-based systems protect watersheds from degradation and provide cover against soil erosion and degradation (Lal 2004; Tscharntke et al. 2012). Approximately one-third of Malawi’s

land area is classified as forest land, but forest cover loss and land degradation have intensified over the years resulting from population pressure and agriculture expansion (FAO 2015).



Source: Haack et al., (2015).

Figure 1. 2 Malawi land cover map over three decades

Figure 1.2 above reflects the magnitude of the forest cover loss that has taken place since 1990. Estimates suggest that 2.5 million ha of forests were lost in 20 years from 1972 and 1992 representing an annual loss of 2.8% of forests (Government of Malawi. 2017). The FLR opportunities assessment for Malawi mentions that between 2001 and 2009, the cost of land degradation was estimated $244 million and 29 metric tons of soil per hectare are said to be lost each year (Government of Malawi. 2017). Increasing population and density are increasing demand for land, water, energy, and other resources. The current population of 17.5 million has

grown by 35 % between 2008 and 2018 (Government of Malawi. 2018). This is leading to smaller landholdings per household and contributing to food insecurity, forest, and land degradation. 58% of households reported irregular rains and 36% reported to have experienced drought a year prior to the 2016/17 integrated household survey (Government of Malawi. 2017). Occurrences of such phenomena are increasing climate vulnerability.

Studies on environmental impacts have highlighted the importance of good environmental management, albeit not limited to forest conservation. Forest management in Malawi is under the Ministry of Natural Resources, Energy and Mining. The Department of Forestry is responsible for the Forest Landscape Restoration in collaboration with the Environmental Affairs Department which is responsible for the National Climate Change Policy. Between 2016 and 2-17 a joint task force of the government of Malawi, Department of Forestry and the World Resources Institute conducted a national assessment of FLR potential and opportunities. The outcomes of this assessment were published in a Forest Landscape Restoration Opportunities in Malawi report (Ministry of Natural Resources, Energy and Mining, 2017), which identified the following outcome opportunities for Forest Management in Malawi:

- Improved food security

Forests have a capacity to influence rainfall, watersheds, and provide land cover against soil erosion and degradation (Lal, 2004; Tscharntke, et. al., 2012). On a small scale, farms with tree cover have high resistance from destructive winds, retained moisture for plant use, and enhanced productivity in soil fertility.

- Increased energy resources

Forests provide communities with biomass for fuel use – firewood and charcoal. Forest management enables sustainable use, conservation and restoration of forests for continued use of the same for effective energy resource use.

Challenges in energy sources, however, stem from increased use and abuse of forest resources for fuel use (charcoal and firewood) without regard to sustainability in reforestation and good forest management practices

- Increased climate resilience

Tree cover has a positive impact on climate resilience through conservation and restoration of biodiversity. This includes increased precipitation, absorption of carbon gases and reduction of the greenhouse effect; improved soil water retention from shades provided by trees; and diversified bio-ecosystems as a result of trees providing a home to wildlife that in turn improves soil fertility from animal waste, and pollination from insects among others.

- Gender Equity and Equality

FLR has the capacity to bring goals that capture goals for both genders. For example, Galabuzi et al. (2014), in a study carried out in Uganda, found that men are more oriented towards on-farm tree planting to generate timber while women were interested to plant trees on farms to control soil erosion for their subsistence farm produce. Participatory FLR, therefore, presents an opportunity for an all-inclusive gender equitable initiative that does not discriminate against or impinge on either gender.

- Poverty Alleviation

Land restoration has the capacity to alleviate poverty through increased fertile land for smallholder farmers to conduct both commercial and subsistence farming. The primary source of economic

activity for a majority of the population is considered farming, although farmable land has been on the decline due to erosion, change in weather patterns, and land degradation. Forest Land Restoration has thus the capacity to improve people's earning power through improved land use.

Efforts to reduce land and forest degradation can be accelerated through FLR. FLR with strengthened stakeholder coordination, strategic targeting of degraded areas and implementation of various tree-based interventions has the potential to enhance local community livelihoods and address current land use challenges. Essential ecosystem functions that provide multiple benefits such as improved soil fertility, water retention, and biodiversity should result from forest landscape restoration (IUCN & WRI, 2014). There is evidence for this. Through case studies in Brazil, Burkina Faso, Ethiopia, Ghana, Guatemala, the Philippines, and Viet Nam Kumar et al. (2015) has illustrated how FLR improves land productivity and contributes to sustainable food security. To ensure that restoration strategies are adapted to local conditions, FLR activities catalyze active stakeholder participation and involvement. This increases the likelihood of strong local project ownership, strong community participation, and improved forest governance (Climate Investment Funds 2012). However, the challenges to achieving sustainable landscape goals related to tree-based interventions include, among others, a lack of skilled human capacity, economic costs for program and project implementation, institutional capacity to enforce laws, operational guides for ministries and stakeholders to work together towards common goals, and more (Milton et al. 2003; Elliott et al. 2013; Van Oosten 2013).

1.1.3 Policy Framework and Strategies for Implementation of FLR in Malawi

Malawi has a robust number of policies and strategies related to forest landscape restoration implementation with links to international policies and programs. A few among the policies and strategies that are considering both environmental and socio-economic development outcomes are shown in Table 1.1

Table 1.1 FLR Policy Strategies

Policy/Strategy	**Goal linked to FLR**
National Forest Policy (2016)	sustainable production of forest goods and services to support sustainable development
National Agriculture Policy (2016)	increased agricultural production, productivity, and incomes
National Resilience Plan (2016)	stop recurring food insecurity and related crises
National Climate Change Policy (2016)	climate change adaptation and mitigation, capacity building for sustainable livelihoods and development of a green economy
National Charcoal Strategy (2017)	address increased demand for household cooking fuel that is causing deforestation and forest degradation
National Energy Policy (2003)	contribute to poverty reduction, industrialization, and economic growth
National Biodiversity Strategy and Action Plan (2015)	sustainable management of biodiversity

By linking the restoration of trees and forests on landscapes across the country, FLR has the enabling policy framework needed to significantly transform the country's national efforts on land management and conservation. The Government of Malawi has set an ambitious target of 4.5 million hectares for restoration under the Bonn Challenge and the African Forest Landscape Restoration (AFR100) initiative. Nearly 80% of the country area (7.7 million hectares of land) has been identified as providing suitable locations for restoration and implementing improved agricultural technologies. These locations are also suitable for establishment and management of community forest areas and woodlots, improved forest management, soil and water conservation, and river and stream-bank restoration. Advancing these potential activities for FLR across Malawi is rooted in pivotal questions raised by Lamb et al. (2012): (i) How much restoration should be carried out in a landscape? (ii) Where should this be carried out? (iii) What type of restoration should be done at each location? (iv) How should the FLR process be managed? In Malawi, these questions were addressed through an assessment using the Restoration Opportunities Assessment Methodology (ROAM) developed by WRI and IUCN. IUCN and WRI (2014) developed the method to facilitate the identification of targeted degraded areas -- also referred to as opportunity areas for restoration -- with a combination of the stakeholder engagement process, scientific and technical analysis.

Stakeholder consultations identified scaling up improved management of forests and natural resources and sustainable land management with a focus on tree-based restoration practices as the main agenda for restoration of deforested and degraded landscapes by 2030. When implemented, the following goals are attainable; increased food security, resilience to impacts of climate change, watershed protection and improved water supplies, increase production of forest products,

biodiversity conservation and enhance gender equity. The legal and policy framework was assessed to determine the enabling conditions.

Economic costs and benefits were analyzed, and it was established that an investment of approximately 279 billion Malawi Kwacha (over 350 million US Dollars) or approximately 62,000 Malawi Kwacha (85 US Dollars) per hectare is required for Malawi to achieve the 4.5 million ha commitment to restoration. Figure 1.3 below details the steps taken during the national assessment for FLR opportunity areas in Malawi.

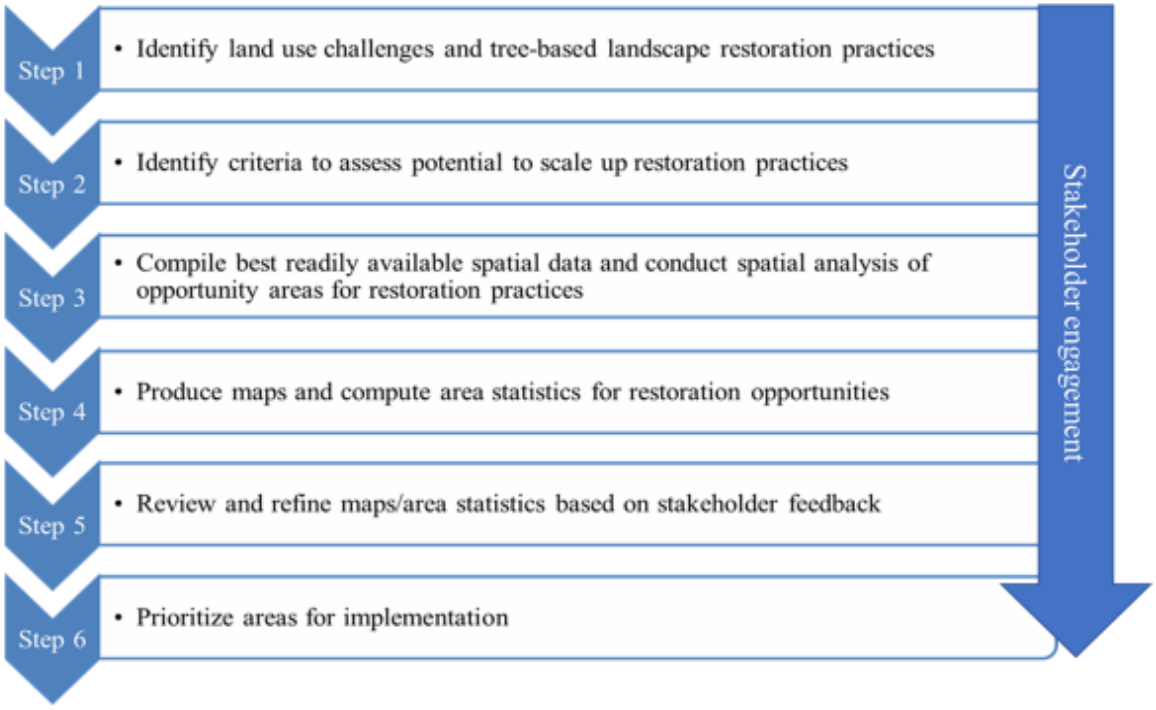


Figure 1. 3 Steps in restoration opportunity mapping

The department of forestry, a national task force on FLR with support from a team of technical partners from IUCN and WRI facilitated stakeholder workshops during the assessment in 2017. Districts provided a range of stakeholders for the process. A stocktaking of land use challenges

and current restoration practices being implemented was done for all districts. Available maps were used by district stakeholders to identify degraded areas and areas with successful restoration.

Other series of workshops investigated gender responsiveness of FLR, enabling conditions for FLR implementation and a costs and benefits analysis of FLR. Final maps showing priority areas for restoration and recommended interventions in each district were produced and validated by stakeholders before the final report. The assessment identified the following interventions as having the best potential for success across the country:

- 3.73 million (mil) hectares (ha) under improved agricultural technologies (conservation agriculture, farmer-managed natural regeneration, and agroforestry). Smallholder farmers would be better off in the long run with improved agricultural technologies. Farmer Managed Natural Regeneration (FMNR) was identified as the most cost-effective and least labor-intensive.

- 753,000 ha potential for the establishment and management of community forest areas and woodlots (private woodlots and /village forest areas);

- 3.4 million ha for improved forest management on public land (protect 2.4 million ha of existing natural forests; rehabilitate 820,000 ha of degraded and deforested forest areas; and 138,000 ha for improved management of plantations.). These areas are catchments where severe degradation from extraction activities often happens and areas of high biodiversity value.

- 1 million ha is an opportunity area for soil and water conservation activities (check dams, gully protection, terracing, contour bunds, infiltration trenches, and/or ridges). Areas prone to flooding and extreme water flow that causes gully formation, particularly as it affects croplands will benefit most from soil and water conservation infrastructure.

- 36,000 ha subjected to river and stream-bank restoration (tree planting and/or natural regeneration along rivers and /streams).

A national FLR implementation strategy was developed following the results of the assessment who must be involved, what interventions and how Malawi will achieve restoration at scale (Government of Malawi. 2017).

Figure 1. 4 Overview of the Malawi FLR strategy

Although the range of restoration goals cuts across the policies and strategies cited earlier, the matching of degraded areas with specifically suited restoration interventions is what sets apart the national FLR strategy. Restoration activities related to landscape restoration have been implemented without emphasis on stakeholder coordination and strategic targeting of degraded areas. FLR can contribute to transformation in the current situation by supporting continued stakeholder engagement. Literature shows that local multi-stakeholder participation in monitoring leads to more successful outcomes in restoration projects (Evans and Guariguata 2016).

1.1.4 Monitoring FLR implementation in Malawi

Various entities implementing restoration activities are engaged in monitoring for varying reasons and at different scales. Monitoring information comes from districts through district councils and project implementation units to the national level through ministries. The Government of Malawi (2018) developed a framework for Monitoring FLR implementation to ascertain progress on the FLR strategy by focusing on both the restoration goals and interventions.

Figure 1. 5 Framework for Monitoring FLR implementation in Malawi

The process included stakeholder consultations and a comprehensive review of existing monitoring systems from which 160 indicators were identified to have links with the FLR monitoring goals. Existing monitoring systems were also assessed to avoid duplications and efficiently use resources for monitoring. The 160 indicators were reviewed and systematically assessed against five criteria: 1) relevance to goal or target, 2) reliability of collection, 3) quality, 4) sensitivity to restoration interventions, and 5) ease of communication. 30 indicators we a result of the analysis and they are among the regularly collected by other efforts. Technical partners used conceptual models during the development of the framework to demonstrate the importance of developing a system that monitors both the biophysical and socio-economic impacts of FLR. This was done to ensure that monitoring of FLR accounted for progress on biophysical and socio-economic outcomes. Core indicators, metrics, data sources, and baseline data for monitoring

progress have been outlined with a majority regularly collected by stakeholders including the National Statistical Office (NSO) during Integrated Household Surveys.

Currently, departments and other government agencies report to their line ministries on the progress of their strategies and initiatives. The Department of Forestry reports on the National Charcoal Strategy, National Forestry Policy, and National FLR Strategy to the Ministry of Natural Resources, Energy and Mining. However, there are times when ministries or departments from different ministries are expected to coordinate in monitoring. In the decentralized government system, districts have monitoring and evaluation (M&E) officers that report on district-level indicators to the Ministry of Local Government and Rural Development. Meanwhile, other sectors represented at district councils, like the District Forestry Officer, focuses only on monitoring forestry indicators and parallel to reporting at the council level also report to the Department of Forestry.

1.2 Problem Statement

Because stakeholder engagement is key to the success and forwards progress of a national FLR effort, the monitoring framework for Malawi's National Forest Landscape Restoration Strategy should include an evaluation of the degree to which the program has actively engaged each stakeholder group identified in the planning process and implementation strategy. These stakeholder groups include farmers, rural communities, traditional authorities, Non-Governmental Organizations' (NGOs), government sectors, the private sector, and partners. Monitoring should be optimized and attractive especially for local community participation (farmers, rural communities and traditional authorities) but also user-friendly enough to be understood by all stakeholders. In 2017, 84 % of the Malawi population lived in rural areas and 93 % of them

involved in agriculture. It is important to make sure that they contribute to FLR monitoring for efficiency, effectiveness, and sustainability.

However, the monitoring framework is not clear on inclusiveness. By not outlining how local communities can get involved in monitoring, the framework is taking the route of other current monitoring systems that only consider local communities as passive participants in monitoring. A critique of the framework would suggest that it is biased toward people with technical expertise who are usually not direct FLR implementers. Ignoring direct implementers of FLR activities has the potential to slow down scaling up of FLR implementation. The monitoring framework mentions that currently only 8% and 4% of households across the country have access to forestry and agroforestry extension services. Creating an enabling condition for participatory monitoring can eliminate the challenge of extension staff shortage and improve farmer to farmer learning. The sharing of insight and knowledge with community members and acceptance of their subjective contributions is of noticeable value to monitoring. Monitoring should identify the circumstances under which various interventions succeed or fail to inform management (Danielson et al. 2005). Optimization of the current FLR monitoring framework by ensuring that local communities participate in monitoring is crucial for sustainability. In this study, socio-economic factors that constitute enabling conditions for local community participation in monitoring found in literature and information gathered in Machinga are analyzed and a monitoring plan for FLR is suggested.

1.3 Aim of the Study

According to Stanturf (2015), well-defined expectations with indications of a desired endpoint, mechanism and trajectory of change are a hallmark of successful restoration. Among the next steps mentioned in the Malawi FLR monitoring framework is the development and implementation of

a system for collecting, storing and analyzing data. As partners in restoration, communities and stakeholders need to work with monitoring data that are in a form accessible and credible to them, and which measures aspects that are of local relevance to inform decision making (Danielson et al. 2005). Lamb et al. (2012) recommend the development of monitoring systems that allow adaptive management. Achieving success and positive changes due to restoration in developing countries is complex. Economic and social factors must be considered because both ecological and socioeconomic circumstances can make or break the initiative. *Based on its literature review this study assumes that implementation of the FLR strategy will be more successful with participatory monitoring.*

The study will establish what constitutes an *enabling environment* for FLR participatory monitoring in Malawi by looking at the following:

- What will motivate local communities to participate?
- Do we have the necessary governance structures to implement participatory monitoring of FLR?
- What are the potential incentives that should be considered to implement participatory monitoring?

Devries et al. (2016) emphasize the criticality that national monitoring systems ensure local stakeholder participation in monitoring. Enhancing local participation in FLR by creating an enabling environment that motivates and incentivizes engagement provides a catalyst for implementation and long-term sustainability of the implemented activities (Ekowati et al. 2016). Boissière et al. (2017) discussed the importance of understanding the motivation and incentives of local participants in monitoring creates local ownership and ensures sustainability. Additionally, this study will develop a monitoring plan for FLR.

