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PROTECTING ECOSYSTEMS AND RESTORING FORESTS IN MALAWI (PERFORM):

RESTORATION OPPORTUNITIES ASSESSMENT REPORT—LIWONDE FOREST RESERVE LANDSCAPE

MAY 2016

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LIST OF ACRONYMS

AFR100	African Forest Landscape Restoration Initiative
ALAP	The Africa Landscape Action Plan
ARI	African Restoration Initiative
BMZ	German Ministry for Economic Cooperation and Development
CDCS	Country Development and Cooperation Strategy
CBO	Community Based Organization
DoF	Department of Forestry
EI	Emmanuel International
EPA	Extension Planning Area
FAO	Food and Agriculture Organization of the United Nations
FMNR	Farmer-Managed Natural Regeneration
FR	Forest Reserve
FLR	Forest Landscape Restoration
GIS	Geographic Information System
GPFLR	Global Partnership on Forest Landscape Restoration
GoM	Government of Malawi
IUCN	International Union for the Conservation of Nature
MGDS	Malawi Growth and Development Strategy
PERFORM	Protecting Ecosystems and Restoring Forests in Malawi
REDD+	Reducing Emissions from Deforestation and Degradation of Forests
ROAM	Restoration Opportunities Assessment Methodology
TA	Traditional Authority
USAID	United States Agency for International Development
VFA	Village Forest Area
VNRMC	Village Nature Resource Management Committee
WRI	World Resources Institute

INTRODUCTION

1.0 SCOPE OF WORK

Protecting Ecosystems and Restoring Forests in Malawi (PERFORM) is a five-year project funded by USAID/Malawi and implemented by Tetra Tech ARD. PERFORM is a core component of environment programming under USAID's Development Objective Assistance Agreement with the Government of Malawi (GoM), and is the flagship implementation vehicle for the low-emissions partnership between the U.S. and the GoM. PERFORM was designed to align with Malawi's mid-term Growth and Development Strategy and to promote forest conservation and green growth. The objectives of the PERFORM project are:

1. Advance REDD+ (Reducing Emissions from Deforestation and Degradation) readiness
2. Increase low-emissions land use opportunities in targeted geographies
3. Improve low-emissions development capacities
4. Institute pathways for sustainability
5. Advance CDCS (Country Development and Cooperation Strategy) priorities of integration and institutional strengthening.

The World Resources Institute (WRI) provides short-term technical assistance to PERFORM and GoM partners in support of Objective 2 (see Appendix 1). This report presents the results of the **Pilot Application of the Restoration Opportunities Assessment Methodology (ROAM) in the Liwonde Forest Reserve Landscape**, which was carried out between October 2015 and February 2016 by Katie Reytar (GIS Analyst) and Bob Winterbottom (Forest Restoration/Natural Resource Management Specialist), part of WRI's Global Restoration Initiative Team[1].

The pilot application of ROAM in the Liwonde landscape employed stakeholder consultation, geospatial analysis and an assessment of enabling conditions to achieve the following objectives:

1. Identify the specific land use challenges in the landscape of the Liwonde Forest Reserve that restoration could help to address.
2. Identify the scope and extent of major types of restoration opportunities in the landscape.
3. Identify the key success factors and barriers to implementing restoration in the Liwonde landscape.
4. Generate actionable recommendations for scaling up restoration that address identified land use challenges and barriers to restoration at scale, and amplify key success factors.

This final report documents the outcomes of the stakeholders consultations that were held in the Liwonde landscape in October 2015 and February 2016, and reports the results of the geospatial analysis and assessment of enabling conditions in terms of the four objectives outlined above.

1.1 BACKGROUND AND CONTEXT

1.1.1 Forest Landscape Restoration

Much of the planet's lands and landscapes are becoming degraded, causing myriad challenges to people and ecosystems alike. Restoring these degraded areas is key to improving human livelihoods, long-term

[1] http://www.wri.org/our-work/project/global-restoration-initiative

food security, biodiversity conservation and even climate stability. Trees play an important role in landscapes across the world, helping to provide multiple ecosystem services such as stabilizing soils, improving water quality, keeping soils fertile for agriculture, and providing important habitat for wildlife. By restoring trees to the landscape, whether as natural forests or as part of mixed land-use systems, land degradation can be reversed, reestablishing productivity and resilience across targeted rural landscapes.

Forest landscape restoration (FLR) is a means to achieving this renewed productivity and resilience. FLR is defined as a long term process of regaining ecological function and enhancing human well-being in degraded landscapes. The goal of FLR is "a restored, more productive landscape that incorporates diverse land uses based on the context of the landscape and the needs of the community." FLR is a forward looking approach that aims to strengthen the resilience of landscapes and rural communities, while maintaining a variety of future options for both people and biodiversity.

In Malawi, FLR can be linked to many of the GoM's existing development priorities as outlined in the Malawi Growth and Development Strategy (MGDS).[2] The four areas that are particularly high on the development agenda and strongly connected to FLR are: 1) Agriculture and food security, 2) Integrated rural development, 3) Green belt irrigation and water development, and 4) Climate change, natural resources and environmental management.

1.1.2 Liwonde Landscape

Based on consultations with the GoM Department of Forestry and other stakeholders, the PERFORM project selected three sites--in Machinga, Mzimba and Ntchisi districts--in which to focus FLR activities in support of its objectives. The Machinga site, which includes the area surrounding the Liwonde Forest Reserve, was chosen for this Pilot Application of the Restoration Opportunities Assessment Methodology (ROAM), due to the scale of degradation and deforestation that the PERFORM team noted at the site through prior assessment and data collection efforts, and recognition that this site had the greatest need for and most to gain from restoration.

In early 2015, the PERFORM team conducted a baseline survey and an assessment of drivers of deforestation and forest degradation, which provided extensive background information about the Liwonde landscape to inform the pilot application of ROAM. This effort made use of focus group discussions, satellite imagery and household questionnaires to investigate the "who" and "why" of forest loss, including an analysis of the direct or proximate causes as well as the indirect or underlying causes of deforestation and degradation. Direct drivers include conversion of forest land to agriculture, and harvesting of firewood and charcoal production for home consumption and for income generation. Indirect drivers include poverty, population growth, high dependency on wood fuels (98% of households rely on firewood for cooking) and policy and institutional issues related to weaknesses in law enforcement and forest governance. The following survey results provide important context to the pilot assessment for restoration, in several key thematic areas:

- **Agriculture:** For the Liwonde landscape, most households depend on rain-fed and irrigated agriculture for their livelihood. Households own land through customary tenure, with an average of 2 parcels of 1.5 hectares. Women are the majority of landowners (70 percent) and farm size is declining. Some 20 percent of households surveyed indicated that they plan to clear forest or fallow land, mainly to grow more crops to consume and to sell. Accordingly, it is important for forest

[2] http://www.mw.one.un.org/wp-content/uploads/2014/04/Malawi-Growth-and-Dedvelopment-Strategy-MGDS-II.pdf

landscape restoration interventions to contribute to agricultural intensification and to boost the productivity of croplands.

- **Productivity of land:** Eighty-five percent of household said the quality of their land was average to poor, and the household survey underscored the need to restore soil fertility. Seventy-nine percent of households have adopted some practices to improve soil fertility, but the adoption rates for agroforestry and conservation agriculture are relatively low (19 percent), evidently due to lack of training and assistance, and to a lesser degree due to lack of information.
- **Access to water**: Forty percent of households have access to small parcels of irrigable land but small scale production of irrigated crops mostly relies on the use of watering cans.
- **Income generation**: Most households are 4 to 9 km from markets (1.5 to 2 hours travel each way) and households do not have easy access to capital to assist them in diversifying their livelihood strategies and sources of income. Many rely on the sale of firewood and charcoal which generates 3.4 million MK in income annually. However, supplies of fuelwood are reporting declining, and women spend 18 hours / week to collect and transport firewood. Only 12 percent of households use fuel-efficient cook stoves.
- **Community-based organizations**: Forty-seven percent of households belong to community based organizations (CBOs), including forest co-management Block Management Committees, Village Development Committees, and Village Natural Resource Management Committees. These CBOs are well positioned to mobilize local communities, although households indicate that they need assistance with training, seedling production and other assistance to adopt improved natural resource management and restoration practices.

METHODOLOGY

2.0 OVERVIEW OF THE RESTORATION OPPORTUNITIES ASSESSMENT METHODOLOGY (ROAM)

The Restoration Opportunities Assessment Methodology (ROAM)[3] is a framework for rapidly identifying and analyzing forest landscape restoration potential and locating specific areas of opportunity. This methodology, developed by the International Union for the Conservation of Nature (IUCN) and World Resources Institute (WRI), uses geospatial, economic, and Rapid Restoration Diagnostic analyses to map and quantify the area of degraded land suited for a range of restoration practices, and to assess the enabling conditions for scaling up restoration. An overview of the steps in a typical ROAM analysis are shown in **Figure 1**.

[3] https://cmsdata.iucn.org/downloads/forest_handbook_140321_5_share.pdf

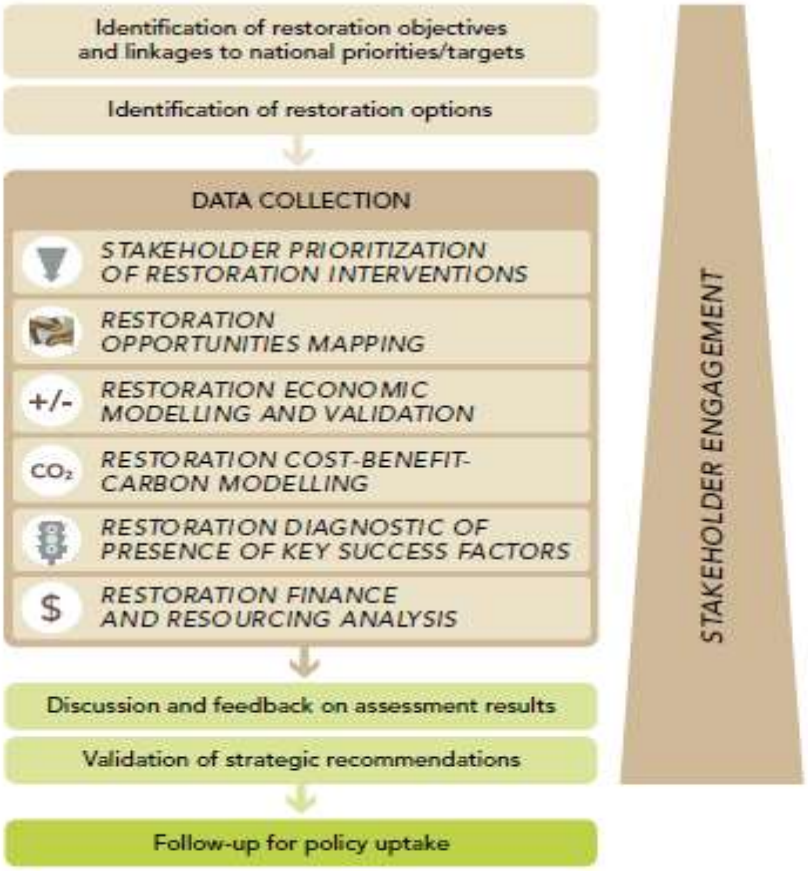

Figure 1. Steps in a typical ROAM analysis.

As shown in Figure 1, ROAM involves a series of individual analyses that serve to inform planning for restoration at scale. Some of the questions ROAM helps to answer include:

1. Where is restoration socially, economically and ecologically feasible?
2. What is the extent of restoration opportunities?
3. What are the costs and benefits associated with different restoration strategies?
4. What policy, financial and social incentives exist or are needed to support restoration?

Due to the pilot nature of this assessment as well as timing and resource constraints, the ROAM assessment for Liwonde focused on two components of ROAM: the Restoration Opportunity Mapping and the Diagnostic of Key Success Factors. The methods for these two components are described in more detail in the following sections.

2.1 METHODS FOR RESTORATION OPPORTUNITY MAPPING

The objectives of the restoration opportunity mapping are to identify where specific types of restoration practices are feasible and to what extent. The process for developing the Liwonde landscape restoration opportunity maps followed six general steps (Figure 2).

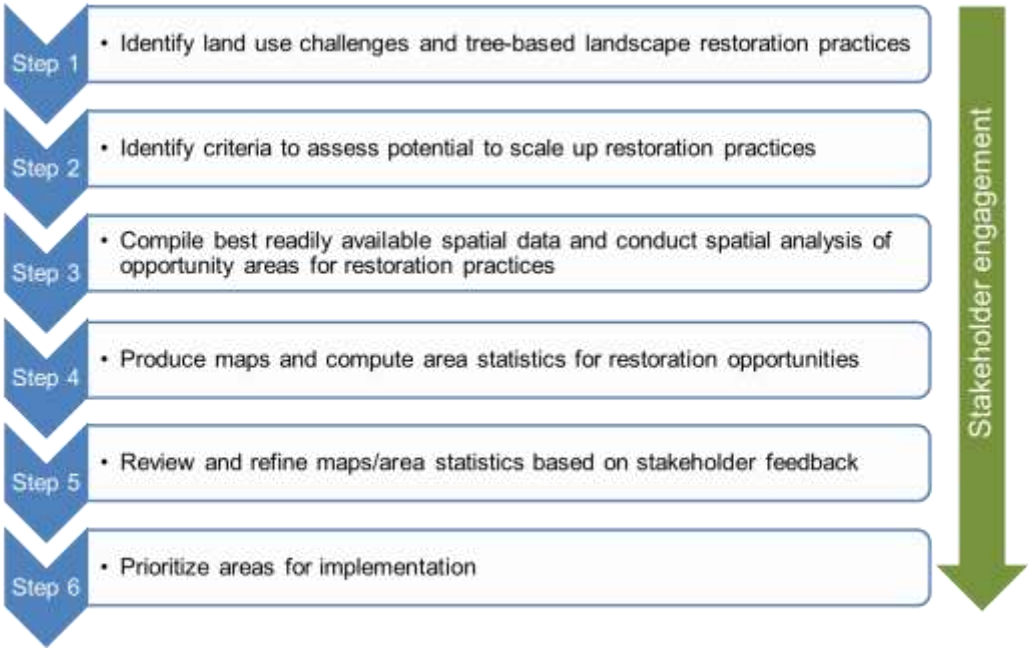

Figure 2. Steps in restoration opportunity mapping process for Liwonde landscape.

To quantify the opportunity areas for restoration, a geospatial analysis was performed incorporating more than a dozen datasets representing biophysical, geographic and topographic features. Datasets used in the analysis included elevation, slope, land use/land cover, tree cover, water bodies, forest reserve boundaries, and administrative areas. These data were consolidated into a geographic information system (GIS), where criteria associated with each type of potential restoration intervention were applied. The datasets representing these criteria were overlaid and combined with each other, and areas where they intersected were identified as opportunity areas. This process was replicated for each of the restoration interventions to create maps of opportunity areas. Areas were summarized at various administrative levels (e.g., EPA) to convey the level of opportunity within an applicable context. The results and specific criteria used in the analysis are summarized in Section 4 and detailed further in Appendix 7.

As shown by the green arrow on the right in Figure 2, development of the restoration opportunity maps relied heavily on stakeholder engagement and consultation. The inception workshop and site visits, held in October 2015 and summarized in Section 3 of this report, were fundamental to defining the land use challenges, restoration objectives, and proposed restoration practices that are part of Steps 1 and 2 in the mapping process. Consultation with in-country partners, particularly the PERFORM team and Department of Forestry, were critical to compiling the best-available spatial data that were inputs to the geospatial analysis and production of the maps, as part of Steps 3 and 4. A second stakeholder workshop was held in February 2016 to obtain feedback on the maps and discuss next steps and priorities for local-level implementation, as part of Steps 5 and 6.

2.2 METHODS FOR DIAGNOSTIC OF KEY SUCCESS FACTORS

The objective of the Diagnostic of Key Success Factors is to provide information about what types of political, institutional, financial, and socioeconomic barriers need to be addressed before restoration can be implemented at scale.

There are a number of factors that, when present, increase the likelihood that forest landscape restoration will successfully occur. In order to assess the state of these "key success factors" a "Restoration Diagnostic" framework developed by WRI and IUCN was used to identify which success factors already exist and which are currently missing (or partially missing) within landscapes being considered for restoration.[4]

The Restoration Diagnostic framework is based on the assessment of more than 16 examples of successful restoration around the world. Careful research and examination of each example showed that success in restoration exhibits three common themes:

1. A clear motivation. Decision makers, landowners, and/or citizens were inspired or motivated to catalyze processes that led to forest landscape restoration.
2. Enabling conditions in place. A number of ecological, market, policy, social, and institutional conditions were in place that created a favorable context for forest landscape restoration.
3. Capacity and resources for sustained implementation. Capacity and resources were mobilized to implement forest landscape restoration on a sustained basis on the ground.

The diagnostic framework dives further into each of these themes by pointing to a number of thematic factors that were present—either naturally or through human action—in cases where successful forest landscape restoration processes occurred. These are the "key success factors" for forest landscape restoration (Table 1).

[4] http://www.wri.org/publication/restoration-diagnostic

Table 1. Key success factors for forest landscape restoration.

