



**REPUBLIC  
OF MALAWI**

*The Ministry of  
Natural Resources,  
Energy and Mining*

# A FRAMEWORK FOR MONITORING PROGRESS ON MALAWI'S NATIONAL FOREST LANDSCAPE RESTORATION STRATEGY



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## DEFINITIONS

**Indicator:** A measurable variable used to represent change or the attainment of a goal (e.g., increased crop yield). Multiple metrics can address the same indicator.

**Metric:** The specific criteria used to measure the change in the indicator (e.g., increase in average crop yield per hectare, by crop type).

**Monitoring framework:** A basic structure that defines and organizes monitoring indicators and metrics.

**Monitoring system:** The methods, procedures and products that operationalize the monitoring framework. Components of the system include mechanisms for collecting, storing, and analyzing the indicator data, as well as communicating progress toward targets and goals.

**National restoration goals:** Seven specific development goals emphasized as national priorities in Malawi's National Forest Landscape Restoration Strategy (improving food security, increasing energy resources, increasing climate resilience, improving water quality and supply, conserving and restoring biodiversity, ensuring gender equity and equality, and alleviating poverty).

**Restoration intervention targets:** Targets set in Malawi's National Forest Landscape Restoration Strategy to measure success on Malawi's five restoration-specific interventions (agricultural technologies, community forest and woodlots, forest management, soil and water conservation, and river- and stream-bank restoration).

## ACRONYMS AND ABBREVIATIONS

<b>AFR100</b>	African Forest Landscape Restoration Initiative
<b>APES</b>	Agricultural Production Estimates Survey
<b>CA</b>	Conservation Agriculture
<b>DoDMA</b>	Department of Disaster Management Affairs
<b>FLR</b>	Forest Landscape Restoration
<b>FMNR</b>	Farmer-managed Natural Regeneration
<b>GHG</b>	Greenhouse Gas
<b>Ha</b>	Hectares
<b>IHS</b>	Integrated Household Survey
<b>LULC</b>	Land Use Land Cover
<b>M&amp;E</b>	Monitoring and Evaluation
<b>MoU</b>	Memorandum of Understanding
<b>NGO</b>	Non-governmental Organization
<b>NSO</b>	National Statistical Office
<b>NTFP</b>	Non-timber Forest Product
<b>PERFORM</b>	Protecting Ecosystems and Restoring Forests in Malawi
<b>ROAM</b>	Restoration Opportunities Assessment Methodology
<b>UNDP</b>	United Nations Development Programme
<b>USAID</b>	United States Agency for International Development
<b>USGS</b>	United States Geological Survey
<b>WMS</b>	Welfare Monitoring Survey
<b>WRI</b>	World Resources Institute

## PHOTO CREDITS

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# EXECUTIVE SUMMARY

## Highlights

- The monitoring framework focuses on measuring progress toward the goals and interventions outlined in Malawi's 2017 National Forest Landscape Restoration Strategy.
- Thirty indicators were selected for the monitoring framework by analyzing existing data collection systems and ranking relevant indicators based on their relevance to the national restoration goal or intervention target and their reliability of collection, quality, ease of communication, and sensitivity to restoration interventions.
- The framework provides the core indicators, metrics, data sources, and baseline data for monitoring progress on FLR in Malawi. Many of the core indicators and metrics are already being regularly collected as part of the National Statistical Office's Integrated Household Survey.
- Key next steps for activating the framework include: securing high-level support from multiple ministries to adopt the framework as the national standard for monitoring restoration, setting benchmarks for measuring progress on each indicator, establishing a multi-sector Monitoring System Task Force, developing a work plan for creating a long-term monitoring system, and developing a communications plan for reporting progress.

## Summary

This report summarizes the results of research and stakeholder consultation in developing a framework for monitoring progress on forest landscape restoration (FLR) as set forth in Malawi's 2017 National FLR Strategy. The National FLR Strategy is organized around two main pillars: 1) it sets targets for specific FLR interventions to help the Government of Malawi achieve its pledge to restore 4.5 million hectares of degraded and deforested land by 2030; and 2) it outlines seven national restoration goals that can be achieved by accelerating implementation of FLR, specifically: improve food security,

increase energy resources, increase climate resilience, improve water quality and supply, conserve and restore biodiversity, ensure gender equity and equality, and alleviate poverty. The overall objective of this research was to develop a monitoring framework that includes the most useful and relevant indicators that measure progress on FLR against these two pillars.

The process for designing Malawi's monitoring framework consisted of first carrying out a comprehensive review of Malawi's existing policies, strategy plans, and surveys related to Malawi's national restoration goals and intervention targets. From these documents, 160 indicators were extracted that formed a preliminary list of relevant indicators for further review. These indicators were then systematically assessed and scored 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.

Following this assessment, the preliminary list of 160 indicators was narrowed down to a list of 30 suggested core indicators that form a minimum viable framework for monitoring progress toward Malawi's national restoration goals and intervention targets. The scoring process prioritized indicators that were already being collected through other monitoring strategies and surveys to avoid duplication of similar efforts and to make the most of limited resources available for monitoring FLR. As such, many of the core indicators and metrics proposed for monitoring progress on FLR are already being regularly collected through the National Statistical Office's Integrated Household Survey (IHS). These indicators all scored highly during the assessment process for their reliability of collection and quality. Included in the framework is also a list of proposed additional indicators that the research team and stakeholders deemed important for consideration but, for various reasons, they did not score as highly against the criteria.

The framework proposed as part of this study provides the core indicators, metrics, and data sources, as well as some baseline data for

monitoring progress on FLR in Malawi. This framework is a first step in developing a robust, long-term monitoring system for FLR in Malawi. The following activities are recommended as key next steps for operationalizing the monitoring framework:

1. Securing high-level ministerial support to adopt the framework as the national standard for monitoring progress on cross-sectoral FLR activities in Malawi.
2. Establishing a multi-sectoral FLR Monitoring System Task Force dedicated to developing the monitoring system, which would include assigning specific responsibilities to task force members, establishing a plan for long-term funding support, and developing a work plan for implementation.
3. Convening stakeholders to agree upon and set measurable, achievable benchmarks for progress on each indicator using the baseline data.
4. Developing and implementing the components of the system for collecting, storing, and analyzing the indicator data.
5. Creating a communications plan for reporting progress toward the achievement of Malawi's national restoration goals and restoration intervention targets.

Adopting the proposed monitoring framework and investing the resources in mobilizing a long-term monitoring system should help provide reliable evidence to guide the implementation of Malawi's National FLR Strategy and accelerate positive local successes.

## How is this report structured?

The report starts with an introduction that highlights the importance of measuring progress on restoration in Malawi. It provides background on the National FLR Strategy and details the specific goals and intervention targets that form the basis for this monitoring framework. The report then offers an overview of existing monitoring practices in Malawi before launching into the methodology for developing the framework.

The 30 core indicators proposed for the framework are detailed in Tables 3 and 4, followed by descriptions of proposed additional indicators that could be considered for inclusion in the framework in Table 5. Using a selection of data from the 30 core indicators, a few examples are provided to demonstrate how Malawi can use the collected monitoring data to offer insights on food security, energy resources, or soil conservation at the national and district levels. Finally, the report includes recommendations on the next steps for activating the monitoring framework.



# 1. INTRODUCTION

The establishment of a robust monitoring system is important for catalyzing successful forest landscape restoration (FLR) in Malawi. A monitoring system serves both to document progress toward Malawi's target to restore 4.5 million hectares of degraded and deforested land by 2030, as well as to provide critical evidence to help adapt FLR implementation strategies and better understand the influence of restoration on Malawi's development goals.

This report summarizes the results of research and stakeholder consultation in developing a framework for monitoring progress on FLR as set forth in Malawi's 2017 National FLR Strategy. This assessment sought to determine the most useful and relevant indicators to assess whether the strategy is achieving its objectives, both in terms of catalyzing implementation of FLR activities and impacting targeted social and environmental goals. The specific objectives of this research included:

1. **Reviewing information** on existing monitoring and data collection activities at various scales in Malawi (national, regional, and district) that are complementary to FLR activities and goals;
2. **Consulting with stakeholders** to confirm restoration targets, identify potential indicators, and review existing monitoring activities and protocols;
3. **Identifying a suite of indicators** for measuring and monitoring progress on FLR, with a focus on leveraging existing data collection activities when available; and
4. **Developing a monitoring framework** that incorporates a core set of indicators and metrics for monitoring progress on FLR, as well as sources and/or collection methods for compiling the data.

## 1.1 Background on Forest Landscape Restoration in Malawi

In 2016, the Government of Malawi made a national pledge to the African Forest Landscape Restoration Initiative (AFR100) under the Bonn Challenge to restore 4.5 million hectares of degraded and deforested land by 2030. Malawi made this commitment in acknowledgment of the role that FLR can play in helping Malawi to achieve many of its national development goals related to climate resilience, agricultural and economic security, and sustainable economic development.

To help inform and support this commitment, a *National Forest Landscape Restoration Opportunities Assessment for Malawi* was initiated in 2016 and completed in 2017. The assessment provided a technical review of the most viable FLR intervention opportunities, maps of where those interventions could be implemented, a cost/benefit analysis of which interventions are the most cost effective, and a policy and institutional analysis of enabling conditions for effectively implementing FLR. National leadership for the assessment was provided by the Department of Forestry, with a multi-sectoral Task Force organized to guide and support the process. Consultations with district authorities and communities formed important components of the assessment.

The results of the National FLR Assessment fed into Malawi's 2017 *National Forest Landscape Restoration Strategy*, which outlines an action plan for implementing specific FLR interventions and sets targets for these interventions to help achieve the 4.5-million-hectare restoration goal. The five interventions targeted in the National FLR Strategy are:

- **Agricultural technologies** offer a suite of climate-smart agricultural practices, including conservation agriculture, farmer-managed natural regeneration and agroforestry that serve to increase tree cover on degraded, low-yielding cropland and pastures to improve soil fertility and productivity (estimated area of opportunity: 3,730,790 ha).

- **Community forests and woodlots** restore forest cover on degraded customary land and non-arable land to establish local sources of fuel wood and non-timber forest products and take pressure off forest reserves. Implementation techniques include demarcation of new areas, strengthening community by-laws, and protecting against uncontrolled cutting, grazing, and fire (estimated area of opportunity: 753,471 ha).
- **Forest management** restores forest cover and improves management in deforested and degraded forests, including forest reserves, natural forests outside reserves, and plantations (estimated area of opportunity: 3,401,279 ha).
- **Soil and water conservation** stabilizes soils and increases infiltration in areas with high rates of rainfall runoff. It also reduces erosion and prevents downstream

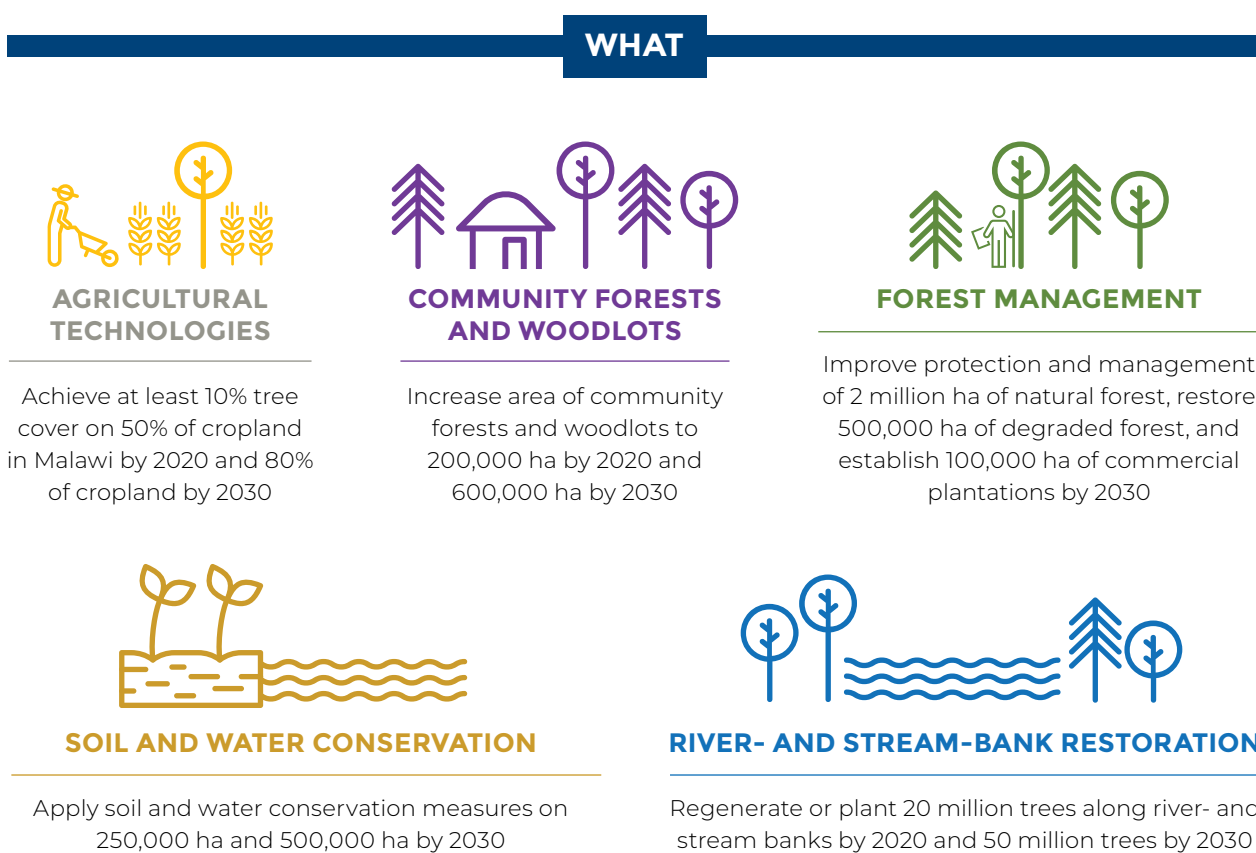
sedimentation to protect croplands, water supplies, and other valuable resources. Implementation techniques include constructing check dams, gully plugs, dykes, infiltration ditches, and implementing rainwater harvesting and other conservation techniques (estimated area of opportunity: 1,043,768 ha).

- **River- and stream-bank restoration** increases tree cover in denuded buffer zones of rivers and streams through natural regeneration and tree planting (estimated area of opportunity: 36,478 ha).

The specific targets set in the National FLR Strategy for each intervention are shown in Figure 1.

The National FLR Strategy also outlines seven national restoration goals that can be achieved by accelerating implementation of FLR: improve food security, increase energy resources, increase climate resilience, improve water quality and

Figure 1 | Overview of Malawi's National FLR Strategy



Source: Reproduced from Republic of Malawi's *National Forest Landscape Restoration Strategy* (2017).