CHAPTER II: LITERATURE REVIEW

Although the previous Chapter provided an examination of some of the literature background on FLR, the purpose of this Chapter is to consider a more expensive examination of the literature. This examination includes a review of the scholarly work that precedes this project, as well as an overview of salient documents and descriptions of the policy frameworks that support FLR in Malawi today.

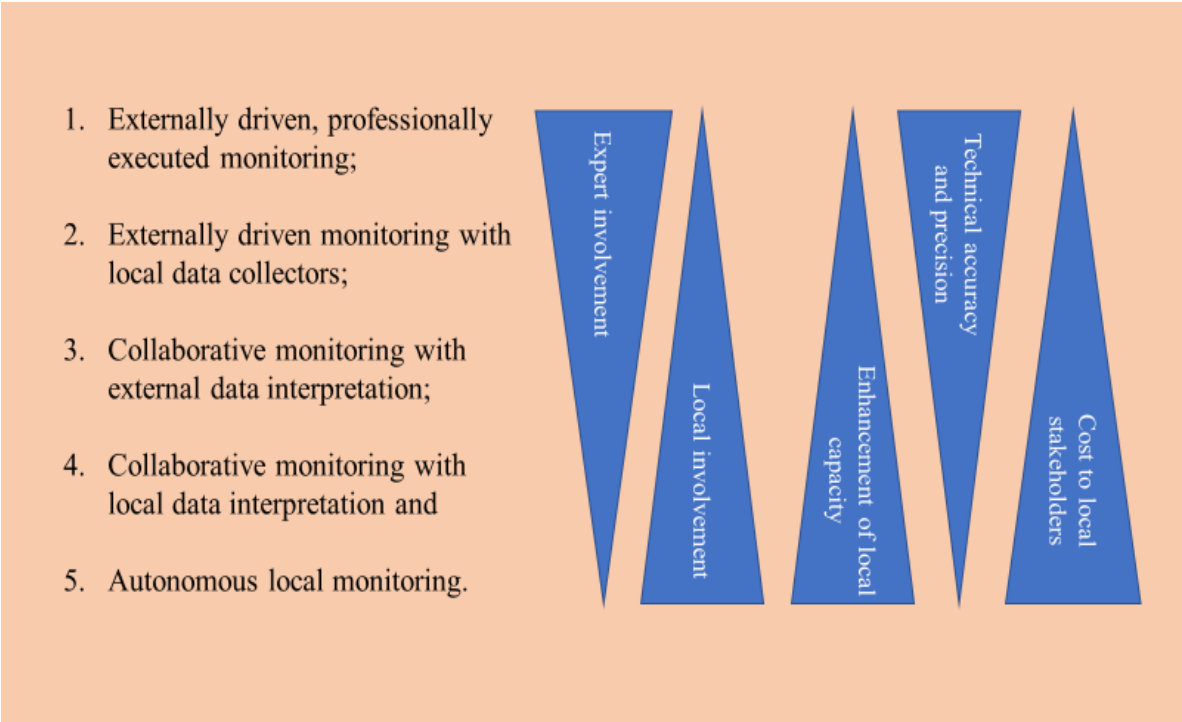
2.1 Participatory Monitoring

In recent years there have been several calls for real action on commitments governments have made to the Bonn Challenge and regional initiatives such as the AFR100. Several countries including Malawi have made pledges to restore degraded areas for both ecological and socioeconomic benefits. Therefore, tracking the progress of implementation towards the restoration pledges and the impacts is important for lessons learning and future decisions (Mansourian et al. 2017). Vernooy et al. (2006) define monitoring as the systematic, data collection and analysis to identify and measure change over time. Monitoring should identify circumstances under which various interventions succeed or fail to inform management (Danielson et al. 2005). Savilaakso et al. (2015) assert that monitoring helps assess the implementation standards and verification of results against objectives. This is true because monitoring includes the collection and analysis of data in order to track change towards set objectives (Evans and Guariguata 2008). Kasturiarachchi et al. (2009) point out that effective monitoring allows for early detection of implementation challenges. We, therefore, expect FLR monitoring to set modalities that support the achievement of objectives by tracking the implementation of restoration interventions and

progress towards restoration goals. This should clearly outline what, how, where, when and by whom to monitor (Hazir 2014).

Larson and Williams (2009) pose that several different monitoring approaches exist. There are predetermined and adaptive approaches, also referred to as conventional and participatory respectively. The two approaches also differ based on who plans and manages the monitoring processes; the role and involvement of stakeholders and ways of measuring success. The authors note that conventional monitoring is planned and managed by experts that are usually external.

In this approach, other stakeholders are only considered to be information providers to the experts and resulting in externally defined success which is mainly in numbers. Danielsen et al. (2009) discussed five approaches to monitoring in natural resources management in the figure below



Adapted from Danielsen et al. (2009).

Figure 2. 1 Monitoring approaches

The levels of local involvement range from the first approach seeing no involvement of local communities in monitoring to the last approach where communities are in full control. The second approach considers using local communities in data collection but experts design, analysis and results generation. The third approach only allows for community involvement in implementation and results generation but does not involve local communities in project inception and design. The fourth approach invokes a collaborative role where experts only provide advice and training, leaving the local community to lead in decision making and management. The last approach does not get external or expert involvement.

When put against each other, the approaches that had more local community participation scored lowly in accuracy and capacity to inform national monitoring schemes while externally driven monitoring schemes showed low potential for encouraging local community participation. Therefore, getting a balance for participatory monitoring to benefit from all stakeholders is necessary.

Beaudoin et al. (2016) defined participatory monitoring as the inclusion of local communities' knowledge in monitoring for value addition and Verbrugge et al. (2017) attributes active participation of local communities in data collection to participatory monitoring. Broadly, participatory monitoring in FLR should actively involve local communities, among diverse stakeholders, throughout the process of monitoring (Evans and Guariguata 2016). Local communities involved in monitoring starting from the design stage to data analysis. This allows monitoring to build on existing institutional and management systems (Danielsen et al 2005). Savilaasko (2015) noted that participatory monitoring systems have to ensure harmony with traditional set up in local communities. Luyet et al. (2012) further define participatory monitoring

as a process which sees multi-stakeholders influencing and sharing decision making power over development initiatives in their area.

Participatory monitoring is best applied where local people have a significant interest in re-establishing ecologically functioning landscapes (Danielsen et al. 2018). The authors also note that the monitoring process can influence natural resources management decisions within existing governance institutions, especially when there are policies in place that enable decentralized decision-making. Local communities are not homogenous. As such, there is no fixed model for participatory monitoring (Vernooy et al. 2006). Planning for participatory monitoring must be flexible and consider different interests, geographic, economic, and political contexts. The recognition of the local differences will result in more inclusive restoration and monitoring with better outcomes (Von and Zambrano 2010).

Savilaasko (2015) recognizes the emphasis on participatory approaches from the early 2000s. Various studies have shown local community capacities and concluded that participatory monitoring has advantages. Evans and Guariguata (2008) defined terms that are used in reference to participatory monitoring. Locally based monitoring, collaborative monitoring, joint monitoring, self-monitoring, and event monitoring. They all constitute participatory monitoring and add value to monitoring.

It is also worth mentioning that the peer literature is indicating that there can be variations in levels of local involvement in participatory monitoring. International conventions are calling for monitoring that allows multiple stakeholders groups to participate in the success of different global

goals. The Aichi Biodiversity Targets under the Convention on Biological Diversity and the United Nations Framework Convention on Climate Change (UNFCCC) are among the global conventions highlighting the need for participatory and user-friendly monitoring (Evans and Guariguata 2016). Danielsen et al. (2005) discussed the following six principles for sustainable participatory monitoring:

i. Articulation of benefits to the community
ii. Benefits to individuals from the local community participating in monitoring
iii. Enabling environment created for local participation in monitoring
iv. Build synergy with existing monitoring and management systems
v. Mainstreaming of participatory monitoring from the local to the national level
vi. Local community involvement in the maintenance of data records and analysis

In addition to the six principles above, maintaining local participation and building their capacity is vital in participatory monitoring (Evans and Guariguata 2016). Local communities prefer immediate returns and dislike for working collectively on activities that may only bring marginal returns Shashi and Kerr (2002). Sustained engagement in participatory monitoring should strengthen communities' restoration activities through feedback and therefore continue to positively influence land use decisions. The level of local involvement in participatory monitoring is crucial because it influences the choice of who participates from the community (Luyet et al. 2012). McCall et al. (2016) talked about the importance of recognizing women and young adults' contribution to participatory monitoring. The two groups are often not involved in decision making. True participatory monitoring ensures that local communities have a significant role to play with clear duties, benefits, responsibility, decision making power with a share of authority (Savilaakso et al. 2015).

2.2 Benefits from Participatory Monitoring

Becker et al. 2005, for example, stressed the importance and relevance of participatory approaches that involve local communities… *monitoring can be sustained over time, costs can be kept down, and decision making can be brought closer to the communities. Furthermore, local involvement helps build trust among different stakeholders in enacting together responses to changes in the ecosystem* (Becker et al. 2005; Poulsen & Luanglath, 2005). A lot of projects have applied participatory monitoring and some of the benefits include:

2.2.1 Cost efficient

Savilaakso et al. (2015) observed that projects that have implemented participatory monitoring report low costs when compared to conventional monitoring systems. Monitoring implemented by experts, not involving local people, is more costly. Conventional monitoring cost 3.6 USD/hr/yr on a project in Uganda in 2001 while participatory monitoring cost 0.08 USD/ha/yr on average (Danielsen et al. 2005). However, it is important to note that the cost might be transferred to the local participants. The authors analyzed levels of community participation in five monitoring approaches and an increase in costs to local participants were observed as their level of involvement increased. The initial costs required to train local participants in monitoring may also be expensive and time-consuming (Luyet et al. 2012).

2.2.2 Increased local participation

McCall et al. (2016) observed that local participation in monitoring led to increased participation in improved natural resource management in general. Savilaakso et al. (2015) linked this outcome as a result of community ownership towards project activities. In the end, the numbers of local people adopting project activities increased in the community.

2.2.3 Improved governance

improved governance is observed in projects that involve local communities through community acceptance of decisions (Luyet et al. 2012). Participatory monitoring generates trust among the local participants and increases resilience because of its transparency (Savilaakso et al. 2015; McCall et al. 2016; Evans and Guariguata 2016). Shashi and Kerr (2002) even said that local participation in monitoring reduces corruption.

2.2.4 Promotes learning

Evans and Guariguata (2016) mention that participatory monitoring provides a platform for learning. Participants, experts, and representatives from the local community work together to better understand the context of restoration, benefits and other impacts (FAO 2015). Both sides learn from each other when the integration of various interests and opinions and members of the local community also learn from each other (Luyet et al. 2012). Participatory monitoring offers participants an opportunity to understand the linkages that exist between the environment, the economy and social conditions (FAO 2015). Experts learn about local ecological health, economics, and social dynamics while local communities get more understanding of how ecological health impacts their socio-economy. Increased understanding strengthens the bond between participants and the environment (Bong et al. 2016). Participants operate with hope since benefits from the restoration are usually long term (Evans and Guariguata 2016).

2.3 Challenges with participatory monitoring

While there are benefits to participatory monitoring, one common misconception is to assume that any project that directly involves the local community and incorporates the local community towards locally driven solutions is destined for success.

2.3.1 Timing of monitoring activities

Having noted the connection FLR monitoring between local communities, the impact of local involvement in FLR monitoring on local livelihoods is very important. Participatory monitoring demands time from local participants away from their day to day activities that have the potential to cause conflicts (McCall et al. 2016).

2.3.2 Data inaccuracy

Evans and Guariguata (2016) acknowledged that participatory monitoring may generate inaccurate data. Experts must determine the level of technical knowledge that local participants require to ensure data validity and credibility. Other data unreliability arises from a failure to account for leakage. Local participants might not measure leakage taking place in neighboring communities (McCall et al. (2016).

2.3.3 Identification of new conflicts

Where local communities earn livelihoods from activities that promote land and forest degradation, participatory monitoring my face challenges (Boissière et al 2017). Communities might not be willing to get involved especially if alternative livelihoods are not available. Participatory monitoring also risks potential stakeholder frustration (Luyet et al. 2012). People within the local community have different views and aspirations (Boissière et al 2017). As such sustaining participation is another challenge for participatory monitoring (Evans and Guariguata 2016). Involvement of local participants that do not represent the larger community or those that are already ahead of others in engagement is another potential risk (Luyet et al. 2012). Within the community, there may be traditional powerful individuals that dominate and impede others from participating (Von and Zambrano 2010).

Ribot (2002) in his paper Democratic Decentralization of Natural Resources provides a case study of the tragedy of open access and legalization of local corruption. Community ownership led to what is called the tragedy of the commons (collective actions of individuals leading to depletion of a resource as a result of individuals' self-interests to maximize one's own benefits). The latter saw decentralization of power to allocate timber licenses to local authorities as an incentive to curbing illegal logging as the local authorities were deemed closer to the problem. The act saw increased logging due to corruption where local authorities simply granted licenses without consideration for control. The author, therefore, warns the dangers of decentralization without enough powers, resources and accountability mechanisms: Transferring power without accountable representation is dangerous. Establishing accountable representation without power is empty. Von and Zambrano (2010) record that powerful individuals from the local community dominated decision making on a Mexico City wetland restoration project.

2.4 Can participatory monitoring be applied in forest landscape restoration?

Landscape-scale monitoring with local participation has increasingly been suggested for FLR (Singh et al. 2014). Participatory monitoring in FLR is crucial in order to get local buy-in (Evans and Guariguata 2016). FLR in its nature aims at active stakeholder active participation although there might be variations in restoration objectives. The nature of monitoring changes when local stakeholders are involved because the priorities broaden and address stakeholder interests that may not be directly linked to monitoring (Evans and Guariguata 2016). FAO 2015, emphasizes the need to identify ways of ensuring that FLR monitoring responds to the concerns of all stakeholders. It is important to note that stakeholder engagement, in this case, does not only represent a means for FLR projects. It is a model for ensuring that the concerned are involved for more informed

decision making (Larson and Williams 2009). Whereas, a participatory monitoring approach sees various stakeholders planning and managing monitoring processes including the sharing of information on findings and required action to be taken. As such, participatory monitoring approaches measure success mainly qualitatively with collectively defined indicators. This qualitative information becomes locally meaningful and specific to local conditions. Expected outcomes of forest landscape restoration are directly linked to land use decisions that impact tree and forest condition. Beaudoin et al. (2016) argue that such impacts are site specific and should be considered in the local context. Thereby making local participation in monitoring vital and crucial. The need ensure that local communities other local interested stakeholders are engaged has made participatory monitoring approaches popular over conventional monitoring approaches (Vernooy et al. 2006).

Local stakeholder involvement in monitoring clarifies the connection between local conditions and restoration commitments. As decision makers on land use, local communities need to understand and see benefits that may result from restoration in general and their involvement in monitoring. With the magnitude of land use challenges that FLR should address, active stakeholder involvement in monitoring will support sustainability (Kasturiarachchi and UNDP 2009). Lindenmayer and Likens (2010) argue that effective monitoring considers local conditions and people in its approach. The involvement of local communities in projects leads to the participatory monitoring concept.

Participatory monitoring in restoration projects will provide the basis for understanding local livelihood strategies and stakeholders' priorities. Local stakeholders include community members and farmers; community leaders such as chiefs; local and international organizations; extension officers that directly work with the community and farmers; and conservation groupings (Staddon et al. 2015, Lupton. 2014). Key to the monitoring process is who participates. Among these are the community members, community leaders such as chiefs, local and international organizations, forest extension officers, farmers, forestry department, climate change affiliated groups, and conservation groupings (Staddon et al. 2015). Although the list is not exhaustive, it is worth noting that who is involved in the monitoring process depends on the funding agency and the local needs. Another context might be deliberate mechanisms put in place by project planners with regards to their assessment on key variables like culture, community interrelations and the broader operational institutional and legal framework. Where digital equipment is required, Evans and Guariguata (2016) recommend working with young adults from the local community. They are usually more familiar with digital tools.

Local involvement has shown a lot of potential in Reducing Emissions from Deforestation and forest Degradation (REDD +) monitoring. Savilaakso et al. (2015) advocate for locally relevant monitoring systems that support active local involvement in decision making. Hawthorne et al (2016) point out that with adequate capacity building, local communities can collect local biomass data. The locally collected data is used to verify data collected through remote sensing and geographical information systems (Praputra et al. 2016). Evans and Guariguata (2016) concluded that local community representatives are accurate in providing the spatial, temporal and thematic details of the forest change that complements and enhances remote sensing-based, forest change

analysis. Monitoring benefits from details on changes that local communities can identify thereby adding value.

FLR monitoring must take place at all levels of management of restoration activities and at the local level involving people who face the daily consequences of environmental changes (Danielsen et al. 2010). The expectation is that local stakeholder engagement in monitoring enhances management responses at the local level creates a feedback loop that supports faster decision-making to tackle environmental challenges (Danielsen et al. 2010). However, FLR monitoring cannot afford to ignore motivation for local communities to participate in monitoring (Singh et al. 2014). The authors recommend that motivation to drive local participation in monitoring should be identified as monitoring systems are developed. Rewards and local involvement in discussion fora such as meetings and research seminars have the potential to increase interest and encourage participation.

2.5 Monitoring of policy frameworks that support FLR in Malawi

2.5.1 National Forestry Policy

The national forestry policy was reviewed and published in 2016 with an overall goal of ensuring that trees and forests are conserved, established, protected and managed in Malawi. Implementation arrangements mention a wide range of stakeholders mainly from government. The private sector, academia, research institutions, civil society, development partners, traditional partners, and district councils are among the influential stakeholders expected to support policy implementation. The policy has a monitoring and evaluation plan outlines objectives, outputs performance indicators, targets, baseline data, data verification sources, and assumptions. The role of stakeholders in monitoring is not described although monitoring is expected to happen at the national, sectoral and local level.

