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Making Community Forest Enterprises Deliver for Livelihoods and Conservation in Tanzania

September 28, 2018

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COVER PHOTO: Harvesting Timber in rural Tanzania.
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Africa Biodiversity Collaborative Group

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III. ACRONYMS

ABCG	Africa Biodiversity Collaborative Group
AGB	Above ground biomass
AVA	Adding Value to the Arc project
CBFM	Community-Based Forest Management
CCRO	Certificate of Customary Right of Occupancy
DBH	Diameter at breast height
DFO	District Forest Officer
FMU	Forest Management Unit
FSC	Forest Stewardship Council
IBEK	Improved Basic Earth Mound Kiln
LPG	Liquid Petroleum Gas
MCDI	Mpingo Conservation and Development Initiative
MJUMITA	Mtandao wa Jamii wa Usimamizi wa Misitu Tanzania or Tanzania Community Forest Network
MT	Metric Tonne
PFM	Participatory Forest Management
REDD+	Reduced Emissions from Deforestation and Forest Degradation
TATEDO	Tanzania Traditional Energy Development Organization
TFCG	Tanzania Forest Conservation Group
TFS	Tanzania Forest Service
TSH	Tanzania Shilling
TTCS	Transforming Tanzania's Charcoal Sector
UCRT	Ujamaa Community Resource Team
UNFCCC	United Nations Framework Convention on Climate Change
VNRC	Village Natural Resource Committee
URT	United Republic of Tanzania
VLFR	Village Land Forest Reserve
VLUMC	Village Land Use Management Committee
VNRC	Village Natural Resource Committee

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The study is comprised primarily of three case studies of community forest enterprises in Tanzania. These case studies were developed in collaboration with three local Tanzanian organizations that are carrying out the work described: Mpingo Conservation and Development Initiative, the Tanzania Community Forest Network (MJUMITA), and Carbon Tanzania. These three organizations provided support to the case study development and documentation of their work of facilitating these community forest enterprises. Many individuals and organizations provided their time to provide information and perspectives on these case studies through interviews and email correspondence, and are gratefully acknowledged for their valuable inputs to the report.

In addition, valuable comments and suggestions on earlier drafts of this report were provided by Tom Blomley, Matt Morley, Peter Veit, Kimberly Holbook, Jo Anderson and Makala Jasper.

The three case studies were developed by the following authors:

- Sustainable Timber (Mpingo Conservation and Development Initiative): Rebecca Trupin and Hugh Doulton
- Sustainable Charcoal (MJUMITA): Theron Morgan-Brown
- Carbon Offsets/REDD+ (Carbon Tanzania): Rebecca Trupin

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V. EXECUTIVE SUMMARY

Tanzania has been an African pioneer in community-based forest management since the passage of the landmark 1998 National Forest Policy and 2002 Forest Act. These measures enable local communities to legally establish their own Village Land Forests Reserves (VLFRs) where local communities have broad rights over forest management and governance, including control over harvesting forest products. Over the past twenty years, at least 2.5 million hectares of village land have been established as VLFRs, enabling communities to improve forest management, better control use, and manage trade in forest products.

A critical issue in community-based forest management is the ability of rural communities to support their economic development and add value to local forest uses by developing local forest-based enterprises. During the past decade, community involvement in forest management and conservation in Tanzania has gradually shifted beyond a focus solely on local subsistence use, to a range of commercial initiatives and ventures involving community forest products.

This study contributes to documenting some of these emergent community forest enterprises in Tanzania and their impacts on forest conservation and the livelihoods of local communities. The study does this by providing detailed case reviews of three different models of community forest enterprise involving sustainable timber, sustainable charcoal, and carbon offsets from natural forests (REDD+) carried out in different parts of the country. The three models have been developed and facilitated by entrepreneurial Tanzanian NGOs or social enterprises, working in close partnership with local communities, district governments, and other stakeholders.

These community forest enterprise examples demonstrate significant progress in Tanzania over the past five to ten years in enabling communities that have established VLFRs to capture a growing suite of economic benefits from their forests. Since they were established less than a decade ago, these three models have generated over $1 million[1] in total revenues captured by over 30 different villages. Some communities, such as Nanjirinji A village in Kilwa District, which has established one of the largest VLFRs in southern Tanzania, or the Hadza communities in Yaeda Valley, where Carbon Tanzania has established the country's leading carbon offset (REDD+) project, are earning in excess of $60,000 in annual revenue. The sustainable charcoal project developed in central Tanzania by MJUMITA and TFCG has resulted in 13 Village Councils earning a combined total of $203,000 from charcoal royalties during a four-year period (2013-2017). All of these enterprise models are based on growing overall markets for these forest products, ranging from new global markets for carbon offsets linked to climate change mitigation, to a domestic charcoal market in Tanzania that is worth an estimated $767 million.