THEME	FEATURE	KEY SUCCESS FACTOR
MOTIVATE	BENEFITS	Restoration generates economic benefits
		Restoration generates social benefits
		Restoration generates environmental benefits
	AWARENESS	Benefits of restoration are publicly communicated
		Opportunities for restoration are identified
	CRISIS EVENTS	Crisis events are leveraged
	LEGAL REQUIREMENTS	Law requiring restoration exists
		Law requiring restoration is broadly understood and enforced
ENABLE	ECOLOGICAL CONDITIONS	Soil, water, climate, and fire conditions are suitable for restoration
		Plants and animals that can impede restoration are absent
		Native seeds, seedlings, or source populations are readily available
	MARKET CONDITIONS	Competing demands (e.g., food, fuel) for degraded forestlands are declining
		Value chains for products from restored area exists
	POLICY CONDITIONS	Land and natural resource tenure are secure
		Policies affecting restoration are aligned and streamlined
		Restrictions on clearing remaining natural forests exist
		Forest clearing restrictions are enforced
	SOCIAL CONDITIONS	Local people are empowered to make decisions about restoration
		Local people are able to benefit from restoration
	INSTITUTIONAL CONDITIONS	Roles and responsibilities for restoration are clearly defined
		Effective institutional coordination is in place
IMPLEMENT	LEADERSHIP	National and/or local restoration champions exist
		Sustained political commitment exists
	KNOWLEDGE	Restoration "know-how" relevant to candidate landscapes exists
		Restoration "know-how" transferred via peers or extension services
	TECHNICAL DESIGN	Restoration design is technically grounded and climate resilient
		Restoration limits "leakage"
	FINANCE AND INCENTIVES	Positive incentives and funds for restoration outweigh negative incentives
		Incentives and funds are readily accessible
	FEEDBACK	Effective performance monitoring and evaluation system is in place
		Early wins are communicated

Using the list in Table 1 as a guide, the next step in the Restoration Diagnostic process is for users to identify which key success factors are already in place—and which are not—within the landscape being considered for restoration. Then users identify which policy reforms, changes in incentives, and other interventions would help to address the missing factors and reinforce the favorable enabling conditions for scaling up restoration.

Stakeholder engagement was critical to understanding the situation related to the key success factors for forest landscape restoration in the Liwonde landscape. As detailed in the following sections, stakeholders provided input during the workshop and in additional consultative sessions as to whether or not these key success factors and needed enabling conditions were in place, partly in place, or not in place.

SUMMARY OF PRELIMINARY STAKEHOLDER ENGAGEMENT

3.0 STAKEHOLDER INCEPTION WORKSHOP IN LIWONDE LANDSCAPE

The inception workshop to kick off the ROAM application in the Liwonde Forest Reserve Landscape was held on 19 October 2015. The workshop was organized into a half-day session at the Hippo View Lodge in Liwonde, Malawi with more than 40 local stakeholders in attendance. The stakeholders represented a variety of sectors with interests in the Liwonde landscape, ranging from government staff with the departments of Forestry, Water, and Agriculture, to academic staff and students with the Malawi College of Forestry and Wildlife, to traditional authorities and chiefs from local villages. A detailed agenda for the workshop and full participant list can be found in Appendixes 2 and 3, respectively.

The objectives of the workshop were to 1) present the concepts of forest landscape restoration (FLR) and the ROAM process to participants, and 2) to create dialogue with local stakeholders about the various land use challenges that they face and how they could be improved through FLR. These objectives were covered in a series of five sessions as follows:

- Session 1: Forest Landscape Restoration (FLR) Overview
- Session 2: Restoration Goals
- Session 3: Most Promising Restoration Approaches
- Session 4: Key Barriers to Successful Restoration
- Session 5: Field Visits – Overview and Coordination

Session 1 of the workshop, **FLR Overview** was conducted by Bob Winterbottom and Katie Reytar and focused on presenting the fundamental concepts and definitions of what FLR is and what it can achieve, and examples of successful FLR in other countries, including which factors contributed to success and how local communities and landscapes were transformed. This session also introduced the Restoration Opportunities Assessment Methodology (ROAM) process that will be used to guide the planning and implementation of FLR in the Liwonde Landscape. The overview of the ROAM process included walking through the steps for identifying opportunities for various types of FLR interventions (e.g., agroforestry, soil and water conservation, expansion and improved management of woodlots and village forests etc.), mapping those opportunities, and identifying enabling conditions or barriers to successful implementation.

Sessions 2 and 3, Restoration Goals/Most Promising Restoration Approaches, were facilitated by Tangu Tumeo of the Malawi Department of Forestry. (The two sessions were combined into one due to time constraints). The objective was to engage local stakeholders in a discussion of the various challenges that they have experienced related to deforestation and natural resource degradation, and how FLR could address those challenges through specific restoration approaches. Participants were organized into four groups according to the Extension Planning Area (EPA) where they lived, worked, or were otherwise most familiar. The discussion in each group was led by the coordinator for that EPA. The specific questions that each group was asked to address were:

- What are the key land use challenges (i.e., problems) that they would like to see addressed through FLR?

- What are the most important objectives to be achieved through FLR?
- What types of FLR approaches could be implemented to achieve these objectives?

The coordinator from each EPA group then reported back to the plenary the key points of their discussion, as summarized below.

Table 2. Summary of major land use challenges, restoration objectives, and most promising restoration approaches per extension planning area (EPA) as identified by working groups

Land Use Challenges	Restoration Objectives	Promising Restoration Approaches
Mtubwi EPA		
Water scarcity	Improve water quality and quantity	River bank planting, soil and water conservation
Soil erosion, gullies	Reduce soil erosion	
Deforestation/ loss of tree cover	Improve firewood resources, access to traditional medicines/forest products	Reforestation
Food insecurity/ malnutrition/ low crop yields	Improve crop yields, access to forest products	Agroforestry, conservation agriculture
Poverty and loss of income from non-timber forest products	Improve access to forest products, alternative income opportunities	Agroforestry, woodlots
Mbonechera EPA		
Siltation, drying up of rivers	Control erosion	Plant vegetation on ridges, vetiver grass
Erosion		
Low crop production	Improve crop yields	Agroforestry, conservation agriculture
Low water table	Increase water table	Watershed management
Firewood scarcity	Increase forest cover	Natural regeneration, agroforestry, reforestation
Erratic rains	Support adaptation to climate change and increased resiliency	Watershed management, conservation agriculture, agroforestry
Domasi EPA		
Poor soil quality, low crop yields	Increase crop yields, improve soil fertility	Climate smart agriculture, agroforestry, soil and water conservation, crop diversification and introduction of early-maturing varieties
Forest cover loss	Increase forest cover	Reforestation, natural regeneration, introduction of enterprises to reduce charcoal production/ consumption, agroforestry
Shortage of fuelwood	Increase access to fuel wood	
Reduced supplies of thatch, fodder, medicinal plants	Increase access to forest products	
Depletion of water resources	Improve access/quality of water resources	Watershed management, catchment conservation
Declining fish and wildlife	Increase biodiversity	Introduction of aquaculture
Erratic rainfall		
Poor governance in management of natural resources	Improve management of natural resources	Enforce laws, better leadership, clear ownership and allocation of resource rights
Nsanama EPA		
Soil erosion	Reduce soil erosion, increase soil fertility	Watershed management, conservation agriculture, compost, manure
Floods	Reduce run off, increase infiltration	
Drying of wetlands (for rice production)	Recharge wetlands and streams	
Destruction of buildings due to strong winds	Reduce effect of winds on structures	Tree planting as windbreaks
Low crop yields	Increase food security	Agroforestry
Scarce fuel wood	Increase tree cover, access to fuel wood	Establish woodlots in impact areas
Declining income sources (e.g., rice, curios, honey)	Diversify income sources	Plantations / plant high-value tree species for export

Session 4, Key Barriers to Successful Restoration, was facilitated by Luke Malembo of the PERFORM team. The objective of this session was to brainstorm among the plenary group the various institutional, social, financial, technical, or other types of barriers currently in place that need to be overcome in order to increase adoption and facilitate widespread implementation of restoration approaches across the landscape. A summary of the key barriers identified during the group discussion are outlined below:

Socio-economic and environmental factors:

- Declining soil fertility; land use pressures
- Limited alternative sources of livelihood
- Low literacy rate
- Dependence on firewood and charcoal from natural forests

Knowledge and technical support:

- Few action-oriented leaders on forest landscape restoration
- Lack information about cost-effective restoration practices and their benefits
- Lack models for sustainable charcoal production
- Limited extension, training, technical support for adoption of restoration practices
- Lack information about integrated landscape management

Policy and institutional issues:

- Conflicting approaches among development projects
- Weak coordination of upstream and downstream interventions
- Limitations of top-down approaches without full participation of communities
- Deficiencies in enforcement of existing regulations; fines are too low

Session 5 of the workshop, Overview and Coordination of Field Visits, was facilitated by Alinafe Chibwana of the PERFORM team, who presented a summary of the objectives of the "stocktaking" field visits in the Liwonde Landscape that would be conducted over the next 2 ½ days. The objectives of the site visits were twofold: 1) to understand better the land use challenges from the perspective of the land user, and 2) to take stock of and investigate examples of successful FLR approaches that could be scaled up to other parts of the landscape. Specifically, the site visits sought to answer a few key questions: What motivated the farmer or community to adopt the practice? What were the main benefits that they saw? What made the approach successful or what were some problems that had to be overcome? See Appendix 4 – Questionnaire for Site Visits. The site visits were designed to inform the identification of the most promising restoration approaches across the landscape and associated enabling conditions based on small-scale successes that could be scaled up.

3.1 SITE VISITS TO LIWONDE LANDSCAPE

The field visits to villages in the Liwonde Landscape were conducted on 19-21 October 2015 and included to visits to one or more sites within each of the four EPAs surrounding the Liwonde Forest Reserve: Mtubwi, Mbonechera, Domasi, and Nsanama. Sites were selected based on input from each EPA coordinator and were meant to showcase specific land use challenges and how they were or were not addressed through specific restoration-related projects. Each site visit involved a walk-through of the targeted area and discussion with the village leaders and practitioners about the approach. About 25 of the participants from the workshop also participated in the site visits. A brief summary of the key takeaways from the site visits are provided in Table 3 below and the full report that provides details on each site can be found in Appendix 5.

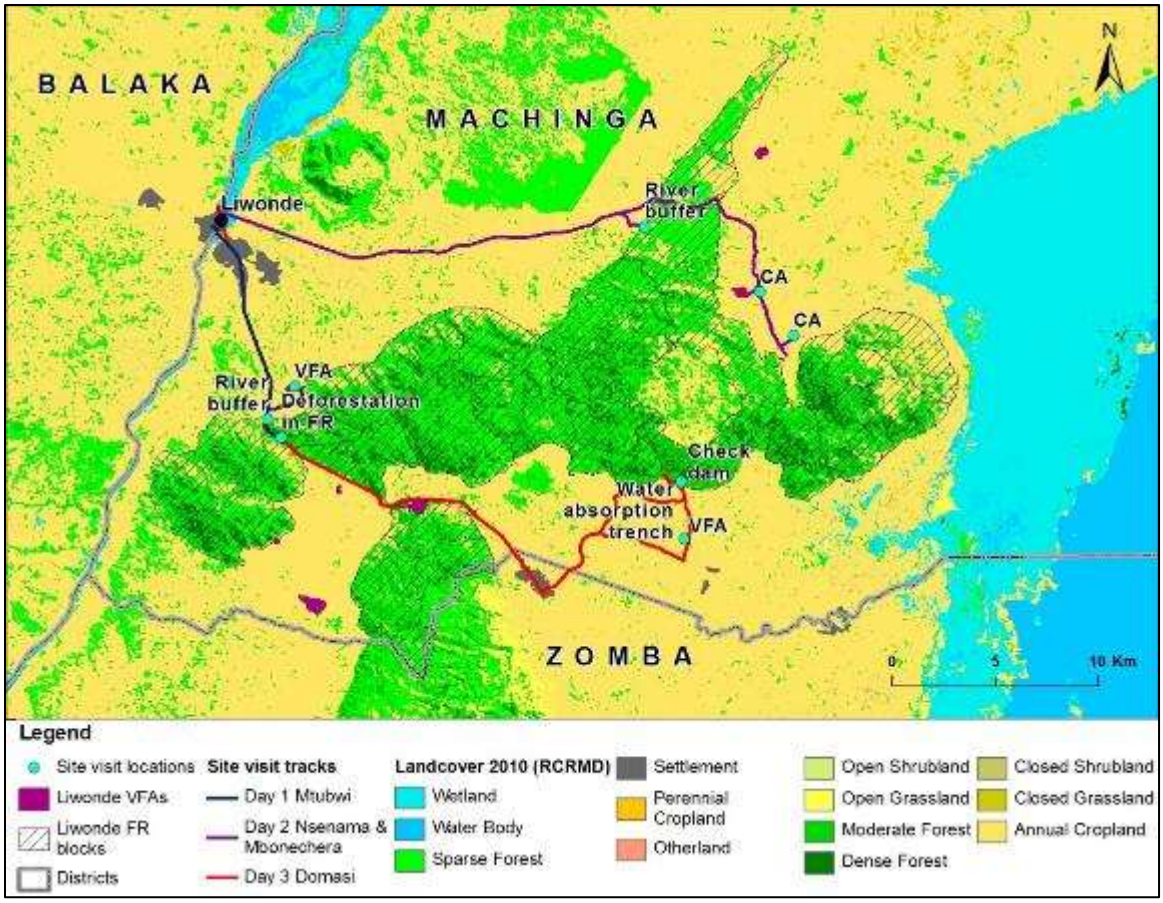

Figure 3. Locations of site visits in the Liwonde Landscape.

Table 3. Summary of key takeaways from site visits in Liwonde Landscape.

EPA	Restoration activity	Motivating factors	Perceived benefits	Key success factors	On-going problems/issues
Mtubwi	Village forest area	Need for more forest products; safety net in case of depletion of Forest Reserve (FR)	Improved access to forest products	Strong interest and leadership from within community	Continued deforestation of FR block; charcoal production
	Stream bank planting	Water shortage, erosion and sedimentation	Reliable, sustainable water source	Strong interest and support from community, NGO (Greenline Movement); access to seedlings/training	
Nsanama	Conservation agriculture	Low soil fertility, crop production	Lower fertilizer application; improved soil fertility and decreased work load over time	Training from extension agent through demonstration plot; leadership from village chief	Need for more extension training/ support and follow up visits; Mixed messages from farmers about training and benefits of CA
	Forest Reserve Block Management Committee	Increased access to forest resources through co-management	Honey production from beekeeping	N/A	Continued deforestation of block; lack of market opportunities for selling forest products; communities tend to protect the forest in their blocks and harvest trees from adjacent areas; BMC are reluctant to share revenues; management of funds is not transparent and equitable
	Village forest area/ VNRMC	Safety net in case of depletion of Forest Reserve (FR)	Access to poles for construction and honey from beekeeping	Strong leadership from chief and participation from community	Need more training and technical capacity and government support, especially in terms of when to harvest from VFA; want compensation, uniforms and recognition of authority of community guards
Mbonechera	River bank planting	Problems of gullies and major erosion downstream due to force of river during rainy season	Protective forest and soil stabilization	Knowledge-sharing between communities	Need more training and technical capacity, especially on suitable tree species and locations to plant trees to maximize soil stabilization; more access to capital
Domasi	Watershed management through check dams, water absorption trenches, contour trenches, vetiver grass, and *Faidherbia albida*	Problems of soil erosion and forceful water flow affecting productivity of crops downslope	More productive crop fields that are more resistant to climate and other impacts including drought/ floods; ability to diversify crop species due to irrigation	Early adoption by TA and chiefs; benefits accrued very early in project process; sustained support from NGO for 3 years; good access to markets for selling farm and forest products	Perception that other communities cannot adopt these same practices without help from NGO for tools, community mobilization, strengthening of by-laws and facilitation of the organization of watershed associations; instances of sabotage and destruction of canals and trenches; charcoal production continuing in FR block;

					continued sedimentation problems from other communities upstream
	Village forest area	Need for a secure source of fuel wood and forest products	Closer, more secure source of fuel wood and forest products	Leadership of village chief who donated land for VFA; knowledge sharing from extension agent and other communities with VFAs	Issue of tenure security – VFA land is still technically owned by chief and not community

3.2 SUMMARY OF KEY OUTCOMES FROM INCEPTION WORKSHOP AND SITE VISITS

Following the conclusion of the last site visit on 21 October, a wrap-up session was held with the site visit participants at the Hippo View Lodge to discuss and summarize the lessons learned and key outcomes from the workshop and site visits. The session involved revisiting the restoration objectives and approaches identified during the first day's workshop to ensure they aligned and fully captured the observations from the field. The session also involved discussion of proposed criteria for mapping restoration opportunities based on observed landscape characteristics as well as brainstorming strategies for scaling up promising restoration approaches.

The discussion on key success factors are informed by a review of factors in three main categories:

1. Motivation and inspiration of decision makers
2. Enabling conditions in place
3. Capacity and resources for sustained implementation

A preliminary listing of the specific types of factors that could play a critical role in enabling FLR at scale was informed by analysis of 16 case studies of successful large scale restoration from around the world (See http://www.wri.org/publication/restoration-diagnostic for more information).

The discussion of key success factors to take into account in the strengthening of enabling conditions for the adoption of FLR practices in the Liwonde landscape highlighted the importance of the following factors which should be in place to enable successful restoration at scale:

Motivating factors:

- Crisis events leveraged
- FLR practices generate economic and environmental benefits to natural resource users
- Benefits of investing in and adopting FLR practices are publicly communicated
- Suitable areas for scaling up restoration practices are identified
- Laws supporting restoration are in place

Enabling factors:

- Suitable ecological conditions (soils, water, climate) exist for the successful adoption of FLR practices
- Invasive species are absent or controlled and do not inhibit the adoption of FLR practices
- Seed sources and growing stock are available
- Competing demands for land are declining
- Value chains for restoration products are well established and functional
- Land and tree tenure are secure
- Policies in support of FLR are aligned and supportive
- Restrictions exist and are enforced on clearing protected natural forests
- Local communities are empowered to protect and manage natural resources that they manage and utilize
- Roles and responsibilities in supporting FLR are clearly defined
- Effective institutional coordination is in place

Factors related to capacity for implementation of FLR:

- FLR champions are recognized, given a voice and supported
- Political commitment for FLR is assured
- Restoration know how exists and is applied, and transferred through extension and peer to peer learning
- Restoration practices are sound, climate resilient and enable adaptation to climate change
- Financing is accessible
- Performance monitoring systems are in place
- Early wins are communicated

In the discussion of potential strategies for scaling up FLR, consideration was given to activities grouped into six main categories that emerged from an analysis of successful interventions that helped to facilitate and accelerate the widespread adoption of FLR practices in restored landscapes in Niger, Ethiopia, Mali and other countries.