Table 1 | Goals Targeted by Malawi's National FLR Strategy

NATIONAL GOAL	FLR CONTRIBUTIONS TO NATIONAL GOALS
<b>Improve food security</b>	<ul style="list-style-type: none"> <li>Reduce soil and nutrient loss, restore soil organic matter content, increase and diversify crop yields and cultivars, enable more efficient use of inorganic inputs</li> <li>Increase rural access to and availability of food by increasing the production of timber, fuelwood, fodder, honey, mushrooms, and other nontimber forest products that directly or indirectly contribute to the food security of rural communities</li> </ul>
<b>Increase energy resources</b>	<ul style="list-style-type: none"> <li>Increase supplies of locally managed and sustainable sources of fuel wood</li> <li>Decrease sedimentation in catchments of hydropower infrastructure to boost energy outputs</li> </ul>
<b>Increase climate resilience</b>	<ul style="list-style-type: none"> <li>Restore soil fertility to boost yields, diversify farming systems and facilitate adaptation of farmers to erratic weather patterns</li> <li>Reduce landslide risks, reduce consequences of flooding/extreme weather events</li> <li>Support ecosystem-based adaptation</li> <li>Reduce GHG emissions from agriculture</li> <li>Increase carbon sequestration</li> </ul>
<b>Improve water quality and supply</b>	<ul style="list-style-type: none"> <li>Control erosion mitigation and reduce sedimentation</li> <li>Protect source water from sedimentation</li> </ul>
<b>Conserve and restore biodiversity</b>	<ul style="list-style-type: none"> <li>Contribute to more effective protection, accelerated regeneration and ecological restoration of native ecosystems and threatened species across landscapes</li> <li>Help to restore the health of ecosystems and increase the flow of ecosystem services</li> </ul>
<b>Ensure gender equity and equality</b>	<ul style="list-style-type: none"> <li>Promote women's access to, ownership and control of productive resources including land, water, and farm inputs</li> <li>Promote agricultural education and technical training for women</li> <li>Facilitate access to finance for women in agriculture</li> </ul>
<b>Alleviate poverty</b>	<ul style="list-style-type: none"> <li>Enhance sustainable management of forest resources and their contribution to the national economy</li> <li>Strengthen linkages between agriculture, forestry, and other sectors to ensure resilient socioeconomic growth</li> </ul>

Source: Reproduced from Republic of Malawi's *National Forest Landscape Restoration Strategy* (2017).

supply, conserve and restore biodiversity, ensure gender equity and equality, and alleviate poverty. Table 1 provides more detail on how FLR contributes to each of these goals.

## 1.2 Why Monitoring is Needed

The National FLR Strategy articulates why FLR is important and how it can contribute to progress on development goals. However, to assess the impact of FLR, a system for monitoring and evaluating progress toward specific goals needs to be established. Monitoring FLR is critical to the

continuation of restoration at a larger scale and serves at least five important purposes:

1. To **communicate** results and outcomes to encourage positive momentum, inspire replication, and allow for transferable results;
2. To **guide** implementation of restoration and provide feedback, including continuous and collective learning for adaptive management;
3. To **ensure** transparency and provide evidence of progress, achievements, and impact in relation to specific goals and objectives, including periodic assessments of who benefits and how from restoration interventions;

4. To **support** sharing of evidence to restoration investors to enhance trust and foster additional investments and scaling up; and
5. To **support** regular reporting on progress in achieving national, regional, and international commitments (AFR100 Working Paper Series 2017).

A robust and well-rounded monitoring system goes beyond reporting on hectares under restoration and instead serves to inspire action and provide feedback for adapting management of FLR activities. With these functions in mind, the principal components of a robust monitoring system should include the following:

1. A core set of indicators for monitoring progress toward national restoration goals and restoration intervention targets;
2. Uniform, coordinated methods of collecting data and measuring changes in these indicators;
3. An open repository of collected data; and
4. A communications plan for reporting progress toward the achievement of Malawi's national restoration goals and restoration intervention targets.

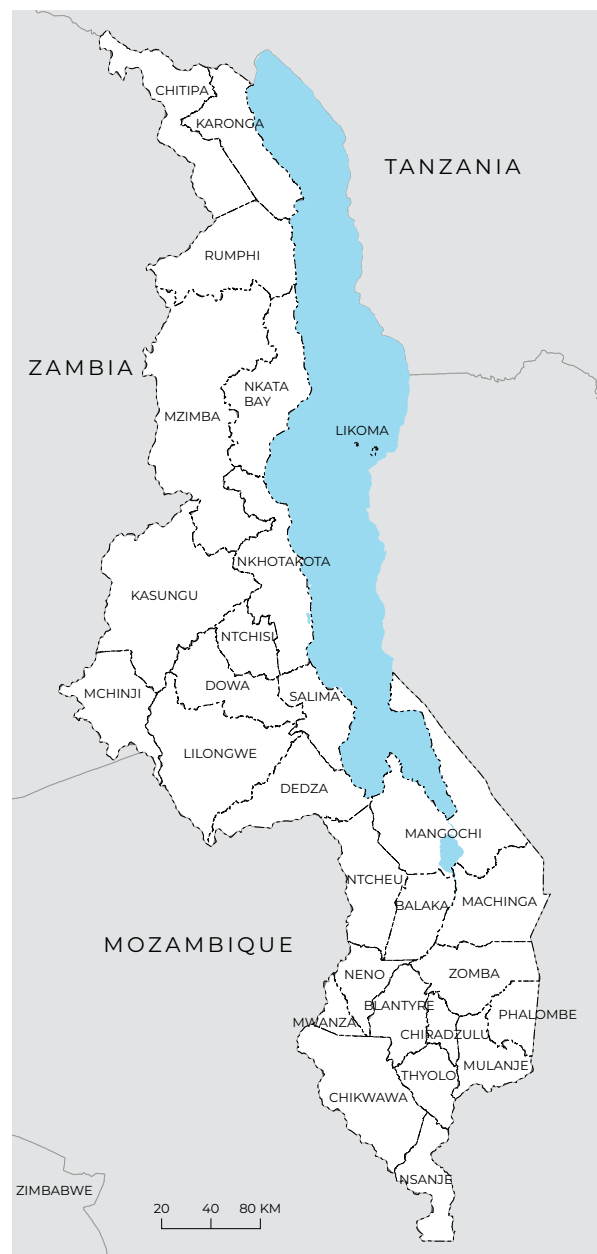
The monitoring framework developed as part of this assessment provides recommendations on the first principal component described above, with the expectation that upon adoption of the framework, the remaining components will follow.

## 1.3 An Overview of Current Monitoring Practices in Malawi

### 1.3.1 Types of Monitoring

At present, the Government of Malawi monitors progress on a variety of development-related indicators at two scales: the national level and the district level. At the **national** level, each ministry reports on its own strategies and initiatives. For example, the Department of Disaster Management Affairs (DoDMA) reports on the indicators in the National Resilience Strategy. The ministries have some collaborative work or strategic

Figure 2 | Districts of Malawi



Source: WRI.

objectives that cross ministerial boundaries. This approach is becoming more common, especially with donor interest in inter-ministerial work. In addition, the Government of Malawi reports on development indicators to the United Nations, including on global commitments such as the Sustainable Development Goals and Millennium Development Goals. The Government of Malawi also has its own national development strategy, Vision 2020, that highlights the key goals for development, such as improving food security and sustainable resource management.

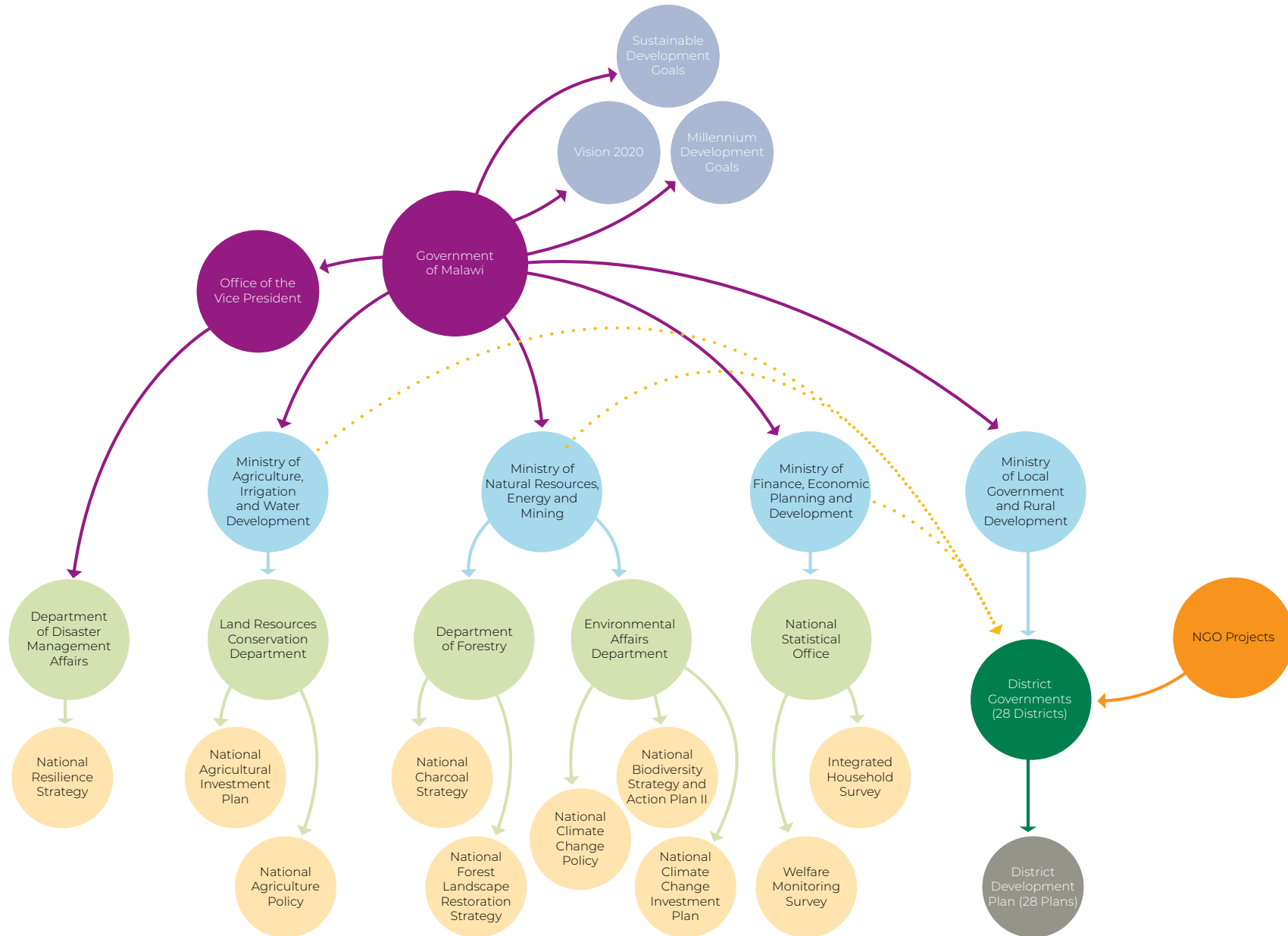
At the **district** level, each ministry has a Monitoring and Evaluation (M&E) representative that reports on district-level indicators directly to the relevant national ministry and to the Ministry of Local Government and Rural Development. For example, the Department of Forestry has a representative in the Machinga district who focuses only on monitoring forestry indicators. Malawi has 28 districts and each district chooses its own indicators from a selection provided by the Ministry of Local Government and Rural Development. This process leads to some indicators being shared across districts and some being unique to specific districts or regions. In the Machinga district, three indicators are officially collected for the Department of Forestry: 1) number of seedlings planted, 2) percentage of planted seedlings that have survived, and 3) number of hectares regenerated. In Ntchisi, the district chose seven indicators: 1) number of Village Forest Areas established, 2) number of agroforestry seedlings planted, 3) number of trees planted, 4) number of income generating activity groups formed, 5) number of households utilizing alternative energy sources, 6) number of hectares conserved, and 7) hectares under catchment area conserved. Other indicators reported to different ministries, such as the Ministry of Agriculture, Irrigation, and Water Development, are also relevant to restoration monitoring.

Monitoring also occurs as part of the numerous **non-governmental organization (NGO) projects** operating at a local scale across Malawi. NGO projects often have to report their M&E indicators to their donors and, as a result, carefully monitor their specific project sites and project activities. For example, in the Machinga district, NGOs are expected to sign a Memorandum of Understanding (MoU) with the district officials in areas where they operate, stipulating that NGOs are required to send their M&E reports to the officials. In practice, according to Machinga district officers, NGOs rarely report to the district government. When NGOs do report, the lack of georeferenced data at the district level means that the NGO project work can be difficult to track over time. In addition, there is no specific system to report on NGO project work to the national ministries and the Ministry of Local Government and Rural Development. As a result, NGO M&E reports often get subsumed into the district reports, making it hard to differentiate between government-led efforts and NGO-led efforts.



In short, many different entities are involved in monitoring in Malawi at varying scales and with varying reporting structures. Many of these initiatives are government-led and nationally focused, but district-level monitoring and NGO project monitoring also contribute to the country's diverse monitoring capabilities. Figure 3 offers a visual overview of the different actors associated with monitoring restoration in Malawi, showing the connections between government bodies and their strategies, plans, and initiatives. It similarly highlights how district-level monitoring connects with national-level systems. Figure 3 includes only strategies and plans analyzed for this study that are relevant to FLR specifically, hence the lack of inclusion of all national ministries. The figure is not intended to show all connections and actors involved in restoration, but to offer a snapshot of some of the points discussed in this section.

Figure 3 | Overview of Connections Between Government Bodies, Strategies, and Plans Relevant to Monitoring Restoration in Malawi



### 1.3.2 Challenges

In conducting the research and stakeholder consultations for this monitoring framework, two notable challenges were consistently identified as barriers to current monitoring efforts: 1) a lack of data quality standards and 2) a lack of available long-term funding. These two challenges are described in more detail in this section.

#### Data Quality

One of the most significant barriers to monitoring restoration-relevant indicators in Malawi is data quality. The USAID's report on "Improving Data Collection for Malawi" focuses on data quality within the existing monitoring systems in Malawi. Although the USAID report is primarily focused on greenhouse gas (GHG) emission reporting, the focal areas for GHG monitoring show significant overlap with restoration focal areas (e.g., land use land cover (LULC), energy, and agriculture). The report highlights that promising yearly data on agricultural yield collected by the Ministry of Agriculture, Irrigation and Water Development, known as the Agricultural Production Estimates Survey (APES) has few quality control measures. The APES data remains a combination of quantitative and qualitative data mostly collected on paper. Specifically, the report argues that "the APES is currently inadequate and scientifically questionable."