2.5.2 National Agriculture Policy

The 2016 National Agriculture Policy was developed to provide clear and comprehensive policy guidance in agricultural development towards increasing production, productivity, and income from agriculture. The policy focuses on establishing strong linkages among stakeholders with interest in agriculture including farmers, the public sector, the private sector, civil society, NGOs, development partners, academic and research institutions. As much as farmers and farmer-based organizations are mentioned under implementation arrangements, the roles of local institutions are not mentioned in monitoring. The existing data systems targeted for leverage by the Ministry of Agriculture are expert institutions. The monitoring and evaluation plan for the policy outlines outputs, performance indicators, target, baseline data, data verification sources, and assumptions. Farmer organization is mentioned as verification sources on a few indicators.

2.5.3 National Resilience Plan

The 5-year National Resilience Plan focuses on building Malawi's' resilience to disasters, including impacts of climate change, that are contributing to food insecurity. The responsibly of monitoring implementation of the plan has been left with government ministries, departments, and other agencies. The Department of Disaster Management Affairs and the Department of Economic Planning and Development were tasked with conducting periodic monitoring. The monitoring plan outlines strategies, outputs, output indicators, baseline data, annual targets and data sources. All data sources mentioned are expert institutions.

2.5.4 National Climate Change Policy

The National Climate Change Management Policy was developed to ensure that climate change management is well coordinated. The policy stipulates priorities for climate change interventions and outlines modalities for implementation of adaptation, mitigation, technology transfer, and

capacity building measures. A wide range of stakeholders is mentioned including decentralized structures at district and local level. The policy is expecting local level institutions to integrate climate change into projects and plans. The monitoring plan for the policy, developed with measurable, reportable and verifiable indicators calls, for participatory monitoring with community-based organizations representing local communities.

2.5.5 National Charcoal Strategy

The Ministry of Natural Resources, Energy and Mining developed the national charcoal strategy to address problems of increased deforestation and increased demand for household cooking fuel. The strategy is expected to facilitate investment and transformation in the energy sector. Opportunities for sustainable energy have been identified to reduce deforestation and the associated impacts on rural livelihoods and the national economy. The charcoal strategy does not have a monitoring plan. Instead, there is a mention of creating and implementing a robust monitoring and evaluation system to track impact.

2.5.6 National Energy Policy

The national energy policy of 2003 provides guidelines on energy, supply, use, development distribution, pricing and industry governance in Malawi. One of the policy objectives is to address Malawi's over-dependent on biomass energy. The policy does not a monitoring plan but mentions government plans to strengthen monitoring and evaluation.

2.5.7 National Biodiversity Strategy and Action Plan

Biodiversity management in Malawi is guided by the National Biodiversity Strategy and Action Plan in response to the Malawi Growth and Development Strategy which prioritizes biodiversity management programs among other socio-economic and environmental issues. Local communities have been specifically mentioned among stakeholders targeted for communication

of the strategy and action plan. Apart from informing local communities on biodiversity conservation, the strategy and action plan also expects communities to participate in activities that will result in biodiversity conservation. The strategy and action plan have a monitoring and evaluation plan. Objectives, indicators, baseline data, and responsible data collectors form the monitoring and evaluation plan. Local communities are not among the listed data collectors.

Figures 2.2 and 2.3 in the proceeding page illustrate the current flow of progress information on policy and strategy implementation. The Ministry of Natural Resources, Energy and Mining oversees implementation of the National Forest Policy, National Climate Change Policy, National Charcoal Strategy, National Energy Policy, and the National Biodiversity Strategy and Action Plan. The Office of President and Cabinet is the custodian of the National Resilience Plan and is depending on relevant ministries and agencies to monitor progress. The Ministry of Agriculture, Irrigation and Water Development oversee the implementation of the National Agriculture Policy.

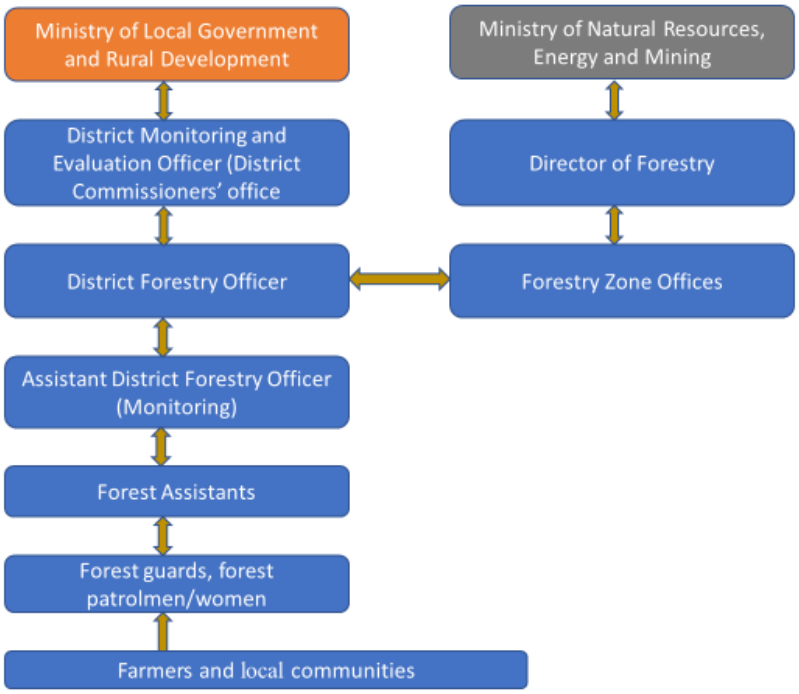


Figure 2. 2 The flow of progress information for policies developed by the Ministry of Natural Resources, Energy and Mining.

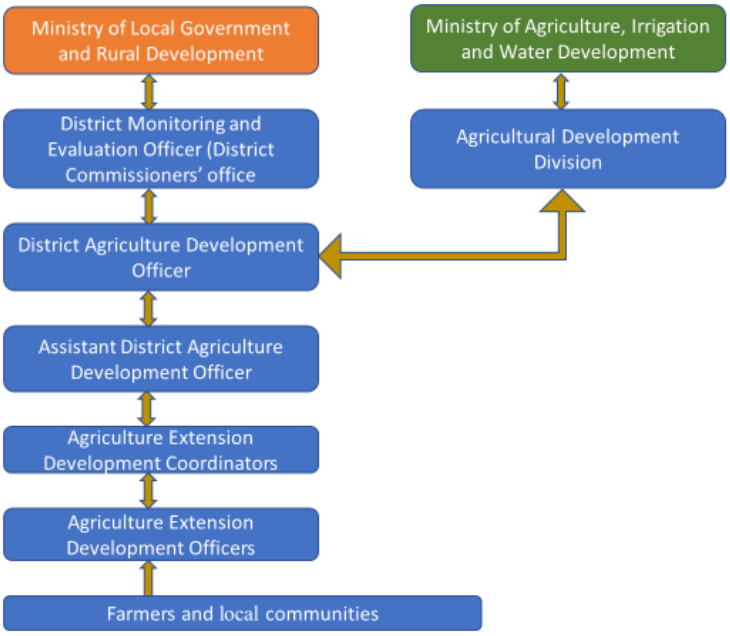


Figure 2. 3 The flow of progress information for policies developed by the Ministry of Agriculture, Irrigation and Water Development.

2.5.8 Malawi Decentralization policy

Malawi has a decentralization policy from 1998 developed to decentralize political and administrative authority to the district level. Decentralization is considered a strategy for alleviating poverty in the country. Under the guidance of the Ministry of Local Government and Rural Development, governmental agencies at the district and local levels are operating under one administrative unit. District commissioners manage the decentralized structures and to ensure implementation of national government policies while promotes stakeholder participation in governance institutions development activities.

The decentralization policy objectives fit very well with FLR implementation and monitoring.

"to create a democratic environment and institutions in Malawi for governance and development; at the local level which will facilitate the participation of the grassroots in decision making";

"to promote accountability and good governance at the local level in order to help Government reduce poverty";

- The National Forest landscape Restoration Strategy envisions that strengthened landscape governance is vital in putting Malawi on a path to large scale restoration. Participation of the local communities in decision making will determine the way trees and other natural resources are managed. By consolidating and promoting local governance institutions and democratic participation, decentralization promotes good governance with accountable and transparent structures. Currently, district assemblies have formed action committees at Traditional Authority level, Ward and Village level.

"to eliminate dual administrations (field administration and local government) at the district level with the aim of making public service more efficient, more economical and cost-effective";

- FLR calls for improved coordination of stakeholders in planning and implementation of restoration activities. The elimination of dual administration brings local stakeholders together creates room for comprehensive engagement that will result in more efficient, more economical and cost-effective public services. This way, mainstreaming of various landscape management policies and strategies becomes more coherent at all levels of implementation.

"to mobilize the masses for socio-economic development at the local level."

- District assemblies have a responsibility for developing development plans that promote infrastructural and economic development. They are also expected to mobilize resources for implementation. This corresponds with the national FLR implementation strategy's focus on ensuring increased socio-economic benefits to communities and individual households investing in implementing restoration. All these are aiming at improved livelihoods of local communities.

The National Guidelines on Integrated Catchment Management and Rural Development explore the theory of strategic catchment management from the national to the local community level. The guidelines were developed under the Shire River Basin Management program and consider environmental degradation as a result of poverty and high population growth. The guidelines are being applied in the districts that are implementing the project. Local communities are involved in the monitoring of the village level action plans. Monitoring is supposed to assist local government institutions such as village development committees with information on activity implementation problems for improved management.

It has been observed from the above-described strategies and plans that support FLR, there is more that needs to be done to achieve participatory monitoring in Malawi. Shashi and Kerr (2002) concluded that government departments and agencies have limited potential for improving internal monitoring. The Ministry of Agriculture, Irrigation and Water Development in the agriculture policy recognizes that monitoring led by the central ministry is cumbersome and demanding on the time of field-level extension agents and looks to a streamlined system. Despite reservations that experts may have on local community capacity to monitor, an effective way to improve monitoring is to involve the communities. Training opportunities and other incentives should be made available for farmers to be motivated and participate.

Participatory monitoring must be institutionalized at each level of implementation of the policies and strategies with all stakeholders understanding its benefits (Vernooy et al. 2006). In the decentralized system, there are community governance structures that work with district assemblies and traditional authorities. Participatory monitoring has the best potential if it builds upon these existing community governance structures and political processes. The complexity of integrated monitoring for all national policies in natural resource management projects calls for a holistic approach (Von and Zambrano 2010). The monitoring framework for the national forest landscape restoration strategy presents that opportunity. However, it is important to have a framework that clearly outlines what to monitor, where to monitor, who to participate in monitoring and how. There is a lot that needs to be done to facilitate the flow of information that takes and gives back to all stakeholders. Currently, local communities are passive participants. Establishing a working relationship with local stakeholders is crucial for communication and recruitment of participants in monitoring (Bong et al. 2016). This is where an understanding of

incentives and motivation for participating becomes fundamental. The monitoring framework for FLR must create an enabling environment for participatory monitoring to sustainably track progress on implementation.

CHAPTER III: RESEARCH METHODS

3.1. Study site

The study area for this research is Machinga district. Located in the southern region of the country, the district covers 393,161 hectares of land representing 4.1% of the total land area. The district has a population of 735,438 people against the country population of 17,563,749. The population growth rate is among the highest in the country at 3.9% second from highest Mzuzu at 5.1%. The average country population growth rate is at 2.9% (NSO, 2018). The rate of population growth is putting pressure natural resources since the majority of the people in the district depend on natural resources that include farmlands, Lake Chirwa, and forests.

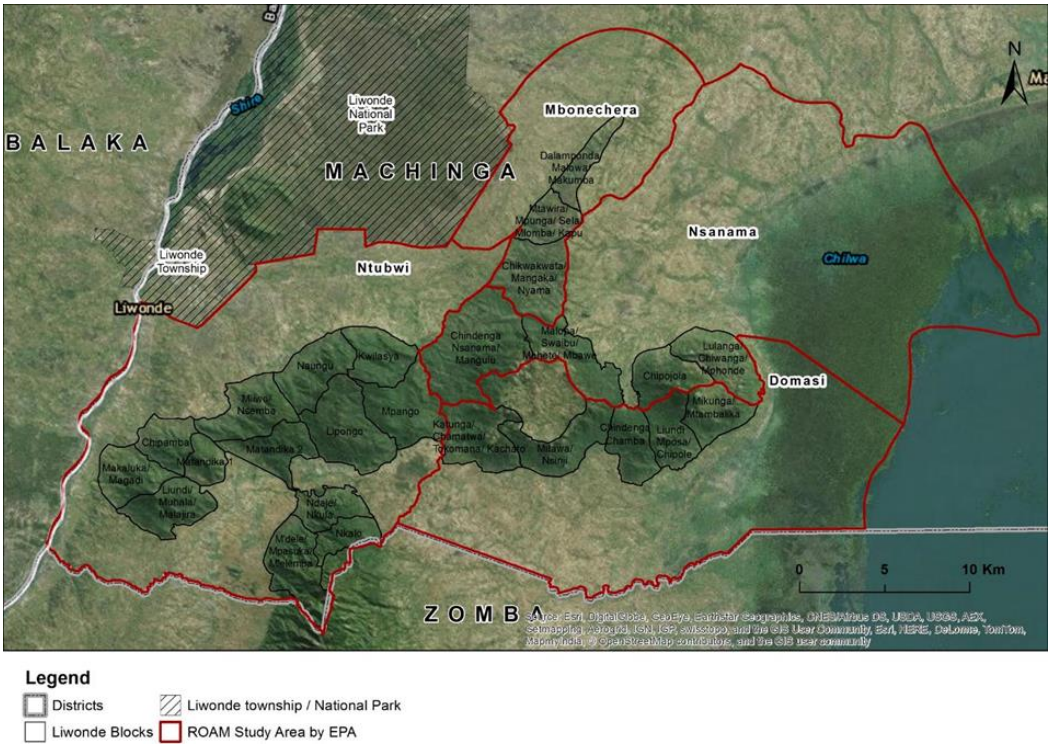


Figure 3. 1 Map of Machinga district

Source: NSO Statistical Yearbook (2016).

Figure 3. 2 Map of Malawi showing Machinga district

The district's topographical area falls within the Shire valley basin, with most of the Land Use Land Classification categorizing the region under moderate forest and annual cropland.

3.2 General Research Method and Sampling Strategy

The study employs a descriptive research design. This is where the study aims to inquire on the state of affairs as it exists at present with implications for policy, and decision making (Kothari, 2004). Descriptive research employs an analytical aspect based on facts or information collected or already available. The study finds justification in the research method because the focus will be on what is at present. The study is also qualitative. A qualitative approach falls within exploratory research and primarily used to gain an understanding of phenomena on why things are the way they are, the opinions people have about context and conditions, and people's and institution's motivations (Lewis, 2015). This is in comparison to exploratory research designs where little or no information on a given subject matter exists and studies aim to establish basic information, for example, anthropological studies.

Using the descriptive research method, the study aims to review motivating factors, local governance structures and potential incentives for local participation in FLR monitoring. To achieve this, the initial stage was is a review of the literature on participatory monitoring in natural resources management and lessons learned from community engagement in REDD+ monitoring. There have been notable research on local participation in REDD+ and biodiversity monitoring. This study assesses the participatory monitoring principles with an emphasis on social enabling conditions for local participation to make the monitoring framework for FLR implementation in Malawi participatory. In the second stage, the study uses social science tools and methods to assesses local community responses in Machinga to interviews and surveys, where a project piloting FLR has been implemented by USAID. The project is working with communities living in the areas of landscapes around two protected areas (Liwonde Forest Reserve and Liwonde

National Park). This study method deployed two survey tools to collect information from communities: a) focus group discussions and b) household survey. Additionally, the study included findings and observations from workshops and field visits that were conducted for the development of the national monitoring framework.

Using an analysis of the findings and input from the literature, the study identifies motivating factors, existing local governance structures to support FLR monitoring and identifies potential incentives for local participation. Motivation is looked at first with a focus on restoration goals from the community before assessing the governance structures and incentives. Table 3.1 provides information regarding the local communities who participated in focus group discussions:

Table 3.1 Focus group discussion participation

Extension Planning Area	**Village Name**	**Village Size (total number of households)**	**Male participants**	**Female participants**
Nsanama	Adani	78		12
Mtubwi	Mboma	87	8	13
Mbonechera	Mkachelenga	137	11	16
Mbonechera	Saidi Mpotola	106	12	14
Nsanama	Swaibu	141	14	15
Mtubwi	Disi	68	9	10
Mbonechera	Dauda	56	6	18
Mbonechera	Mangaka	63	9	10
	Total		**69**	**108**

The sampling was directed to villages based on a list of villages that were implementing FLR with support from USAID-PERFORM project. The villages were stratified based on the number of FLR interventions being practiced. The interventions included improved agricultural technologies, forest management, river and stream bank restoration, soil and water conservation, and community forests and woodlots.

To select villages for surveys and data collection, the study area was sampled using a procedure based on systematic stratified sampling. This is a technique where the population is subdivided into subpopulations based on a homogeneous trait (Kothari, 2004). The study stratified the population based on FLR interventions practice to avoid communities that are not yet experienced in FLR modalities and practices. 43 out of 181 villages were identified as practicing more than one FLR intervention. The names of these 43 villages were put in a bowl and 4 field coordinators randomly picked 2 villages. Field coordinators were assistants hire by the investigator to carry out the survey and data gathering under specific controlled protocols established by the investigator. The selection of 2 villages per field coordinator was reached based on time limitations, distance, and costs.