These types of activities that could potentially be important in scaling up strategies include:

1. Identify and analyze existing restoration successes
2. Build a grassroots movement
3. Address policy and legal issues to enable widespread adoption
4. Develop and implement a communication strategy
5. Develop or strengthen agroforestry value chains
6. Expand research activities

In the case of the Liwonde landscape, the following interventions seemed particular important:

- Prioritize communities with strong leadership, community based organizations
- Devolve authority and reinforce local enforcement of bylaws to protect and regenerate trees across the landscape – in fields, woodlots, village forests as well as forest reserves
- Develop a communication strategy and increase support for outreach, extension, peer to peer training
- Provide incentives and support for sustainable fuelwood production from private woodlots, agroforestry, border plantings, bamboo
- Research, publicize economic benefits of restoration
- Facilitate multi-sector, integrated landscape approach

The key outcomes from the workshop discussions are shown in Table 4.

Table 4. Summary of Key Outcomes from Liwonde Workshop and Site Visit Wrap-Up Session – 21 October 2015

Overall Restoration Objectives	Specific Restoration Objectives	Promising Restoration Approaches	Landscape Characteristics - to map restoration opportunities	Key Barriers and implementation issues	Scaling up strategies	Overall Enabling Conditions
Improve food security Secure and improve livelihoods Increase household incomes Conserve biodiversity Restore wildlife and fisheries habitats Increase resilience, adaptation to climate change Reduce risk of flooding Restore and enhance other ecosystem services in targeted landscapes	Improve soil fertility, Increase wood supplies	Agroforestry – FMNR	Cropland without trees (less than 10% density)	-Lack of awareness and extension support -Weak integration of AF into extension messages	-Increased communication and outreach -Mainstream AF into CSA strategies -Provide seed for planting of agroforestry tree species on farms	Target landscapes in district in crisis: facing water scarcity, food insecurity, firewood shortages Prioritize landscapes with strong local champions and effective by-laws governing natural resources Work with and strengthen community based organizations, including women's groups, S&L associations, NRM committees Support coordination, linkages, integration across sectoral interventions (water, forests, agriculture, local government, poverty reduction, CC adaptation)
	Conserve soil moisture Boost crop yields	Conservation Agriculture on farms	Cropland with trees (> 10% density)	-Lack of awareness and extension support -Weak coordination of extension and project support	-Increased support to apply CA guidelines -Increase demonstration plots	
	Improve water quality and quantity	River bank planting	Within 10 m buffer on each side	-Need for technical advice on appropriate tree species -Insufficient and delayed supplies of tubes, seeds and tools for seedling production	-Develop guidelines for species selection for river bank planting -Increased outreach and extension support	
	Reduce rainfall runoff, soil erosion and sedimentation Improve streamflow	Check dams, infiltration ditches, contour bunds	Uncultivated sloping land (3 -20 degrees)	Weak mechanisms for coordination of upstream and downstream communities	-Organize study tours to landscapes transformed by restoration successes -Develop guidelines and training programs with a focus on peer to peer learning	
	Maintain and increase forest cover Protect watershed catchment areas	Natural Forest Management – fire control, regenerate, replant tree cover	Within all demarcated forest reserves and parks; any forest cover outside of reserves/parks > 5 ha	-High demand for charcoal -Poor law enforcement -Unclear rights and responsibilities -Weak governance of benefit sharing	-Strengthen bylaws -Extend assistance for BMC and develop exit strategy -Research and publicize benefits of NFM successes	
	Increase fuelwood and forest product availability	Increase village forest areas	Uncultivated ridgetops, stony/ shallow soil	-Weak political support -Few local champions -Competing land use pressures	Promote cross visits to publicize successful VFA	
		Small scale woodlots	TBD	Competing land use pressures	Develop legal framework and value chain incentives for sustainable charcoal production from alternative sources	

RESULTS

4.0 TARGETED RESTORATION OBJECTIVES AND PROPOSED INTERVENTIONS

Following the consultations with stakeholders in Liwonde as described in Section 3, the restoration objectives and most promising approaches were reviewed and consolidated into a "short list" that captures those that were consistently identified across the four EPAs. The purpose of the short list is to streamline the restoration opportunity mapping and focus first on the greatest restoration needs across the landscape.

The short list of **targeted restoration objectives** are:

1. Improve soil fertility, conserve soil moisture and boost crop yields
2. Protect watersheds, reduce runoff and erosion, improve streamflow, water quality and quantity
3. Maintain and increase forest and tree cover, and increase forest product availability
4. Secure and improve livelihoods and increase household incomes
5. Increase resilience to climate change

The **restoration approaches and practices proposed to achieve the above objectives** are:

1. Agroforestry / farmer-managed natural regeneration (FMNR)
2. Conservation agriculture
3. Expand village forest areas and woodlots
4. Natural forest management (fire control, regeneration, enrichment plantings)
5. Tree planting along river/stream banks
6. Soil and water conservation (check dams, infiltration ditches, contour bunds)

Each of these proposed approaches were observed as part of the site visits and were demonstrated to have been successfully implemented on a small scale in the Liwonde landscape (see Appendix 5). They were specifically chosen for these reasons; restoration approaches that have already been successful on a small scale are most promising for scaling up across the landscape. The following sections describe each of the six proposed approaches (or interventions) in more detail.

4.0.1 Agroforestry – particularly farmer-managed natural regeneration (FMNR)

Agroforestry refers to any type of intercropping of trees with crops. Trees on croplands stabilize the soil and improve soil fertility, which helps to boost crop yields with the added benefit of providing fodder for grazing animals. Farmer-managed natural regeneration (FMNR) is a specific type of agroforestry in which farmers do not plant trees but rather manage and cultivate the natural regrowth of trees on their farms instead of eliminating them. Natural regeneration can originate from multiple sources, including livestock waste, root systems, or seed (see Figure 4). FMNR is a more cost-effective and less labor-intensive form of agroforestry in that it does not require acquiring and planting seeds or seedlings.

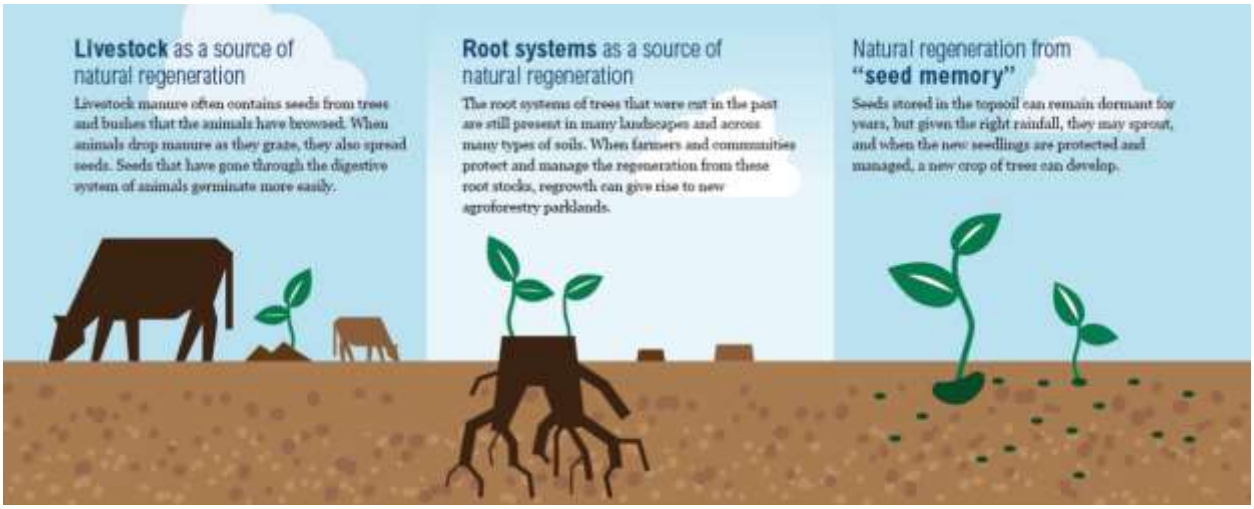

Figure 4. Sources of natural regeneration. Source: WRI, Scaling up Re-greening - 6 Steps to Success

4.0.2 Conservation agriculture

Conservation agriculture is an approach to farming that minimizes tillage and soil disturbance, and involves permanent soil cover (such as with crop residue or live mulch) and crop rotation or intercropping. The successful adoption and benefits of conservation agriculture can be enhanced by combining it with agroforestry or FMNR (i.e., intercropping with trees). The main benefits of conservation agriculture include improving soil fertility and conserving soil moisture, which helps to boost crop yields. It also helps to keep croplands more resilient and stable in the face of climate change and irregular weather patterns.

Figure 5. Steps in conservation agriculture. Source: FAO, http://www.fao.org/zhc/detail-events/en/c/238478

4.0.3 Village forest areas and woodlots

Village forest areas (VFAs) and woodlots are areas of customary land set aside and sustainably managed for fuel wood and forest products. The benefits of VFAs and woodlots are that they provide a consistent, sustainable and nearby source of fuel wood and forest products, which reduces or eliminates pressure on the forest reserve, provides alternative sources of income, and reduces the level of effort in collecting these resources – mainly in terms of time invested and distance traveled—particularly among women who tend to shoulder the majority of this effort.

4.0.4 Natural forest management

The natural forest management restoration approach involves two types of activities. One is protecting existing forest stands, either inside or outside of the forest reserve, by implementing fire control, enforcing restrictions on tree cutting, and other methods of protection. The second activity is regenerating recently degraded or deforested areas through managed natural regeneration and enrichment plantings to encourage regrowth of natural forest. The benefits of these natural forest management activities include soil stabilization and watershed protection, increased availability of forest products such as mushrooms, improved biodiversity and habitat for wildlife, and increased resilience to climate change.

4.0.5 River / stream-bank planting

River and stream bank planting involves planting trees as a buffer along streams and river courses to stabilize the soil. The benefits include decreased erosion and sedimentation into waterways which improves water quality and quantity.

4.0.6 Soil and water conservation (check dams, infiltration ditches, contour bunds)

The soil and water conservation approach involves establishing infrastructure such as check dams, infiltration ditches and contour bunds along slopes and hillsides for the purposes of regulating water flow during heavy rains. These types of infrastructure are particularly important where croplands are located at the base of these hillsides and thus are more vulnerable to soil and nutrient loss and crop damage from heavy or rapid water flow. The check dams serve to reduce the force of water flow downslope while the infiltration ditches and contour bunds absorb and accumulate soil and water. Planting vetiver grass and other vegetation along the slopes also adds to the absorption and mitigation benefits.

The potential to scale up these six restoration interventions were analyzed and mapped across the landscape, as shown in the following section.

4.1 RESTORATION OPPORTUNITIES BY INTERVENTION TYPE

The objective of the restoration opportunity mapping is to identify where and to what extent the biophysical conditions suitable for implementing a particular restoration intervention are present. The maps are meant to show the scale of opportunity for each type of intervention for the purposes of setting priorities for more local-level planning. The following sections provide a brief summary of the criteria used to map the interventions as well as the final map and summary statistics (number of hectares) that show the scale of opportunity for the intervention per extension planning area (EPA). A more detailed summary of the criteria and datasets used in creating the maps, including justification for the criteria, can be found in Appendix 7.

4.1.1 Agroforestry / FMNR

The criteria for mapping areas potentially suitable for agroforestry and FMNR were areas of cropland with very low or no existing tree cover. The data inputs included land cover that is currently under cultivation, the existing level of tree canopy cover is less than 15 percent, and the area is outside of the Liwonde forest reserve. Combining these datasets produced the map of opportunity area for agroforestry and FMNR, as shown in Figure 6. The bar chart in Figure 7 summarizes the total opportunity area in hectares per EPA.

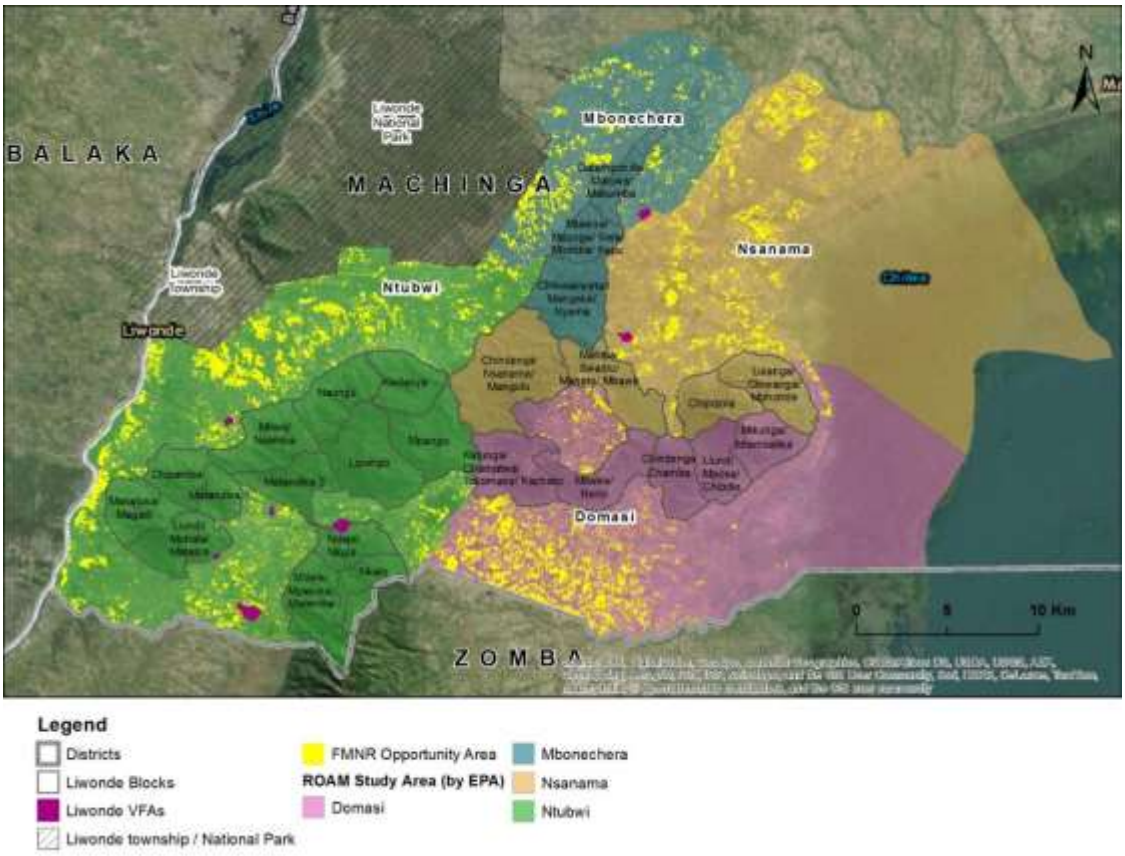

Figure 6. Agroforestry and FMNR opportunity area.

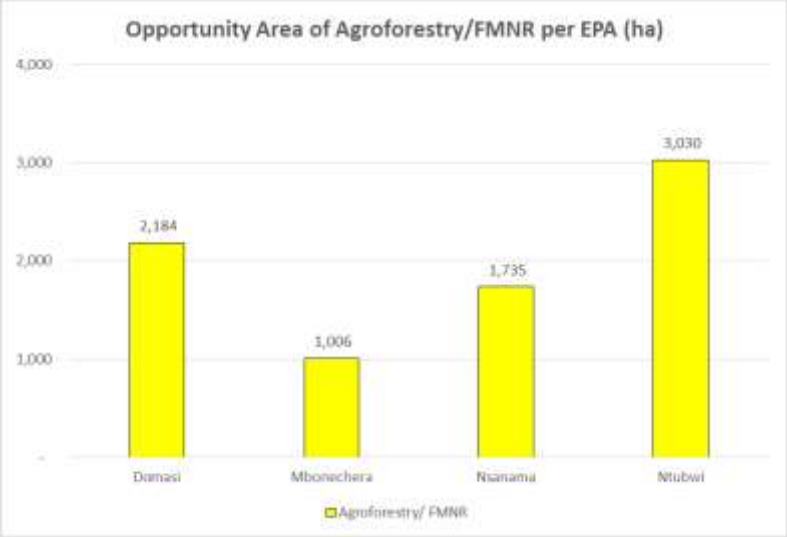

Figure 7. Opportunity area (ha) for agroforestry/FMNR per EPA.

4.1.2 Conservation agriculture

The criteria for mapping conservation agriculture opportunity were croplands where some tree cover was already present, since conservation agriculture is best suited for locations where some agroforestry/FMNR is already in place. The data inputs included land cover that is currently under cultivation, the existing level of tree cover is at least 15 to 25 percent canopy cover, and the area is outside of the Liwonde forest reserve. Combining these datasets produced the map of opportunity area for conservation agriculture, as shown in Figure 8. The bar chart in Figure 9 summarizes the total opportunity area in hectares per EPA.