With regards to data quality, data collected by the National Statistical Office (NSO) appears to be the most accurate and technically sound. The NSO's two flagship surveys, the Integrated Household Survey (IHS) and the Welfare Monitoring Survey (WMS), both have trusted collection methodologies. In addition, both surveys allow ministries

to input on indicators relevant to their priorities (although it can be a lengthy process). The USAID report concludes that the "NSO is the strongest institution when it comes to survey methodology and the logistical planning of surveys."

#### Long-term Funding

Long-term funding is especially important for restoration monitoring as trees and vegetation grow slowly, requiring a long time-horizon for measuring their impacts at the landscape level. The challenge of securing long-term funding affects the consistency of monitoring in Malawi. Most in-depth, high-quality surveys are dependent on donor funding. For example, the NSO's IHS is funded by the World Bank and Millennium Challenge Account and the WMS by the Norwegian Embassy, the United Nations Children's Fund (UNICEF), and the United Nations Development Programme (UNDP). While the IHS has secured additional funding for the next study in 2019/2020, the funding of the next WMS is still uncertain.

Funding for government strategies is even less consistent, with many offering ambitious monitoring plans without a plan in place to fund the monitoring of each indicator proposed. The DoDMA's National Resilience Strategy is an example of an ambitious monitoring plan that may not be able to be carried out in full due to funding challenges.

In acknowledgment of these two major challenges, the proposed monitoring framework for FLR sought to prioritize the selection of indicators with attention to their quality and reliability for collection, as described in more detail in the section on methodology.



# 2. METHODOLOGY FOR DESIGNING MALAWI'S MONITORING FRAMEWORK

The process for designing Malawi's monitoring framework consisted of first establishing the goals for FLR that are to be monitored, and then developing a set of measurable indicators that capture progress toward these goals. More details on the methods are described in the following sections.

## 2.1 Goals for Monitoring Restoration

The overall goal of Malawi's FLR monitoring framework is to measure progress on the National FLR Strategy. The National FLR Strategy is composed of five restoration intervention targets and seven national restoration goals, which make up two distinct pillars of the strategy, as shown in Figure 4. The monitoring framework proposed in this report is organized around these two pillars to best capture Malawi's progress on the National FLR Strategy.

In developing the monitoring framework around these two pillars, it is important to first understand the relationship between the restoration interventions and the national goals. Each of the five interventions is connected to the seven national goals via multiple pathways. Conceptual models can help to demonstrate the pathways through which restoration interventions address land degradation issues and help achieve national

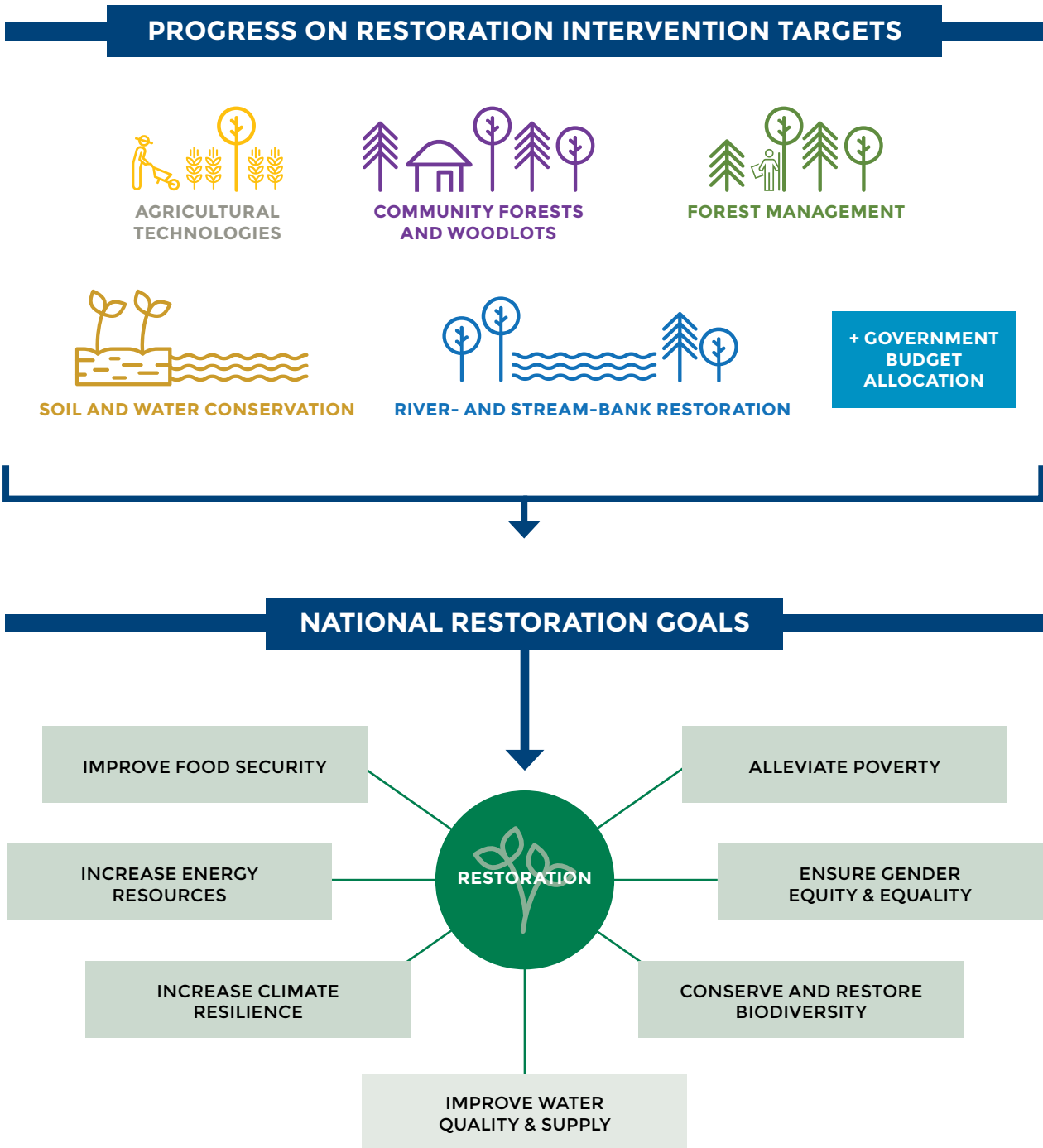
goals. The conceptual models in Figures 5 to 9 show how each of the five restoration interventions addresses a key land degradation issue (orange boxes) and the various pathways that lead to achieving the seven national goals (green boxes).

For example, the conceptual model shown in Figure 5 demonstrates how agricultural technologies—including farmer-managed natural regeneration (FMNR) and conservation agriculture (CA)—address degradation on croplands and the pathways that lead to increased food security, improved water quality, increased climate resilience, and poverty alleviation.

The conceptual models demonstrate the importance of developing a system that monitors both the biophysical and social impacts of FLR. Measuring progress on interventions (i.e., increases in tree cover) is important to show that FLR interventions are being physically implemented, while measuring progress on the social impacts shows that FLR is being implemented in the right places and with the appropriate techniques to improve the lives of local people and support development goals. By focusing on both interventions and goals, Malawi's monitoring system can more effectively and holistically measure progress on FLR.



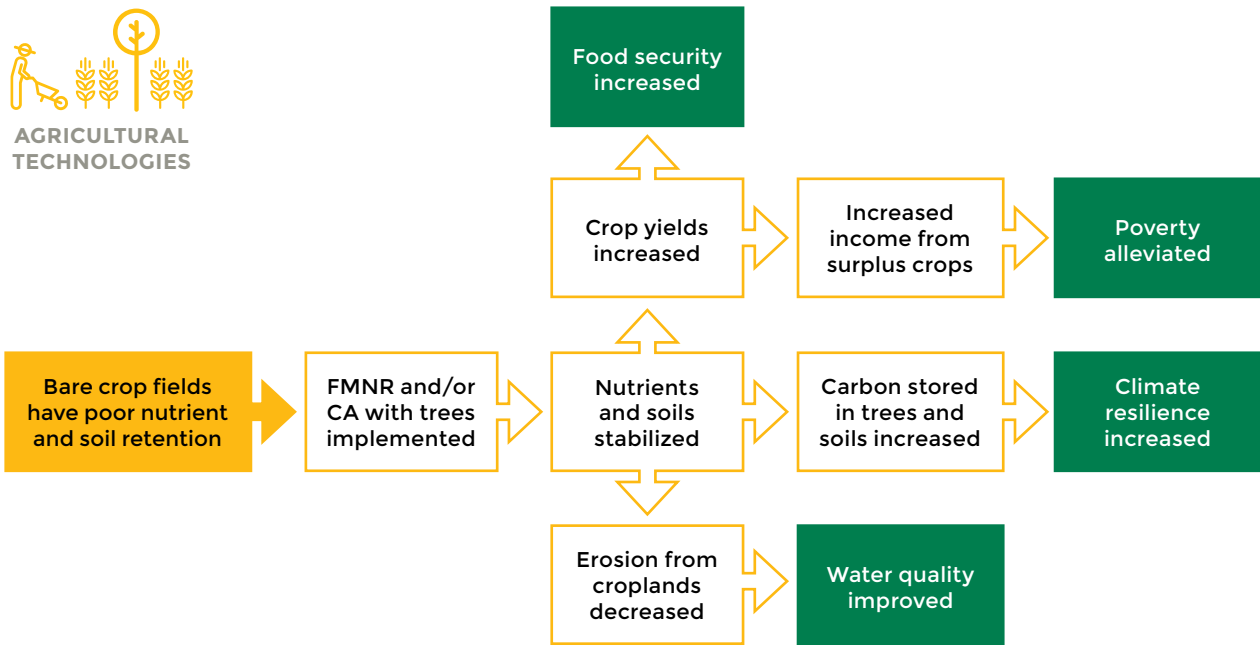
Figure 4 | The Two Pillars of Malawi's FLR Monitoring Framework



Source: WRI.

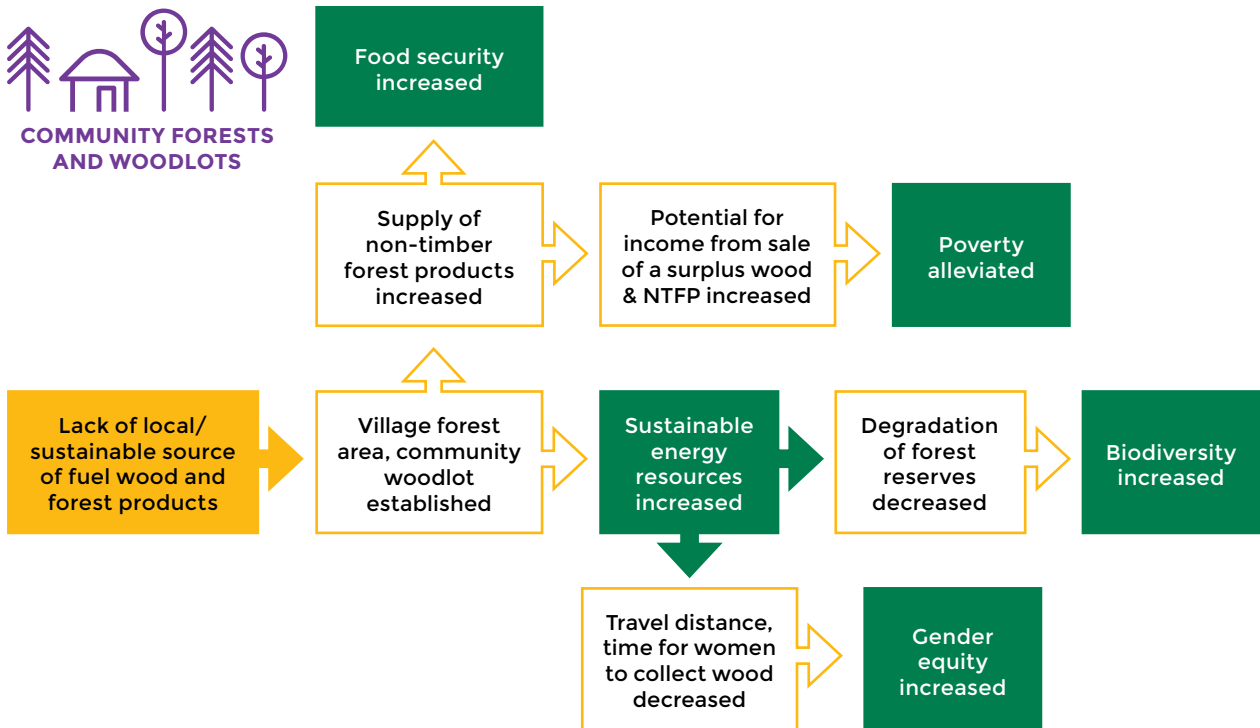


Figure 5 | Conceptual Model for Agricultural Technologies



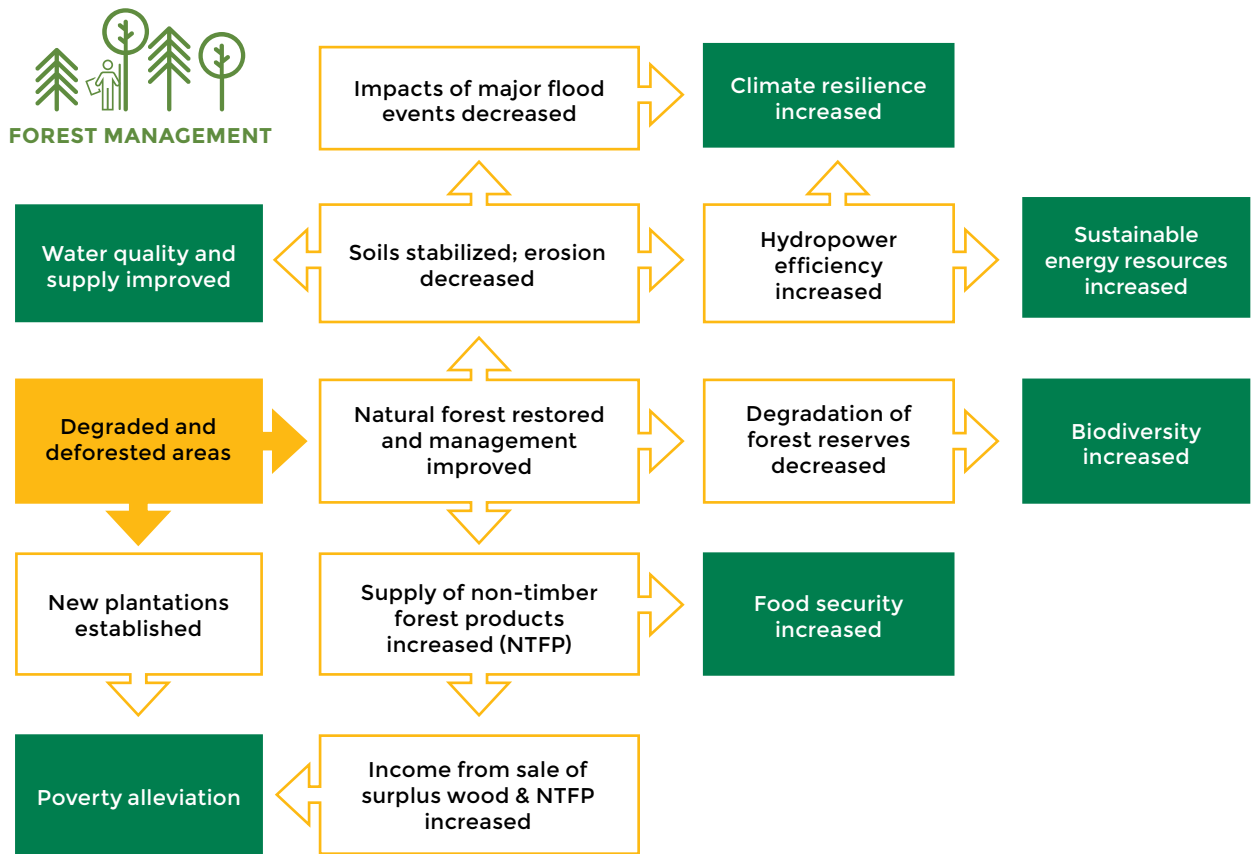
Source: WRI.