Borrowing from a similar study PERFOM (2016) *Agents and Drivers of Deforestation and Livelihoods Assessment,* that used a systematic "k-in-1" sample procedure, 10 households were selected per village. The project conducted a similar survey in three target districts before commencing implementation in 2015 to understand local conditions and set project baselines. To get the 10 households in a village, the total number of households was divided by 10 and every 8th household in Mboma village (87 HHs) and every 13th household in Mkachelenga (137 HHs)

for example were targeted for the study. This selection method was also selected as a way to reduce any systematic bias associated with interviewing households that are clustered together within a village. 10% of village households were deemed to be efficient, representative as it would account for at least 10% of the population, high reliability in replicating the study, and flexibility over budget and availability of household members to respond to the survey.

The choice of using a stratified approach was an important choice in the study as other studies have highlighted its preference in other forest and landscape restoration case. Poudel (2015) in his study *Strategies for Sampling and Estimation of Aboveground Tree Biomass* established the efficiency of "stratified probability proportion", which yielded better results than other procedures such as simple random sampling. Similarly, Koprivica (2017) assessed different sampling techniques in forestry inventory which included simple, stratified, block, two-stage, and multi-phase sampling techniques; with the objective of achieving maximum precision and accuracy in measurement of forest parameters at minimum cost. It was shown that stratified sampling with properly stratified homogeneous groups yielded more precise and accurate results over other methods in the measurement of forest parameters.

3.3 Choice of Study Area

Machinga is considered a high priority area for improved land management and development work by the government, several international organizations and some NGO's. It is a USAID designated priority area where a few projects under the Sustainable Economic Growth agenda are under implementation. According to the FLR opportunity assessment report for Malawi (Ministry of Natural Resources, Energy and Mining, 2017), Machinga has been identified as a candidate for

deploying all five priority FLR interventions (agricultural technologies, soil and water conservation, forest management, river and stream bank restoration, and community forests and woodlots). District level consultations were conducted by the Ministry of Natural Resources, Energy and Mining for the assessments to develop the National FLR Monitoring Framework and the pilot Forest Landscape Restoration Opportunities Assessment in Machinga district, with villages located within 5 km of the Liwonde forest reserve buffer zone being designated as the key landscape area. A meeting with technical sectors at the District Assembly including district forestry office, district agriculture development office, and district lands office among others. This puts Machinga as an ideal study site to observe how FLR implementation is working since local buy-in from local authorities and data was already available.

According to the 2012 District State of the Environment Report, the district is facing a series of environmental problems that include forest degradation and cultivation along river banks, coupled with social detriments including small landholding sizes and limited employment opportunities. Communities produce charcoal and sell firewood as livelihood activities and these are leading to increased forest and tree cover loss. The district report implies that improved management of natural resources, environmental awareness and education can assist in addressing the current forest and land use challenges. A baseline study conducted by USAID-PERFORM between 2014 and 2015 (PERFORM, 2016) highlighted land use challenges occurring in Machinga and create a high potential for ecosystem benefits from landscape restoration.

The baseline study by USAID-PERFORM in its methodology used Focus group discussions, satellite imagery and household questionnaires to investigate the “who” and “why” of forest loss,

including an analysis of the direct or proximate causes as well as the indirect or underlying causes of deforestation and degradation. Results of the baseline study mention conversion of forest land to agriculture, harvesting of firewood and charcoal production for home consumption and income generation as the direct drivers of degradation. Indirect drivers include poverty, population growth, high dependency on wood fuels and poor law enforcement. For Machinga, most households depend on rain-fed with a few engaged in irrigated agriculture for their livelihood. Households own land through customary tenure, with an average of 2 parcels of 1.5 hectares each. Women are the majority of landowners (70 percent) and farm size is declining. Results also showed that farmers have noticed a decline in soil fertility. Farmers are adopting practices to improve soil fertility but the adoption rates for agroforestry and conservation agriculture are relatively low (19 percent), evidently due to lack of training and assistance, and to a lesser degree due to lack of information. Forty-seven percent of households are members of community-based organizations (CBOs), including governance structures such as forest Block Management Committees, Village Development Committees, and Village Natural Resource Management Committees. These CBOs are well positioned to mobilize local communities, although households indicate that they need assistance with training, seedling production and other assistance to adopt improved natural resource management and restoration practices.

Based on the national rate of deforestation which is at 2.8%, the country has seen a 57% decline in the forest cover from 1972 to 1992 alone. Machinga is part of the southern part of Malawi which has a deforestation rate of 2.7% higher than the central region (2.4%) on average. This coupled with Machinga's high population growth rate at 3.9% higher than the country average of 2.8% reflects on how land use and restoration is important to cater for the growing demand for natural

resources caused by population increase. Since food security is the priority goal, identified by stakeholders, for FLR in Malawi, it is important for forest landscape restoration interventions to contribute to improved agricultural productivity in Machinga. The analysis done during the development of the national FLR monitoring framework shows that the proportion of households reporting inadequate household food is 21% above the country.

3.4 Data collection

Data were collected from 8 villages in 3 agricultural Extension Planning Areas (EPAs) within the district that cover for representative land distribution in the district. The villages are namely: Adani, Mboma, Mkachelenga, Saidi Mpotola, Swaibu, Disi, Dauda, and Mangaka. The villages involved in the study were selected using a simple stratified method and are part of the USAID-PERFORM project. All 181 villages working with the project took part in the baseline survey but 43 villages were considered for the study for they are engaged in more than one restoration intervention

Household surveys from the study covered 80 households and the questionnaire was adapted to the baseline study conducted by the project. The household data identifies the socioeconomic activities that communities depend on and their motivation for engaging in restoration. Data on existing local governance structures were obtained in order to understand governance.

The survey questionnaire (Appendix 2) was uploaded onto a tablet with Open Data Kit (ODK). Collected and aggregated data is analyzed in Stata 14. Four field coordinators for the USAID-PERFORM project from Machinga district were already familiar with data collection of the and the collected data. With the help of community leaders (chiefs) consent was sought before

engaging members of the community to ensure information collected was legitimate, ethical, and voluntarily given. The questionnaire collected baseline data on households that ranged from household size, livelihood strategies, land owned, perceptions towards engagement and community dynamics. The data used concurrently with the FGDs data enabled for context setting in understanding the communities and their goals for restoration.

The study also used Focus Group Discussions (FGDs). Focus group discussions are considered one of the widely used tools for collecting qualitative data. Focus group discussions are a convenient way to collect data from several people simultaneously, focus groups explicitly use group interaction as part of the method (Kitzinger 1995). One major disadvantage of FGDs is bias coming from group domination from select members; during the study, the researcher minimized this by separating men from women during interviews. 2 FGDs in each of the 8 villages. This was key given the traditional nature of women keeping silent as a sign of respect when grouped together with men (Phiri 2007).

The FGD discussions followed a questionnaire that had 5 themes: Understanding community goals for FLR; community perceptions on drivers of degradation; changes in forest cover; stakeholder engagement; and forest governance. The themes aimed at addressing the research questions in the identification of social factors that should enable local communities to participate in FLR monitoring. FGD participants composed of community members sourced from village committees (ADCs and VDCs), local leaders, and prominent members of the community like lead farmers. A total of 15 FGDs were conducted: 8 were with female groups and 7 male groups. Each group had

at least 8 participants, with variations from 8 to 13 participants. A voice recording device was used to record the discussions and transcribed to supplement responses from the discussions.

3.5 Data Management and Analysis

As a tenant for good research ethics, confidentiality was observed and where necessary with anonymity. The data gathered is confidentially handled and only be used for the purposes of the study alone. Secure tablets and voice recorders are used to gather data which is processed and analyzed for inferences. The data collected from FGDs is thematically analyzed using Nvivo, a qualitative data analysis tool for text-intensive studies. Since the FGD questionnaire had 33 questions which were answered in the text, Nvivo was the best tool for analysis since it has the potential to give more insight into the data. The household survey data is analyzed using Stata, a quantitative data analysis tool to generate relevant tables, inferences, and correlations in the data collected.

CHAPTER IV: RESULTS

Activities that form part of forest and land restoration are not a new phenomenon in Malawi. Most communities in Machinga district, for example, knew the importance of forest cover and how it directly impacts on their livelihoods. Traditionally, forests have been kept for various purposes including for the provision of non-timber forest products such as medicine and culturally in graveyards. On the other hand, forests have been exposed to depletion from deforestation as a result of charcoal making, firewood, and land clearance. In order to fully comprehend the socio-economic context for participatory FLR monitoring in Malawi, this section presents results from a study conducted in Machinga district.

The surveys and focus group interviews provided basic demographic, livelihoods, literacy and other information about the population. From the 80 households sampled for the household survey, 34% were male and 66% females while 177 participants took part in focus group discussions of which 39 % were male and 61% were female. The ages of the household survey respondents ranged from 19 to 78 with males averaging 47 years and females 41 years. 82 % of the respondents depend on agriculture through rain-fed or irrigated farming and livestock. Dependence on forest-based income was minimal. Other main livelihood strategies included pottery, brick making, selling dried fish, and petty trading. Farming remained their preferred livelihood strategy by 63 % with 31 % of the respondents preferring to engage in commodity and skills trading. It was established that the mean land size owned by a household was 2.1 acres, with a standard deviation of 1.4 acres and there was no correlation between land size guaranteed to a household and household size. From the household surveys, 70 % of the respondents had a level of education with the majority only attending primary school classes. Of respondents who could read or write,

75% were females. For all respondents, 62% could read and 64% could write. The capacity to read or write has an implication on the technical monitoring capacity demands to be placed on local community members.

The study revealed that fire and illegal harvesting of forest products largely for charcoal production from the forest reserve came up as the largest contributors to forest degradation followed with population growth which is increasing demand for land for settlements and farming areas (Figure 4.1). Taking note of drivers of degradation from local communities is part of the foundation for developing locally relevant participatory FLR monitoring (Bong et al. 2016). As it is, the drivers of degradation present the risks, opportunities and potential benefits associated with FLR in Malawi. The information also highlights the interaction between drivers of degradation and local community livelihood strategies.

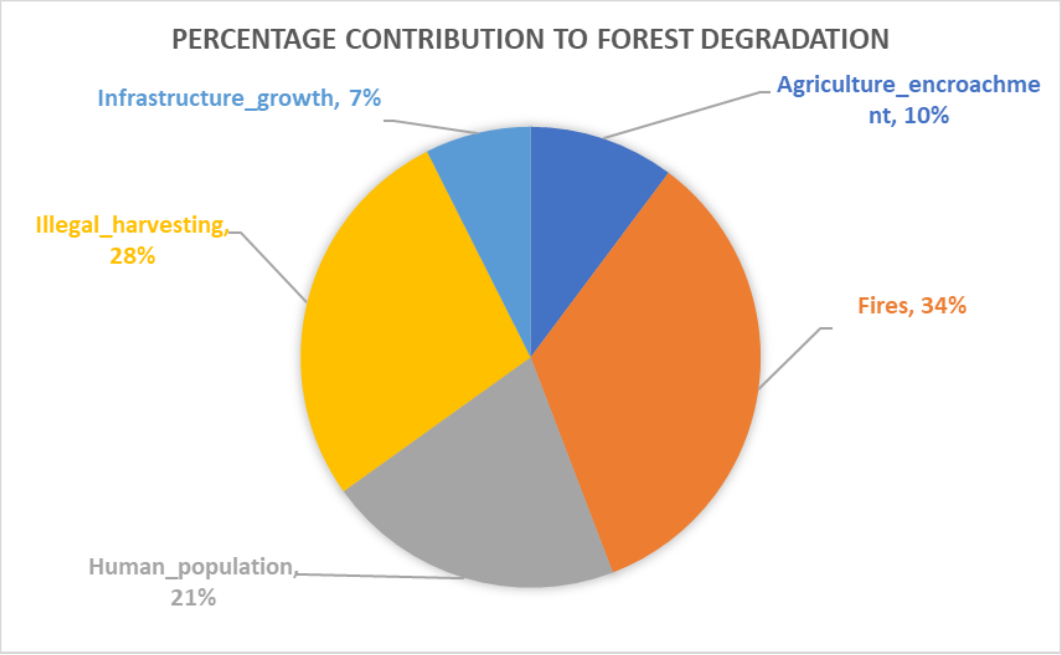


Figure 4. 1 Drivers of forest degradation

The surveys confirmed that the community is very much aware that forest loss is occurring both on the communal land and in the Liwonde Forest Reserve; it is highly visible and ubiquitous.

Landsat mosaic Epoch 2000

Landsat mosaic Epoch 2015

Figure 4. 2 Changes in forest cover

The two maps above from the REDD Readiness land monitoring system are concurring with the respondents from the study. The 3 areas highlighted on the maps are pointing out some of the areas showing the significant change between 2000 and 2015. During FGDs, participants were able to mention some of the tree species that were there in the past and are no longer available with the most change happening in the forest reserve when compared to the communal areas because there are well-managed village forest areas. In the 2016/2017 farming season, 34 % of the households cleared trees for farming mainly on fallow agricultural land. Only 1 of the respondents said that they cleared a forest area. However, when asked if they had intentions to clear more trees and forest 45% of the households said that they are considering doing that in the future to produce more food and indicated that increased forest cover from natural regeneration management could

be achieved in the next 5 years if incentives for intensive agriculture and reduced dependence on crop farming were introduced.

The study shows that communities and farmers are aware of, engaged in, and practicing forest and land restoration interventions. Communities are planting trees, and this has potential to maintain tree and forest cover against the loss of cover in other areas of the District since the household survey also indicates that 100 % of the respondents use firewood for cooking daily. 23 % of the respondents supplement the firewood with crop residues while 11 % supplement with charcoal. The most popular intervention for soil fertility improvement included incorporation of farm residues as part of conservation agriculture, use of manure, agroforestry in the form of farmer-managed natural regeneration and crop rotation in that order.

4.1 Motivation for local communities to participate in FLR monitoring

McCall et al. (2016) emphasize the importance of addressing the question of local community benefits to participation in monitoring as a way of identifying motivation factors. Local communities expect various benefits from their participation in monitoring activities (Beaudoin et al. 2016). Increased food security and improved availability of fuelwood were the top objectives for forest and land restoration among respondents. Nationally, statistics are showing food inadequacy increasing from 40% in 2010 to 55% in 2016, thus underlying their motivation to restore degraded landscapes (NSO 2017). Since farming remains the preferred livelihood strategy and the demand for firewood remains high, it is important for the community to engage in FLR. Realizing increased sources of firewood as a result of FLR intervention activities will be an

important way to assist communities in meeting domestic energy demand because 70% of households in Malawi use firewood and 24% use charcoal in 2016 according to national statistics.

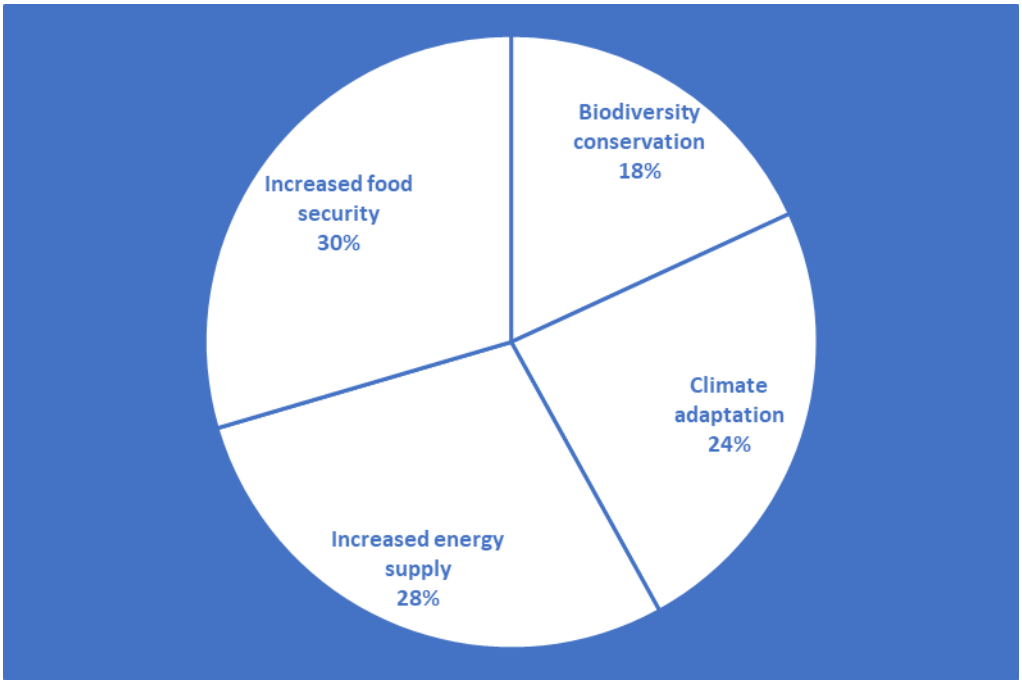


Figure 4. 3 Restoration goals identified from the household survey

Participatory FLR monitoring becomes essential when national and global restoration goals are informed by local needs. Based on the FDG discussions and household survey, I found that the stated objectives for households to practice and participate in FLR initiatives include increased food security, energy supply, and increased soil and water conservation. Other fringe objectives included climate resilience, increased income generating opportunities. The table below presents a comparison of FLR objectives from a local community perspective, derived from the results of this study, against the published national FLR objectives. Either by chance or design, we now know that there are strong similarities between national objectives and those of the local communities. This is a realization that can greatly inform the implementation of the national FLR and focus the assessment of progress against these objectives as key priorities.

Table 4.1 A comparison of the local community and national restoration goals

Local Community FLR goals	National FLR goals
• Improved food security • Increased energy resources (firewood) • Increased climate resilience • Conserve and restore biodiversity • Increase income generating opportunities	• Improved food security • Increased energy resources (hydropower generation and fuelwood) • Increased climate resilience • Improved water quality and supply • Conserve and restore biodiversity • Ensure gender equity and equality • Alleviate poverty

The importance of rooting FLR goals to the aspirations of the community is important, but not enough to encourage participation in the achievement of monitoring goals especially if the aspirations do not offer instant benefits or rewards to the community members. Community sensitization may perhaps be an important factor in making sure that effective participation occurs especially for long term goals so that progress on the implementation of the national FLR strategy is fully captured. The characteristics of an improved landscape and improved livelihoods mentioned during FGDs collaborated with national restoration goals outlined in the National Forest Landscape Restoration Strategy. Food security from conserved soils and improved soil fertility was on top with increased forest cover and good houses further characterizing an improved landscape and improved livelihoods respectively.