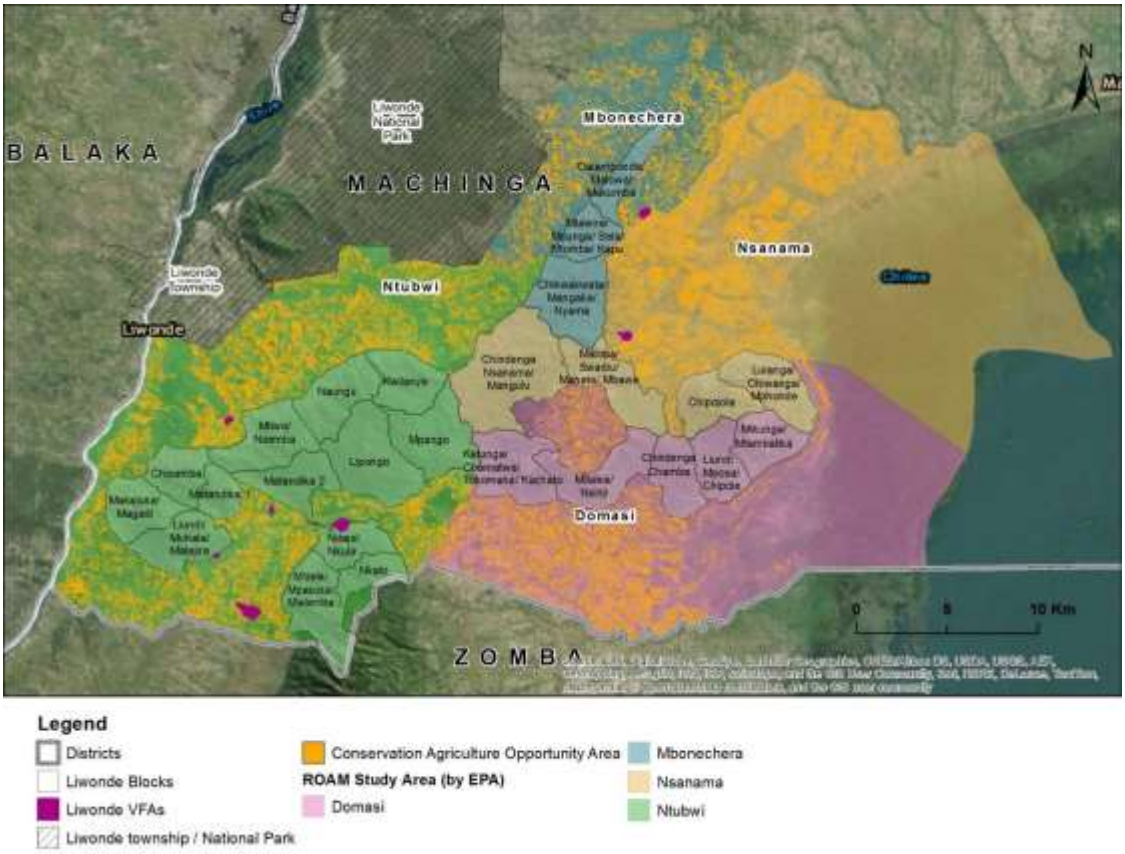

Figure 8. Conservation agriculture opportunity area.

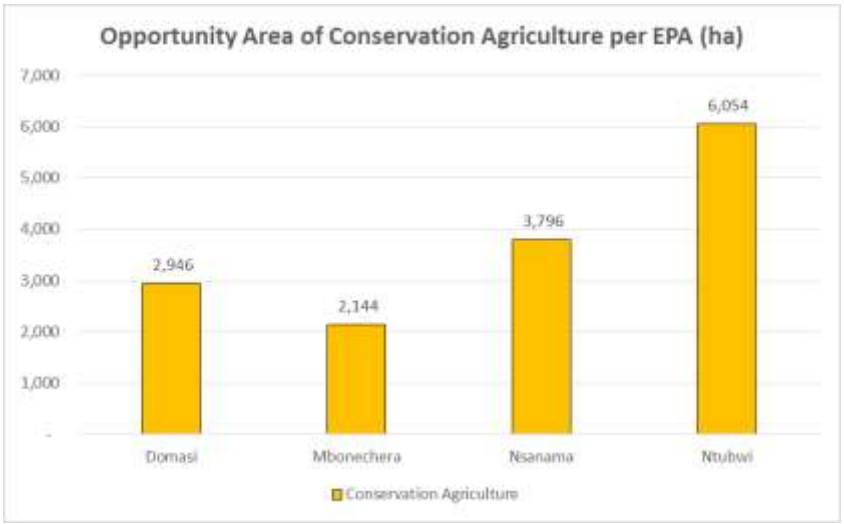

Figure 9. Opportunity area (ha) for conservation agriculture per EPA.

4.1.3 Village forest areas and woodlots

The criteria for mapping village forests and woodlots were areas that are unsuitable or less desirable for cultivation, and thus would not interfere with a community's ability to produce food given the high value and competition for agricultural land. These areas were defined in this analysis as uncultivated ridgetops, given that these areas tend to have greater slopes and rockier soil that limit agricultural productivity. The data inputs were land cover that is currently not cultivated, topographic highs (ridgetops), and areas outside of the forest reserve boundaries. Combining these datasets produced the map of opportunity area, as shown in Figure 10. The bar chart in Figure 11 summarizes the total opportunity area in hectares per EPA.

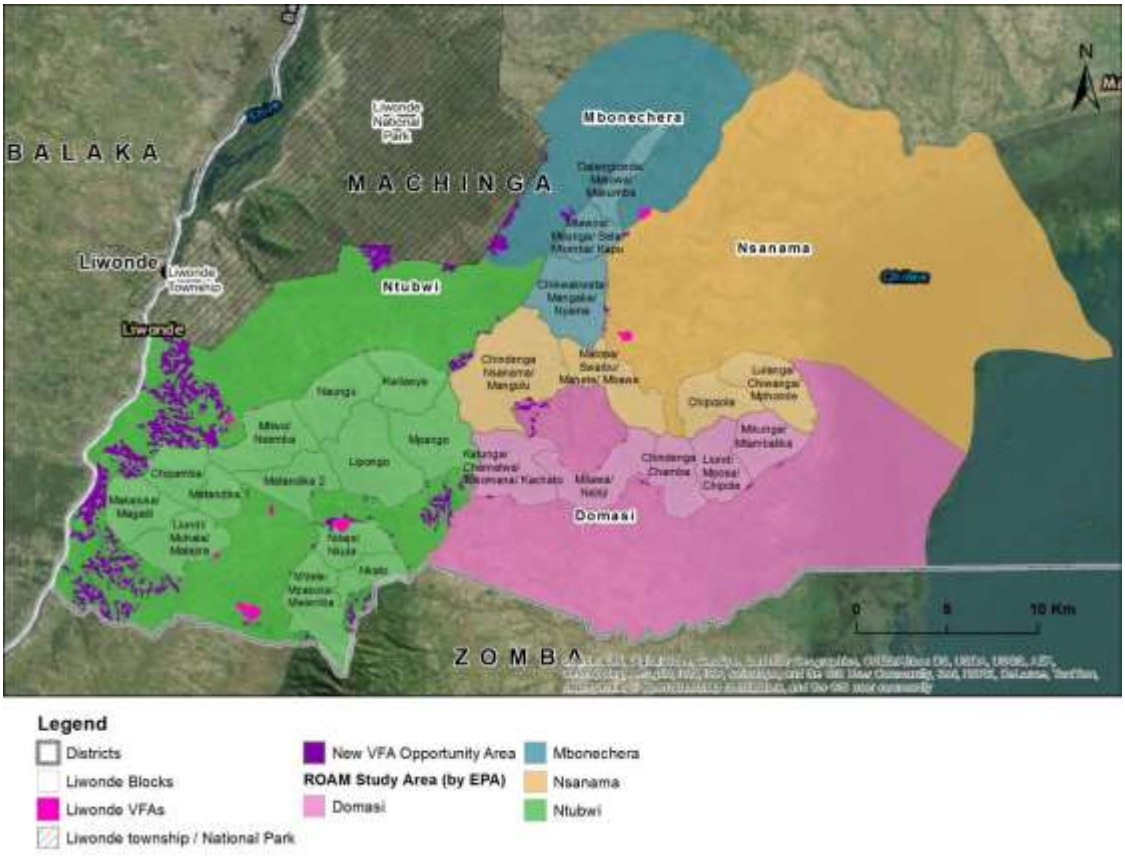

Figure 10. Village forest area and woodlot opportunity area.

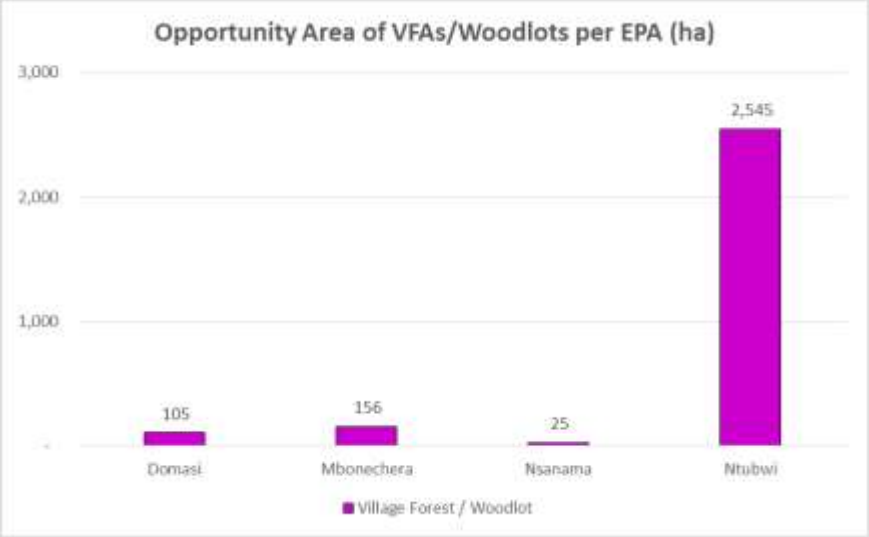

Figure 11. Opportunity area (ha) for village forest areas and woodlots per EPA.

4.1.4 Natural forest management

The natural forest management restoration approach involved two activities, the first of which is protecting existing stands of natural forest whether inside or outside of the forest reserve. The criteria for this intervention were areas of existing forest, which was defined using the data as areas of tree canopy cover greater than 20 percent, in stands of at least 5 hectares, and in areas where the land cover was suitable for tree plantings (i.e., not wetlands). The second activity is regeneration of degraded natural forest, which was defined as recent forest degradation 'hotspots' where tree canopy cover decreased between 2000 and 2014. Combining these datasets produced the map of opportunity area, as shown in Figure 12. The bar chart in Figure 13 summarizes the total opportunity area in hectares per EPA.

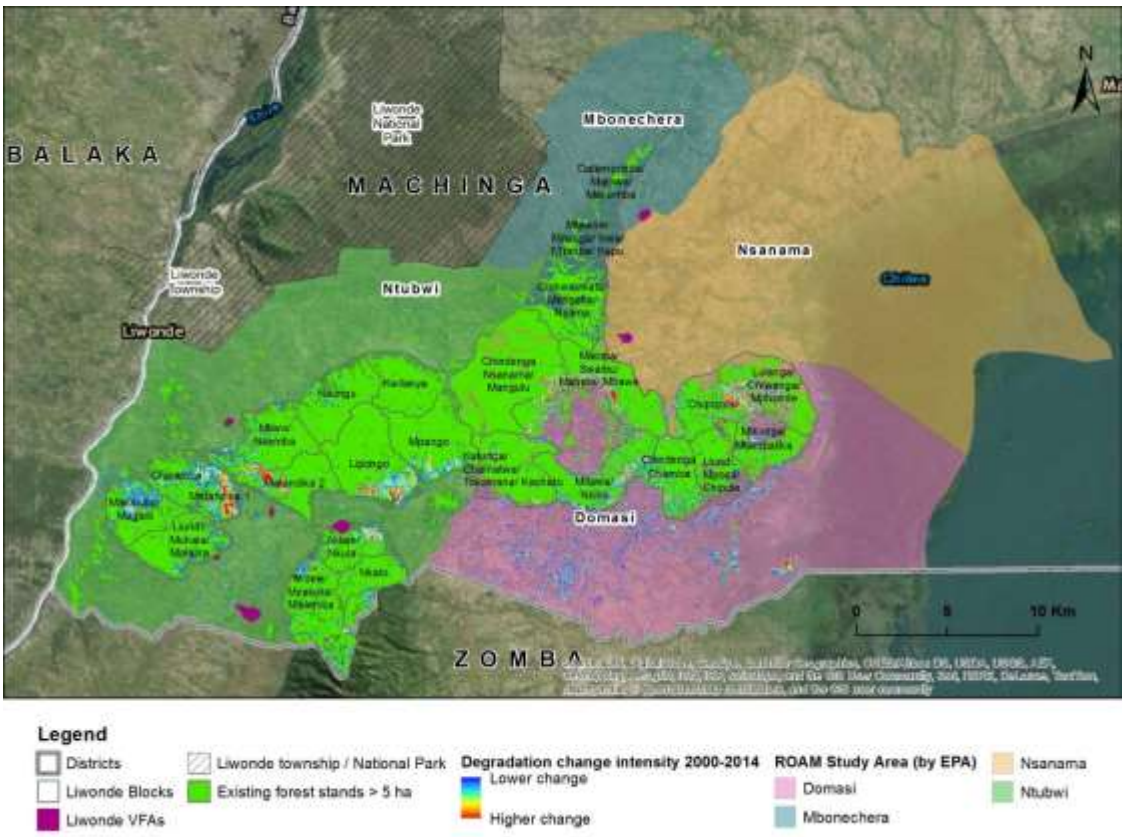

Figure 12. Opportunity area for natural forest management (protection of natural forest and regeneration of degraded areas).

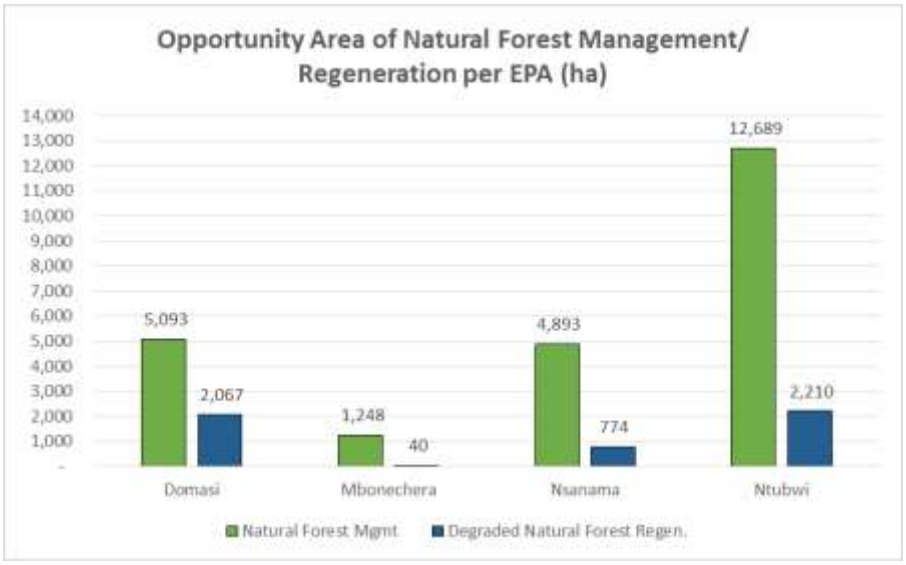

Figure 13. Opportunity area (ha) for natural forest management per EPA.

4.1.5 River / stream-bank planting

The criteria for mapping opportunity areas for river and stream bank plantings were defined as areas within 10 meters on each side of a stream or river that currently have low or no tree cover. The 10-meter buffer was based on stakeholder recommendation during the site visits, in which it was pointed out that trees planted as close as possible to the stream or river bed are the most effective at stabilizing soils. Also, farmers will have to sacrifice less cropland for tree cover given that in many areas, farmers have cultivated their lands right up to the edges of rivers and streams. The specific data inputs for the analysis were stream and river networks, a 10-m (each side) buffer of these networks, areas of tree canopy cover less than 35 percent, and areas that are suitable for tree plantings (i.e., not wetlands). Combining these datasets produced the map of opportunity area, as shown in Figure 14. The bar chart in Figure 15 summarizes the total opportunity area in hectares per EPA.

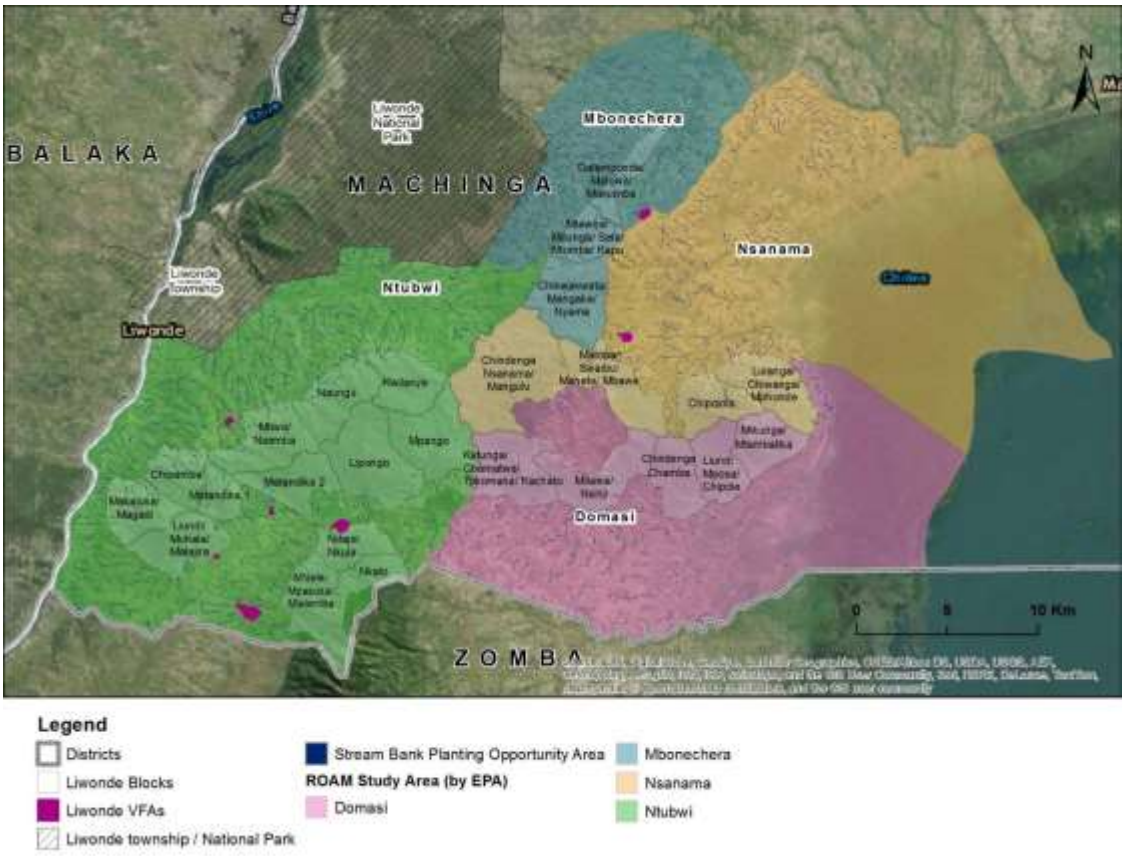

Figure 14. Opportunity area for river and stream bank plantings.