Figure 6 | Conceptual Model for Community Forests and Woodlots



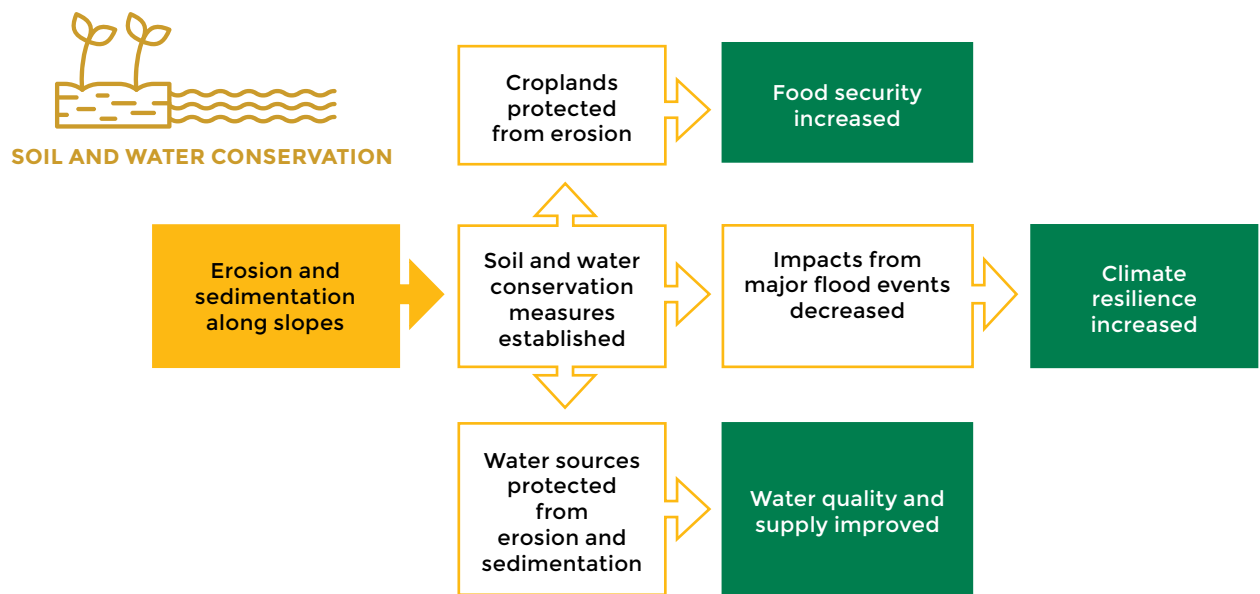
Source: WRI.

Figure 7 | Conceptual Model for Forest Management



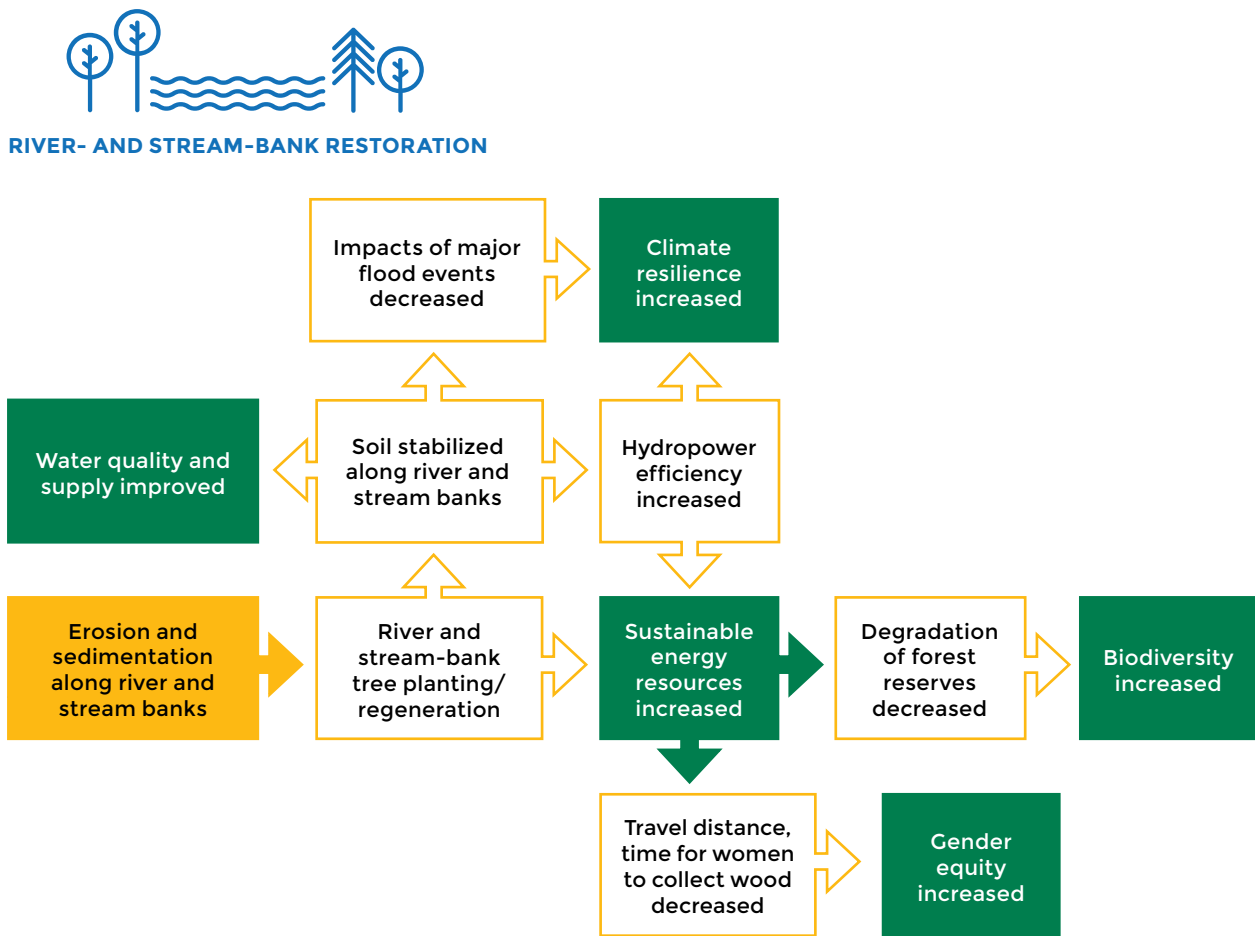
Source: WRI.

Figure 8 | Conceptual Model for Soil and Water Conservation



Source: WRI.

Figure 9 | Conceptual Model for River- and Stream-bank Restoration



Source: WRI.

## 2.2 Developing Indicators and Metrics

The *Global Framework on Measuring Progress for Forest Landscape Restoration* (Buckingham et al. 2017) served as the basis for developing the indicators and metrics for Malawi’s monitoring framework. The Global Framework is a guide for selecting monitoring indicators, which was informed by research on more than 100 indicator frameworks from a variety of restoration-related disciplines and surveys of 140 restoration monitoring experts. The Global Framework focuses on the users’ goals for restoration, the restoration interventions being implemented, and the drivers of degradation. By encouraging users to make choices, it leads them through the process of selecting the most relevant, accurate, and cost-effective indicators. As described in more detail in this section, workshops, stakeholder consultations, and literature review were all important components in designing the

monitoring framework. The approach used in selecting and refining the core set of indicators for inclusion in the framework is also described in more detail in this section.

### 2.2.1 Workshops and Consultations

In February 2018, a **preliminary workshop** hosted by the Department of Forestry and co-organized by the World Resources Institute (WRI) and the USAID-funded Protecting Ecosystems and Restoring Forests in Malawi (PERFORM) project launched the process for developing a national monitoring framework for tracking progress on FLR in Malawi. Using the Global Framework as a guide, workshop participants analyzed the example indicators in the framework to discuss the indicators’ relevance to Malawi’s National FLR Strategy. Outcomes from the workshop emphasized that the indicators should be relevant to multiple FLR and development objectives, which would lead the monitoring system to be incorporated

into multiple initiatives among a broad group of ministries. In addition, the workshop highlighted that barriers to effective monitoring should be carefully considered and addressed. And finally, mechanisms for communicating monitoring results back to community members and other stakeholders should not be overlooked.

In addition, as part of the preliminary research into developing the monitoring framework, a team from the Department of Forestry, WRI, and PERFORM visited the **Machinga** district council to discuss their current monitoring and evaluation (M&E) efforts to obtain a better understanding of the data collected at the district level. District M&E officers from the Ministry of Agriculture, Irrigation and Water Development and the Ministry of Natural Resources, Energy and Mining, among others, shared their insights on how they collect indicators relevant to restoration and what limitations they encounter in reporting. Machinga was chosen as a pilot district for this assessment because of the significant need and opportunity for restoration and the district's history of engagement on restoration-related activities over the past few years. For example, the Machinga district council has been highly engaged in the development of Malawi's National FLR Strategy and it served as the country's pilot landscape for an opportunities assessment using the Restoration Opportunities Assessment Methodology (ROAM). USAID's PERFORM project also has ongoing restoration-related activities in the area.

Following the preliminary workshop and site visit to Machinga district, the research team reviewed the information collected from stakeholders and began the process of conducting an in-depth literature review and building a list of preliminary indicators for inclusion in the monitoring framework. This process is discussed in more detail in the following section. In May 2018, a **follow-up workshop** was held where the early results of the study and concrete next steps to begin monitoring restoration in Malawi were discussed among stakeholders. The participants supported the proposed structure of the monitoring framework and offered feedback on specific indicators that could be added or modified to provide more detailed results. The feedback on these additional indicators is included in Section 3.2 of this report.

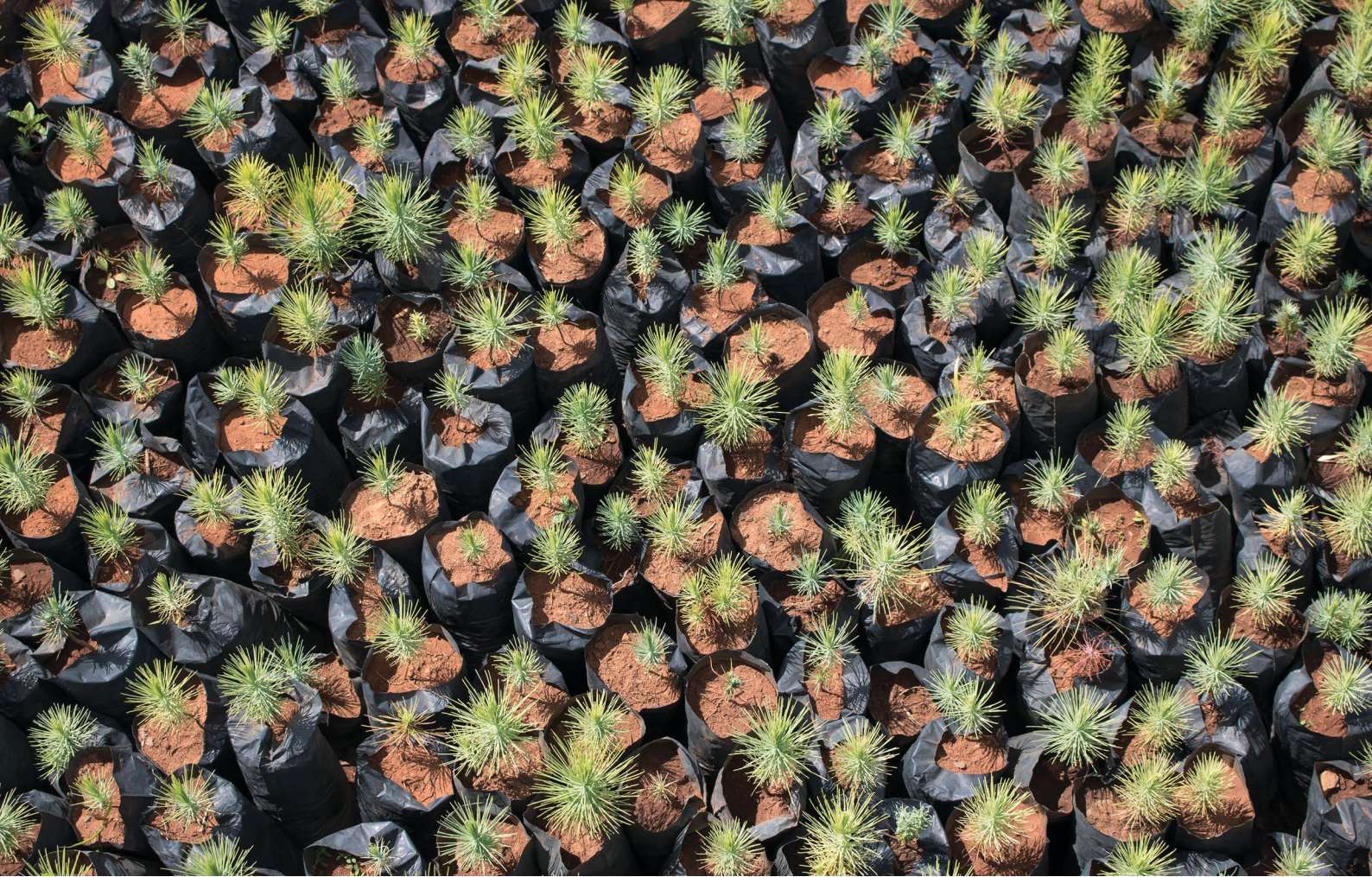
Attendees of the two workshops included representatives from many different ministries and departments within the Government of Malawi, as well as representatives from NGOs (see Appendix C). These included:

- Ministry of Agriculture, Irrigation and Water Development (Land Resources Conservation Department, Crops Development Department);
- Ministry of Finance, Economic Planning and Development (Economic Planning and Development Department, National Statistical Office);
- Department of Disaster Management Affairs;
- Ministry of Gender, Children and Community Development;
- Ministry of Local Government and Rural Development;
- Ministry of Natural Resources, Energy and Mining (Environmental Affairs Department, Department of Forestry);
- District-level stakeholders (Machinga); and
- Non-governmental and bilateral organizations (PERFORM, WRI, U.S. Geological Survey (USGS), and World Agroforestry Centre (ICRAF)).