These new and growing sources of income from sustainable forest utilization are contributing towards clear positive impacts on forest conservation outcomes, as documented across all three cases. They have contributed to around 600,000 ha of community land being established as VLFRs, community land

[1] All currency designated by "$" is given in U.S. dollars.

use plans, and other local management measures. Deforestation rates have dropped in a number of sites, providing strong evidence on the links between community forest enterprise, VLFR establishment, and efforts to reduce deforestation locally in line with Tanzania's forest conservation and climate change mitigation objectives.

These models provide strong opportunities for stakeholders to work together to scale up community forest enterprises as a promising model for unlocking economic benefits from one of the country's most valuable natural resources, while supporting efforts to protect forests, wildlife habitats, and reduce Tanzania's carbon emissions. However, significant market and institutional barriers to scaling up these enterprises exist and should be addressed if benefits and enterprises are to grow. Priorities for scaling up these forest enterprise models should address these barriers by promoting measures such integrating the different enterprise models (e.g., charcoal and timber) in single sites so as to expand and diversify the sources of forest-based income communities are able to realize; removing policy and regulatory barriers to community trade in timber and charcoal harvested sustainably from VLFRs, while providing incentives for community and business investment in community forest enterprises; and marketing and value addition initiatives that expand the demand and market access for community forest products. It is also imperative for all stakeholders to ensure that Tanzanian forest policy and law remains supportive of community-based forest management, and that the tenure and governance arrangements that have underpinned VLFRs for nearly two decades remain in place as a foundation for communities to continue to benefit from and protect local forests.

1. INTRODUCTION

Tanzania has played a leading role in community forest management in Africa, and indeed globally, over the past twenty years since the passage of the landmark 1998 National Forest Policy. By building on the country's unique village governance structures and framework for community land tenure and land use planning, that forest policy and the subsequent Forest Act of 2002 provided for Village Land Forests Reserves where local communities have broad rights over forest management and governance. This has led to a broad and diverse set of efforts by local communities, district and national government, and supporting NGOs to facilitate community-based forest management around the country.

A critical issue in all community forest management is the ability of rural communities to support their economic development and livelihood aspirations through developing local forest-based enterprises that help them generate revenue, participate in markets, and capture the economic value of forests on their lands. Although over 1,000 villages around Tanzania have become involved in setting up Village Land Forest Reserves and securing rights over forests since the late 1990s (URT, 2006), building the kinds of enterprises that enable communities to earn meaningful revenues from their forests has been much slower to develop.

This study seeks to build a stronger analytic and evidence base for community forest enterprises in Tanzania, including in particular the impacts on forest conservation and their delivery of economic benefits at different levels. The study does this by providing detailed case reviews of three different models of community forest management and enterprise development:

- Sustainable timber harvesting by communities, supported by Mpingo Conservation and Development Initiative (MCDI), in Lindi Region and surrounding parts of southeastern Tanzania.
- Sustainable charcoal production by communities, as facilitated jointly by the Tanzania Community Forest Conservation Network (MJUMITA[2]) and Tanzanian Forest Conservation Group (TFCG).
- Community partnerships for the production of carbon offsets, as developed by Carbon Tanzania in Mbulu District, and now expanding into other areas in northern and western Tanzania.

The focus across all the case studies is to examine the outcomes from these different community forest enterprise models in terms of overarching livelihoods and forest conservation impacts, and to distill the lessons learned from their design and implementation in different social and environmental settings across Tanzania.

The study documents how these enterprises are gradually maturing and delivering more significant streams of revenue to local communities, who are in turn placing larger areas of forest under local management and protection. Markets for sustainably harvested timber, carbon offsets, and charcoal are all being developed in concert with local communities and gradually providing greater benefits to

[2] Mtandao wa Jamii wa Usimamizi wa Misitu Tanzania

communities in different parts of the country. At the same time, a range of market factors and governance issues may limit the growth and impact of sustainable forest enterprises and their potential to support conservation, reduce deforestation and carbon emissions, and benefit rural livelihoods.

Nevertheless, emerging models for community forest enterprises in Tanzania represent an important set of experiences for scaling up community-based forest conservation and management more widely, including in other African countries. Tanzania presents a relatively rare example where community forest enterprises are being carried out on a meaningful scale and delivering tangible results and impact over an extended period of time.