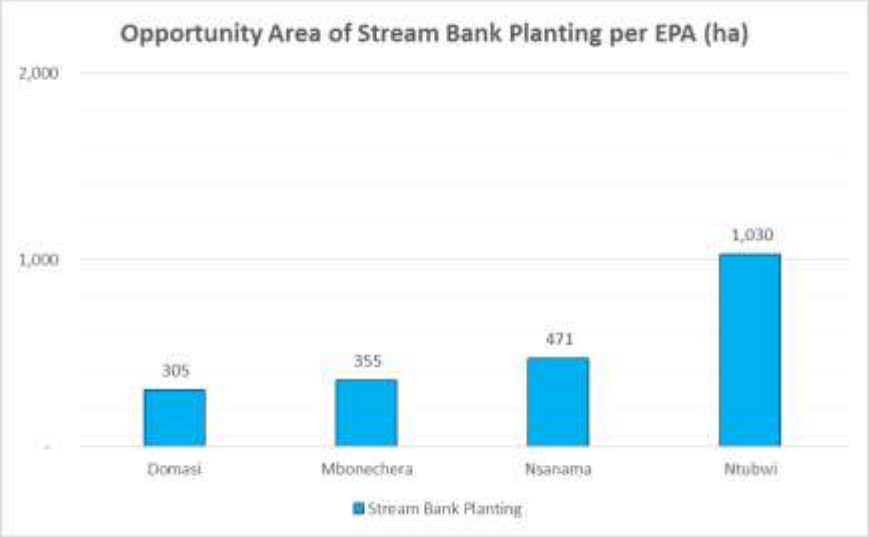

Figure 15. Opportunity area (ha) for river and stream bank plantings per EPA.

4.1.6 Soil and water conservation (check dams, infiltration ditches, contour bunds)

Mapping opportunity areas for soil and water conservation, such as check dams, contour bunds, and infiltration ditches, involved identifying areas of sloping land where croplands were located downslope and thus would benefit from infrastructure that would manage water flow toward these croplands. The data used in the analysis included areas with slope of 5 to 20 degrees, the land cover is currently uncultivated, excludes areas that is not suitable for infrastructure (e.g., not wetlands). Combining these datasets produced the map of opportunity area, as shown in Figure 16. The bar chart in Figure 17 summarizes the total opportunity area in hectares per EPA.

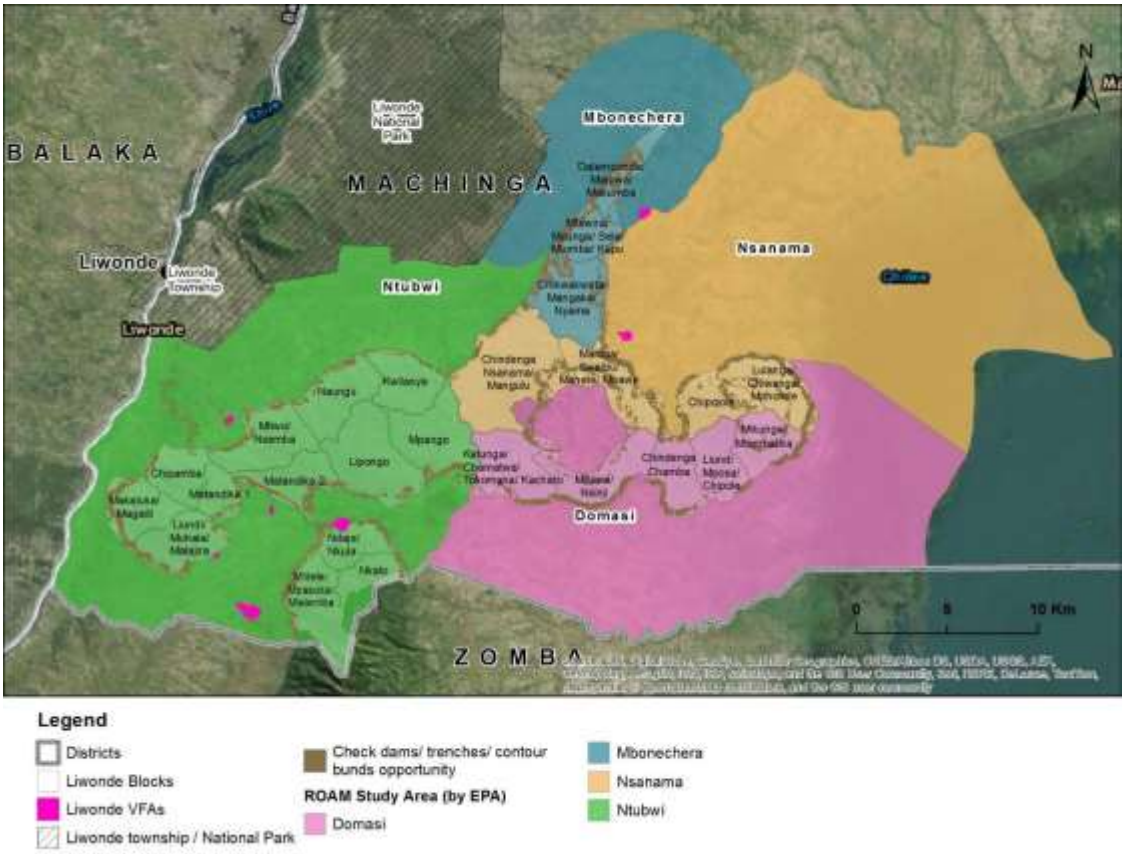

Figure 16. Opportunity area for soil and water conservation.

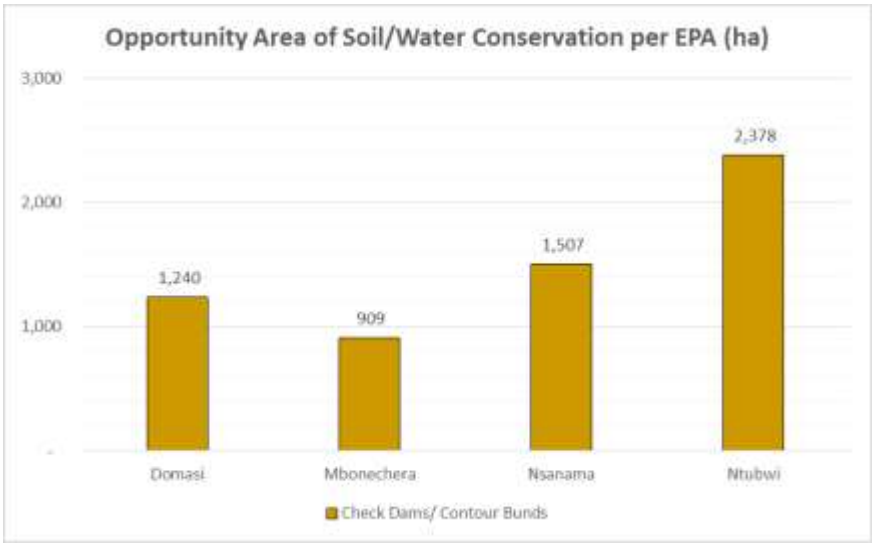

Figure 17. Opportunity area (ha) for soil and water conservation per EPA.

4.1.7 Composite summary of restoration opportunity mapping results

Each of the six restoration interventions were mapped individually and thus there is the potential for some interventions to overlap. Figure 18 shows all restoration interventions compiled into one map, and displays locations where there is opportunity for one, two, three, or four interventions. The red and dark red areas, which are mostly on the edges of the forest reserve, are the areas that are suitable for a variety of interventions and thus could be considered priority areas for focusing field-level efforts. Figure 19 compiles all of the restoration interventions into one bar chart, showing how the scale of opportunity compares across EPAs and across interventions.

Table 5 shows the area values for each restoration intervention and as a percentage of the EPA. In total, 52,535 ha (47%) of the Liwonde landscape (as defined in this analysis) are suitable for at least one restoration intervention. Of this area, 10,400 ha are suitable for multiple restoration inteventions.

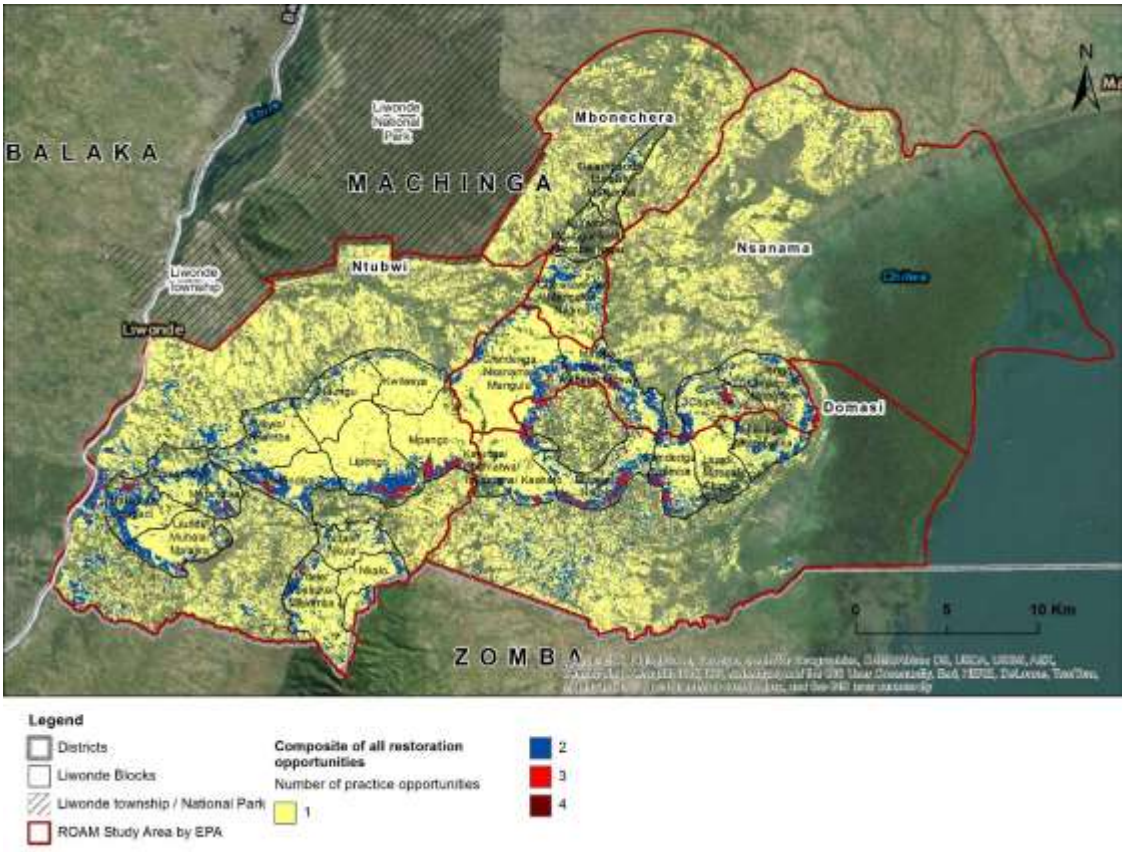

Figure 18. Composite map of all restoration interventions.

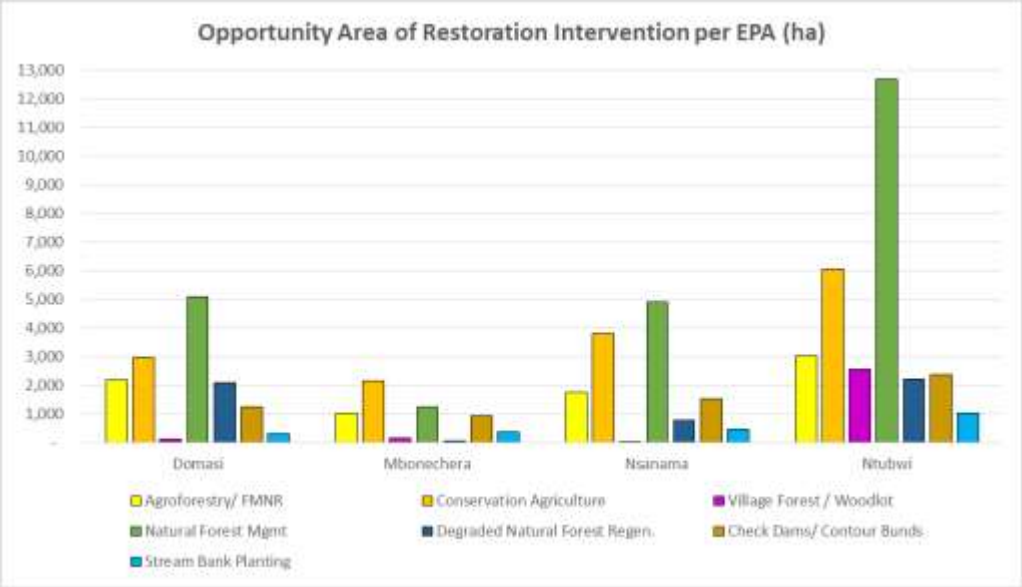

Figure 19. Comparison of area (ha) for all restoration interventions by EPA.

Table 5: Opportunity Area of Restoration Intervention by EPA, in hectares

EPA	Total EPA Area in Study Area	Agroforestry / FMNR	Conser-vation Agriculture	Village Forest / Woodlot	Natural Forest Mgmt	Degraded Natural Forest Regen.	Check Dams/ Contour Bunds	Stream Bank Planting	Total opportunity area (may include overlaps)	% of total EPA Area
Domasi	**26,027**	2,184	2,946	105	5,093	2,067	1,240	305	**13,940**	**54%**
Mbonechera	**11,972**	1,006	2,144	156	1,248	40	909	355	**5,859**	**49%**
Nsanama	**37,222**	1,735	3,796	25	4,893	774	1,507	471	**13,201**	**35%**
Ntubwi	**35,593**	3,030	6,054	2,545	12,689	2,210	2,378	1,030	**29,934**	**84%**
TOTAL (ha)	**110,813**	**7,954**	**14,939**	**2,831**	**23,923**	**5,091**	**6,034**	**2,160**	**62,934**	**57%**

4.2 DIAGNOSTIC RESULTS

As described in Section 3, consultations with stakeholders in Liwonde as well as discussions with the PERFORM team and Department of Forestry personnel, served to inform the Restoration Diagnostic, in which various political, institutional, financial, and socioeconomic factors that typically enable restoration were evaluated. Each factor was assigned a value of "in place", "not in place" or "partly in place". For those factors that were partly or not in place, strategies for how to overcome these barriers were proposed. Table 6 describes each key success factor, its status, and proposed strategies for enabling successful restoration at scale.

Table 6. Status of Key Success Factors and Strategies for Overcoming Barriers

Theme	Feature	Key Success Factor	Status	Strategies
MOTIVATE	Benefits	Restore generates economic benefits	In place	Increase flow of benefits to resource users investing in FLR and local communities
		Restoration generates social benefits	In place	
		Restoration generates environmental benefits	In place	
	Awareness	Benefits of restoration are publicly communicated	Not in place	Major support for communication and outreach campaign, including government services, partners, schools, all stakeholders; billboards, radio and TV, documentaries, competition and awards, give voice to champions
	Legal requirements	Law requiring restoration exists	Partly	Strengthen bylaws and update laws to increase incentives for FLR
		Law requiring restoration is broadly understood and enforced	Not in place	Outreach to TA, magistrates, community leaders

Theme	Feature	Key Success Factor	Status	Strategies
ENABLE	Ecological Conditions	Soil, water, climate and fire conditions suitable for restoration	In place	Mobilize communities and reinforce local bylaws to manage wild fires
		Plants and animals that can impede restoration are absent	Partly	Assess local conditions to address issues of invasive species
		Native seeds, seedlings, source populations available	Partly	Promote FMNR; support seed distribution, seedling production
	Market conditions	Competing demands for degraded lands declining	Not in place	Restore and boost productivity of managed forests and cropland
		Value chains for restoration products exist	Not in place	Strengthen agroforestry VC
	Policy conditions	Land and natural resource tenure are secure	Partly	Strengthen community based land use planning and bylaws
		Policies affecting restoration are aligned and streamlined	Not in place	Organize multi-sectoral FLR task forces at national and district levels
		Restrictions on clearing remaining forests exists	Partly	Strengthen community by laws
		Forest clearing restrictions are enforced	Not fully in place	Strengthen community based organizations and forest law enforcement
	Social conditions	Local people are empowered to make decisions about restoration	Partly	Devolve more authority to BMC and CBOs
		Local people are able to benefit from restoration	Partly	Decentralize decision making about benefit distribution; promote equity
	Institutional conditions	Roles and responsibilities for restoration are clearly defined	Not in place	Organize multi-sectoral FLR task forces at national and district levels
		Effective institutional coordination is in place	Partly	

Theme	Feature	Key Success Factor	Status	Strategies
IMPLEMENT	Leadership	National and/or local restoration champions exist	Partly	Reinforce emergence of champions in multiple sectors and institutions at all levels
		Sustained political commitment exists	Partly	Extend commitment across government and from national to local levels
	Knowledge	Restoration "know how" relevant to landscapes exists	Partly	Increase support for training, outreach on FLR
		Restoration "know how" transferred via peers or extension services	Partly	Support peer to peer learning and strengthening of extension for FLR
	Technical Design	Restoration design is technically grounded and climate resilient	Partly	Promote exchange visits and expand research on FLR
	Finance and incentives	"Positive" incentives for restoration outweigh "negative" incentives	Not in place	Expand efforts to reduce degradation and scale up FLR
		Incentives and funds are readily accessible	Not in place	Engage donors and partners in supporting restoration strategies
	Feedback	Effective performance monitoring and evaluation system in place	Not in place	Adapt and elaborate M&E systems for FLR process and outcomes
		Early wins are communicated	Partly	Communicate success stories

RECOMMENDATIONS AND NEXT STEPS

The findings of the restoration opportunity mapping assessment and key success factor diagnostic led to several recommendations for how to best scale up restoration in the Liwonde landscape. The proposed scaling stragies include:

- Prioritize landscapes in crisis (shortages of water, food, firewood)
- Prioritize communities with strong leadership, bylaws and community based organizations
- Devolve authority and reinforce local enforcement of bylaws to protect and regenerate trees across the landscape – in fields, woodlots, village forests as well as forest reserves

- Provide incentives and support for sustainable production from private woodlots, agroforestry, border plantings, bamboo
- Develop a communication strategy and increase support for outreach, extension, peer to peer training
- Research, publicize economic benefits of restoration
- Facilitate multi-sector, integrated landscape approach

In February 2016, the methods and results of the assessment as described in this report were presented to the Department of Forestry (DoF) and to stakeholders in Liwonde as part of a validation workshop. In total, DoF and stakeholders were receptive and supportive of the findings, with much anticipation over next steps so that restoration can be implemented on the ground. Dr. Clement Chilima, Director of the Department of Forestry, noted in particular that it will be important to involve other ministries and departments across GoM involved in this effort to make it successful. Another key outcome of the validation workshop, as suggested by Mr. Marvin Mkondiwa of the District Council in Machinga, was to follow up with the District Environmental Sub-Committee and present the assessment at their next meeting for approval and discussion of how the recommendations could be supported and integrated into the planning process.