As part of the process for developing Malawi's National Monitoring Framework, the U.S. Geological Survey (USGS) with support from USAID is developing **national maps of land use and land cover** as well as maps documenting on-farm tree cover for baseline year 2017, the year the National FLR Strategy was launched. These maps will provide data on the biophysical progress of FLR interventions in Malawi (e.g., percent of tree cover), which will serve to set a baseline for monitoring biophysical progress on the agricultural technologies, forest management, and community forest and woodlot restoration interventions.

## 2.2.2 Methods for Selecting Core Indicators and Metrics

To build the monitoring framework, the research team carried out a comprehensive review of Malawi's existing policies, strategy plans, and surveys related to Malawi's national restoration goals. Policies, plans, and surveys at both the



national and district level were included in the review. In particular, the following government entities had relevant and readily-available documents that were included in the review: Land Resources Conservation Department, National Statistical Office, Department of Environmental Affairs, Department of Disaster Management Affairs, Department of Forestry, and the districts of Machinga and Ntchisi. A full list of documents is provided in Appendix A. The review involved analyzing these documents to understand ongoing monitoring initiatives by different government bodies, and extracting the indicators related to restoration. USGS was also consulted on what indicators could be derived from their work on mapping land cover. Indicators were categorized according to their relevance to the national restoration goals in the FLR strategy, or how they measured biophysical progress toward restoration intervention targets.

The indicators extracted from this review formed a preliminary list of 160 indicators relevant to Malawi's national restoration goals. Following the compilation of this list, an assessment was conducted to determine the suitability of these indicators for Malawi's FLR monitoring system.

The methodology used for this assessment was adapted from Baldera et al., which outlines a step-by-step process for identifying indicators to collectively assess multiple large-scale restoration projects across a landscape. While Baldera et al. applied their assessment to restoration projects in and around the Gulf of Mexico, the principles of their methodology are universal and adaptable to the FLR context in Malawi. With their research as guidance, five criteria were used to assess FLR indicators for Malawi: relevance, reliability, quality, sensitivity, and ease of communication. Descriptions of the five assessment criteria are as follows:

**1. Relevance to goal or target.**

An indicator is relevant if it measures progress on one or more of the national restoration goals or restoration intervention targets in the FLR strategy.

*Example:* The proportion of households that report inadequate consumption of food is a measure of food insecurity that is directly relevant to the goal of improving food security.

Table 2 | Definitions of Scores Assigned to Indicators

SCORE	DEFINITIONS
3	Strongly meets criterion; compelling evidence
2	Somewhat meets criterion; partially applicable
1	Marginally meets criterion; limited applicability
0	Does not meet criterion; not applicable

Source: WRI.

**2. Reliability of collection.**

An indicator is reliable if representative data are collected at regular intervals from a consistent source or program.

*Example:* The NSO has regularly conducted its Integrated Household Survey over the past ten years; therefore, the indicators that are based on data from this survey are considered reliable. Indicators with no record of consistent data collection are unreliable.

**3. Quality.**

An indicator is of good quality if the data collection method and reporting are unambiguous and consistent.

*Example:* If the method of data collection is well established and, in the case of survey data collection, the questions used in the survey are consistent over time, the data can be considered good quality. The NSO’s Integrated Household Survey meets these standards for data quality.

**4. Sensitivity to restoration interventions.**

An indicator is sensitive if progress made on restoration interventions would produce a predictable response in the indicator.

*Example:* The average amount of time per day that a person spends collecting firewood is sensitive to the availability of firewood from a local source. In other words, an increase in the availability of firewood from community forest and woodlot interventions would decrease the amount of time spent collecting firewood.

**5. Ease of communication.**

An indicator is easy to communicate to a broad audience if the conceptual relationship between the indicator and progress toward a restoration goal is easy to understand.

*Example:* The relationship between the abundance and distribution of threatened species and progress toward the goal of conserving and restoring biodiversity is easy to communicate. An increase in the presence of threatened species indicates an increase in biodiversity.

Each one of the 160 preliminary indicators extracted from the literature review was assigned a score for how well it met each of these five criteria on a scale of zero to three. Definitions of the scoring criteria are provided in Table 2. Indicators with the highest cumulative scores were considered for inclusion in the core list of indicators most suitable for monitoring FLR in Malawi.

# 3. PROPOSED INDICATORS FOR THE NATIONAL MONITORING FRAMEWORK

## 3.1 Core Indicators

After conducting the indicator assessment described in the previous section, the preliminary list of 160 indicators was narrowed down to a list of 30 suggested core indicators that form a minimum viable framework for monitoring progress toward Malawi's national restoration goals and restoration intervention targets. These 30 indicators were selected from the 160 preliminary indicators for two reasons. First, they scored highly against the five assessment criteria of relevance, reliability, quality, sensitivity, and ease of communication. Second, each of the 30 indicators measured a unique dimension of progress toward the national restoration goals and restoration intervention targets. These dimensions of progress were identified by examining the specific contributions of FLR to national restoration goals (Table 1) and the causal pathways that connect restoration interventions to goals (Figures 5 to 9).

As described in Section 2, the monitoring framework sought to include indicators that measure progress on FLR against the two pillars of the National FLR Strategy: national restoration goals (e.g., food security, climate resilience) and restoration intervention targets (e.g., tree cover along rivers and streams). As such, the suggested core indicators are divided by these categories into two tables below: Table 3 includes the indicators that measure progress toward national restoration goals, and Table 4 includes the indicators that measure progress toward restoration intervention targets. The indicators in the tables are organized according to the relevant restoration goal or target, and include information on the metric (i.e., quantitative measure), the source of the data, the dimension of progress measured, and whether they are already being regularly collected.

As shown in the following tables, many of the core indicators and metrics proposed for monitoring progress on FLR are already being regularly collected through the NSO's Integrated Household Survey (IHS), which is conducted every three to five years nationally in Malawi. These indicators all scored highly during the assessment process for their reliability of collection and quality. The indicators selected for the core list also scored highly in terms of their relevance to the restoration goal and sensitivity to restoration interventions. Since the IHS provides such a robust and reliable source of data at minimal additional cost or effort for restoration monitoring, the indicators from this survey constitute the majority of the proposed framework. It should be noted that the indicators and metrics reported by NSO's IHS are written exactly as they are asked within the survey.

However, some gaps remain in measuring progress on certain FLR goals and targets. For example, all of the indicators related to conserving and restoring biodiversity are not currently being regularly collected, so additional resources would need to be allocated for their collection to ensure that progress toward all goals is being adequately captured in the framework. Furthermore, the indicators sourced from USGS, which include biophysical mapping and quantification of tree cover toward intervention targets, are being collected for baseline year 2017, but there are no current plans in place to regularly map these indicators at defined intervals.

In two cases, the proposed indicators are essential to monitoring progress on restoration intervention targets but are not being monitored under any existing survey, initiative, or strategy; therefore, a data collection plan would need to be developed and established. Indicators in this circumstance include quantification of river- and stream-bank restoration and government budget allocation toward restoration-related projects.

**Table 3 | Core Indicators of Progress on National Restoration Goals**

INDICATOR	METRIC	SOURCE OF DATA	DIMENSION(S) OF PROGRESS MEASURED	REGULARLY COLLECTED?
<b>1. Improve Food Security</b>				
1.1 Welfare of basic needs	Proportion of households reporting inadequate consumption of food	NSO IHS— Household Survey	Directly measures progress on the national restoration goal to improve food security and is influenced by on-farm restoration activities.	Yes
1.2 Types of crops cultivated	Proportion of plots by type of crop cultivated and average acreage	NSO IHS— Agriculture Survey	Demonstrates crop diversity, a sign of resilient agricultural practices and a component of agricultural technology interventions that promotes food security.	Yes
1.3 Soil quality	What proportion of agricultural plots have soil quality characterized as:  1-Good 2-Fair 3-Poor	NSO IHS— Agriculture Survey	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.	Yes
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 B) Proportion of households that followed the advice, disaggregated by gender	NSO IHS— Agriculture Survey	Indicates level of knowledge dissemination and uptake of agroforestry and forest management interventions, which is related to the effectiveness and sustainability of these interventions. Collecting gender-disaggregated data indicates progress made in promoting agricultural education and technical training for women.	Yes
<b>2. Increase Energy Resources</b>				
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	NSO IHS— Household Survey	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.	Yes
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)	NSO IHS— Household Survey	Measures level of dependence on fuel wood, which indicates need for FLR interventions to increase energy resources.	Yes



**Table 3 | Core Indicators of Progress on National Restoration Goals**

INDICATOR	METRIC	SOURCE OF DATA	DIMENSION(S) OF PROGRESS MEASURED	REGULARLY COLLECTED?
<b>2. Increase Energy Resources, continued</b>				
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)	NSO IHS— Household Survey	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.	Yes
<b>3. Increase Climate Resilience</b>				
3.1 Recent shocks to the household	Proportion of households severely affected by shocks during the last 12 months	NSO IHS— Household Survey	Measures impact of FLR interventions in reducing the consequences of flooding, landslides, and weather events to support increased climate resilience.	Yes
<b>4. Improve Water Quality and Supply</b>				
4.1 Access to safe drinking water	Proportion of households with access to safe drinking water	NSO IHS— Household Survey	Measures progress on the national restoration goal of improving water quality and supply.	Yes
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	NSO IHS— Household Survey	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.	Yes
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	NSO IHS— Agriculture Survey	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.	Yes

**Table 3 | Core Indicators of Progress on National Restoration Goals**

INDICATOR	METRIC	SOURCE OF DATA	DIMENSION(S) OF PROGRESS MEASURED	REGULARLY COLLECTED?
<b>5. Conserve and Restore Biodiversity</b>				
5.1 Wildlife corridors created	Number of wildlife corridors created	Department of National Parks and Wildlife (DNPW)	Indicates progress in prioritizing and improving ecosystem protection, contributing to the national goal of conserving and restoring biodiversity.	No
5.2 Trend in abundance and distribution of known threatened species	Number of threatened species for which trend in abundance and distribution is known	Department of National Parks and Wildlife (DNPW)	Indicates effectiveness of FLR interventions in restoring threatened species, which measures progress toward the goal of improving biodiversity.	No
5.3 Indigenous plant species cultivated and protected	Number of indigenous plant species cultivated and protected	Malawi Plant Genetic Resources Centre (MPGRC)	Indicates level of success in diversifying plant cultivation and protecting culturally important species, which measures progress in conserving and restoring biodiversity.	No
<b>6. Ensure Gender Equity and Equality</b>				
6.1 Ownership/ management of plots	Primary plot ownership by gender	NSO IHS—Agriculture Survey	Trend in agricultural plot ownership by gender indicates progress in promoting women's ownership of productive resources and equity in agricultural decision-making.	Yes
<b>7. Alleviate Poverty</b>				
7.1 Perception of household current economic well-being	Percentage distributions of household perceived current economic well-being	NSO IHS—Household Survey	Measures progress on the national restoration goal of alleviating poverty.	Yes
7.2 Enterprises engaged in sale of forest-based products	Proportion of enterprises that sell forest-based products and source of the products	NSO IHS—Household Survey	Indicates effectiveness of FLR interventions at enhancing forest resources' contribution to the national economy.	Yes

Source: WRI.

**Table 4 | Core Indicators of Progress on Restoration Intervention Targets**

INDICATOR	METRIC	SOURCE OF DATA	DIMENSION(S) OF PROGRESS MEASURED	REGULARLY COLLECTED?
<b>A. Agricultural Technologies</b>				
A.1 On-farm tree cover	Number of hectares of cropland with at least 5% tree cover	USGS— Remote Sensing	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.	No
A.2 Agroforestry adoption	Average proportion of households in a community that practice agroforestry	NSO IHS— Community Survey	Indicates extent of adoption at the community level of agroforestry, one of the primary agricultural technology interventions.	Yes
A.3 Legume cover crop adoption	Average proportion of households in a community that plant legume cover crops	NSO IHS— Community Survey	Indicates extent of adoption at the community level of conservation agriculture, one of the primary agricultural technology interventions.	Yes
<b>B. Community Forests and Woodlots</b>				
B.1 Community forests / woodlots	Number of hectares of community forests / woodlots	USGS— Remote Sensing	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.	No
B.2 Community forest proportion	Average proportion of land in a community that is forest and not used for agriculture	NSO IHS— Community Survey	Indicates the extent of commitment of communities toward reserving land for community forest and where additional outreach is needed to improve adoption of interventions.	Yes
<b>C. Forest Management</b>				
C.1 Natural forest protection and regeneration	Number of hectares of forest with at least 50% canopy cover	USGS— Remote Sensing	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.	No
C.2 Plantations	Number of hectares of plantations	USGS— Remote Sensing	Indicates progress toward the National FLR Strategy target to establish 100,000 ha of commercial plantations by 2030.	No

**Table 4 | Core Indicators of Progress on Restoration Intervention Targets**

INDICATOR	METRIC	SOURCE OF DATA	DIMENSION(S) OF PROGRESS MEASURED	REGULARLY COLLECTED?
<b>D. Soil and Water Conservation</b>				
D.1 Soil and water conservation interventions	Proportion of agricultural plots that implement erosion control/water harvesting interventions, which include: <ol style="list-style-type: none"> <li>1. No erosion control</li> <li>2. Terraces</li> <li>3. Erosion control bunds</li> <li>4. Gabions / Sandbags</li> <li>5. Vetiver grass</li> <li>6. Tree belts</li> <li>7. Water harvest bunds</li> <li>8. Drainage ditches</li> <li>9. Other</li> </ol>	NSO IHS— Agriculture Survey	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.	Yes
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: <ol style="list-style-type: none"> <li>1. Requires too much labor</li> <li>2. Materials not available</li> <li>3. Materials too costly</li> <li>4. No soil or water erosion problems on any plots</li> <li>5. Too risky/benefits unclear</li> <li>6. Other</li> </ol>	NSO IHS— Agriculture Survey	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.	Yes
D.3 Bund adoption	Average proportion of households in a community that have earth or stone bunds	NSO IHS— Community Survey	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.	Yes
D.4 Terrace adoption	Average proportion of households in a community that have terraces	NSO IHS— Community Survey	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.	Yes

**Table 4 | Core Indicators of Progress on Restoration Intervention Targets**

INDICATOR	METRIC	SOURCE OF DATA	DIMENSION(S) OF PROGRESS MEASURED	REGULARLY COLLECTED?
<b>E. River- and Stream-bank Restoration</b>				
E.1 River- and stream-bank restoration	Percent of river and stream banks with tree cover within 30 m	To Be Determined	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.	No
<b>F. Budget Allocated to Restoration</b>				
F.1 Government allocation of budget toward restoration-related projects	Percent of budget allocation per ministry that is earmarked to fund restoration-related projects	To Be Determined	Indicates overall governmental support for National FLR Strategy and the targets it sets.	No

### 3.2 Proposed Additional Indicators

As described in Section 2.2, during the screening process for selecting core indicators, priority was given to indicators that were already being collected through other monitoring strategies and surveys to avoid duplication of similar efforts and to make the most of the limited resources available for monitoring FLR. Such an approach meant, however, that some parts of the framework were less robust than others, as existing data collection activities for some goals and interventions remain limited.