The national FLR opportunity assessment (Ministry of Natural Resources, Energy and Mining, 2017) indicated limited awareness of the feasibility and economic benefits from FLR based on the practice of FLR interventions such as agricultural technologies. The district state of the environment report for Machinga expects increased awareness will improve natural resources management. Therefore, communication and information sharing have the potential to motivate communities to participate in monitoring. Information availability and access on FLR to local communities are also considered a motivating factor for local participation in monitoring (Savilaakso et al. 2015).

The FGDs show that various developmental meetings take place in the communities on topics including forest management, education, and health and hygiene among others. Regular meetings and interaction between the community and extension staff were suggested as the best way of ensuring that farmers get feedback concerning interventions that they are implementing. Verbrugge et al. (2017) note that effective communication and information sharing will motivate local communities to participate in monitoring. Respondents described effective stakeholder engagement as increased interaction between farmers in the villages and extension staff or restoration intervention initiators. They expect to learn by doing from extension staff and projects. Interaction between farmers is also expected to improve farmer to farmer learning and technical cooperation and knowledge sharing, thereby increasing adoption of restoration interventions. The FGDs also showed that women are involved in meetings and decision making. However, Savilaakso et al. (2015) cautioned that participation in decision making does not guarantee that views are considered and used.

Youth and men in most cases look for income-generating activities outside their communities. Therefore, emphasizing and openly promoting that diverse stakeholder and community groups are included may be a motivational factor for local participation in FLR monitoring. McCall et al. (2016) agree with this by going further to advocate for the involvement of women and the youth in participatory monitoring structures.

The FGDs also noted that it will be necessary for some individuals to be identified as focal points or local community points of contact. The FGD data suggest there is importance in giving attention to community members whose participation is characterized by their dedication to community work and who can afford to allocate time for monitoring activities. Ritchie et al. (2000) advocate for the sharing of responsibilities among stakeholder representatives since different community groups may have different knowledge and skills, and some may have specific skills to contribute that others do not. Specific community groups can be assigned task areas of monitoring where they are most knowledgeable and skilled.

As seen from this study, communities are noticing changes in trees and forests density and availability. Communities are active informal data gatherers and information collectors. Respondents noted that they expect effective stakeholder interaction to increase awareness through knowledge sharing. Thus, constructing a shared knowledge base and building trust should increase community motivation and willingness to participate in monitoring and also adopt restoration interventions.

4.2 Local forest governance structures to support FLR participatory monitoring

Local and traditional governance structures are important building blocks and have the potential to sustain participatory monitoring (Evans and Guariguata 2016). When FGD participants were asked to describe the characteristics of good forest governance, strong village leadership and transparency were the most mentioned characteristics. When reflecting on where good forest governance exists in the management of village forest areas, Strong village leadership together with community understanding and cooperation were said to be the key enabling conditions. The following committees provide leadership in the communities and can be linked to forest governance in Machinga;

- Area Development Committees at the Traditional Authority level
- Block Management Committee at the Group Village Headman level
- Village Development Committees (VDCs) at the village level
- Village Natural Resources Management Committees (VNRMCs) at the village level

The respondents were asked to what extent they were satisfied with the service provided by the different committees. The scores were rated on a scale from -2 very dissatisfied, -1 somewhat dissatisfied, 0 I don't know, 1 somewhat satisfied, and 2 very satisfied. For all 4 governance institutions above, the results were skewed toward a mean score of 1.2 to 1.6, with a normal distribution. However, during FGDs it was noted that there are some Block Management Committee members that have been accused of engaging in illegal forest harvesting and village headmen are unable to reprimand them because they are under group village headmen. This was mentioned as the reason why the forest reserve is not well managed in comparison to the village

forest areas. Good forest governance influences forest management because when communities have trust in leadership community willingness to participate in forest management is high. Village natural resources management committees and the other village level institutions are accountable to the village traditional leadership and the entire village. This is not the case with block committees that cut across villages and operate at group village headman level. The local institutions are empowered to resolve conflicts and in cases where resolution is not possible, the village leadership offers its support.

Savilaakso et al. (2015) mention transparency, participation, and accountability as three important principles of good governance. Transparency in communication and information sharing; participation of diverse interested stakeholders; and accountability in decision making. The three principles are vital in ensuring the existence of an enabling environment for local participation in FLR monitoring. This is possible where details of stakeholder roles and responsibilities are clearly outlined (FAO 2015).

The link between local governance structures and the central government care critical for achieving sustainability in participatory monitoring. Such a link is provided through the decentralized local government structure. Elected Members of Parliament (MP) and Councilors are expected to facilitate the process of local empowerment, strengthening local capacity for sustainable development in terms of knowledge, skills, and organization. The role of village leadership was deemed very important in conflict resolution and enforcement of by-laws. Good village leadership together with community understanding and cooperation were said to be the enabling conditions for good forest governance

4.3 Potential incentives to enhance local participation in FLR monitoring

Identification and engagement of local citizen representatives in FLR monitoring require an understanding of their incentives to be engaged (Bong et al. 2016). McCall et al. (2016) documented that incentives for local community participation can be the natural outcome of the participatory monitoring process. Meeting the needs and interests of local stakeholders is an important way to create incentives for engagement. Thus, understanding these needs and livelihood demands is important for addressing drivers of degradation and achieving restored landscapes. During focus group discussions participants suggested assistance from government and projects to address immediate community needs. Attaching incentives to community participation and increasing the number of extension staff in the communities are ways the government can be engaged. Those actions that deliver short-term needs may be considered as good incentives to participatory FLR monitoring. These could be in the form of food relief, especially to venerable households. National statistics indicate that female-headed households experiencing low food security increased from 32% in 2010 to 64% in 2016. Participatory FLR monitoring can take advantage of ongoing initiatives to offer incentives to local participants. The socio-cash transfer (public works programs) implemented by government and livestock distribution implemented by non-governmental partners can include local monitoring participants on the list of beneficiaries.

Boissière et al. (2017) reiterate the need to develop incentives that include non-financial incentives. For example, 31 % of the respondents preferring to engage in commodity and skills trading can be offered training opportunities in technical skills such as bricklaying, carpentry, and

other skills. Local community contributions must be acknowledged and matched with livelihood improvement opportunities. The study observed that local community meetings are generally well attended when the agenda is not shared in advance but the most attended are those that involve organizations that offer incentives like livestock and money to farmers for participation in community activities. This implies that participation in community work increases for projects and activities that come with incentives. Viani et al. (2017) gave examples of employment and other income generation opportunities as incentives and criteria used by the Pacto monitoring protocol in Brazil.

CHAPTER V: DISCUSSION AND CONCLUSIONS

For Malawi to achieve the 4.5 million hectares committed for restoration by the 2030 and sustainable management of land and forests, a comprehensive approach like FLR which advocates for improved stakeholder engagement and coordination is a must. Monitoring of progress will be crucial for effective and efficient FLR implementation with relevant information and feedback. Stakeholder organizational and technical capacities of both initiators and local communities must be strengthened. The study sought to assess social factors that would lead to effective sustainable participatory monitoring of Forest Landscape Restoration.

5.1 Discussion

Through this study, it is evident that to achieve sustainability and effectiveness, implementation and monitoring of FLR must consider and include strong stakeholder involvement. At the same time, it must identify and acknowledge the economic implications of restoration on both the initiator and communities. Last it must be cognizant of and take into account the socioeconomic conditions of the communities in the restoration area (Viani et. al, 2017). Participatory FLR monitoring has the potential to bring a balance between environmental and socio-economic benefits without competing with land and forest production. FLR monitoring must recognize that community members and other stakeholders in a landscape are not passive recipients of interventions but important implementing partners who must be engaged transparently to get local support. Local communities have knowledge that is appropriate for FLR monitoring. A two-way learning process should be established between the local community and government agencies, NGO's and project implementers to integrate local knowledge systems into monitoring. Although we have identified that in Machinga the local communities' desired goals and objectives of FLR

are similar and consistent with the stated national goals at this early stage, there must be an ongoing process of maintaining a close connection with the aims and needs of the communities.

Based on the overall goal of monitoring the progress of the national FLR strategy, the national FLR monitoring framework considers the connection between the 5 interventions and national goal and the question of what to collect data to evaluate national objectives on has already been addressed.

According to the national monitoring framework, the most referred to sources of data are the National Statistical Office household surveys, agricultural surveys, and community surveys. All these data-gathering efforts are generally "one-way" processes and protocols, where the institution conducting the survey interviews the communities only for specific information that they are looking to get at that time. So, it might be true that the right information is provided, in the right form and at the right time according to the data collector, but community-based biophysical and social measurement of change might not be fully be captured. Such a monitoring approach does not expect a farmer to keep records of accurate measurements and observations to be presented at the time of data collection. Thus the current constructs for data collection are not sufficient for FLR, which, as we find, requires strong local community participation. Based on this, FLR monitoring in Malawi must be comprehensive and its efficiency hinges on procedures, indicators and on the motivation of data collectors both staff and community members among others. Legitimate, effective and sustainable participatory FLR monitoring entails local communities sharing authority, roles and responsibilities, benefits and management capacity (Savilaakso et al. 2015).

Hawthorne et al. (2016) discuss the importance of awareness, governance institutions and ensuring that access to forest resources is secured and legal. They recognize that local communities have knowledge of forest ecosystem functions, thus collecting local monitoring data through participatory processes has the potential to positively influence sustainable forest management. Furthermore, the sub-national and national governance structure must support local institutions to increase transparency, participation, and accountability.

5.1.1 Identification of participants for FLR monitoring from the local communities

Participatory monitoring of FLR is incomplete without the people to participate and attention to their needs and interests. Key to local participants is the demographic distribution. Much of the population countrywide, and as evidenced from the household survey results are young (35 years below) with the country statistic at 52% for those aged 18 and below. McCall et al. (2016) offer caution by saying that young people who may have more technical skills and energy often leave rural communities making working with older community members more stable. Population aggregated by gender showed no significant differences and will hence be of little consequence to discussion on this theme. However, education showed stark trends with the majority only having attended junior primary education. The complexity of monitoring tasks must, therefore, reflect the level of competence of the participatory community. The National FLR Monitoring framework, for example, does not incorporate this aspect nor consider the monitoring standards to reflect the local capacity to sustain the same except for the provision of extension workers. We conclude that a follow-up study is conducted to review various options for demographic-specific protocols for data collection and engagement which can inform and be implemented through the national program.

5.1.2 Data collection

Participatory FLR monitoring must develop locally appropriate methods and procedures for data collection. This can be done for almost all core indicators of the national restoration goals which include trends in abundance and distribution of known threatened species, types of crops cultivated, access to extension services among others. The few indicators such as soil quality, level of erosion can then be done by extension staff based on technical expertise required. And the same principle can be applied for core indicators of progress on restoration interventions. With an initial investment in lead farmers or local champions, participatory monitoring of FLR might, therefore, assist farmers and FLR initiators address the challenge of low extension services coverage in the country through the promotion of self-reliance based on their active participation. However, the timing for data collection and other related activities will have to fit in local community schedules and farming season having learned that the majority are farmers and depend on farming as a source of livelihood and income. This study suggests that a major effort in the national program be initiated to devise a series of locally relevant measures and indicators, that fulfill the requirements we have identified: a) local access and accessibility, b) local relevance, c) measures locally useful parameters or resources, d) demonstrates progress and provides feedback on progress that local stakeholders can use in their implementation of FLR practices, and e) inform the national government of what resources and incentives are needed by the communities.

It is important to note that participatory monitoring may produce information that varies in accuracy and validity considering that just over half the population know how to read and write. For example, measurement of physical variables such as seedlings raised, and the number of trees planted can be reliably provided by farmers unlike variables area restored then chances of errors

might increase. During household surveys, farmers could mention a number of trees they have raised or planted but when asked about the sizes of their farming areas, they could not be exact because they had never measured their land. Therefore, Participatory FLR monitoring should facilitate the process of strengthening local capacity for monitoring despite the low levels in education as the study has shown. It should be possible for work with lead farmers and local governance institutions who can keep records in a presentable form.

5.1.3 Processing of data and reporting of information

Participatory monitoring of FLR must consider how data processing and reporting is conducted. Since information users will be diverse groups with diverse interests, the conversion of data into information regarding the depth of analysis and the form in which the results are shared must consider that diversity. With reference to the national monitoring framework; as monitoring information passes up the hierarchy, it will be increasingly summarised for strategic purposes in quarterly or annual reports. Participants at a national stakeholder workshop during the development of the monitoring framework recommended the development of mechanisms for communicating monitoring results back to community members and other stakeholders. For the sake of the local community, brief summaries of observations and impressions of implementation progress packaged verbally, formally and informally might be enough. Otherwise, the monitoring reports should aim at relating progress or achievements on identified problems with suggestions of actions and decisions to be taken where progress and achievement are yet to be noticed.

5.1.4 FLR participatory monitoring plan

Participatory FLR monitoring will require a detailed outline of what data must be collected, how and who participates. A monitoring plan that considers all decision makers and emphasizes local community participation in monitoring. Management skills for integrating local interests

especially those that might not seem directly linked to FLR implementation and monitoring should motivate farmers to participate in FLR monitoring. Where members of local monitoring teams are retained within the community, their knowledge and skills obtained through training can be relied upon for years (McCall et al. 2016). Table 5.1 has a suggested outline of roles and responsibilities for various stakeholders in participatory FLR monitoring.

Since the national monitoring framework has already been published, it is important to ensure that local stakeholders are made aware of their active participation. Government and other FLR initiators must take the lead on financing and providing necessary technical skills required for local representatives to participate. Local governance structures, traditional leadership and extension staff in the communities have important roles and responsibilities in ensuring that community participation is achieved. Other stakeholders, especially organizations implementing activities in communities should also be engaged for synergies, enhanced transparency, and openness. Based on the results of this study, it is recommended that the national program develop a guide to data management and planning, that can provide considerations, best practices, and recommendations on how to devise a local monitoring plan.

Table 5.1 1Stakeholder roles and responsibilities in participatory FLR monitoring (Adapted from Scheyvens (2012))

STAKEHOLDER ROLES AND RESPONSIBILITIES				
	FLR initiators and District M&E	**Local governance structures and traditional leadership**	**Local monitoring representatives**	**Other stakeholders**
Financial and technical Resources mobilization	Leads process	Participates		Participates
Training of local monitoring teams	Leads process	Participates	Participates	Can observe
Community consultations	Participates	Can provide guidance	Leads process	Can observe
Determination of research sites	Leads process	Can provide guidance	Participates	Participates
Training of community members to support the local monitoring team	Participates	Can provide guidance	Leads process	Can observe
Mapping	Leads process	Can observe	Participates	Participates
Data collection	Leads process	Can observe	Participates	Participates
Record keeping	Leads process	Can observe	Participates	Participates
Data analysis	Leads process	Can observe	Participates	Can observe
Communication and packaging of monitoring results	Leads process	Participates	Participates	Participates

Following the roles and responsibilities in Table 5.1, Table 5.2 below has been adapted from the framework for monitoring progress on Malawi's national FLR strategy to illustrate potential local contribution and data collection intervals. This study is recommending that local monitoring teams be considered as additional data sources. Data collected by local communities must be used to verify the other parallel and technical data sources. District monitoring and evaluation officers will be responsible for gathering monitoring data together from various stakeholders. The framework illustrates that national FLR goals and restoration intervention will be monitored. Details of indicators, metrics, dimensions of progress to be measured and current data sources for each of the seven goals and five restoration interventions are stipulated in the framework. However, the potential for local community contribution and data collection intervals have not been specified. By sharing the responsibilities of FLR monitoring with local stakeholders, the government will reduce the workload on the few field staff and district monitoring and evaluation officers. Local monitoring teams must be trained on how to carry out various assessments and keep records while maintaining transparency. As such, extension services will be more than supervisory and advisory visits to communities but include training for capacity building of local monitoring teams.

Government and FLR initiators lead by the district monitoring and evaluation office must agree with local stakeholders on when data must be collected, submitted and shared. It will be important to draw a calendar in consultation with local communities, considering the farming season when farmers are busy, laying out when specific monitoring activities should be carried out.