APPENDIX

6.0 TERMS OF REFERENCE

WRI Assistance to USAID funded PERFORM Project for Pilot Application of ROAM in Liwonde Landscape

Goal: This activity will provide technical support to apply the Restoration Opportunities Assessment Methodology (ROAM) at the sub-national level in Malawi to generate actionable recommendations for forest landscape restoration based on dialogue with stakeholders about restoration goals and GIS analysis of empirical data with consideration for available resources.

This activity would contribute to the results identified for PERFORM Objective 2 – Increasing Low Emissions Land Use Opportunities, with a focus on increasing tree cover in targeted geographies and associated livelihood opportunities.

The activity would produce a report identifying the scope and extent of major types of restoration opportunities in the landscape of the Liwonde Forest Reserve based on a spatial analysis of the areas suitable for these restoration opportunities and an assessment of the enabling conditions, which will inform recommended actions to support the scaling up of restoration in the targeted landscape and more widely.

Description:

WRI proposes to mobilize two technical specialists to work with the PERFORM team and implementing partners to support the application of ROAM mapping and diagnostic tools in the landscape of the Liwonde Forest Reserve. The proposed specialists are: Katie Reytar, GIS Analyst and Bob Winterbottom, Forest Restoration / CBNRM specialist.

The WRI team would provide technical support for the following visits and activities:

October 2015 (first visit):

1. Travel to Malawi and consult with PERFORM team to confirm schedule, collect available data, review documentation, and prepare for field visit;
2. Meet with government stakeholders to a) review their perspective on goals for restoration at national and local levels, and b) discuss current strengths and weaknesses of the policy framework and enabling environment for restoration, including key policy and institutional barriers.
3. Participate in field visits to take stock of successful interventions and approaches leading to increased tree/forest cover, with attention to physical characteristics and conditions, to identify the most promising pathways for forest landscape restoration (FLR) in the Liwonde landscape and associated characteristics/conditions important for replication.
4. Convene local stakeholders to discuss primary goals for restoration, taking into account key drivers of degradation, observed and anticipated benefits of restoration, and best options for implementing restoration.
5. Review existing spatial data, including available Land Use/Land Cover maps, and consult with key stakeholders to identify characteristics of the landscape that can be used to assess restoration opportunities.

November 2015 – January 2016:

1. Review available household survey data and other collected information on successful interventions, major drivers of deforestation, and key barriers and constraints to restoration;
2. Apply the Rapid Restoration Diagnostic to assess the status of enabling conditions for increased local investment in and adoption of FLR and related restoration practices, including the need for interventions to leverage key success factors that may be needed.
3. Identify and quantify areas to be targeted for forest landscape restoration interventions, with a focus on areas of tree cover loss over the past ten years. FLR interventions may include:
    a. Restocking / regeneration / reforestation and improved management of deforested and degraded natural forests and forest reserves;
    b. Protection, regeneration and improved management of village forests;
    c. Establishment and management of small scale private woodlots and tree plantations;
    d. Establishment and management of larger scale commercial tree plantations;
    e. regeneration, increased density and improved management of trees on croplands and pasture land; and
    f. Other opportunities to scale up additional promising restoration techniques and best practices for FLR identified during the field visits.

February 2016 (second visit):

1. Convene all relevant stakeholders to a) present results of restoration opportunities mapping to obtain feedback on identified FLR opportunity areas and intervention types, and b) present results of restoration diagnostic to validate findings on key strengths and weaknesses of the enabling environment and recommended actions.
2. Convene government stakeholders to provide information and basic training on the steps and techniques used to apply the ROAM methodology at the sub-national level; engage these stakeholders in identifying practical steps and processes that could be used to identify restoration opportunities nationally.

February 2016 – March 2016:

Refine results based on feedback received during second visit and prepare a technical report summarizing the findings from the field visit to Liwonde landscape, mapping and GIS analysis, restoration diagnostic and related recommendations related to the pilot application of ROAM.

6.1 AGENDA FOR INCEPTION WORKSHOP

Schedule for Monday, 19th October 2015 kick-off session for ROAM application in Liwonde Forest Reserve Landscape

MONDAY 19th October 2015		
TIME	**ACTIVITY**	**WHO**
8:00-8:15	Registration	Clifford Mkanthama
8:15-8:30	Opening prayer and Introductions	Clifford Mkanthama
8:30-9:30	Session 1: FLR Overview The session will include a shortened powerpoint presentation (15-20 min) that defines and provides several examples of Restoration. It will also provide an overview of ROAM and highlight the key questions that will serve to orient the fieldwork. A 20 minute video documentary "Ethiopia Rising" will also be shown to give an example of successful restoration. Ethiopia Rising presents the transformation of landscapes and communities in the Tigray region of northern Ethiopia as seen through the eyes of Aba Howie, the "man of fire". The video illustrates the importance of vision, commitment and collaboration and the role of local leadership in mobilizing people to take action in the face of land degradation, and shows what can be achieved and how to restore a life giving landscape. Points to be reinforced by the facilitator: - What do we mean by restoration, and what can be achieved through restoration? - How can restoration transform landscapes and the lives of people? - What are some factors that contribute to successful restoration?	Bob Winterbottom & Katie Reytar
9:30-10:30	Session 2: Restoration Goals (group work – 30 minutes discussion) This session will build upon the first session and provide an opportunity for the key stakeholders of the Liwonde Landscape to answer the question: why restore the Liwonde Landscape? In other words, what are the key problems (land use challenges) that they would like to see addressed through restoration? And what are the most important objectives to be achieved through restoration? Examples of land use challenges: - Poor soil quality and crop production - Forest cover has been depleted - Shortages of fuelwood, poles, other wood products - Reduced supplies of thatch, fodder, mushrooms, medicinal plants and other non-wood forest products - Reduced access to drinking water - Poor water quality in rivers and streams - Declining fisheries and wildlife resources - Other locally important problems related to deforestation, land degradation and land use Examples of objectives that can be achieved through restoration:	Tangu Tumeo

	Better crop yields and more productive agricultural land to avoid clearing more forests for cropland - Improved water quality in boreholes, rivers and streams - Closer, sustainable source of fuel wood to shorten collection times - Restored density and extent of tree and forest cover - Increased availability of forest products such as mushrooms - Conserve biodiversity - Reduce rainfall runoff, control erosion and improve watershed management - Increase benefits and raise incomes for local communities who invest in restoration - Other locally important objectives Working Groups are to highlight and provide more information about the most important problems they've noticed or experienced related to deforestation and natural resource degradation in the Liwonde landscape, and then provide corresponding long term objectives that can be achieved through restoration. Proposed timing: 5 minutes to orient and organize working groups 25 minutes for each group to discuss and identify most important problems and restoration objectives 25 minutes for groups to share results 5 minutes to summarize overall results and take stock of which problems/objectives were identified in multiple groups	
10:30-10:45	Tea	Hippo Lodge
10:45-11:30	Session 3: Most Promising Restoration Approaches The aim of this session is to identify potential forest landscape restoration options and highlight the most promising approaches to restoration that would serve to achieve the prioritized restoration objectives. Participants will be encouraged to suggest restoration approaches based on known successes in the landscape or ideas from other locations that could be successful in Liwonde. The site visits and fieldwork will aim to take stock of particularly promising experience with specific restoration approaches and practices. Restoration options and promising approaches could include: - Expansion of agroforestry and farmer managed natural regeneration of trees on agricultural land - Expansion of other soil and water conservation practices on agricultural land (such as conservation agriculture, contour bunds, vetiver strips, mulching) - Expanded area and improved management of small scale woodlots for local, domestic wood supplies - Development of commercial tree plantations for production of valued forest products - Increased protection, regeneration, reforestation and improved management of natural forests - Erosion control on steep slopes (using check dams, infiltration ditches or other techniques)	Phelire Nkhoma

	- Increased tree and vegetative cover along streams and rivers and to protect water bodies especially where there are water quality and flooding problems downstream - Fire control and management - Control and management of livestock grazing - Other The most promising approaches and practices would be identified through facilitated participation in group discussion.	
11:30-12:00	Session 4: Key barriers to successful restoration This session will identify key barriers that need to be overcome to increase the adoption of restoration practices and to implement the most promising approaches and types of restoration practices across the landscape. . What are the key barriers to widespread adoption of promising restoration practices? (e.g. weak enforcement of local bylaws to protect forests and govern resource use too few champions of restoration, lack of information, training, extension and technical support lack of capital or access to credit, limited access to markets.) How can rates of adoption of these restoration practices be increased? (e.g., strengthened enforcement of by-laws, more farmer-to-farmer knowledge sharing and peer to peer training in restoration practices, more community-based groups, better access to loans) What other kinds of interventions could be supported to address the key barriers and facilitate and accelerate adoption of restoration at scale? (for example adoption or reform of key enabling policies and regulations) These questions will be answered through facilitated group discussion.	Luke Malembo
12:00-12:30	Session 5: Field Visit schedule Building on the previous sessions, the participants will be asked to identify key sites to be visited, to gather more information about promising restoration approaches and how they could help to address the key problems related to deforestation and degradation and achieve the identified restoration objectives Following the identification of priority sites, and scheduling of group visits to the sites, the participants will be briefed on key questions to be answered during each site visit. Questionnaires will be handed out to all participants for note-taking during the site visits. Suggested questions to guide discussions with local stakeholders during the site visits include: 1. What type of restoration activity was done to restore the landscape and how? 2. What is the primary motivation for this type of restoration activity? (i.e., what problem does it address?)	Alinafe Chibwaa

	3. What are the main benefits of this restoration activity? 4. Where can this restoration practice be applied and scaled up? (i.e., what are the important characteristics of the landscape where this practice would be suitable? For example, types of land use, soils, slope, proximity to water, roads, markets.) 5. What are some key success factors and enabling conditions that contributed to the success of this restoration activity? 6. What are the estimated costs of this restoration practice?	
12:30	Lunch	

6.2 LIST OF PARTICIPANTS – INCEPTION WORKSHOP

No	Name	Organisation
	Team # 1	
1	Gloria Nkhoswe	DoF Lilongwe
2	Tangu Tumeo	DoF Lilongwe
	Patricia Masupayi	
3	Francis Chilimampunga	DoF Lilongwe
	Team # 2	
5	Henry Utila	Frim Zomba
6	Mike Chirwa	Frim Zomba
7	Gloria Makhambera	Frim Zomba
	Team # 3	
9	Tembo Chanyenga	Frim Zomba
10	Aidah Mkwezalamba	Frim Zomba
	Team #4	
12	Wilfred	RFO (S)
13	Gerald	RFO (S)
	Teams # 5	
15	Dan Ndalowa	MCFW Dedza
16	Trinitas Senganimalunje	MCFW Dedza
17	Anderson Ndema	MCFW Dedza
18	Monica Gondwe	MCFW Dedza
19	Francis Kamangadazi	MCFW Dedza
	Team # 6	
21	Clifford Mkanthama	PERFORM Lilongwe
23	Jane	PERFORM Lilongwe
	Team # 7	
25	Bob Winter Bottom	WRI
26	Kattie	WRI
	Team # 8	
28	Luke Malembo	PERFORM Lilongwe
29	Chisomo Mdalla	PERFORM Lilongwe
30	Phelire Nkhoma	PERFORM Lilongwe
	Team # 9- Traveling on public transport	
32	Madalo Itimu	TLC Machinga
33	Ponsilio Bwalo	TLC Machinga
34	Hastings Chikoko	TLC Machinga
35	Yanjanani Lambiki	TLC Machinga
36	Names to be given	AEDEC

37	Names to be given	AEDEC
38	Names to be given	AEDEC
39	Names to be given	AEDEC
	Team # 10 user their vehicles	
40	Montfort Somanje	DFO Machinga
41	Paul Muhosha	DFO Machinga
42	Pasulani	DFO Machinga
43	Master	DFO Machinga
44	Munyane	DFO Machinga
45	Grace Mussa	DFO Machinga
	Team # 11	
46	Names to be given	Water Dpt -Machniga
47	Names to be given	Water Dpt (Machniga)
48	Names to be given	DADO
49	Names to be given	Health
50	Names to be given	Health
51	TA Chamba	Machinga
52	TA Mposa	Machinga
53	TA Sitola	Machinga
54	TA Mkula	Machinga
55	TA Msanama	Machinga
56	TA Mlomba	Machinga
	David Chitedze	Machinga

6.3 SITE VISIT QUESTIONNAIRE FOR LIWONDE ROAM ASSSESSMENT

Date: _____

Name of Interviewer:_____

Email address:_____

Site Location:_____

1. What type of restoration activity was implemented to restore the landscape? How was it done?

2. What was the primary motivation for this restoration activity? (What problem does it address?)

3. What have been the main benefits of this restoration activity? (For example: better crop yields, shorter time to collect fuel wood, etc.)

4. What are the important characteristics of the site location that make this practice suitable? In other words, on what type of land could this restoration practice be applied to scale it up to other locations? (For example: specify type of land use (agriculture, village, grazing, etc.), flat or steep slope, proximity to water, roads, markets, etc.)

5. What are some key success factors and enabling conditions that contributed to the success of this restoration activity? (For example: strong community leadership, training, microfinance, etc.)

6. Is there a cost for supplies or other investments associated with this restoration practice? If so, approximately how much?

6.4 FULL REPORT ON SITE VISITS

LIWONDE ROAM STAKEHOLDER CONSULTATIONS AND SITE VISITS, 19-21 OCTOBER 2015

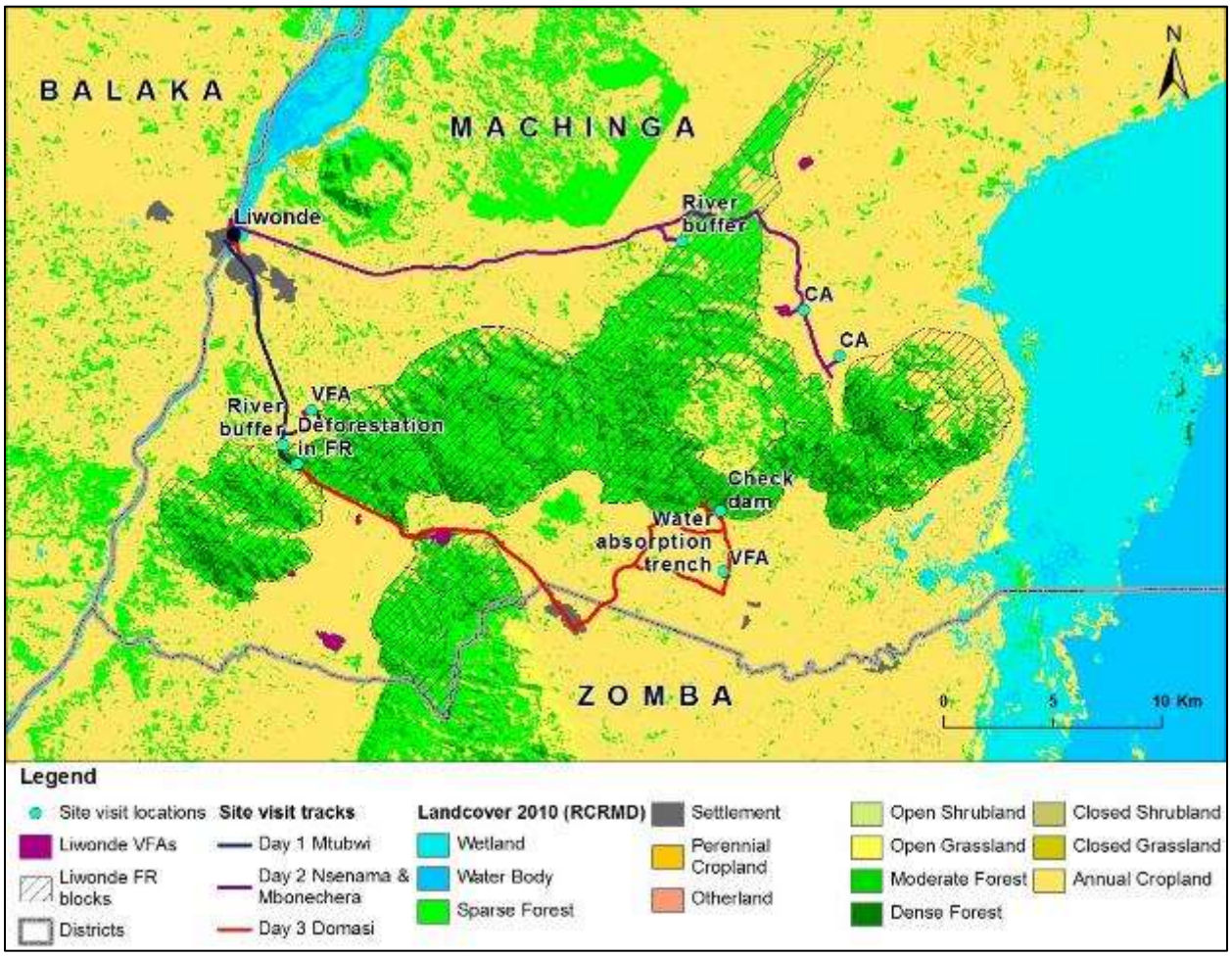

Figure 20. Map of site visit locations 19-21 October 2015.