During the consultation process, stakeholders identified options for expanding the proposed core indicators beyond those listed in Section 3.1 if additional resources and investment in data collection were available. For example, stakeholders suggested that an indicator of soil organic carbon would be valuable for assessing the effectiveness of restoration interventions at improving soil quality and productivity. However, data on soil organic carbon is not adequately or consistently collected in the frameworks of any existing policies, strategies, or surveys and the data collection process tends to be relatively costly and time intensive.

Table 5 includes proposed additional indicators that measure dimensions of progress beyond those covered by the core indicators that would help to make the framework more comprehensive if resources were available to support their collection. The indicators in the table were included based on feedback collected during the May 2018 workshop in Lilongwe together with additional research from the team, which included examining the specific contributions of FLR to national restoration goals (Table 1) and the causal pathways that connect restoration interventions to goals (Figures 5 to 9) to assess any gaps in the proposed framework. Academic studies, grey literature, monitoring frameworks from other countries, and interviews of experts in restoration-related fields contributed to the compilation of additional indicators. As with the 30 core indicators, these proposed additional indicators were screened against the five assessment criteria of relevance, reliability, quality, sensitivity, and ease of communication.

As the indicators in Table 5 are not being monitored under existing strategies, a data collection plan would need to be developed and established for each indicator. Many of these proposed indicators would be collected through survey methods and could be incorporated into the next Integrated Household Survey, for example. Others, especially those related to climate resilience, water quality, and energy resources, will require more specialized data collection plans.

**Table 5 | Proposed Additional Indicators of Progress on National Restoration Goals**

INDICATOR	METRIC	DIMENSION(S) OF PROGRESS MEASURED	PROPOSED DATA COLLECTION METHOD
<b>1. Improve Food Security</b>			
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
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
<b>2. Increase Energy Resources</b>			
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
<b>3. Increase Climate Resilience</b>			
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
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
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
<b>4. Improve Water Quality and Supply</b>			
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

**Table 5 | Proposed Additional Indicators of Progress on National Restoration Goals**

INDICATOR	METRIC	DIMENSION(S) OF PROGRESS MEASURED	PROPOSED DATA COLLECTION METHOD
<b>4. Improve Water Quality and Supply, continued</b>			
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)	Field measurements
<b>5. Conserve and Restore Biodiversity</b>			
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
<b>6. Ensure Gender Equity and Equality</b>			
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
<b>7. Alleviate Poverty</b>			
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

Source: WRI.

# 4. INTERPRETING MONITORING DATA

Since many of the core indicators proposed for the FLR monitoring framework are already being collected by existing surveys and monitoring efforts, some data are immediately available for analyzing trends in indicators over time. This information can be used to plan restoration-related activities that target specific locations where progress on implementation of FLR interventions or national goals has been limited to date, or to identify which goals need the most investment to achieve progress. A full compilation of these available data can be found in Appendix B. The data are sourced primarily from the Integrated Household Survey 4 (IHS4) that was conducted in 2016–2017. Where available, data from prior surveys such as IHS3 (2010–2011) were also included to show trends. A few examples of key findings from analysis of the data at the national level and for the Machinga district are provided in this section. It is important to note that benchmarks of progress for these indicators have not yet been set for the monitoring framework. As a result, this section presents some examples of how monitoring data could be interpreted to show progress toward goals or provide guidance on adaptively managing FLR implementation, but it does not seek to draw any conclusions on whether specific benchmarks are being met.

## 4.1 Examples of Data Interpretation at the National Level

### 4.1.1 Indicator 1.4: Access to Extension Services

Indicator 1.4 provides information on the proportion of households that received advice from extension services on forestry and agroforestry, and the proportion of households that followed the advice (Table 6). The data show that **the reach of extension services is still low** across Malawi, with forestry services reaching only about eight percent of households and agroforestry reaching only four percent. In terms of following the advice, the uptake of forestry services is higher at nearly 63 percent versus only 50 percent for agroforestry. These results indicate that extension services are being relatively effective at providing advice that households find useful and are willing to implement, but significant investment is needed to reach a wider audience. More analysis of the services themselves would likely reveal which factors influence why households are choosing not to implement the advice, and why forestry services are more likely to be implemented than agroforestry.

Table 6 | Proportion of households that received advice from extension services on forestry, agroforestry, and proportion of households that followed the advice (Indicator 1.4)

	FORESTRY	PROPORTION FOLLOWED	AGROFORESTRY	PROPORTION FOLLOWED
<b>IHS4 2016–2017</b>				
Malawi	7.9	62.7	4.2	50.1
Male	8.4	62.2	4.7	49.4
Female	6.8	64.5	3.1	52.8

Source: Adapted from the National Statistical Office's *Integrated Household Survey 4* (2016–2017).



The data on extension services also reveal interesting results from a gender perspective. While fewer women than men are receiving either forestry or agroforestry extension services, they are consistently more likely to follow the advice. These results show that the adjustments to the provision of extension services to **target a higher proportion of women** would also lead to higher proportion of households implementing the advice.

#### 4.1.2 Indicator 3.1: Recent shocks to the household

To provide insight into restoration’s influence on climate resilience, Indicator 3.1 (Table 7) provides data on the proportion of households severely affected by shocks during the last 12 months. At the national level in Malawi, **the high cost of food was the most prevalent shock**, followed closely by irregular rains, unusually high cost of

agricultural inputs (i.e., fertilizers), and drought. Floods, landslides, and the unusually low price of agricultural outputs were reported at relatively low levels.

These results have important implications that should encourage tailoring of restoration interventions to address these shocks. More investment in interventions such as agroforestry and conservation agriculture, which are proven to enrich soils and decrease reliance on fertilizers, will have a significant influence on increasing households’ resilience to shocks related to the high cost of agricultural inputs. Furthermore, by helping retain nutrients and water in the soil, the interventions will increase resilience to droughts and irregular rains on agricultural plots. Overall, these interventions will help stabilize crop yields, which will in turn stabilize food prices, addressing the shock most widely reported as a concern across Malawi.

Table 7 | Proportion of households severely affected by shocks during the last 12 months (Indicator 3.1)

	DROUGHT	IRREGULAR RAINS	FLOODS	LANDSLIDES	UNUSUALLY HIGH COST OF AGRICULTURAL INPUTS	UNUSUALLY HIGH COST OF FOOD	UNUSUALLY LOW PRICE OF AGRICULTURAL OUTPUTS
<b>IHS4 2016–2017</b>							
Malawi	36.2	57.8	4.3	1.5	45.6	68.4	12.5
Male	34.6	54.9	4.5	1.5	43.9	68.2	12.9
Female	39.3	63.3	3.8	1.6	48.7	68.9	11.8
	DROUGHT AND IRREGULAR RAINS		FLOODS AND LANDSLIDES		UNUSUALLY HIGH COST OF AGRICULTURAL INPUTS	UNUSUALLY HIGH COST OF FOOD	UNUSUALLY LOW PRICE OF AGRICULTURAL OUTPUTS
<b>IHS3 2010–2011</b>							
Malawi	37.8		3.5		26.2	24.5	12.2
Male	36.2		3.6		26.1	23.8	12.9
Female	42.8		3.5		26.4	26.5	10.0

Note: In IHS3, the survey defined shocks as “Droughts and Irregular Rains” and “Floods and Landslides.” In IHS4, these shocks were divided into “Droughts,” “Irregular Rains,” “Floods,” and “Landslides.”

Source: Adapted from the National Statistical Office’s *Integrated Household Survey 4* (2016–2017) and *Integrated Household Survey 3* (2010–2011).

### 4.1.3 Indicator D.1: Soil and water conservation interventions

Indicator D.1 provides data on the application of soil and water conservation interventions related to the proportion of agricultural plots that have implemented erosion control or water harvesting interventions (Table 8). Nationally, nearly 57 percent of Malawi’s agricultural plots are reported to have no erosion control based on data from 2016–2017. The **most common type of intervention is erosion control bunds**, which are applied on 22 percent of plots. At a distant second is vetiver grass (8 percent), followed by drainage ditches (5 percent), terraces (3 percent), and water harvest bunds (3 percent). These results indicate that more investment in outreach is needed to promote the benefits of these interventions for preventing erosion and improving crop yields.

While adoption rates of soil and water conservation interventions are low overall, there is modest improvement from the previous data collection period of the IHS in 2010–2011. Data from this period showed that 59 percent of plots had no erosion control measures in place, which indicates lower rates of adoption than the 2016–2017 period. There was also a shift in the types of interventions being implemented, with less implementation of drainage ditches, vetiver grass,

and gabions/sandbags, but slightly more implementation of erosion control bunds, terraces, and water harvest bunds.

The data also reveal interesting trends when comparing implementation by gender. Men consistently adopted all types of soil and water conservation interventions at a higher rate than women during data collection periods. Further exploration into why adoption rates are lower among women would be important to pursue. It is possible that women are not being targeted enough by extension services or NGOs to learn how to implement these types of interventions and understand their benefits.

## 4.2 Examples of Data Interpretation for the Machinga District

Project planning and implementation occurs mainly at the district level in Malawi. As a result, it is important to monitor progress on restoration at this jurisdictional level to understand trends and adapt projects to meet restoration goals. A few examples of how monitoring data across themes of food security and energy resources could be interpreted for the Machinga district are discussed in this section.

Table 8 | Proportion of agricultural plots by erosion control/water harvesting intervention (Indicator D.1)

	NO EROSION CONTROL	TERRACES	EROSION CONTROL BUNDS	GABIONS/SANDBAGS	VETIVER GRASS	TREE BELTS	WATER HARVEST BUNDS	DRAINAGE DITCHES	OTHER
<b>IHS4 2016–2017</b>									
Malawi	56.8	3.4	22.1	1.3	7.7	0.8	2.7	5.1	2.4
Male	55.3	3.4	23.4	1.3	8.0	0.9	3.0	4.8	2.3
Female	60.5	3.2	18.8	1.1	6.9	0.7	2.0	5.9	2.5
<b>IHS3 2010–2011</b>									
Malawi	59.4	4.0	25.8	0.5	5.8	0.9	4.5	1.9	0.5
Male	58.5	4.2	25.8	0.5	6.1	0.9	4.5	1.9	0.6
Female	62.4	3.1	24.9	0.4	4.1	0.9	4.3	2.0	0.3

Source: Adapted from the National Statistical Office’s *Integrated Household Survey 4* (2016–2017) and *Integrated Household Survey 3* (2010–2011).



#### 4.2.1 Indicators of Food Security

Given the widespread reliance on subsistence agriculture in Machinga, **food security is an important issue for restoration to address in the district.** In analyzing the indicators of food security for the Machinga district compared to the national average for Malawi (Table 9), Machinga is worse off than the rest of Malawi in terms of households' inadequate consumption of food. Nearly 85 percent of Machinga households reported inadequate consumption of food, while the national average was 64 percent (Indicator 1.1). In comparing results from several prior IHS surveys (2010–2011 and 2004–2005), Machinga has consistently reported higher rates of food insecurity than the national average, and the number of households that are food insecure has doubled since 2010–2011.

For the proportion of each plot by type of crop cultivated, Machinga households grow more maize proportionally than the national average for Malawi (82 percent versus 76 percent, respectively) and significantly more pigeon peas (54 percent vs. 19 percent) and rice (12 percent vs. 3 percent) (Indicator 1.2). Machinga households grow significantly fewer crops of tobacco, beans,

and soya beans, while groundnut cultivation is about the same as the national average. Planting a variety of crops is important for both food security and climate resilience, and Machinga's above-average numbers for crop variety indicate a positive trend toward improvement for these goals.

In terms of soil quality, households in Machinga have consistently reported their soils being of lower quality than the national average for Malawi, where soils are less likely to be rated as "good" as opposed to "fair" or "poor." On the positive side, more respondents reported their soils being good in 2016–2017 (36 percent) than in 2010–2011 (25 percent), indicating that progress on improving soil quality is being achieved. Regarding the proportion of households that receive extension services on forestry and agroforestry and whether they followed the advice (Indicator 1.4), in Machinga the results show that households received more extension services than the national average. However, they were much less likely to follow the advice, particularly for agroforestry. These results indicate that more investment in understanding what is causing the lack of uptake of advice from agricultural extension services is critical for increasing the success of interventions and improving the food security situation for Machinga.

**Table 9 | Food Security Indicators for the Machinga District Compared to Malawi's National Average**

<b>Indicator 1.1 Proportion of households reporting inadequate consumption of food</b>								
SOURCE	MALAWI				MACHINGA			
IHS4 2016–17	63.8				84.8			
IHS3 2010–11	38.3				41.3			
IHS2 2004–05	56.5				63.6			

<b>Indicator 1.2 Proportion of plots by type of crop cultivated</b>								
SOURCE	REGION	MAIZE	PIGEON PEAS	GROUNDNUTS	TOBACCO	BEANS	RICE	SOYA BEANS
IHS4 2016–17	Malawi	75.7	19.3	10.2	4.2	9.3	3.0	6.8
	Machinga	82.3	54.0	10.0	0.8	0.2	12.0	0.0

<b>Indicator 1.3 Proportion of agricultural plots by soil quality</b>				
SOURCE	REGION	GOOD	FAIR	POOR
IHS4 2016–17	Malawi	51.3	36.2	12.5
	Machinga	35.9	45.7	18.5
IHS3 2010–11	Malawi	46.6	42.0	11.4
	Machinga	25.4	63.5	11.1

<b>Indicator 1.4 Proportion of households that received advice from extension services on forestry, agroforestry, and proportion of households that followed the advice</b>					
SOURCE	REGION	FORESTRY	PROPORTION ALLOWED	AGROFORESTRY	PROPORTION ALLOWED
IHS4 2016–17	Malawi	7.9	62.7	4.2	50.1
	Machinga	15.4	50.9	7.0	26.9

Source: Adapted from the National Statistical Office's *Integrated Household Survey 4* (2016–2017) and *Integrated Household Survey 3* (2010–2011).