Developing this type of synthetic analysis is important at the present time, particularly in the context of global objectives around deforestation and forest conservation (e.g., UNFCCC, Paris Declaration, New York Declaration on Forests, United Nations Sustainable Development Goals), and relating action at the local scale in countries such as Tanzania to these wider development goals and initiatives. This study helps document how emerging community forest enterprises can achieve tangible improvements in forest conservation that are linked to local community capacity, incentives, and benefits, and thereby provides a range of lessons and models for informing similar efforts in other countries or regions. These lessons are equally important within Tanzania, as government policy makers consider a range of options that may impact existing forest governance institutions and the way that rights and responsibilities are allocated to local communities and other stakeholders.

2. BACKGROUND: FORESTS, DEFORESTATION AND FOREST MANAGEMENT IN TANZANIA

Forests are a key resource for human livelihoods, national economies, and biodiversity conservation around the world. Forests provide ecosystem services such as protecting water sources, preventing erosion, and regulating the climate on both local and larger national scales. In Tanzania, forests provide building materials, food, and energy supplies that sustain the livelihoods of millions of people in rural communities, as well as supporting agriculture as the foundation of the rural and national economy. Tanzania's forests are also ecologically significant: they play a vital role in mitigating climate change due to the carbon they store and sequester, and provide important preserves for biodiversity, including many endemic species found nowhere else in the world.

But Tanzania's forests are facing rapid deforestation and degradation. Tanzania loses an estimated 373,000 hectares of forests annually, and lost nearly 15% of its forest cover between 1990 and 2005 (Tremblay and Lowry, 2016a; Kidegesho, 2015). The primary causes are expansion of smallholder agriculture and charcoal production, illegal logging, and forest fires. These pressures on forests are only set to increase, with the population in Tanzania expanding at a rate of around one million people per year.

Deforestation in Tanzania is fundamentally driven by institutional and economic factors that favor agriculture over forests. About 45% of Tanzania's forests are found on village land (MNRT, 2015) and all that is required for villagers to convert forests to farmland on unreserved village lands is permission from the Village Council. Thus, in the absence of community-based forest management, the current policy environment favors conversion of village forests to farmland, thereby replacing native trees with crops owned by individual households.

Combating deforestation through effective measures to sustainably manage forests is therefore a major national economic and livelihoods challenge in Tanzania and depends on increasing local incentives from sustaining and protecting forests. With nearly half of Tanzania's forests located on village lands, community forest management is central to efforts to reduce deforestation, sustainably manage the country's forests and conserve biodiversity (Kidegesho, 2016). Moreover, forests are a valuable natural asset found on community lands, with Tanzania projected to lose over $3 billion over the next 15 years in economic production and natural assets as a result of current levels of deforestation (Tremblay and Lowry, 2016a). By the same token, forests are one of the most valuable assets available to many rural communities, and these values could be sufficient to finance local management and create incentives for local people to manage them sustainably.

Developing policies and management practices that effectively engage rural communities in forest conservation is a key strategy for sustaining forests across sub-Saharan Africa more widely. Since the

1990s, different forms of participatory and community-based forest management have spread across Africa, supported by a wide range of policy and legal reforms (Alden Wily & Mbaya, 2001). Key to all of these efforts is securing community user rights to forests and creating local incentives for rural communities to protect and sustainably manage their forests. Where local communities are able to capture forests' economic value through appropriately designed enterprises such as selective timber harvesting or other activities, it is possible to create incentives for stewardship and sustainable use. For example, research has shown that where local communities hold secure rights to manage and protect forests, deforestation rates may be up to ten times lower than on surrounding lands, including state protected areas (Stevens et al., 2014).

In Africa, community forest enterprises based on the sustainable use of natural forests and forest products are potentially of great importance both to forest restoration and conservation, and to rural livelihoods. Forest products such as timber and charcoal, non-timber products such as honey or wild foods, and new products such as carbon offsets all provide opportunities for diversifying rural economies through sustainable use of natural resources. These kinds of sustainable enterprises are critical to forest conservation efforts, because they can align local forest conservation measures with the long-term stewardship of forests, and provide resources that can support conservation efforts. However, a number of key factors impede access to forest benefits and contribute to deforestation pressures.

First, historically villages have had no clear rights to manage or benefit from forest resources. During and after colonialism forests were managed by the state and, as a result, village members typically feel no responsibility or ownership for their forests (Kalonga et al., 2015). Villages continue to lack legal authority to control and manage the harvesting of forest products on their lands, unless they have obtained a specific designation for those forests under Tanzania's 2002 Forest Act (*see below*).