Date: 19 October 2015 (Day 1)

Site Location: Mtubwi EPA, Sitola TA, Mliwo FRB, Semba NRM

Summary of restoration activity:

- Establishment of Village Forest Area (VFA), which was officially demarcated with the Department of Forestry (DoF) in 2006.
- Greenline Movement provided assistance in initiating and organizing this activity.
- VFA is managed by a 26-member committee from 8 villages and they have established by-laws for how to manage the VFA. Chiefs from 8 villages agreed to support protection of the demarcated Village Forest, through enforcement of by-laws.
- Management practices include thinning of forest with District Forest Office (DFO) guidance; weeding; firebreak maintenance; firefighting. No apparent investment in soil and water conservation

/ erosion control / water harvesting to boost regrowth of forest cover and conserve soil and water resources.

- Community members harvest firewood in the adjacent Forest Reserve, with permits issued by the Forest Dept (50 MK / head load)
- All forest cover in the Village Forest is natural regeneration; no trees were planted.
- Beekeeping is in place within VFA (26 people on VFA committee were trained) but with limited success: only 3 of 18 hives are colonized. Problems include: shortage of water at the site, limited access to market for honey, lack of appropriate harvesting equipment.

Motivation for implementing restoration activity:

- Need for more forest products – medicines, herbs, etc.
- Poverty
- Need for protection of forest cover around new water tank.
- Recognition that the Liwonde Forest Reserve could be depleted in the future and they need a backup plan, or a "savings account" for the future.
- The community land on which the existing VFA stands had been deforested and degraded; they needed to introduce more structure and by-laws to end the deforestation and promote regeneration.

Perceived benefits achieved through restoration activity:

- Improved access to forest products such as mushrooms, herbs, medicines, and honey from beekeeping.
- Community ownership and shared vision for its protection.
- Repository of wood for the community once the FR is depleted.

Key factors that made this restoration activity successful:

- Strong interest and leadership from within the community; sense of ownership.
- Successful enforcement of VFA bylaws.

Characteristics of the landscape that make the activity suitable, for assessing the potential to scale up across the landscape:

- Located on a ridgetop and steep slope; customary community land; shallow, rocky soil unsuitable for cultivation; previously degraded and unproductive land.

On-going problems/issues that were noted:

- Continuing deforestation of the Forest Reserve Block (Milwo and Matandika blocks) despite establishment of the VFA. Establishment and protection of VFA by itself is not a successful strategy to reduce pressure on FR.
    - The VFA is functioning as a fully conserved forest area; by-laws state that community members are not allowed to collect greenwood in the VFA, only dry wood if they receive approval from the managing committee. Most people do not seek to collect dry wood due to the bureaucracy of the approval process. Community continues to source all of their fuel wood from the Forest Reserve, with permits issued by the Forest Dept.
    - The Forest Reserve Block Committee says that they cannot control the deforestation in their block. The FR is more difficult to manage because it involves 10 villages instead of 8 as with the VFA. FR is also a much larger area than the VFA and difficult to monitor for violators

who come in from other villages. Difficulty in enforcing the rules and lack of support from surrounding communities.

- Perception is that protecting the FR is a lost cause – too many people are coming from surrounding forest to produce charcoal and collect wood.
- Lack of support or leadership from local chiefs and local government; collusion between DFO and charcoal producers who are warned about patrols in advance.
- Continue to be problems of demand for charcoal, people who are managing the forest reserve block are buying charcoal.
- There are problems of preferential treatment of committee members who are supported by the village chief of being selected for trainings to benefit from the monetary allowances given out at the trainings.

Figure 21. Msemba Village Forest Area.

Figure 22. Deforestation and charcoal production in Milwo and Matandika Forest Reserve Blocks.

Date: 19 October 2015 (Day 1)

Site Location: Mtubwi EPA, Sitola TA, Mliwo - Matandika block

Summary of restoration activity:

- Tree planting immediately adjacent to stream bed (< 1 m). *Khaya anthotheca* (East African mahogany) and *Rauvolfia caffra* trees planted 9 years ago (2006).
- Initiated with assistance from Greenline Movement.

Motivation for implementing restoration activity:

- Water shortage and need for reliable, sustainable access to water.
- Erosion and sedimentation in stream.

Perceived benefits achieved through restoration activity:

- Reliable, sustainable access to water resources both aboveground and below ground.
- Improved water quality due to reduced sedimentation and erosion.

Key factors that made this restoration activity successful:

- Strong interest and support from community; sustained support from Greenline Movement.
- Access to seedlings; training and transference of technical knowledge about appropriate species to plant and how to maintain;

Characteristics of the landscape that make the activity suitable, for assessing the potential to scale up across the landscape:

- Stream/river bed as important source of water for community.

On-going problems/issues that were noted:

- The team observed illegal, unauthorized tree cutting and construction of earthen kilns for charcoal production in the Forest Reserve upstream from the river bank plantings, local block management committee disrupted the operation and the producers fled. The community observed that the producers had previously relied on incomes from harvesting crabs in the river, but with reduced flow, there are fewer crabs and few alternative sources of income apart from illegal charcoal production.
- The VFA has informed the DFO and traditional authorities but there has not been an effective response and the illegal charcoal production continues.

Figure 23. Stream bank planting.

Date: 20 October 2015 (Day 2)

Site Location: Nsanama EPA, Mlomba TA, Malopa/Chipojola/Swayibu block, Malopa/Swayibu VNRMC

Summary of restoration activity:

- Two conservation agriculture (CA) field sites visited – village chief and one other farmer. Six farmers have reportedly adopted CA in the village.
- Very recent introduction of CA to village (2 seasons ago). Introduced through extension agents who set up a demonstration field in village.

- CA approach on these fields included: no burning of crop residue; residue put back in field on top of soil; no-till in some places, but some fields still tilled w/ ridges; maize plantings 10-cm apart; no crop rotation practiced.
- CA is practiced on parts of fields, not all of the farmers' fields. Village chief practiced CA on pigeon peas field; other farmer practiced on maize field.
- Low density agroforestry in place on village chief's field. 10 seedlings of *Faidherbia albida* were provided to each farmer by Rural Infrastructure Development Project (RIDP), but survival rates of planted seedlings were very low (easily damaged during tillage, or burned or browsed)

Motivation for implementing restoration activity:

- Low soil fertility and soil moisture leading to low crop yields.
- Field size is smaller and more difficult to afford fertilizer, so need to boost yields
- Training from ag extension agent.

Perceived benefits achieved through restoration activity:

- Lesser need for fertilizer. Farmers say that their CA fields need 1.5 bags fertilizer instead of 2 bags; say they understand that fertilizer needs will decrease further with time.
- Women's perspective: gradual decrease in work load because of low/no till and no burning of crop residues; less fertilizer application. Difficult the first time and additional work with moving crop residues on and off field but work load decreases with each planting.
- Crop residues preserve soil moisture and improve soil fertility.

Key factors that made this restoration activity successful:

- CA is still in early stages of adoption, but leadership of village chief in being early adopter is promising.
- Introduction of CA concept through ag extension training and demo field on site.

Characteristics of the landscape that make the activity suitable, for assessing the potential to scale up across the landscape:

- Cropland with little or no agroforestry/FMNR in place.

On-going problems/issues that were noted:

- Mixed messages from farmers about the benefits of CA. Some say it is because they were told what to do by ag extension without any information about benefits; others clearly have knowledge of benefits. Some conflicting and possibly inflated figures about crop yields were provided.
- Need for more ag extension training and support, which is clear in the fact that there is only partial adoption of CA concepts
- Low survival rates of Faidherbia one cause of low adoption of agroforestry (10% of seedlings donated by RIDP apparently survived). Faidherbia does not naturally occur in this area but small, medium and large sized trees were observed in fields; density of trees in fields could be increased further by promoting direct seeding or through farmer managed natural regeneration of seedlings that germinate after livestock browse on seedpods from existing trees and seeds are deposited in manure.

Figure 24. Conservation agriculture.

Date: 20 October 2015 (Day 2)

Site Location: Nsanama EPA, Mlomba TA, Malopa/Chipojola/Swayibu FRB

Summary of restoration activity:

- Forest Reserve Block Management Committee, in place since 2013

Motivation for implementing restoration activity:

- N/A

Perceived benefits achieved through restoration activity:

- Some beekeeping is on-going in block but hives are damaged; still able to sell some honey.

Key factors that made this restoration activity successful:

- N/A

Characteristics of the landscape that make the activity suitable, for assessing the potential to scale up across the landscape:

- Demarcated forest reserve block.

On-going problems/issues that were noted:

- Outsiders are harvesting from the block.
- Lack of commercial opportunities for income other than forest reserve; formerly there were estates in the area but not anymore.
- Very willing to work but also expect benefits (money) in return. Currently only the committee receives benefits and they are not distributing it to the community for which it is earmarked despite village chief's instruction.
- Perception is that they can't enforce the laws and violators have lack of respect for community's attempts at enforcement; community says they need uniforms, "guns without bullets", and payment from DoF to manage forest.
- Lack of market opportunities in this area.

Date: 20 October 2015 (Day 2)

Site Location: Nsanama EPA, Malopa/Swayibu VNRMC

Summary of restoration activity:

- Village forest area/Village Natural Resource Management Committee (VNRC)

Motivation for implementing restoration activity:

Perceived benefits achieved through restoration activity:

Key factors that made this restoration activity successful:

Characteristics of the landscape that make the activity suitable, for assessing the potential to scale up across the landscape:

On-going problems/issues that were noted:

- Technical capacity and knowledge is lacking, especially in terms of when to harvest from VFA.

Date: 20 October 2015 (Day 2)

Site Location: Mbonechera EPA, Nsanama TA, Nyama/Mangaka FRB, Malilima VFA, Villages: Msambuzi, Malilima, Mangaka, Chikwakwata

Summary of restoration activity:

- Mixed tree plantations of *Senna*, *Acacia*, *Albizzia* and other species established by planting seedlings along river upstream of fields and village, approximately 10-20 m from river bed.

Motivation for implementing restoration activity:

- Tree plantings are an attempt to prevent occurrence of significant gullies and major erosion problems downstream due to force of river during rainy season; trees were planted as barrier to reduce force of flowing water and to protect streambanks.
- Community learned of this practice to stabilize streambanks and soils through visits to other nearby blocks.
- Bylaws do not permit women from collecting fuel wood from this forest area unless a small fee is paid; fuel wood is sourced from eucalyptus woodlots.

Perceived benefits achieved through restoration activity:

- Protective forest and soil stabilization.
- Trees along river channels and streambanks lessen impacts from flooding.

Key factors that made this restoration activity successful:

- Knowledge-sharing between communities.
- Successful community management of forest area and enforcement of bylaws.
- Lots of willingness to implement restoration activities.

Characteristics of the landscape that make the activity suitable, for assessing the potential to scale up across the landscape:

- Low density or no tree cover within 10-20m of river channel upstream of village/fields.

On-going problems/issues that were noted:

- Urgent need to address gullies and major erosion problems downstream by ; important to address soil erosion and formation of gullies by reducing runoff, increasing tree cover and rainfall infiltration, and improving watershed management upstream with check dams, agroforestry and other measures, in combination with river bank tree plantings.
- Attempts to plant trees downstream at site of gullies and erosion problems were said to be unsuccessful with low survival rates.

- Village recognizes need for more training from extension, particularly in knowledge of tree species suitable for river bank planting (the species they planted were not appropriate) and also in identifying tree seeds and seedlings; some concerns about widespread planting of Eucalyptus
- They identified need for additional equipment for tree plantings; in particular tubes for producing seedlings. Note that PERFORM is providing 150,000 tubes for this planting season
- Need for more access to capital; village savings and loan.
- Need for boreholes in village to provide water for nursery.

Figure 25. River buffer planting (above); VNRMC (below).

Date: 21 October 2015 (Day 3)

Site Location: Domasi EPA, Chamba TA, Mitawa FRB, Lingoni River watershed catchment

Summary of restoration activity:

- Watershed management to address problems of water flow and erosion damaging soil and crops downslope. Practices implemented include check dams, water absorption trenches, contour trenches, vetiver grass, and *Faidherbia albida*.
- Specific watershed management activities included:
    - Check dams every 15 m along runoff channels on slopes above crop fields to reduce water runoff and the amount of soil that is washed away from the fields.
    - Water absorption/contour trenches to accumulate soil and water dug at 10 m spacing.
    - Vetiver grass along hillslope and behind check dams to stabilize soils and reduce water flow and erosion.
    - *Faidherbia albida* in crop fields to provide nitrogen fixation and increase tree cover.
    - Irrigation canals to channel water from Lingoni River to fields downslope; crops produced with irrigation include maize, tomatoes, rice and other vegetables.
- Community has three separate committees to manage activities: Irrigation, Watershed, and Forest Reserve Block committees. They meet together regularly to discuss issues.
- Size of village is 3,394 ha. At first, 134 ha were protected (35 fields); now there are more than 200 fields protected.
- In the watershed, 5,440 trenches were dug by 3,000 people.

Motivation for implementing restoration activity:

- Problems of soil erosion and forceful water flow affecting productivity of crops downslope.
- In 2010, NGO Emmanuel International (EI)/ WALA approached the Traditional Authority (TA) about implementing watershed management practices; TA and community agreed to participate. EI provided technical training, equipment, and other support until 2014.
- EI provided incentives for digging trenches that included 4 L of cooking oil and 15 kg of beans per person per month.

Perceived benefits achieved through restoration activity:

- Greener, more productive crop fields that are more resistant to climate and other impacts including drought/floods.
- Diversification of crop production because of irrigation scheme, including rice, tomatoes and other vegetables.
- Increased awareness throughout community of the importance of watershed-scale restoration.

Key factors that made this restoration activity successful:

- Early support and adoption by TA and village chiefs who provided leadership and encouraged community members to participate. The first trenches were dug in TA's field.
- Benefits of adopting contour trenches were seen very early in project process. A drought in 2010 convinced many to start adopting; during the rainy season, the farmers who had dug trenches had greener, more productive crops than those without trenches.
- Mechanisms in place for how to address problems and settle disputes. For individual community members, problems are reported to the TA. For problems with other communities upstream (e.g., causing muddy water), then the problem is reported to the extension agent, who then talks to the FR block management committee at the source of the problem. Village chief can also meet with other

chiefs at source of problem to negotiate a solution, such as planting more trees to prevent sedimentation in river.

- EI provided support to community for 3 years, which was enough time to fully engage with community and provide for technology transfer, knowledge and ownership to help ensure that maintenance of infrastructure will continue after EI's support ended.
- Lingoni Watershed Association now well established with local leadership (Chairman of Watershed Committee, Wilfred Charles, is dynamic and committed to the continuing success of the watershed management practices; contact: 088 135 3306)
- Community has had access to nearby markets for selling crop and forest products.

Characteristics of the landscape that make the activity suitable, for assessing the potential to scale up across the landscape:

- Watershed catchment area that is characterized by steep slopes and crop fields downslope of water source.

On-going problems/issues that were noted:

- Some instances of sabotage and destruction of canals and trenches.
- Chief from village upstream of the community at source of river arrived at meeting; this community blamed his community for causing muddy waters. He blamed community for producing charcoal.
- Perception that communities cannot adopt watershed management practices without outside resources and support from NGOs or government. Lack of willingness from surrounding communities to learn from their successful project without receiving the same support.
- Charcoal is being produced in FRB, but community blames outsiders for this practice. Also note a lack of political will of government to protect forest.
- Continuing issues of encroachment into forest reserve boundary; boundary was already moved once because of encroachment.

Figure 27. Village chief and members of Irrigation, Watershed, and Forest Block management committees (left); irrigation canal (right).

Figure 26. Check dams (left); water absorption trench (right).

Figure 28. Irrigated agriculture.

Date: 21 October 2015 (Day 3)

Site Location: Domasi EPA, Chamba TA, Chisomo VFA

Summary of restoration activity:

- Village Forest Area (VFA) established in 2013 on fallow land that was donated by the village chief.
- VFA management committee is chaired by a woman, and includes 20 women and 3 men.
- VFA management activities include preparing seed and clearing brush. Bylaws allow for managed cutting.

Motivation for implementing restoration activity:

- Recognition of the need for a source of fuelwood and forest products for the community that is secure and available for future needs.

Perceived benefits achieved through restoration activity:

- Secure source of wood and forest products to meet future needs of community.
- Gaining access to stocks of wood that are closer than adjacent forests on hill slopes (and that require some 6 hours to walk to the forest, collect wood and return to the village)

Key factors that made this restoration activity successful:

- The leadership and awareness of the village chief in recognizing the importance of a village forest to meet the needs of the community, which motivated him to donate his land.

- The leadership and mobilization of women in the VFA, including the chairperson, Agness Bello.
- Knowledge sharing from extension agents who showed them examples of VFAs from other communities.

Characteristics of the landscape that make the activity suitable, for assessing the potential to scale up across the landscape:

- Fallow or unproductive crop land that can be set aside.

On-going problems/issues that were noted:

- An issue of security of tenure – the trees are planted on customary land allocated by the village chief, and the land is still technically owned by the village chief. There is no guarantee that land will remain for the community if village chief or his children decide to take back the land. Need to officially register the VFA with the Department of Forestry to secure the plot of land as community forest land.
- Promotion of Village forest / woodlot can be complemented by encouragement of individual tree plantations around homesteads and field boundaries, to develop supplies of wood that can be directly managed by each household and that are more accessible than adjacent forest reserves.

Figure 29. Chisomo Village Forest Area.