#### 4.2.2 Indicators of Energy Resources

In analyzing the indicators related to energy resources (Table 10), the results show a **higher-than-average dependence on firewood for fuel** across the district. In Machinga, nearly all households (94 percent) rely on firewood as their source of cooking fuel while the national average is 80 percent. The remaining six percent of households reported using charcoal for cooking and no households in Machinga reported using electricity, which are both below the national average (Indicator 2.2). Meanwhile, 34 percent of households collect their own firewood while the national average

is only 15 percent. The proportion of households collecting firewood has increased 15 percentage points in Machinga since 2010/2011, while the national average has decreased by four points (Indicator 2.1). Given these statistics, access to sustainable sources of firewood is critical for restoration initiatives to address in the district.

The majority of households are using unfarmed areas of the community and forest reserves as their source of firewood, while adoption of community woodlots is very low compared to the national average. More households utilize private woodlots (6 percent) than community woodlots (3

**Table 10 | Indicators of Energy Resources for the Machinga District Compared to Malawi's National Average**

<b>Indicator 2.1 Proportion of persons aged between 15-64 years who collect firewood and average daily hours spent on collection</b>						
SOURCE	REGION	PROPORTION COLLECTING			AVERAGE HOURS SPENT ON COLLECTION, AMONG THOSE COLLECTING	
IHS4 2016-17	Malawi	15.2			1.3	
	Machinga	34.3			1.3	
IHS3 2010-11	Malawi	19.3			1.1	
	Machinga	20.2			1.5	

<b>Indicator 2.2 Proportion of households by main source of fuel for cooking</b>				
SOURCE	REGION	FIREWOOD	CHARCOAL	ELECTRICITY
IHS4 2016-17	Malawi	80.5	16.0	1.9
	Machinga	94.2	5.8	0.0
IHS3 2010-11	Malawi	87.7	8.9	2.5
	Machinga	95.6	3.2	0.0

<b>Indicator 2.3 Proportion of households by collection source of firewood</b>						
SOURCE	REGION	OWN WOODLOT	COMMUNITY WOODLOT	FOREST RESERVE	UNFARMED AREAS OF COMMUNITY	OTHER
IHS4 2016-17	Malawi	5.3	14.0	13.2	61.2	6.3
	Machinga	6.1	3.6	18.1	61.4	10.8
IHS3 2010-11	Malawi	14.7	16.7	18.7	46.5	3.4
	Machinga	11.5	10.9	38.3	39.3	0.0

Source: Adapted from the National Statistical Office's *Integrated Household Survey 4* (2016-2017) and *Integrated Household Survey 3* (2010-2011).

percent) (Indicator 2.3). Thus, there is significant opportunity for investing more resources toward improving the rate of adoption of both private and community woodlots to relieve pressure on forest reserves and community lands, which would also reduce the number of hours spent on firewood collection.

Overall, these results show that Machinga is behind the curve for Malawi when it comes to reducing dependence on firewood in favor of electricity or other alternative energy sources.

They also show that there is room to adopt strategies for reducing dependence on firewood and to adapt restoration project planning to improve the availability of firewood from sustainable sources. In addition, more resources should be invested in extension services to increase the uptake of agroforestry and forestry interventions within communities.

# 5. RECOMMENDATIONS AND NEXT STEPS

The framework proposed as part of this study provides the core indicators, metrics, data sources, and some baseline data for monitoring progress on FLR in Malawi. An important next step in developing the monitoring system will be to **convene stakeholders to agree upon and set measurable, achievable benchmarks for progress on each indicator using the baseline data**. These benchmarks will guide progress on restoration activities and indicate whether these activities are achieving their potential or adjustments need to be made.

The following step will be to **develop and implement the components of the system for collecting, storing, and analyzing the indicator data**. This system would include establishing an open repository of data and developing a communications plan for reporting progress toward the benchmarks set for restoration goals and intervention targets. The latter is particularly important for adapting restoration projects and implementation plans if progress toward restoration goals is not meeting expectations.

In the workshops and consultations conducted for this report, stakeholders have acknowledged that a multi-sectoral approach is critical to the success of the monitoring system, given that so many different government agencies are involved in restoration and have a stake in the progress toward restoration-related goals (see Figure 3, Section 1). The Department of Forestry, given their leadership on FLR activities thus far, has offered to host the monitoring system and lead the next steps on implementation, but they have widely acknowledged that any successful implementation relies on the input and engagement of multiple ministries, particularly the Ministry of Agriculture, Irrigation and Water Development; the Ministry of Finance, Economic Planning and Development; the Ministry of Lands, Housing and Urban Development; the Ministry of Local Government and Rural Development; and the Department of Disaster Management Affairs. Without their input, advisement, and support, the monitoring system will not be sustainable and progress

on restoration goals would be significantly more difficult to achieve. Therefore, it is recommended that **a critical next step is to secure high-level buy-in for the framework from the ministers or permanent secretaries of each of these key ministries** that shows their collective support for its implementation.

After achieving this support, it will be important to **establish a multi-sectoral FLR Monitoring System Task Force dedicated to developing the FLR monitoring system**. The Task Force would be composed of technical staff with directives from their ministries to support activities such as establishing a plan for long-term funding support and developing a work plan for implementing the monitoring system.

While the implementation of the system is outside the scope of this report, this proposed framework provides the blueprint for the monitoring system upon which to build. Furthermore, the process for developing the framework, particularly the stakeholder discussions and consultations, highlighted key insights of what will drive a successful monitoring system in Malawi. Investing in restoration monitoring should help provide reliable evidence to guide the implementation of Malawi's National FLR Strategy and accelerate positive local successes.



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# APPENDIX A: POLICIES, PLANS, AND STRATEGIES REVIEWED

Over 30 policies, plans, and strategies were reviewed to find the most relevant restoration indicators. The full list is included below along with the department in charge of each document and the year each document was published. The files are divided into two categories: national-level documents and district-level documents (from the districts of Machinga and Ntchisi).

## National-level Documents

- Department of Disaster Management Affairs with UNEP, National Resilience Strategy (2018–2013): Implementation Plan & Strategy
- Environmental Affairs Department, National Biodiversity Strategy and Action Plan II (2015–2025)
- Environmental Affairs Department, National Climate Change Investment Plan (2013–2018)
- Environmental Affairs Department, National Climate Change Policy (2012)
- Department of Forestry, National Forest and Landscape Restoration Strategy (2017)
- Department of Forestry, National Restoration Opportunities Assessment (2017)
- Department of Forestry, National Charcoal Strategy (2017)
- National Statistical Office, Integrated Household Survey (2016–2017, 2010–2011, 2004–2005)

- National Statistical Office, Welfare Monitoring Survey (2014, 2011, 2009)
- Land Resources Conservation Department, Malawi National Agriculture Policy (2016, 2010)
- Land Resources Conservation Department, Malawi Agricultural Sector Wide Approach (ASWAP) (2011, 2009)
- Land Resources Conservation Department, National Agricultural Investment Plan (NAIP) (2018)
- Determinants of Adoption of Conservation Agriculture (CA) (2012)
- Malawi Vision 2020 (2000)
- Malawi State of Environment and Outlook (2010)
- Malawi Millennium Development Goal Report (2014)
- UNDP Millennium Development Goal Endline Report (2015)

## District-level Documents

- Machinga District Development Plan (2013-2018)
- Machinga District Council M&E Framework (2013-2018)
- Machinga District Performance Indicators
- Machinga District Project Indicators
- Ntchisi District Development Plan (2013-2018)



## APPENDIX B: BASELINE DATA FOR CORE INDICATORS

Appendix B includes a compilation of data for the core indicators that are already being collected through existing surveys and therefore have baseline data available. The indicators in this compilation are organized according to restoration goal and include those indicators sourced from the National Statistical Office's Integrated Household Survey (IHS). The most recent data are from IHS4, which was conducted in 2016–2017. Where available, earlier survey data are included, such as from IHS3

(2010–2011) or IHS2 (2004–2005) for comparison. Data are included as a national aggregate for Malawi, and also disaggregated by gender (male/female) to demonstrate trends in gender equity and social inclusion. Data for all districts are available from the IHS surveys. As the Machinga district was chosen as the case-study district for this report, data unique to the Machinga district are reported in these tables as well.

**Table B-1 | Data for Core Indicators by National Restoration Goal**

<b>1. Improve Food Security</b>								
<b>1.1 Welfare of basic needs: Proportion of households reporting inadequate consumption of food</b>								
<b>SOURCE</b>	<b>MALAWI</b>	<b>MALE</b>	<b>FEMALE</b>	<b>MACHINGA</b>				
<b>IHS4 2016–17</b>	<b>63.8</b>	<b>60.8</b>	<b>71.1</b>	<b>84.8</b>				
IHS3 2010–11	38.3	35.8	46.3	41.3				
IHS2 2004–05	56.5	54.6	62.9	63.6				
<b>Indicator 1.2. Types of crops cultivated: Proportion of plots by type of crop cultivated</b>								
<b>SOURCE</b>	<b>REGION/ GENDER</b>	<b>MAIZE</b>	<b>PIGEON PEAS</b>	<b>GROUNDNUTS</b>	<b>TOBACCO</b>	<b>BEANS</b>	<b>RICE</b>	<b>SOYA BEANS</b>
<b>IHS4 2016–17</b>	<b>Malawi</b>	<b>75.7</b>	<b>19.3</b>	<b>10.2</b>	<b>4.2</b>	<b>9.3</b>	<b>3.0</b>	<b>6.8</b>
	<b>Male</b>	<b>73.0</b>	<b>17.1</b>	<b>10.1</b>	<b>5.4</b>	<b>9.1</b>	<b>3.1</b>	<b>7.3</b>
	<b>Female</b>	<b>82.7</b>	<b>24.9</b>	<b>10.4</b>	<b>1.3</b>	<b>9.7</b>	<b>2.6</b>	<b>5.4</b>
	<b>Machinga</b>	<b>82.3</b>	<b>54.0</b>	<b>10.0</b>	<b>0.8</b>	<b>0.2</b>	<b>12.0</b>	<b>0.0</b>
IHS3 2010–11	Malawi	70.9	16.4	15.6	8.5	5.7	2.8	4.9
	Male	68.0	14.7	15.1	10.4	5.5	2.7	4.3
	Female	78.9	21.3	17.0	3.3	6.2	3.1	6.4
	Southern Region	86.3	41.2	10.7	3.2	5.4	2.7	12.2

Table B-1 | Data for Core Indicators by National Restoration Goal

1.3 Soil quality: Proportion of agricultural plots by soil quality					
SOURCE	REGION/GENDER	GOOD	FAIR	POOR	
<b>IHS4 2016-17</b>	<b>Malawi</b>	<b>51.3</b>	<b>36.2</b>	<b>12.5</b>	
	<b>Male</b>	<b>51.7</b>	<b>35.8</b>	<b>12.4</b>	
	<b>Female</b>	<b>49.2</b>	<b>36.8</b>	<b>13.9</b>	
	<b>Machinga</b>	<b>35.9</b>	<b>45.7</b>	<b>18.5</b>	
IHS3 2010-11	Malawi	46.6	42.0	11.4	
	Male	47.6	41.5	11.0	
	Female	43.8	43.7	12.6	
	Machinga	25.4	63.5	11.1	
1.4 Access to extension services: Proportion of households that received advice from extension services on forestry, agroforestry, and proportion of households that followed the advice					
SOURCE	REGION/GENDER	FORESTRY	PROPORTION FOLLOWED	AGROFORESTRY	PROPORTION FOLLOWED
<b>IHS4 2016-17</b>	<b>Malawi</b>	<b>7.9</b>	<b>62.7</b>	<b>4.2</b>	<b>50.1</b>
	<b>Male</b>	<b>8.4</b>	<b>62.2</b>	<b>4.7</b>	<b>49.4</b>
	<b>Female</b>	<b>6.8</b>	<b>64.5</b>	<b>3.1</b>	<b>52.8</b>
	<b>Machinga</b>	<b>15.4</b>	<b>50.9</b>	<b>7.0</b>	<b>26.9</b>
SOURCE	REGION/GENDER	FORESTRY	ADVICE WAS USEFUL	AGROFORESTRY	ADVICE WAS USEFUL
IHS3 2010-11	Malawi	13.8	77.0	N/A	
	Male	14.8	76.3		
	Female	10.6	79.9		
	Machinga	1.3	40		

Table B-1 | Data for Core Indicators by National Restoration Goal

<b>2. Increase Energy Resources</b>						
<b>2.1 Proportion of persons aged between 15-64 years who collect firewood and average daily hours spent on collection</b>						
<b>SOURCE</b>	<b>REGION/GENDER</b>	<b>PROPORTION COLLECTING FIREWOOD</b>	<b>AVERAGE HOURS SPENT ON FIREWOOD COLLECTION AMONG THOSE COLLECTING</b>			
<b>IHS4 2016-17</b>	<b>Malawi</b>	<b>15.2</b>	<b>1.3</b>			
	<b>Male</b>	<b>14.2</b>	<b>1.3</b>			
	<b>Female</b>	<b>18.6</b>	<b>1.3</b>			
	<b>Machinga</b>	<b>34.3</b>	<b>1.3</b>			
IHS3 2010-11	Malawi	19.3	1.1			
	Male	18.6	1.1			
	Female	22.1	1.1			
	Machinga	20.2	1.5			
<b>2.2 Source of fuels used for cooking: Proportion of households by main source of fuel for cooking</b>						
<b>SOURCE</b>	<b>REGION/GENDER</b>	<b>FIREWOOD</b>	<b>CHARCOAL</b>	<b>ELECTRICITY</b>		
<b>IHS4 2016-17</b>	<b>Malawi</b>	<b>80.5</b>	<b>16.0</b>	<b>1.9</b>		
	<b>Male</b>	<b>78.6</b>	<b>18.0</b>	<b>2.1</b>		
	<b>Female</b>	<b>85.1</b>	<b>11.2</b>	<b>1.6</b>		
	<b>Machinga</b>	<b>94.2</b>	<b>5.8</b>	<b>0.0</b>		
IHS3 2010-11	Malawi	87.7	8.9	2.5		
	Male	86.6	9.9	2.6		
	Female	91.1	5.6	2.0		
	Machinga	95.6	3.2	0.0		
<b>2.3 Source of firewood: Proportion of households by collection source of firewood</b>						
<b>SOURCE</b>	<b>REGION/GENDER</b>	<b>OWN WOODLOT</b>	<b>COMMUNITY WOODLOT</b>	<b>FOREST RESERVE</b>	<b>UNFARMED AREAS OF COMMUNITY</b>	<b>OTHER</b>
<b>IHS4 2016-17</b>	<b>Malawi</b>	<b>5.3</b>	<b>14.0</b>	<b>13.2</b>	<b>61.2</b>	<b>6.3</b>
	<b>Male</b>	<b>5.5</b>	<b>13.9</b>	<b>13.4</b>	<b>60.9</b>	<b>6.3</b>
	<b>Female</b>	<b>5.0</b>	<b>14.4</b>	<b>12.6</b>	<b>61.9</b>	<b>6.2</b>
	<b>Machinga</b>	<b>6.1</b>	<b>3.6</b>	<b>18.1</b>	<b>61.4</b>	<b>10.8</b>
IHS3 2010-11	Malawi	14.7	16.7	18.7	46.5	3.4
	Male	14.8	16.7	18.9	46.1	3.4
	Female	14.5	16.8	18.1	47.6	3.1
	Machinga	11.5	10.9	38.3	39.3	0.0