Table 5.2 Potential local contribution and data collection intervals to core progress on national restoration goals and interventions (adapted from the framework for monitoring progress on Malawi's national FLR strategy)

CORE AND PROPOSED OF PROGRESS ON NATIONAL RESTORATION GOALS						
GOAL	**INDICATOR**	**METRIC**	**DIMENSION(S) OF PROGRESS MEASURED**	**SOURCE OF DATA**	**POTENTIAL LOCAL COMMUNITY CONTRIBUTION**	**FREQUENCY FOR LOCAL DATA COLLECTION**
1. Improve Food Security	1.1 Welfare of basic needs	Proportion of households reporting inadequate consumption of food	Directly measures progress on the national restoration goal to improve food security and is influenced by on-farm restoration activities.	NSO IHS, Household Survey	Local monitoring representatives can cordinate with community development field staff and area development committees for data collection and record keeping	Twice a year
	1.2 Types of crops cultivated	Proportion of plots by type of crop cultivated and average acreage	Demonstrates crop diversity, a sign of resilient agricultural practices and a component of agricultural technology interventions that promotes food security.	NSO IHS, Agriculture Survey	Local monitoring representatives can cordinate with agriculture extension staff and area development committees for data collection and record keeping	Once a year
	1.3 Soil quality	What proportion of agricultural plots have soil quality characterized as:1-Good 2-Fair 3-Poor	Perception of soil quality indicates where on-farm interventions have been effective at improving crop yields, food security, and climate resilience, and where more interventions are needed.	NSO IHS, Agriculture Survey	Local monitoring representatives can cordinate with agriculture extension staff and area development committees for data collection and record keeping	Once a year
	1.4 Access to extension services	A) Proportion of households that received advice from extension services on:1) Forestry or 2) Agroforestry, disaggregated by gender	Indicates level of knowledge dissemination and uptake of agroforestry and forest management interventions, which is related to the effectiveness and sustainability of these interventions.	NSO IHS, Agriculture Survey,	Local monitoring representatives can cordinate with agriculture extension staff and area development committees for data collection and record keeping	Once a year

Table 5.2 (Cont'd)

CORE AND PROPOSED OF PROGRESS ON NATIONAL RESTORATION GOALS						
GOAL	**INDICATOR**	**METRIC**	**DIMENSION(S) OF PROGRESS MEASURED**	**SOURCE OF DATA**	**POTENTIAL LOCAL COMMUNITY CONTRIBUTION**	**FREQUENCY FOR LOCAL DATA COLLECTION**
		B) Proportion of households that followed the advice, disaggregated by gender	Collecting gender- disaggregated data indicates progress made in promoting agricultural education and technical training for women.	NSO IHS, Agriculture Survey,	Local monitoring representatives can cordinate with agriculture extension staff and area development committees for data collection and record keeping	Once a year
Proposed indicators	Crop yield	Average annual crop yield per household per hectare (kg/ha), by crop type	Trend in crop yield over time indicates effectiveness of FLR interventions at restoring productivity to agricultural lands and improving food security.	NSO IHS, Agriculture Survey	Local monitoring representatives can cordinate with agriculture extension staff and area development committees for data collection and record keeping	Once a year
	Yield of non- timber forest products	Average annual yield of non-timber forest products (kg) per community, by type (e.g., fruits, medicinal plants, mushrooms, honey)	Trend in supply of non-timber forest products indicates the effectiveness of FLR interventions at providing secondary sources of food and income.	NSO IHS, Community Survey	Local monitoring representatives can cordinate with forestry extension staff and area development committees for data collection and record keeping	Once a year
2. Increase Energy Resources	2.1 Domestic activities—firewood collection	Proportion of persons aged between 15-64 years who collect firewood and average daily hours spent on collection, disaggregated by gender	Measures progress on increasing supplies of locally managed fuel wood from sustainable sources, showing an increase in energy resources. Also measures how much time women spend on collecting wood, indicating progress toward the goal of ensuring gender equity.	NSO IHS, Household Survey	Local monitoring representatives can cordinate with forestry extension staff and area development committees for data collection and record keeping	Once a year
	2.2 Source of fuels used for cooking	Proportion of households by main source of fuel for cooking (collected firewood, purchased firewood, charcoal, crop residues, animal waste, electricity, gas)	Measures level of dependence on fuel wood, which indicates need for FLR interventions to increase energy resources.	NSO IHS, Household Survey	Local monitoring representatives can cordinate with forestry extension staff and area development committees for data collection and record keeping	Once a year
	2.3 Source of firewood	Proportion of households that collect firewood from:1. Own woodlot, 2. Community woodlot, 3. Forest reserve, 4. Unfarmed area of community, 5. Other (specify)	Measures progress on specific FLR interventions to increase energy resources and indicates where more interventions are needed to increase supplies of locally sourced fuel wood.	NSO IHS, Household Survey	Local monitoring representatives can cordinate with forestry extension staff and area development committees for data collection and record keeping	Once a year

Table 5.2 (Cont'd)

CORE AND PROPOSED OF PROGRESS ON NATIONAL RESTORATION GOALS						
GOAL	**INDICATOR**	**METRIC**	**DIMENSION(S) OF PROGRESS MEASURED**	**SOURCE OF DATA**	**POTENTIAL LOCAL COMMUNITY CONTRIBUTION**	**FREQUENCY FOR LOCAL DATA COLLECTION**
Proposed indicator	Sediment in catchments of hydropower infrastructure	Depth of sediment trapped in catchments, or amount dredged from catchments	Depth of sediment or amount of sediment dredged indicates effectiveness of FLR interventions at reducing sedimentation and increasing hydropower efficiency.	Field measurements	Local monitoring representatives can cordinate with district water office and area development committees for data collection and record keeping	Once a year
3. Increase Climate Resilience	3.1 Recent shocks to the household	Proportion of households severely affected by shocks during the last 12 months	Measures impact of FLR interventions in reducing the consequences of flooding, landslides, and weather events to support increased climate resilience.	NSO IHS, Household Survey	Local monitoring representatives can cordinate with community development field staff and area development committees for data collection and record keeping	Once a year
Proposed indicators	Soil organic carbon	Soil organic carbon concentration (mg/ha)	Soil organic carbon, a proxy for soil organic matter, indicates soil fertility and carbon sequestration on agricultural land, which contribute to increased climate resilience and improved food security.	Field measurements	Local monitoring representatives can cordinate with agriculture extension staff and area development committees for data collection and record keeping	Once a year
	Application of synthetic fertilizers	Annual application of synthetic fertilizers per household (kg),including information on type of fertilizer (i.e., nitrogen content), and by crop type	Synthetic fertilizers contribute to increased GHG emissions and reduced water quality from runoff. Their application rates also indicate where additional FLR interventions are needed to improve natural fertilization techniques.	NSO IHS, Agriculture Survey	Local monitoring representatives can cordinate with agriculture extension staff and area development committees for data collection and record keeping	Once a year
	Crop residues	Method of management or disposal of crop residues per household (e.g., burning, field application, fodder, biofuels)	Management method for crop residues indicates the adoption level of conservation agriculture techniques. It also indicates their contribution to carbon sequestration (via field application) or GHG emissions (via burning), all of which influence climate resilience.	NSO IHS, Agriculture Survey	Local monitoring representatives can cordinate with agriculture extension staff and area development committees for data collection and record keeping	Once a year

Table 5.2 (Cont'd)

CORE AND PROPOSED OF PROGRESS ON NATIONAL RESTORATION GOALS						
GOAL	**INDICATOR**	**METRIC**	**DIMENSION(S) OF PROGRESS MEASURED**	**SOURCE OF DATA**	**POTENTIAL LOCAL COMMUNITY CONTRIBUTION**	**FREQUENCY FOR LOCAL DATA COLLECTION**
4. Improve Water Quality and Supply	4.1 Access to safe drinking water	Proportion of households with access to safe drinking water	Measures progress on the national restoration goal of improving water quality and supply.	NSO IHS, Household Survey	Local monitoring representatives can cordinate with community development field staff and area development committees for data collection and record keeping	Once a year
	4.2 Domestic activities—water collection	Proportion of persons aged between 15–64 years who collected water and average daily hours spent on collection, disaggregated by gender	Measures progress on the goal of improving water quality and supply at local sources. Also measures how much time women must spend on collecting water, indicating progress toward the goal of ensuring gender equity.	NSO IHS, Household Survey	Local monitoring representatives can cordinate with community development field staff and area development committees for data collection and record keeping	Once a year
	4.3 Level of erosion	Proportion of agricultural plots with the extent of erosion characterized as:1-No Erosion, 2-Low, 3-Moderate, 4-High	Perception of erosion on agricultural plots indicates the effectiveness of FLR interventions on mitigating erosion and protecting source water from sedimentation, which measures progress on the national goal of improving water quality and supply.	NSO IHS, Agriculture Survey	Local monitoring representatives can cordinate with agriculture extension staff and area development committees for data collection and record keeping	Once a year
Proposed indicators	Turbidity in surface water	Turbidity in rivers and streams (NTU)	Measure of turbidity demonstrates impact of FLR interventions on preventing sedimentation and erosion and improving water quality. For catchments with hydroelectric power, it indicates effectiveness of upstream FLR interventions at reducing sediment accumulation in downstream reservoirs.	Field measurements	Local monitoring representatives can cordinate with the district water office and area development committees for data collection and record keeping	Once a year
	Drinking water quality	Turbidity (NTU), total dissolved solids (mg/L), and nitrates (mg/L) in drinking water sources	Indicates effectiveness of FLR interventions at limiting inorganic agricultural inputs (source of nitrates) and runoff, and protecting source water from soil erosion (source of turbidity and total dissolved solids)		Local monitoring representatives can cordinate with the district water office and area development committees for data collection and record keeping	Once a year

Table 5.2 (Cont'd)

CORE AND PROPOSED OF PROGRESS ON NATIONAL RESTORATION GOALS						
GOAL	**INDICATOR**	**METRIC**	**DIMENSION(S) OF PROGRESS MEASURED**	**SOURCE OF DATA**	**POTENTIAL LOCAL COMMUNITY CONTRIBUTION**	**FREQUENCY FOR LOCAL DATA COLLECTION**
5. Conserve and Restore Biodiversity	5.1 Wildlife corridors created	Number of wildlife corridors created	Indicates progress in prioritizing No and improving ecosystem protection, contributing to the national goal of conserving and restoring biodiversity.	Department of National Parks and Wildlife (DNPW)	Local monitoring representatives can cordinate with Department of National Parks and Wildlife and area development committees for data collection and record keeping	Once a year
	5.2 Trend in abundance and distribution of known threatened species	Number of threatened species for which trend in abundance and distribution is known	Indicates effectiveness of FLR interventions in restoring threatened species, which measures progress toward the goal of improving biodiversity.	Department of National Parks and Wildlife (DNPW)	Local monitoring representatives can cordinate with Department of National Parks and Wildlife and area development committees for data collection and record keeping	Once a year
	5.3 Indigenous plant species cultivated and protected	Number of indigenous plant species cultivated and protected	Indicates level of success in diversifying plant cultivation and protecting culturally important species, which measures progress in conserving and restoring biodiversity.	Malawi Plant Genetic Resources Centre (MPGRC)	Local monitoring representatives can cordinate with Malawi Plant Genetic Resources Centre and Wildlife and area development committees for data collection and record keeping	Once a year
Poposed indicator	Abundance and distribution of key indicator species	Annual trend in number and geographic distribution of indicator species in forest reserves and other critical habitats	Trend in number of indicator species inventoried indicates effectiveness of forest interventions in protecting habitats. Identified indicator species that are known to be indicative of ecosystem health may be more sensitive to gradual progress toward restored ecosystems than just abundance of threatened species.	Field surveys	Local monitoring representatives can cordinate with forestry extension staff and area development committees for data collection and record keeping	Once a year

Table 5.2 (Cont'd)

CORE AND PROPOSED OF PROGRESS ON NATIONAL RESTORATION GOALS						
GOAL	**INDICATOR**	**METRIC**	**DIMENSION(S) OF PROGRESS MEASURED**	**SOURCE OF DATA**	**POTENTIAL LOCAL COMMUNITY CONTRIBUTION**	**FREQUENCY FOR LOCAL DATA COLLECTION**
6. Ensure Gender Equity and Equality	6.1 Ownership / management of plots	Primary plot ownership by gender	Trend in agricultural plot ownership by gender indicates progress in promoting women's ownership of productive resources and equity in agricultural decision-making.	NSO IHS, Agriculture Survey	Local monitoring representatives can cordinate with community development field staff and area development committees for data collection and record keeping	Once a year
Proposed indicator	Decision- making authority for agricultural plots	Primary plot decision- making by gender	Trend in agricultural plot decision-making by gender indicates progress made in promoting women's control of productive resources, one of the identified FLR contributions to ensuring gender equity.	NSO IHS, Agriculture Survey	Local monitoring representatives can cordinate with community development field staff and area development committees for data collection and record keeping	Once a year
7. Alleviate Proverty	7.1 Perception of household current economic well-being	Percentage distributions of household perceived current economic well- being	Measures progress on the national restoration goal of alleviating poverty.	NSO IHS, Household Survey	Local monitoring representatives can cordinate with community development field staff and area development committees for data collection and record keeping	Once a year
	7.2 Enterprises engaged in sale of forest- based products	Proportion of enterprises that sell forest-based products and source of the products	Indicates effectiveness of FLR interventions at enhancing forest resources' contribution to the national economy.		Local monitoring representatives can cordinate with forestry extension staff and area development committees for data collection and record keeping	Once a year
Proposed indicator	Income from sale of surplus crops, timber, and non- timber forest products	Annual income from sale of surplus crops, timber and non-timber forest products per household (MK)	The availability of income from sale of surplus products at market indicates where FLR interventions are increasing yields, which both alleviates poverty and increases food security.	NSO IHS, Household Survey	Local monitoring representatives can cordinate with forestry extension staff and area development committees for data collection and record keeping	Once a year

Table 5.2 (Cont'd)

CORE INDICATORS OF PROGRESS ON RESTORATION INTERVENTION						
RESTORATION INTERVENTION	**INDICATOR**	**METRIC**	**DIMENSION(S) OF PROGRESS MEASURED**	**SOURCE OF DATA**	**POTENTIAL LOCAL COMMUNITY CONTRIBUTION**	**FREQUENCY FOR LOCAL DATA COLLECTION**
A. Agricultural Technologies	A.1 On-farm tree cover	Number of hectares of cropland with at least 5% tree cover	Indicates progress toward the National FLR Strategy target to achieve increased tree cover on 50% of cropland in Malawi by 2020 and 80% of cropland by 2030.	USGS, Remote Sensing	Local monitoring representatives can cordinate with agriculture extension staff and area development committees for data collection and record keeping	Once a year
	A.2 Agroforestry adoption	Average proportion of households in a community that practice agroforestry	Indicates extent of adoption at the community level of agroforestry, one of the primary agricultural technology interventions.	NSO IHS, Community Survey	Local monitoring representatives can cordinate with agriculture extension staff and area development committees for data collection and record keeping	Once a year
	A.3 Legume cover crop adoption	Average proportion of households in a community that plant legume cover crops	Indicates extent of adoption at the community level of conservation agriculture, one of the primary agricultural technology interventions.	NSO IHS, Community Survey	Local monitoring representatives can cordinate with agriculture extension staff and area development committees for data collection and record keeping	Once a year
B. Community Forests and Woodlots	B.1 Community forests / woodlots	Number of hectares of community forests / woodlots	Indicates progress toward the National FLR Strategy target to increase area of community forests and woodlots to 200,000 ha by 2020 and 600,000 ha by 2030	USGS, Remote Sensing	Local monitoring representatives can cordinate with forestry extension staff and area development committees for data collection and record keeping	Once a year
	B.2 Community forest proportion	Average proportion of land in a community that is forest and not used for agriculture	Indicates the extent of commitment of communities toward reserving land for community forest and where additional outreach is needed to improve adoption of interventions.	USGS, Remote Sensing	Local monitoring representatives can cordinate with forestry extension staff and area development committees for data collection and record keeping	Once a year

Table 5.2 (Cont'd)

CORE INDICATORS OF PROGRESS ON RESTORATION INTERVENTION						
RESTORATION INTERVENTION	**INDICATOR**	**METRIC**	**DIMENSION(S) OF PROGRESS MEASURED**	**SOURCE OF DATA**	**POTENTIAL LOCAL COMMUNITY CONTRIBUTION**	**FREQUENCY FOR LOCAL DATA COLLECTION**
C. Forest Management	C.1 Natural forest protection and regeneration	Number of hectares of forest with at least 50% canopy cover	Indicates progress toward the National FLR Strategy target to improve protection and management of two million ha of natural forest and restore 500,000 ha of degraded forest land by 2030.	USGS, Remote Sensing	Local monitoring representatives can cordinate with forestry extension staff and area development committees for data collection and record keeping	Once a year
	C.2 Plantations	Number of hectares of plantations	Indicates progress toward the National FLR Strategy target to establish 100,000 ha of commercial plantations by 2030.	USGS, Remote Sensing	Local monitoring representatives can cordinate with forestry extension staff and area development committees for data collection and record keeping	Once a year
D. Soil and Water Conservation	D.1 Soil and water conservation interventions	Proportion of agricultural plots that implement erosion control/water harvesting interventions, which include:1. No erosion control, 2. Terraces, 3. Erosion control bunds, 4. Gabions / Sandbags, 5. Vetiver grass, 6. Tree belts, 7. Water harvest bunds, 8. Drainage ditches, 9. Other	Indicates level of adoption of specific soil and water conservation interventions toward the National FLR Strategy target to apply interventions on 250,000 ha by 2020 and 500,000 ha by 2030.	NSO IHS, Agriculture Survey, Local community	Local monitoring representatives can cordinate with agriculture extension staff and area development committees for data collection and record keeping	Once a year
	D.2 Barriers to soil and water conservation interventions	Proportion of households that do not invest in conservation structures on any plots owned and/or cultivated by the household for the following reasons:1. Requires too much labor, 2. Materials not available, 3. Materials too costly, 4. No soil or water erosion problems on any plots, 5. Too risky/benefits unclear, 6. Other	Reasons that soil and water conservation interventions are not being implemented indicate where more resources need to be invested to adaptively manage intervention techniques and outreach strategies.	NSO IHS, Agriculture Survey, Local community	Local monitoring representatives can cordinate with agriculture extension staff and area development committees for data collection and record keeping	Once a year
	D.3 Bund adoption	Average proportion of households in a community that have earth or stone bunds	Indicates extent of adoption at the community level of earth or stone bunds toward the National FLR Strategy target to apply soil and water conservation interventions on 250,000 ha by 2020 and 500,000 ha by 2030.	NSO IHS, Community Survey	Local monitoring representatives can cordinate with agriculture extension staff and area development committees for data collection and record keeping	Once a year

Table 5.2 (Cont'd)

CORE INDICATORS OF PROGRESS ON RESTORATION INTERVENTION						
RESTORATION INTERVENTION	**INDICATOR**	**METRIC**	**DIMENSION(S) OF PROGRESS MEASURED**	**SOURCE OF DATA**	**POTENTIAL LOCAL COMMUNITY CONTRIBUTION**	**FREQUENCY FOR LOCAL DATA COLLECTION**
	D.4 Terrace adoption	Average proportion of households in a community that have terraces	Indicates extent of adoption at the community level of terracing, contributing to the National FLR Strategy target to apply soil and water conservation interventions on 250,000 ha by 2020 and 500,000 ha by 2030.	NSO IHS, Community Survey	Local monitoring representatives can cordinate with agriculture extension staff and area development committees for data collection and record keeping	Once a year
E. River- and Stream-bank Restoration	E.1 River- and stream-bank restoration	Percent of river and stream banks with tree cover within 30 m	Indicates progress toward the National FLR Strategy target to regenerate or plant 20 million trees along river and stream banks by 2020 and 50 million trees by 2030.	To be determined	Local monitoring representatives can cordinate with forestry extension staff and area development committees for data collection and record keeping	Once a year

5.2 Conclusion

This study was important because it directly evaluated community interest, awareness, responsiveness, and capacity for implementing FLR broadly, and more specifically in participation in the FLR process at the local level. The study directly focused on the important monitoring component of FLR and was significant in that it directly measured aspects of local stakeholder engagement in the monitoring process. This diverges from most cases where programs consider monitoring as a function of the national or upper-level institutions, usually leading to a top-down approach executed by technical experts. The situation in Malawi is no different, where to-date the framework for national monitoring has focused on national objectives using a national approach. This study shows that local communities have interest and awareness in the FLR process, and when these interests are directly taken into account and the program is linked to local needs and incentives, community-based monitoring can enhance the success and efficacy of the program. On the one hand communities in Machinga have a readiness to be involved, under specific conditions and modalities (e.g. incentives, access to appropriate data and reporting, attention to household economic impacts, village institutional and leadership context, etc). On the other hand, engagement of the communities will strengthen the national program and lead to better outcomes and long term sustainability, which is needed for the restoration of landscapes and natural resources based on trees and forests.