6.5 BRIEFING NOTE FOR DISCUSSIONS AT THE MINISTRY OF NATURAL RESOURCES, ENERGY AND MINING

Participants:

Ben Botolo, Principal Secretary, MNREM

Dr. Clement Chilima, Director, Department of Forestry

Tangu Tumeo, Department of Forestry

David Chalmers, Environment Team Leader, USAID/Malawi

Ramzy Kanaan, Chief of Party, PERFORM

Blessings Mwale, Deputy Chief of Party, PERFORM

Robert Winterbottom, Senior Fellow, World Resources Institute

Purpose of the Meeting:

- To brief the PS on recent progress and plans of the PERFORM team to scale up practices aimed at restoring deforested and degraded land in the landscape of the Liwonde Forest Reserve
- To discuss the relevance of these interventions to the goals and programs of the Ministry and GOM, including progress with REDD+, reduction of illegal charcoal production, protection of watersheds, increasing supplies of fuelwood, food, water, enhancing resilience to climate change, boosting household incomes and biodiversity conservation
- To brief the PS on the Bonn Challenge and other global and regional initiatives to support Forest Landscape Restoration as a contribution to the achievement of Sustainable Development Goals, climate change mitigation and adaptation, and other agreed upon development targets and objectives
- To discuss the specific interests of Malawi and options for mobilizing increased attention to Forest Landscape Restoration in Malawi, through engagement in the African Forest Restoration initiative (AFR100) coordinated by NEPAD, and participation in the Global Landscapes Forum at the UNFCCC COP21 in Paris.

Requested decision and action:

- Preparation of a letter to the NEPAD Secretariat to formally express interest in being part of the African Forest Restoration initiative and contributing to the Bonn Challenge, and to outline the main types of assistance and envisioned cooperation that are important for the successful achievement of Malawi's restoration ambitions
- Preparation of Malawi's participation in the Global Landscape Forum and AFR100 launch event

Supporting documentation:

- Folder and brochures on the Bonn Challenge and the Global Partnership on Forest Landscape Restoration and WRI/IUCN map on Restoration: a world of opportunity
- IUCN magazine Arbor Vitae special issue on Forest Landscape Restoration Potential and Impacts

- A Guide to the Restoration Opportunities Assessment Methodology (ROAM) – a handbook of tools and methods to assess forest landscape restoration opportunities at the national or sub-national level
- Scaling Up Regreening: Six Steps to Success. WRI report on practical approaches to achieve increased impact more quickly through forest and landscape restoration
- Powerpoint slide presentation (print out) on Preliminary Findings from stakeholder consultations and site visits for the pilot application of ROAM in the Liwonde landscape

Additional background information:

PERFORM and ROAM

The ***PERFORM*** project (***Protecting Ecosystems and Restoring Forests in Malawi***) is a five year project funded by USAID (budget of $15 million) which began in September 2014. The project goal is to help Malawian institutions and communities to be empowered to manage forest and soil resources more efficiently, equitably and sustainably so as to improve Malawians' quality of life. The specific objectives of PERFORM include advancing REDD+, increasing low-emissions land use opportunities in three targeted landscapes and increasing capacity for low-emissions development.

As part of the assistance provided by PERFORM, the team is working with the Department of Forests and key stakeholders in the Liwonde landscape to apply the ***Restoration Opportunities Assessment Methodology (ROAM)*** to generate actionable recommendations for forest landscape restoration. The recommendations are being developed through dialogue with concerned technical services, traditional authorities, community organizations, NGOs, researchers and university experts and others to identify opportunities for increasing tree cover and improving livelihoods across the landscape.

Following consultations with local stakeholders in the ***Liwonde landscape***, the following restoration objectives were highlighted:

- Improve soil fertility, conserve soil moisture and boost crop yields
- Protect watersheds, reduce runoff and erosion, improve streamflow, water quality and quantity
- Maintain and increase forest and tree cover, and increase forest product availability
- Secure and improve livelihoods, and increase household incomes and resilience to climate change

To achieve these objectives, information from stakeholders and site visits indicated that the following restoration practices could be scaled up:

- Agroforestry – notably farmer managed natural regeneration (FMNR)
- Conservation agriculture in combination with other sustainable agricultural intensification practices (crop diversification, crop rotation, mulching and soil nutrient management)
- Tree planting along river banks
- Soil and water conservation (check dams, infiltration ditches, contour bunds)
- Natural forest management (fire control, regeneration, enrichment plantings)

- Expand village forest areas
- Promote homestead planting, woodlots

Over the next three months, the PERFORM will circulate a summary of stakeholder consultations and field visits, complete a GIS analysis and mapping of restoration opportunities in the Liwonde landscape, and provide further analysis of key success factors, enabling conditions and proposed scaling strategies. A return visit by the WRI ROAM team is planned in January 2016 to present results of mapping and recommended actions.

Bonn Challenge and Forest Landscape Restoration initiatives

The ***Bonn Challenge*** is a global initiative and internationally agreed upon platform calling for the restoration of 150 million hectares of deforested and degraded lands by 2020. This call to action on restoration emerged from an analysis by WRI of the global opportunities to restore the productivity and functionality of an estimated two billion hectares of land that could be transformed into resilient, multifunctional assets for rural communities. IUCN estimates the annual net benefit of restoring 150 million hectares amounts to $85 billion / year. This transformation through the scaling up of restoration practices would contribute to local and national economies, sequester significant amounts of carbon and safeguard biodiversity.

The Bonn Challenge is supported by the ***Global Partnership on Forest Landscape Restoration (GPFLR)***, a network of governments, international and non-governmental organizations and others working to facilitate exchanges and learning and to mobilize capacity and support for the implementation of forest landscape restoration. In addition to GPFLR, the ***Global Restoration Council*** has been organized as a voluntary, non-departmental entity to mobilize internationally recognized champions of restoration. The Global Restoration Council is supported by the World Resources Institute on behalf of, and as a contribution to, the Global Partnership for Forest Landscape Restoration (GPFLR) and in support of other organizations that are actively engaged in restoration activities.

Forest Landscape Restoration goes far beyond tree-planting. It capitalizes on proven experiences with successful, large-scale interventions in support of integrated landscape management, sustainable land use and improved natural resources management that have worked in South Korea, China, Costa Rica, Tanzania, Niger, Ethiopia, Nepal and dozens of other countries. Forest landscape restoration aligns with the priorities of many institutions, technical services, enterprises and community-based natural resource management and sustainable development initiatives, given its ability to deliver multiple benefits across different sectors (food security, water, energy, climate adaptation, forestry, biodiversity).

Restoration helps countries realize international and national commitments already made, such as the REDD+ goal of the United Nations Framework Convention on Climate Change, the Aichi Biodiversity Targets of the Convention on Biological Diversity, the Land Degradation Neutrality objective of the United Nations Convention to Combat Desertification, and the United Nations Sustainable Development Goals.

In addition to responding to the Bonn Challenge and the global call for action adopted in 2011 to bring 150 million hectares of deforested and degraded land into restoration by 2020, the international community agreed in September 2014 to the ***New York Declaration on Forests*** with a target of bringing an additional 200 million hectares into restoring and to achieving a global target of restoring 350 million hectares by 2030. As of July 2015, more than 60 million hectares have been committed to restoration by Chile, Colombia, Costa Rica, Democratic Republic of Congo, Ecuador, El Salvador, Ethiopia, Guatemala,

Mexico, Nicaragua, Peru, Rwanda, Uganda, United States of America and other national governments and entities around the world.

African Regional initiative and restoration target

In September 2015, at the inaugural meeting of the Specialized Technical Committee on Agriculture, Rural Development, Water and Environment convened by the ***African Union*** in Addis Abeba, the following ***resolution*** was endorsed by the country representatives: "The Africa Landscape Action Plan (ALAP) and the African Restoration Initiative (ARI) commit to bring 100 million hectares of degraded and deforested land under restoration in Africa by 2030 to improve soil fertility and food security, improve access to clean water, combat desertification, increase biodiversity and habitat, create green jobs, bolster economic growth and livelihood diversification, and increase the capacity for climate change resilience and adaptation."

NEPAD, working in partnership with the German Ministry for Economic Cooperation and Development (BMZ), the World Resources Institute and others is now establishing a Secretariat to help coordinate and mobilize actions in support of this regional initiative to scale up forest landscape restoration across Africa and to achieve the continental target of restoring 100 million hectares. Some 30 countries have already expressed interest in being part of the Resilient Landscapes initiative that builds upon the financial commitments of the World Bank and others to the TerrAfrica national programs in support of sustainable land management and to the Great Green Wall regional platform. National governments are encouraged to formally indicate their interest in becoming part of the ***African Forest Landscape Restoration initiative (AFR100)*** and to announcing their commitments to national restoration targets. The initial funding for supporting the formal launch and organization of AFR100 is provided by BMZ.

UNFCCC COP and Global Landscape Forum

In association with the UNFCCC COP21, a ***Global Landscape Forum*** will be organized 5-6 December 2015 in Paris at the Palais des Congres de Paris (http://www.landscapes.org/glf-2015/). On Sunday, December 6, from 9-10:30 am, a formal ***launch of the African Forest Restoration initiative*** will be organized with a panel of high level decision-makers and restoration champions from national governments, BMZ and other bilateral and multilateral development assistance agencies, the private sector and others. It is anticipated that the national leadership of Niger, Kenya and several other countries will join Rwanda, Ethiopia, Uganda and other countries to announce their commitments to restoration and to share progress in implementing restoration programs. Malawi is encouraged to participate and to make a statement about the restoration ambitions and specific interests of Malawi in advancing the concerted global, regional, national and sub-national efforts to restore deforested and degraded lands. In addition, in collaboration with the World Bank, TerrAfrica and others, a thematic high level session will be organized on December 6 from 11:00-13:30 on "Migration, resilience and productivity of land: How a sustainable landscape approach can help"

In addition, on the evening December 7, at the Hyatt Regency Paris - Charles De Gaulle, a high level dinner of CEOs and Presidents of organizations, ministers, dignitaries and world leaders on restoration sustainable development and economic affairs will be hosted by the Global Restoration Council Co-Chairs (Wanjira Mathai, of the Green Belt Movement and Dr. Goran Persson, former Prime Minister of Sweden) to raise the profile of restoration, boost financial commitments from the public and private sectors, and launch the "New Restoration Economy".

6.6 RESTORATION OPPORTUNITY MAPPING CRITERIA PER INTERVENTION

The following tables describe the criteria that were used to map each restoration intervention as part of the Liwonde Landscape restoration opportunity mapping exercise. The justification for the criteria and source of data are included.

- **Agroforestry /Farmer Managed Natural Regeneration**
  - Proposed criteria: Cropland with very low or no existing tree cover

Assessment criteria and justification

Assessment criteria	Value	Justification	Source of Spatial Data
Current land cover	Include cultivated cropland: Rainfed herbaceous crops (as primary or secondary land cover type), (see last page of this document for full criteria)	FMNR is appropriate on lands that are already under cultivation.	FAO LandCover
	Exclude wetlands (permanent marsh), rice fields, standing water, (see last page of this document for full criteria)	Wetlands, flooded crop fields (e.g., rice), and water bodies/flooded areas are not ecologically suitable for tree cover.	FAO LandCover
Forest cover	Include areas of <=15% tree canopy cover	Targeting areas for FMNR where there is very low or no existing tree cover to improve soil fertility,	MSU tree cover 2014
Parks and reserves	Excludes all area within existing parks and reserves	Agroforestry and any type of cultivation are not appropriate within parks and reserves	Malawi Dept. of Forestry

- **Conservation agriculture with trees on farms**
  - Proposed criteria: Cropland where some tree-cover is already present

Assessment criteria and justification

Assessment criteria	Value	Justification	Source of Spatial Data
Current land cover	Include cultivated cropland: Rainfed herbaceous crops (as primary or secondary land cover type), (see last page of this document for full criteria)	Conservation agriculture is appropriate on lands that are already under cultivation.	FAO LandCover
	Exclude wetlands (permanent marsh), rice fields, standing water, (see last page of this document for full criteria)	Wetlands, flooded crop fields (e.g., rice), and water bodies/flooded areas are not ecologically suitable for tree cover.	FAO LandCover
Forest cover	Include areas of 15-25% tree canopy cover	Targeting areas for CA where there is already some low density tree cover on farms and FMNR may already be in practice	MSU tree cover 2014
Parks and reserves	Excludes all area within existing parks and reserves	CA and any type of cultivation are not appropriate within parks and reserves.	Malawi Dept. of Forestry

- **River / stream bank planting**
  - Proposed criteria: Within 10m buffer each side in areas without appreciable forest cover (e.g., where existing tree cover density <35%)

Assessment criteria and justification

Assessment criteria	Value	Justification	Source of Spatial Data
Stream networks	Locations of streams within Liwonde Landscape, buffered to 10 m on each side	Stream bank planting along sides of streams at 10m distance to prevent sedimentation/improve water quality and reduce erosion	SRTM, derived from DEM
Current land cover	Exclude wetlands (permanent marsh), rice fields, standing water, (see below)	Wetlands, flooded crop fields (e.g., rice), and water bodies/flooded areas are not ecologically suitable for tree cover.	FAO LandCover
Forest cover	Include areas of no or low tree cover (<35% density)	Tree planting does not need to occur on banks where trees are already present.	MSU tree cover 2014

Check dams, infiltration ditches, contour bunds

- Proposed criteria: Uncultivated sloping land (5 -20 degrees)

Assessment criteria and justification

Assessment criteria	Value	Justification	Source of Spatial Data
Current land cover	Uncultivated or secondary cultivation land only (see below) **but within 300 m of cultivated cropland**	Check dams, infiltration ditches and contour bunds are proposed for uncultivated land because they require land that remains undisturbed – however, they should be located near cultivated cropland so that the erosion and water control benefits will be realized on cropland downslope.	FAO LandCover
	Exclude wetlands (permanent marsh), rice fields, standing water (see below)	Wetlands, flooded crop fields (e.g., rice), and water bodies/flooded areas are not ecologically suitable for tree cover.	FAO LandCover
Slope	Slope 5-20 degrees	Interventions require sloping land in order to be effective at reducing erosion and lessening flooding/water flow downslope	SRTM, Derived from digital elevation model (DEM)

Natural forest management – protecting existing forest

- Proposed criteria:
  - Target areas of recent forest degradation (2000-2014) for restocking/regeneration
  - Management and protection of existing forest (>20% density; >5 ha) inside or outside reserves

Assessment criteria and justification

Assessment criteria	Value	Justification	Source of Spatial Data
Current land cover	Exclude wetlands (permanent marsh), rice fields, standing water (see below)	Wetlands, flooded crop fields (e.g., rice), and water bodies/flooded areas are not ecologically suitable for tree cover.	FAO LandCover
Forest cover	Include all existing forests (>20% density and with area > 5 ha)	Management of existing forest cover.	GFW tree cover 2010
	Areas of recent deforestation or degradation of forest (Loss of density from 2000 to 2010)	Target areas of recent degradation/ deforestation for restocking and regeneration.	MSU degradation change intensity 2000-2014

- **Increase village forest areas (VFAs) and small scale wood lots**
  - Proposed criteria: Uncultivated ridgetops (areas less suitable for cropland; may or may not have existing forest cover).

Assessment criteria	Value	Justification	Source of Spatial Data
Ridgetops	Ridgetops (topographic highs)	Areas that are usually less suitable for crop production	SRTM, Derived from digital elevation model (DEM)
Current land cover	Uncultivated land (see below)	Land that is not already under crop production is more readily available for VFA	FAO Landcover
	Exclude wetlands (permanent marsh), rice fields, standing water (see below)	Wetlands, flooded crop fields (e.g., rice), and water bodies/flooded areas are not ecologically suitable for tree plantings	FAO LandCover
Parks and reserves	Exclude all area within existing parks and reserves	VFAs are to be established on customary/village land.	Malawi Dept. of Forestry

Notes:

Land cover classes used for "**uncultivated land**" that can support tree cover include:

- Broadleaved Deciduous Trees, Closed > (70-60)%
- Built Up, Urban / Built Up, Non-Urban
- Built up Urban Non-Urban/RAINFED HERBACEOUS CROP(s) Small (< 2ha)
- Built up Urban Non-Urban/Woodland Open General (15-65%) with Herbaceous Layer
- Herbaceous closed vegetation (15-100%)
- Tree and Shrub Savannah
- Tree and Shrub Savannah/RAINFED HERBACEOUS CROP(s) Small (<2ha)
- Woodland Open General (15-65%) with Herbaceous Layer
- Woodland Open General (15-65%) with Herbaceous Layer/RAINFED HERBACEOUS CROP(s) Small (<2ha)

Land cover classes used for "**cultivated crop land**" that can support tree cover include:

- Built up Urban Non-Urban/RAINFED HERBACEOUS CROP(s) Small (< 2ha)
- RAINFED HERBACEOUS CROP(s) - Small Field(s) (< 2ha) with a layer of Sparse Trees

- RAINFED HERBACEOUS CROP(s) Large to Medium Field(s) (> 2ha)
- RAINFED HERBACEOUS CROP(s) Small (< 2ha)
- RAINFED HERBACEOUS CROP(s) Small (< 2ha)/Built up Urban Non-Urban
- RAINFED HERBACEOUS CROP(s) Small (< 2ha)/Shrubland Closed to Open (Thicket) (100-15%)
- RAINFED HERBACEOUS CROP(s) Small (< 2ha)/Tree and Shrub Savannah
- RAINFED HERBACEOUS CROP(s) Small (< 2ha)/Woodland Open General (15-65%) with Herbaceous Layer
- SUGAR CANE - Irrigated Herbaceous Crop(s) Large to Medium Field(s) (> 2ha)
- Tree and Shrub Savannah/RAINFED HERBACEOUS CROP(s) Small (<2ha)
- Woodland Open General (15-65%) with Herbaceous Layer/RAINFED HERBACEOUS CROP(s) Small (<2ha)

Land cover classes that **DO NOT** support tree cover include:

- Non-Perennial Natural Waterbodies (Flowing)
- Perennial Natural Waterbodies (Flowing)
- Perennial Natural Waterbodies (Standing)
- Permanent Marsh
- RICE FIELDS - Small Sized Field(s) Of Graminoid Crops On Waterlogged Soil (< 2ha)
- Cultivated DAMBO
- DAMBO Herbaceous Vegetation On Temporarily Flooded Land