Table B-1 | Data for Core Indicators by National Restoration Goal

<b>3. Increase Climate Resilience</b>							
<b>3.1 Recent shocks to the household: Proportion of households severely affected by shocks during the last 12 months</b>							
	<b>DROUGHT</b>	<b>IRREGULAR RAINS</b>	<b>FLOODS</b>	<b>LANDSLIDES</b>	<b>UNUSUALLY HIGH COST OF AGRICULTURAL INPUTS</b>	<b>UNUSUALLY HIGH COST OF FOOD</b>	<b>UNUSUALLY LOW PRICE OF AGRICULTURAL OUTPUTS</b>
<b>IHS4 2016–2017</b>							
<b>Malawi</b>	<b>36.2</b>	<b>57.8</b>	<b>4.3</b>	<b>1.5</b>	<b>45.6</b>	<b>68.4</b>	<b>12.5</b>
<b>Male</b>	<b>34.6</b>	<b>54.9</b>	<b>4.5</b>	<b>1.5</b>	<b>43.9</b>	<b>68.2</b>	<b>12.9</b>
<b>Female</b>	<b>39.3</b>	<b>63.3</b>	<b>3.8</b>	<b>1.6</b>	<b>48.7</b>	<b>68.9</b>	<b>11.8</b>
	<b>DROUGHT AND IRREGULAR RAINS</b>		<b>FLOODS AND LANDSLIDES</b>		<b>UNUSUALLY HIGH COST OF AGRICULTURAL INPUTS</b>	<b>UNUSUALLY HIGH COST OF FOOD</b>	<b>UNUSUALLY LOW PRICE OF AGRICULTURAL OUTPUTS</b>
<b>IHS3 2010–2011</b>							
Malawi	37.8		3.5		26.2	24.5	12.2
Male	36.2		3.6		26.1	23.8	12.9
Female	42.8		3.5		26.4	26.5	10.0
<b>4. Improve Water Quality and Supply</b>							
<b>4.1 Access to safe drinking water: Proportion of households with access to safe water</b>							
<b>SOURCE</b>	<b>MALAWI</b>		<b>MALE</b>		<b>FEMALE</b>		<b>MACHINGA</b>
<b>IHS4 2016–17</b>	<b>87.1</b>		<b>87.1</b>		<b>87.3</b>		<b>81.2</b>
IHS3 2010–11	78.7		77.7		82.0		75.8
<b>4.2 Domestic activities–water collection: Proportion of persons aged between 15–64 years who collected water and average daily hours spent on collection</b>							
<b>SOURCE</b>	<b>REGION/GENDER</b>		<b>PROPORTION COLLECTING WATER</b>		<b>AVERAGE HOURS SPENT ON WATER COLLECTION AMONG THOSE COLLECTING</b>		
<b>IHS4 2016–17</b>	<b>Malawi</b>		<b>41.0</b>		<b>1.1</b>		
	<b>Male</b>		<b>38.3</b>		<b>1.1</b>		
	<b>Female</b>		<b>50.5</b>		<b>1.1</b>		
	<b>Machinga</b>		<b>53.1</b>		<b>1.3</b>		
IHS3 2010–11	Malawi		49.5		0.7		
	Male		47.0		0.7		
	Female		60.8		0.7		
	Machinga		54.9		0.8		

Note for Table B-1.3: In IHS3, the survey defined shocks as “Droughts and Irregular Rains” and “Floods and Landslides.” In IHS4, these shocks were divided into “Droughts,” “Irregular Rains,” “Floods,” and “Landslides.”

Table B-1 | Data for Core Indicators by National Restoration Goal

4.3 Level of erosion: Proportion of agricultural plots by extent of erosion					
SOURCE	REGION/ GENDER	NO EROSION	LOW	MODERATE	HIGH
IHS4 2016-17	<b>Malawi</b>	<b>56.3</b>	<b>29.0</b>	<b>8.4</b>	<b>6.4</b>
	<b>Male</b>	<b>56.3</b>	<b>29.3</b>	<b>8.4</b>	<b>6.0</b>
	<b>Female</b>	<b>56.3</b>	<b>28.3</b>	<b>8.3</b>	<b>7.1</b>
	<b>Machinga</b>	<b>43.2</b>	<b>50.5</b>	<b>3.5</b>	<b>2.7</b>
IHS3 2010-11	Malawi	61.4	26.5	7.2	5.0
	Male	61.3	26.5	7.1	5.1
	Female	61.7	26.3	7.3	4.7
	Machinga	88.4	6.9	4.2	0.5
5. Conserve and Restore Biodiversity <i>No data currently available.</i>					
6. Ensure Gender Equity and Equality					
6.1 Ownership/management of plots: Primary plot ownership by gender					
SOURCE	REGION	EXCLUSIVELY MALE OWNED	EXCLUSIVELY FEMALE OWNED	MALE AND FEMALE JOINTLY OWNED	NOT OWNED
IHS4 2016-17	<b>Malawi</b>	<b>24.3</b>	<b>34.7</b>	<b>17.5</b>	<b>23.5</b>
	<b>Machinga</b>	<b>11.7</b>	<b>39.9</b>	<b>21.0</b>	<b>27.4</b>
IHS3 2010-11	Malawi	34.6	35.1	11.3	19.1
7. Alleviate Poverty					
7.1 Perception of household current economic well-being: Percentage distributions of household perceived current economic well-being					
SOURCE	REGION/GENDER	VERY POOR	POOR	AVERAGE	RICH
IHS4 2016-17	<b>Malawi</b>	<b>35.8</b>	<b>38.5</b>	<b>18.7</b>	<b>7.0</b>
	<b>Male</b>	<b>31.8</b>	<b>40.0</b>	<b>20.4</b>	<b>7.8</b>
	<b>Female</b>	<b>45.8</b>	<b>34.8</b>	<b>15.5</b>	<b>5.0</b>
	<b>Machinga</b>	<b>51.6</b>	<b>34.6</b>	<b>12.9</b>	<b>1.0</b>
IHS3 2010-11	Malawi	33.1	39.7	26.5	0.7
	Male	29.2	40.8	29.2	0.8
	Female	45.5	36.4	17.8	0.3
	Machinga	18.6	34.5	46.0	0.9

Table B-1 | Data for Core Indicators by National Restoration Goal

7.2 Enterprises engaged in sale of forest-based products: Proportion of enterprises that sell forest-based products and source of the products							
SOURCE	REGION/ GENDER	PROPORTION OF ENTERPRISES THAT SELL FOREST- BASED PRODUCTS	SOURCE OF PRODUCTS				
			OWN LAND	FOREST/ WILD PARK RESERVE	COMMUNAL LAND	PURCHASED FROM SOMEONE	OTHER
<b>IHS4 2016-17</b>	<b>Malawi</b>	<b>11.9</b>	<b>4.4</b>	<b>21.9</b>	<b>15.9</b>	<b>53.8</b>	<b>4.0</b>
	<b>Male</b>	<b>12.1</b>	<b>4.8</b>	<b>21.0</b>	<b>13.8</b>	<b>57.3</b>	<b>3.1</b>
	<b>Female</b>	<b>11.0</b>	<b>3.0</b>	<b>25.1</b>	<b>24.2</b>	<b>40.5</b>	<b>7.3</b>
	<b>Machinga</b>	<b>5.7</b>	<b>0.0</b>	<b>33.2</b>	<b>20.0</b>	<b>46.7</b>	<b>0.0</b>
IHS3 2010-11	Malawi	13.2	6.2	25.7	12.7	51.7	3.8
	Male	13.9	5.0	23.6	11.9	55.9	3.6
	Female	10.0	14.0	39.4	17.5	24.2	4.9
	Southern Region	13.4	36.0	22.8	15.1	26.1	0.0
<b>A. Agricultural Technologies</b>							
A.3 Agroforestry adoption: Average proportion of households in a community that practice agroforestry							
SOURCE		MALAWI			MACHINGA		
<b>IHS4 2016-17</b>		<b>10.9</b>			<b>3.4</b>		
<b>A.4 Legume cover crop adoption: Average proportion of households in a community that plant legume cover crops</b>							
SOURCE		MALAWI			MACHINGA		
<b>IHS4 2016-17</b>		<b>51.1</b>			<b>74.5</b>		
<b>B. Community Forests and Woodlots</b>							
B.2 Community forest interventions: Average proportion of land in a community that is forest and not used for agriculture							
SOURCE		MALAWI			MACHINGA		
<b>IHS4 2016-17</b>		<b>12.0</b>			<b>12.5</b>		
IHS3 2010-11		7.8			2.1		
<b>C. Forest Management</b> <i>No data currently available.</i>							

Table B-1 | Data for Core Indicators by National Restoration Goal

<b>D. Soil and Water Conservation</b>										
<b>D.1 Soil and water conservation interventions: Proportion of agricultural plots by erosion control/water harvesting intervention</b>										
SOURCE	REGION/ GENDER	NO EROSION CONTROL	TERRACES	EROSION CONTROL BUNDS	GABIONS/ SANDBAGS	VETIVER GRASS	TREE BELTS	WATER HARVEST BUNDS	DRAINAGE DITCHES	OTHER
<b>IHS4 2016-17</b>	<b>Malawi</b>	<b>56.8</b>	<b>3.4</b>	<b>22.1</b>	<b>1.3</b>	<b>7.7</b>	<b>0.8</b>	<b>2.7</b>	<b>5.1</b>	<b>2.4</b>
	<b>Male</b>	<b>55.3</b>	<b>3.4</b>	<b>23.4</b>	<b>1.3</b>	<b>8.0</b>	<b>0.9</b>	<b>3.0</b>	<b>4.8</b>	<b>2.3</b>
	<b>Female</b>	<b>60.5</b>	<b>3.2</b>	<b>18.8</b>	<b>1.1</b>	<b>6.9</b>	<b>0.7</b>	<b>2.0</b>	<b>5.9</b>	<b>2.5</b>
	<b>Machinga</b>	<b>46.5</b>	<b>9.0</b>	<b>29.0</b>	<b>2.8</b>	<b>1.5</b>	<b>0.7</b>	<b>4.9</b>	<b>6.2</b>	<b>1.7</b>
<b>IHS3 2010-11</b>	Malawi	59.4	4.0	25.8	0.5	5.8	0.9	4.5	1.9	0.5
	Male	58.5	4.2	25.8	0.5	6.1	0.9	4.5	1.9	0.6
	Female	62.4	3.1	24.9	0.4	4.1	0.9	4.3	2.0	0.3
	Machinga	87.4	1.5	8.3	0.6	0.9	0.0	0.2	1.7	0.0
<b>D.2 Barriers to soil and water conservation interventions: Proportion of households by reason for not investing in conservation structures on any plots owned</b>										
SOURCE	REGION/ GENDER	REQUIRES TOO MUCH LABOR	MATERIALS NOT AVAILABLE	MATERIALS TOO COSTLY	NO SOIL OR WATER EROSION PROBLEMS ON ANY PLOTS	TOO RISKY/ BENEFITS UNCLEAR	OTHER			
<b>IHS4 2016-17</b>	<b>Malawi</b>	<b>19.4</b>	<b>7.1</b>	<b>1.5</b>	<b>73.1</b>	<b>2.3</b>	<b>1.8</b>			
	<b>Male</b>	<b>18.2</b>	<b>7.2</b>	<b>1.5</b>	<b>74.1</b>	<b>2.4</b>	<b>1.7</b>			
	<b>Female</b>	<b>22.4</b>	<b>6.8</b>	<b>1.7</b>	<b>70.7</b>	<b>1.9</b>	<b>2.0</b>			
	<b>Machinga</b>	<b>20.5</b>	<b>10.0</b>	<b>4.0</b>	<b>68.3</b>	<b>2.8</b>	<b>1.6</b>			
<b>D.3 Bund adoption: Average proportion of households in a community that have earth or stone bunds</b>										
SOURCE	MALAWI					MACHINGA				
<b>IHS4 2016-17</b>	<b>10.6</b>					<b>17.0</b>				
<b>D.4 Terrace adoption: Average proportion of households in a community that have terraces</b>										
SOURCE	MALAWI					MACHINGA				
<b>IHS4 2016-17</b>	<b>5.5</b>					<b>19.3</b>				

## APPENDIX C: WORKSHOP PARTICIPANTS

### Preliminary Workshop to Develop a National Standard for Monitoring Forest Landscape Restoration in Malawi, 8 February 2018, Lilongwe

NAME	INSTITUTION
Ben Tonho	DPD Machinga
Bertha Kayuni	National Statistical Office
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Chaona Sinalo	Economic Planning & Development
Clifford Mkanthama	PERFORM
Emily Avera	World Resources Institute
F. Sakala / M. Zuze	Local Government & Rural Development
Geoffrey Longwe	Crops Department
Harry Chalira	Machinga DFO
J. Kanyangalazi	Land Resources Conservation Department
Joyce Njoloma	ICRAF
Judith Kamoto	LUANAR
M. Nkhoma	Crops Directorate
Marvin Mkondiwa	Machinga M&E Officer
Maureen Piyasi	PERFORM
Nyuma Muhgohgo	Department of Forestry
Ockens Chipeta	Disaster and Risk Management
Patrick Ndasauka	Gender and Community Development
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Tangu Tumeo	Department of Forestry
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## APPENDIX C: WORKSHOP PARTICIPANTS

Follow-up Workshop to Develop a National Standard for Monitoring Forest Landscape Restoration in Malawi, 18 May 2018, Lilongwe	
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