This study has established the essential socio-economic enabling environment for participatory monitoring that includes motivation for local communities to participate, the functionality of local governance structures that should support participatory monitoring of FLR, and potential incentives. The study has highlighted the importance of considering socio-economic factors for

the success and sustainability of participatory FLR monitoring. Forests and land are central components of local livelihoods as illustrated in this Machinga case, and therefore FLR participatory monitoring is anchored in both what data should be collected and measured and also who is involved in the process. The inclusion of local communities has an important influence on the effectiveness and efficiency of monitoring. Incentives for community motivation, good governance especially for local institutions and structures and engagement for the integration of local knowledge will create an enabling environment for participatory monitoring of forest landscape restoration in Malawi. Although data accuracy might be variable, participatory monitoring is always going to be a better option since professional and extension staff are lacking and lead farmers can be identified to take part in monitoring. Participatory monitoring, therefore, can provide rapid feedback on implementation problems and successes in a simpler and less costly way.

Malawi national forestry policy provides a framework that supports community participation in forest management. Through the co-management model for managing protected areas, communities are empowered to make decisions about sustainable management of natural resources by developing management plans and management agreements with the government. I am therefore recommending that the Ministry of Natural Resources, Energy and Mining should work together with the Ministry of Local Government and Rural development to mainstream participatory monitoring in all districts. Taking advantage of the decentralized system of government, synergies should be encouraged in order to ensure that the socio-economic needs of local communities are address as they implement forest landscape restoration. Current and ongoing

initiatives provide an opportunity for such linkages. However, further studies are required to look at how national standards can be established since no one size fits all in FLR.

APPENDICES

Appendix 1

FOCUS GROUP DISCUSSION GUIDE QUESTIONS FOR PARTICIPATORY FLR MONITORING

Village Name and Number of HHs

Date:

Gender and number of participants

Introduction

The purpose of this focus group discussion is to learn from your experiences with forest landscape restoration activities. This survey aims to help in the development of an effective participatory monitoring tool for Forest Landscape Restoration. We would like to hear your experiences observing changes in forest/tree cover, stakeholder engagement, and forest governance. We would especially like to learn what signs or indicators to look for that would help us develop a good monitoring framework for FLR monitoring based on stakeholder engagement including communities.

Preliminary

What do you aim to achieve through restoration interventions?

What are the characteristics of an improved livelihood?

What are the characteristics of an improved landscape?

What are the drivers of degradation that need to be addressed?

How would you propose we deal with the challenges mentioned above?

Which developmental meetings are regularly held in this community?

Which community meetings are most attended?

Changes in forest cover

What have been the changes in forest cover in this community?

Have you noticed tree species loss over the years?

In which type of landscape is the most change happening?

Do you have an example of a restored forest in this community?

How can an outsider know that the forest has been restored even without asking directly?

Which stakeholders are engaged?

To what extent are the stakeholders mentioned above involved?

Who would you mention is a stakeholder that should have been/be involved for successful implementation of restoration activities?
Why?
What do you envision as the condition of forest resources in the next 5 years?

Stakeholder engagement

What would you describe as effective stakeholder engagement?

How does stakeholder engagement affect forest landscape restoration interventions?

What are the processes that should provide relevant feedback to stakeholders to inform decisions about future actions?

Are women and the youth involved in community discussions and decision making?

Forest governance

How would you describe good forest governance?

How does forest governance affect the implementation of forest landscape restoration interventions?

Can you give an example of a forest in this community where you can say that there is good forest governance?

What are the reasons for your answer?

What are the enabling conditions that must be in place for good forest governance?

How are local governance institutions set up?

Would you say it is working well?

Why and why not?

Are governance institutions accountable to the community and other stakeholders?

Are sanctions in place for those breaking the rules?

Are local governance structures empowered to deal appropriately with issues including conflicts, enforcement of customary laws and other regulations?

Are community mechanisms for patrolling and controlling the extraction of forest and NTFPs by the community members and/or outsiders in place?

Do local organizations interact and the build of contacts with other groups and organizations?

Are meetings organized on environmental and land use problems?

What would you like to see as an ideal future for our community and our forests?

Appendix A

HOUSEHOLD SURVEY QUESTIONNAIRE

Household Questionnaire

(COMPLETE BEFORE APPROACHING HOUSEHOLD)

ENAME: Enumerator name _____

SURNAME: Supervisor name _____

DATE: DATE

HH Identification Number

Name of respondent

START TIME:

INTRO: "We are part of a team from PERFORM Project, who is conducting a baseline survey for the project. Your participation in answering these questions is very much appreciated. Your participation is completely voluntary, and you do not need to answer any questions you do not want to. Your responses will be **COMPLETELY CONFIDENTIAL**. If you choose to participate you may refuse to answer certain questions or you may stop participating at any time. Your responses will be added to those of other households and analyzed together. If you indicate your voluntary consent by participating in this interview, may we begin?

CONSENT:

Yes

No (END SURVEY)

HOUSEHOLD IDENTIFICATION

DISTRICT: Name of District:

1. Machinga (Liwonde Forest)

VILLAGE: Village

GVH: Group Village Head:

EPA: Extension Planning Area (EPA)

HOUSEHOLD SOCIO-DEMOGRAPHIC CHARACTERISTICS

AGE: To which of the following age groups do you belong?

15-29

30-49

50-69

70 and above

GENDER: INTERVIEWER: SELECT RESPONDENT GENDER

Male

Female

EDUCATION: What is the highest level of education you completed?

None

Std 1-5

Std 6-8

Secondary

Tertiary

READ: Can you read?

Yes

No

WRITE: Can you write?

Yes

No

NEW LAND CLEARING

CLEAR: Over the past five years, did you clear land to allow for more cultivation?

YES

NO

ASK IF CLEAR=0

CLEARTYPE: What kind of land did you clear for cultivation?

Forest

Fallow agricultural land

Other

ASK IF CLEARTYPE=2

SPECCLRTYPE: Please specify the type of land that was cleared

_____

CLRMORE: In the next 12 months, do you intend to clear land for cultivation?

Yes

No

ASK IF CLRMORE=0

WHYCLR: Why do you plan on clearing more land for cultivation? (select all that apply)

To grow more crops to sell

To grow more crops to consume

To grow different types of crops

The land I was cultivating in the past is no longer productive

ASK IF CLRMORE=0

WHERECLRMORE: Where do you plan to clear land?

Forest

Fallow agricultural land

Other

ASK IF CLRMORE=0

CLACRE: How many acres do you plan to clear?

LIVELIHOOD STRATEGIES USED BY HOUSEHOLDS

Non-Forest/Indirect Forest Livelihood Strategies

NFSTRAT: Are you or any member of your household engaged in any of the following livelihoods strategies? (Select all that apply)

Livestock Selling

Rain-fed farming

Irrigated farming

Fishing farming

Trading in dried fish

Buying and selling fresh fish

Petty trading

Pottery- kuumba mbiya

Skilled trades - Tin smith, builder

Brick making

Beer brewing

Stone collection

None of the above→SKIP TO FBSTRAT

ASK IF NFSTRATDOES NOT=11 (!)

NFMAINSOURCE: Which do you consider to be your main source of income?

Livestock Selling

Rain-fed farming

Irrigated farming

Fishing farming

Trading in dried fish

Buying and selling fresh fish

Petty trading

Pottery- kuumba mbiya

Skilled trades - Tin smith, builder

Brick making

Beer brewing

Stone collection

ASK IF NFSTRATDOES NOT=11 (!)

NFMAININCOME: In the past 12 months, how much income has been generated from this activity?

_____

ASK IF NFSTRATDOES NOT=11 (!)

NFMAININCGEND: Who in the household is primarily participating in the activity?

Men

Women

Both men and women

ASK IF NFSTRATDOES NOT=11 (!)

NFMAINWOOD: Do you use wood for this activity?

Yes

No

ASK IF NFMAINWOOD=0

NFMAINHEADLOADS: How many headloads of wood in a 12 month period do you use for this activity?

_____

ASK IF NFMAINWOOD=0

NFMAINWOODLOC: Where do you get this wood?

Buy from forest reserve

Buy from individuals customary lands

Buy from village or communal forest

Free from own woodlot or trees

Free from village or communal forest

Illegal collection from forest reserve

Other

ASK IF NFMAINWOODLOC=6

OTHMAINSOURCE: Please specify the other source of wood for this activity.

_____

NFMAINCHAL: What challenges have you or your member of household encountered in the course of undertaking these non-forest based livelihoods? (select all that apply)

Lack of knowledge- no training

Inadequate financial capital

Lack of reliable markets

Lack of inputs or equipment

None

Other

ASK IF NFMAINCHA=5

OTHMAINCHAL: Please specify the main challenge with this activity

_____

ASK IF NFSTRATDOES NOT=11 (!)

SECSOURCE: Which do you consider to be your second most important source of income?

Livestock Selling

Rain-fed farming

Irrigated farming

Fishing farming

Trading in dried fish

Buying and selling fresh fish

Petty trading

Pottery- kuumba mbiya

Skilled trades - Tin smith, builder

Brick making

Beer brewing

Stone collection

NFSECINCOME: In the past 12 months, how much income has been generated from this activity?

_____

NFSECINCGEND: Who in the household is primarily participating in the activity?

Men

Women

Both men and women

NFSECWOOD: Do you use wood for this activity?

Yes

No

ASK IF NFMAINWOOD=0

How many headloads of wood in a 12 month period do you use for this activity?

_____

ASK IF NFSECWOOD=0

NFSECWOODLOC: Where do you get this wood? (select all that apply)

Buy from forest reserve

Buy from individuals customary lands

Buy from village or communal forest

Free from own woodlot or trees

Free from village or communal forest

Illegal collection from forest reserve

Other

ASK IF NFSECWOODLOC=6

NFOTHSECSOURCE: Please specify the source of wood for this activity.

NFSECCHAL: What challenges have you or your member of household encountered in the course of undertaking these non-forest based livelihoods? (Select all that apply)

Lack of knowledge- no training

Inadequate financial capital

Lack of reliable markets

Lack of inputs or equipment

None

Other

ASK IF NFSECCHAL=5

NFOTHSECCHAL: Please specify the main challenge with this activity

ASK IF NFSTRATDOES NOT=11 (!)

NFTERSOURCE: Which do you consider to be your third most important source of income?

Livestock Selling

Rain-fed farming

Irrigated farming

Fishing farming

Trading in dried fish

Buying and selling fresh fish

Petty trading

Pottery- kuumba mbiya

Skilled trades - Tin smith, builder

Brick making

Beer brewing

Stone collection

NFTERINCOME: In the past 12 months, how much income has been generated from this activity?

NFTERINCGEND: Who in the household is primarily participating in the activity?

Men

Women

Both men and women

NFTERWOOD: Do you use wood for this activity?

Yes

No

ASK IF NFMAINWOOD=0

How many headloads of wood in a 12 month period do you use for this activity?

ASK IF NFTERWOOD=0

NFTERWOODLOC: Where do you get this wood?

Buy from forest reserve

Buy from individuals customary lands

Buy from village or communal forest

Free from own woodlot or trees

Free from village or communal forest

Illegal collection from forest reserve

Other

ASK IF NFTERWOODLOC=6

NFOTHSECSOURCE: Please specify the source of wood for this activity.

NFTERCHAL: What challenges have you or your member of household encountered in the course of undertaking these non-forest based livelihoods?

Lack of knowledge- no training

Inadequate financial capital

Lack of reliable markets

Lack of inputs or equipment

None

Other

ASK IF NFTERCHAL=5

NFOTHTERCHAL: Please specify the main challenge with this activity

Direct forest based livelihoods

FBSTRAT: Are you or any member of your household engaged in any of the following livelihoods strategies? (select all that apply)

Firewood for sale

Timber

Poles

Thatch grass

Charcoal making

Charcoal selling

carpentry

Honey

Mushrooms

Dried fruits

Fresh fruits

Sale of bamboo

None Of the above→SKIP TO BIZSTRAT

FBINCOME: In the past 12 months, how much income has been generated from this activity?

_____

FBGEND: Who in the household is primarily participating in the activity?

Men

Women

Both men and women

FBWOOD: Do you use wood for this activity?

Yes

No

ASK IF FBWOOD=0

How many headloads of wood in a 12 month period do you use for this activity?

_____

ASK IF FBWOOD=0

NFTERWOODLOC: Where do you get this wood?

Buy from forest reserve

Buy from individuals customary lands

Buy from village or communal forest

Free from own woodlot or trees

Free from village or communal forest

Illegal collection from forest reserve

Other

ASK IF FBWOODLOC=6

NFOTHSECSOURCE: Please specify the source of wood for this activity.

_____

FBCHAL: What challenges have you or your member of household encountered in the course of undertaking this livelihood activity?

Lack of knowledge- no training

Inadequate financial capital

Lack of reliable markets

Lack of inputs or equipment

None

Other

ASK IF NFTERCHAL=5

FBOTHCHAL: Please specify the main challenge with this activity

Other business oriented strategies

BIZSTRAT: Are you or any member of your household engaged in any of the following livelihoods strategies? {Select all that apply

Bicycle hiring

Bicycle maintenance

Tailoring

House renting

Butcher

Shoe making

None→ SKIP TO EVERCLUB

Other

ASK IF BIZSTRAT=7

OTHBIZSTRAT: Please specify the other business strategy

_____

Livelihood Preference

LIVPREFFIRST: Of the livelihoods available in this area, if you had the option which would be your first preference to pursue as your main source of livelihood?

Farming

Pottery/brick making

Animal husbandry

Firewood/charcoal production and sale

Non-timber forest product collection and sale

Skilled trade (carpentry/smith/mechanic)

Other

ASK IF LIVEPREFFIRST = 6

OTHLIVPREFFIRST: Please specify the preferred livelihood strategy_____

LIVPREFFIRSTWHY: What is the main reason you prefer this strategy?

Easier work

Lower risk

More profitable

More secure

More prestigious

Other

ASK IF LIVEPREFFIRSTWHY = 5

OTHLIVPREFFIRSTWHYOTHER: Please specify the reason for the preferred livelihood strategy_____

LIVPREFSECOND: Of the livelihoods available in this area, if you had the option which would be your second preference to pursue as your main source of livelihood?

Farming

Pottery/brick making

Animal husbandry

Firewood/charcoal production and sale

Non-timber forest product collection and sale

Skilled trade (carpentry/smith/mechanic)

Other

ASK IF LIVEPREFSECOND = 6

OTHLIVPREFSECOND: Please specify the preferred livelihood strategy_____

LIVPREFSECONDWHY: Why do you prefer this strategy?

Easier work

Lower risk

More profitable

More secure

More prestigious

Other

ASK IF LIVEPREFSECONDWHY = 5

OTHLIVPREFSECONDWHYOTHER: Please specify the reason for the preferred livelihood strategy_____

++

LIVPREFTHIRD: Of the livelihoods available in this area, if you had the option which would be your third preference to pursue as your main source of livelihood?

Farming

Pottery/brick making

Animal husbandry

Firewood/charcoal production and sale

Non-timber forest product collection and sale

Skilled trade (carpentry/smith/mechanic)

Other

ASK IF LIVEPREFTHIRD = 6

OTHLIVPREFTHIRD: Please specify the preferred livelihood strategy_____

LIVPREFTHIRDWHY: Why do you prefer this strategy?

Easier work

Lower risk

More profitable

More secure

More prestigious

Other

ASK IF LIVEPREFTHIRDWHY = 5

OTHLIVPREFTHIRDWHYOTHER: Please specify the reason for the preferred livelihood strategy_____

SATISFACTION WITH COMMITTEES

LABEL: What is your level of satisfaction with the performance of the different committees that support implementation of development activities in your area?

VDC: VDC: Would you say you are…

Very satisfied

Somewhat satisfied

Somewhat dissatisfied

Very dissatisfied

I don't know/No opinion

VNRCM: VNRCM: Would you say you are…

Very satisfied

Somewhat satisfied

Somewhat dissatisfied

Very dissatisfied

I don't know/No opinion

ADC: VNRCM: Would you say you are…

Very satisfied

Somewhat satisfied

Somewhat dissatisfied

Very dissatisfied

I don't know/No opinion

BMC: VNRCM: Would you say you are…

Very satisfied

Somewhat satisfied

Somewhat dissatisfied

Very dissatisfied

I don't know/No opinion

LEADERS: How would you rate the level of Local Leadership support in sustaining village development activities?

Very satisfied

Somewhat satisfied

Somewhat dissatisfied

Very dissatisfied

I don't know/No opinion

NATURE CAPITAL

Conservation Agriculture

AWARECA: Have you ever heard about Conservation Agriculture (CA)?

Yes

No→SKIP TO AWARESOIL

ASK IF WHERECA=0

CAPRACTICE: Do you practice CA on your fields?

Yes

No→SKIP TO CABARRIER

ASK IF CAPRACTICE=0

CAYEARS: How long have you been practicing CA?

Less than a year

One year

Two years

More than 2 years

ASK IF CAPRACTICE=0

CAACRES: How many acres of your household's land are currently being cultivated using CA practices?

_____

ASK IF CAPRACTICE=1

CABARRIER: what are your reasons for not trying out CA? (Select all that apply)

No information about the technologies

Used to the traditional ploughing

Don't trust the use of herbicides

Do not have enough labor or equipment needed

No material to mulch

No need to apply the technique/ not interested

Other factors

ASK IF CABARRIER=6

OTHCABARRIER: Specify other reason for not practicing CA

_____

Soil Fertility

AWARESOIL: Are you aware of any practices to improve the quality of your soil?

Yes

No→SKIP TO AWARECONS

ASK IF AWARESOIL=0

SOILTECH: What technologies are you aware of? (Select all that apply)

Grain legume rotation	Incorporation of crop residues
Crop rotation	Compost manure
Use of manure	Use of inorganic fertilisers
Leaving land fallow for as season	Other
Agro forestry methods (planting nitrogen fixing trees)	

SOILPRACT: What practices and technologies are you practicing to improve the quality of your soil?

Grain legume rotation	Incorporation of crop residues
Crop rotation	Compost manure
Use of manure	Use of inorganic fertilisers
Leaving land fallow for as season	None
Agro forestry methods (planting nitrogen fixing trees	Other

ASK IF SOILPRACT=9:

OTHSOILPRACT: Specify other practices used to improve soil quality

_____

ASK IF SOILPRACT=8

SOILBARRIER: Why don't you use any of these practices or technologies?

Not enough land

Too expensive

Not trained

It doesn't work

Other

ASK IF SOILBARRIER=4:

OTHSOILBARRIER: Specify other reason for not using these practices

_____

Land, Soil, and Water Conservation

AWARECONS: Are you aware of any land/soil and water conservation technologies?

Yes

No→SKIP TO IRPOTENTIAL

ASK IF AWARECONS=0

CONSTECH: What technologies are you aware of?

Contour ridges

Vetiver grass

Rain water harvesting

Other

ASK IF CONSTECH=3

OTHCONSTECH: Specify other land/soil and water conservation technologies you are aware of:

_____

ASK IF AWARECONS=0

CONSPRACT: What land/soil and water conservation measures are you practicing?

Contour ridges

Vertiva grass

Rain water harvesting

None

Other

ASK IF CONSPRACT=4

OTHCONSPRACT: Specify other land/soil and water conservation measures being practiced

_____

ASK IF CONSPRACT=3

CONSBARRIER: Why don't you use any of these practices or technologies?

Not enough land

Too expensive

Not trained

It doesn't work

Other

ASK IF CONSBARRIER=4:

OTHCONSBARRIER: Specify other reason for not using these practices

_____

Energy and Fuel

COOKHEATSOURCE: What is your primary source of cooking and heating energy?

Electricity

Firewood

Charcoal

Crop residues

Other

Othcookheat: Specify other source of energy for cooking/heating:

FIRERESP: Who is primarily responsible for collection of firewood in your household?

Men

Women

Boys

Girls

FIREWOODTIME: How long does it take to go and collect firewood? (In minutes, walking one way)

HOURSWOOD: How much time do you or the wood collector spend per week collecting wood (hours)

BUNDLESWOOD: How many bundles (headloads) of firewood does your HH use per week?

SUPPLYWOOD: Is the supply of wood products now smaller than it was five years ago?

There is less wood supply

There is more wood supply

Wood supply has not changed

I don't know

ASK IF SUPPLYWOOD=0

ADAPTATIONWOODSCARCITY: How has your household responded to the decrease in wood supply?

Grow own or more trees.

Participate in collective afforestation or forest conservation activities

Travel farther within village to collect wood

Collect wood from neighbouring villages

Buy wood

Use or increase use of crop residues (maize and pigeon pea stalks, etc)

Use bamboos for fuel

Other

ASK IF ADAPTATIONWOODSCARCITY=7

OTHWOODSCARCITY: Specify other response to wood scarcity

ASK IF ENSOURCE=4

OTHCOOKHEATSOURCE: Specify other energy source: _____

FUELSAVE: Do you use any fuel saving technologies, such as improved kitchen stoves or solar driers?

Yes

No

ASK IF FUELSAVE=0

FUELTECH: What fuel saving technologies do you use?

Improved kitchen stove- Chitetezo mbaula

Solar driers

Other

ASK IF FUELTECH=2

OTHFUELTECH: Specify other fuel saving technology used: _____

LIGHTSOURCE: What is your source of lighting energy?

Tin lamp

Lantern

Pressure lamp

Wood fuel

Solar power

Electricity

Rechargeable lamps/Torch

Other

ASK IF LIGHTSOURCE=7

OTHLIGHTSOURCE: Specify other light source: _____

POLERESP: Who is primarily responsible for collection of construction materials/poles in your household?

Men

Women

Boys

Girls

Agro Forestry

TREE: Do you or any member of your household have a tree nursery or woodlot? (Select all that apply)

Tree nursery

Woodlot

No, none of the above

ASK IF TREE=0

NURSERYTREES: How many trees are in your tree nursery?

ASK IF TREE=0

NURSERYACRE: How many acres is your tree nursery?

ASK IF TREE=1

WOODTREE: How many trees are on your woodlot?

ASK IF TREE=1

WOODACRE: How many acres is your woodlot?

TREEPLANT: Have you or members of your household planted any tree (s) in the past 3 years?

Yes

No

ASK IF TREEPLANT=0

WHYPLANT: Why did you plant trees? (Select all that apply)

Firewood for own source

Firewood for sale

Fruits for sale

Fruits to eat

Timber for sale

Timber for own use

Soil improvement

Other

ASK IF WHYPLANT=7

OTHWHYPLANT: Specify other reason for planting trees: _____

ASK IF TREEPLANT=0

TREENUM: How many trees have you/members of your household planted over the last 3 years?

ASK IF TREEPLANT=0

TREESURVIVE: What proportion of the trees planted survived to date? [_____] Tree

ASK IF TREEPLANT=1

WHYNOPLANT: Why haven't you planted trees in the past 3 years?

Not enough land

Too expensive

Livestock will damage trees

Fire will damage trees

Other

ASK IF WHYNOPLANT=4

OTHWHYNOPLANT: Specify other reason for not planting trees_____

AGROFORESTY: Do you practice agroforestry?

Yes

No

ASK IF AGROFORESTY=0

AFPRACTICE: What type of agro-forestry technologies do you practice? (Select all that apply)

Fertilizer tree systems

Fodder banks

Indigenous fruit tree crop system

Rotational wood lots

Other

ASK IF AFPRACTICE=4

OTHAFPRACTICE: Specify other agro-forestry practice: _____-

ASK IF AGROFORESTY=0

WHYAF: Why do you practice the agro forestry technologies mentioned?

Source of fuel wood and construction materials

Source of income;

Add soil fertility;

For livestock feed;

Promoted by extension agents;

Just a common practice in this area;

Controls soil erosion,

Don't know why,

Other

ASK IF WHYAF=8

OTHWHYAF: Specify other reason for practicing agro-forestry: _____

FLR objective

What do you aim to achieve through restoration interventions?

Increased_food_security

Increased_energy_supply

Biodiversity_conservation

Climate_adaptation

Other_specify

Specify other restoration objective:

An improved livelihood

What are the characteristics of an improved livelihood?

Specify

Why that characteristic?

Specify

An improved landscape

What are the main characteristic of an improved landscape?

Specify

Why that characteristic?

Specify

What are the drivers of degradation that need to be addressed?

Fires

Agriculture_encroachment

Animal_grazing

Mining

Infrastructure_growth

Human_population

Illegal_harvesting

Corruption

Please specify other drivers.

Community meetings

Do you attend community meetings?

Yes

No

Why ?

Which developmental meetings are regularly held in this community?

healthy

Agriculture

Forest_management

education

infrastructure_development

microfinance

security

other

Please specify other community meetings.

Do you attend community meetings on health?

Yes

No

Why?

Do you attend community meetings on agriculture?

Yes

No

Why?

Do you attend community meetings on forest management?

Yes

No

Why?

Do you attend community meetings on education?

Yes

No

Why?

Do you attend community meetings on infrastructure development?

Yes

No

Why?

Do you attend community meetings on micro financing?

Yes

No

Why?

Any other community meetings that you attend?

specify other meetings that you attend

Why?

Last question

Do you have any questions?

Yes

No

Thank you

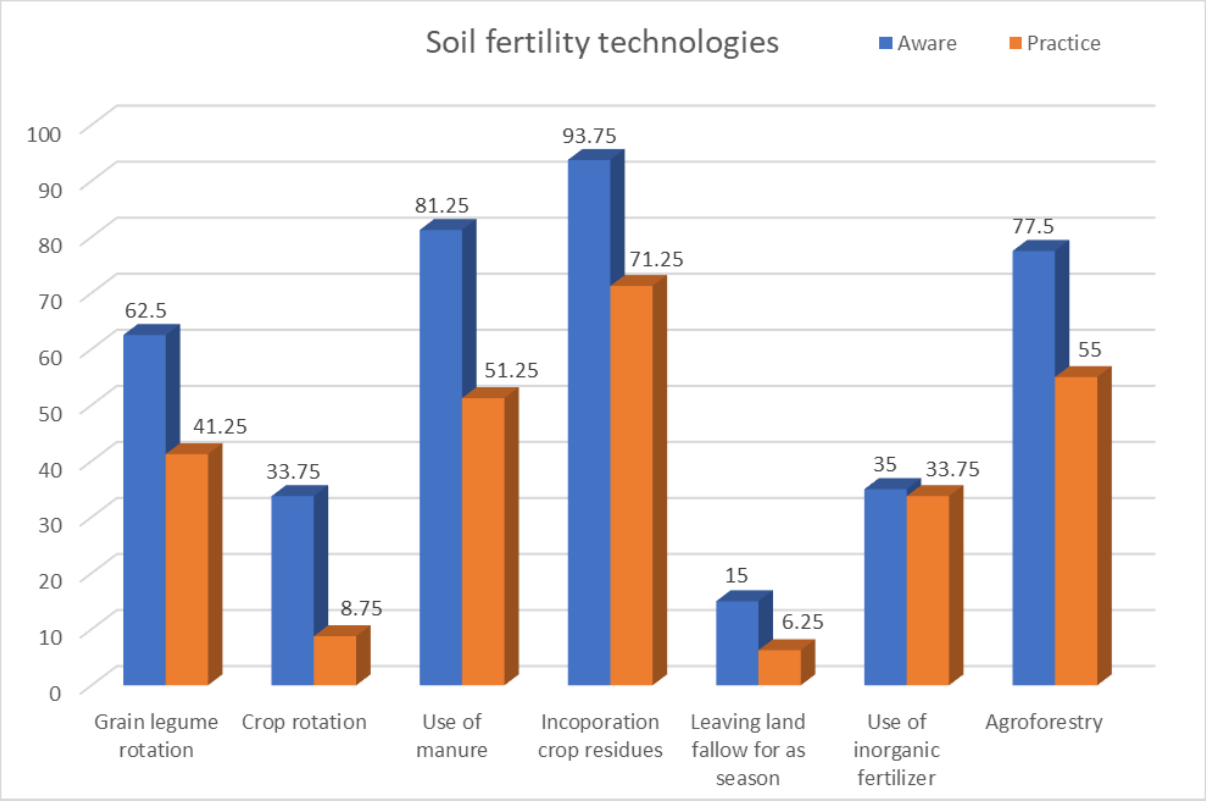
Last question

(NOTE: ENSURE THAT ALL RELEVANT QUESTIONS HAVE BEEN ASKED BEFORE RELEASING THE INTERVIWEE. THANK THE INTERVIEWEE FOR HIS/HER COOPERATION)

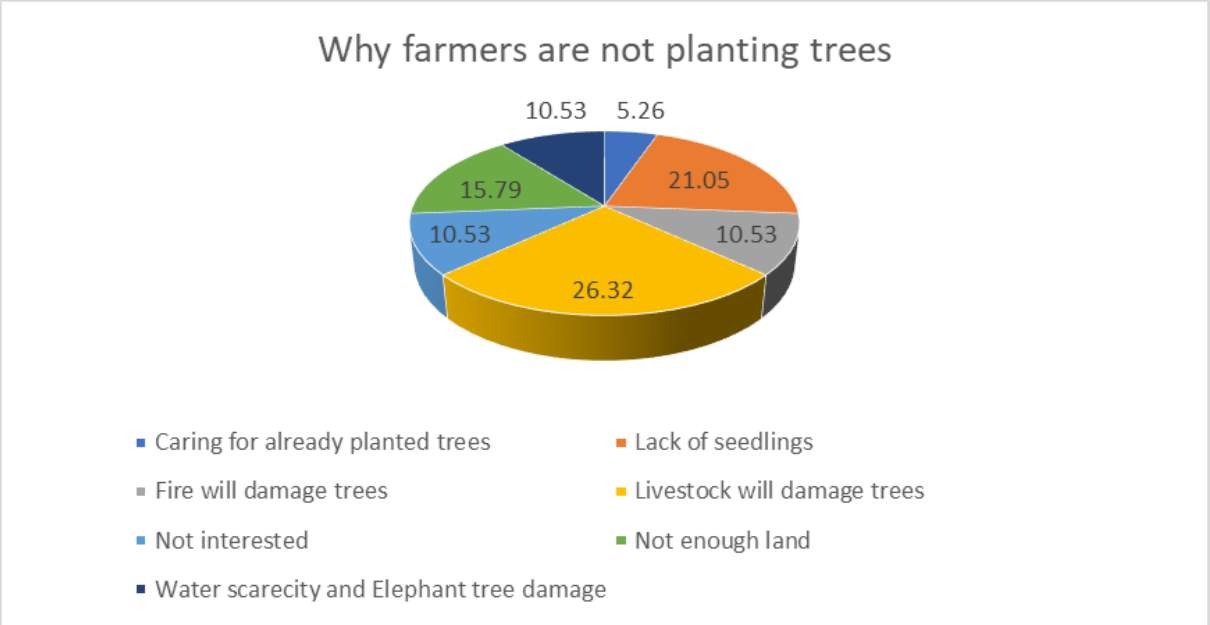
Appendix B

ANALYSIS TABLES

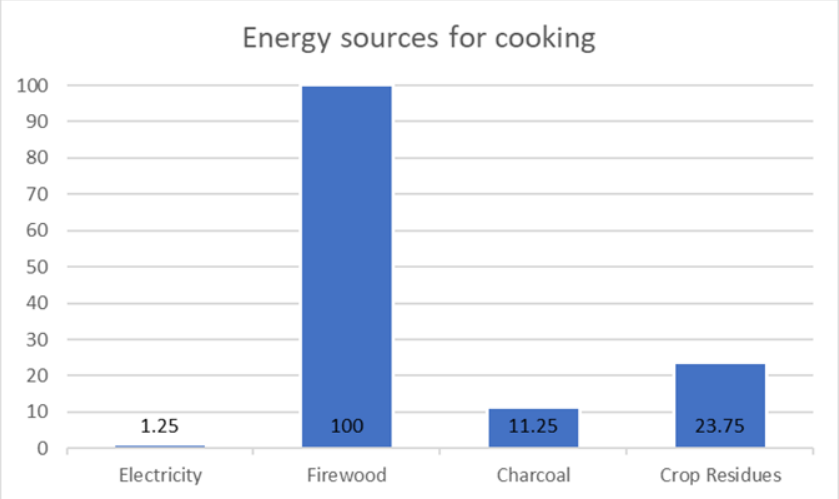
Soil fertility technologies



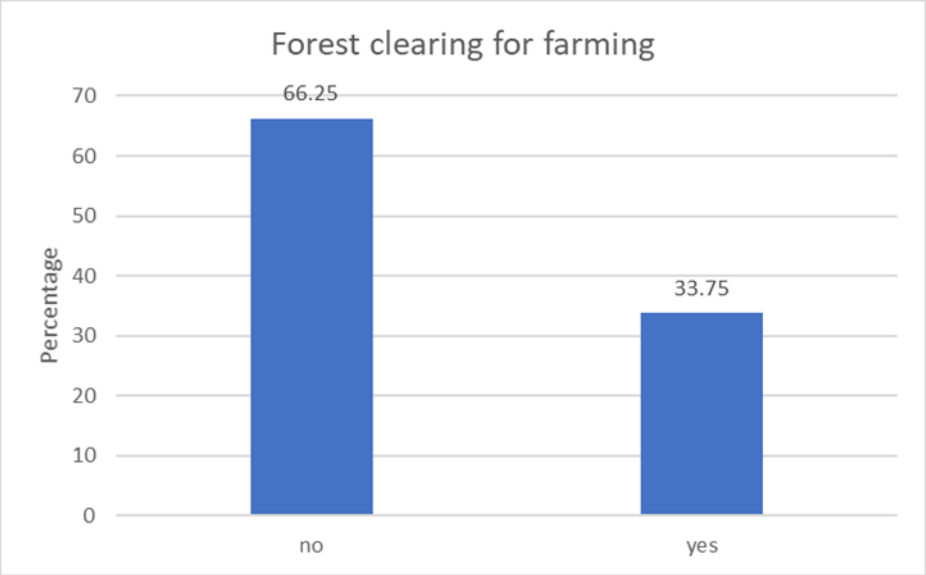
3.2 Why local communities are not planting trees



3.3 Energy sources for cooking



3.4 Forest clearing for farming



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