Secondly, while forests have inherent value to village members as a source of firewood and food, they have lacked the means to capitalize on their most economically valuable forest assets, such as hardwood timber, charcoal, and, more recently, forest carbon. Villages lack marketing and technical capacity, and access to markets and to business infrastructure to harvest and conduct sales themselves. Overcoming these barriers is key to catalyzing greater local economic benefits from forests and putting in place the foundations for sustainable long-term forest management.

2.1 POLICY AND LEGAL CONTEXT OF COMMUNITY-BASED FOREST MANAGEMENT

Tanzania has some of the most progressive land and natural resource ownership laws of any African country (Alden Wily and Mbaya, 2001; Williams 2017). The Village Land Act (1999) allows village members to establish clear rights to manage and administer land and enables village assemblies (all the adult members of a village) to administer village land through elected representatives (Williams, 2017). Seventy percent of the land in the country and 45.7 percent of forested land are village lands (MNRT, 2015), which consists of a mixture of individual or household land held by customary right of occupancy, and undeveloped lands (often with forest) which are communally owned by the whole village.

This village rights and responsibility for land, however, does not automatically extend to resources on that land, such as forests, fisheries, or wildlife. Villages can only gain the rights to manage and access these resources by applying for rights specified in sectoral legislation.

Starting in the late 1990s, Tanzania took steps to decentralize forest management. The Forest Act, 2002, empowered village governments to take more authority over some of their forests. The Forest Act enables rural communities to apply for rights over their natural forests by setting up and sustainably managing Village Land Forest Reserves (VLFRs). VLFRs provide the institutional framework for community-based forest management by proving the legal basis for communities to gain the right to harvest and sell timber and forest products, as well as to undertake patrols (including arresting and fining offenders). They can collect taxes ("royalties") from loggers, which otherwise are paid to district and national government agencies who authorize and license the harvesting of forest products on village lands where VLFRs are not established. This creates an opportunity for villages to collect their own royalties, which creates both the incentive and the revenue they need to protect their VLFRs.

For forests on village lands that are not VLFRs, timber harvesting is under the control of District Forest Officers (DFOs) who issue licenses. The key change in forest management when VLFRs are created is that the DFOs no longer issue harvest permits for those VLFRs, which become subject to the local by-laws and management plans, and all harvesting and payment comes under the control of the village. In these reserves – once the management plans have been approved – communities can harvest and sell timber based on locally-developed management plans, and retain 100 percent of the resulting revenue. The combination of community rights to manage and control access to village lands, and to control forests in VLFRs, creates relatively strong opportunities for communities to manage and benefit from forests.

This means that communities in Tanzania can obtain relatively clear legal rights to delineate, protect and capture the revenues from sustainable enterprises taking place in their forests. This is a critical foundation for community-based forest management (CBFM).

Despite these enabling legal and policy provisions, of the roughly 20 million hectares of forests that are located on village lands, only around 2.5 million hectares have been designated as VLFRs to date. Community-based forest management has not been widely promoted in Tanzania, has not evidently been a national development priority and a large proportion of the VLFRs established to date were established using foreign donor funding and projects. Many villages lack awareness of the option to create VLFRs and the process to establish them, while legally fairly straightforward, can be complicated and made costlier by administrative requirements and red tape, and other barriers to implementation (*see Williams, 2017*).

3. CASE STUDY 1: SUSTAINABLE COMMUNITY TIMBER IN SOUTHERN TANZANIA

The Mpingo Conservation Development Initiative (MCDI), based in southeastern Tanzania, has one of the most advanced track records in helping communities establish VLFRs. Their model involves not only establishing forest reserves, but training communities in sustainable forest management and helping them to market and sell sustainably harvested timber, thereby attempting to put in place the long-term financial and economic basis for sustainable local forest management and conservation.

MCDI was founded in 2004, with a mission to protect forests and improve rural livelihoods. MCDI recognized the central issue as a need for communities to gain significant economic benefits from forest resources. They therefore sought to help communities to establish their rights through the creation of VLFRs, manage those reserves sustainably, and then harvest and sell timber to benefit financially from doing so. The organization takes its name from 'mpingo', which is the African blackwood (*Dalbergia melanoxylon*), one of the most valuable hardwood trees in eastern Africa and a prized species for wood carving and woodwind musical instruments, among other uses.

Originally starting in Kilwa District in Lindi Region, and then expanding in southeastern Tanzania more recently, since its founding MCDI has supported 38 communities to protect over 350,000 hectares of forest in VLFRs (*see Figures 1 & 2*). This work has mostly been supported by international donors and external funders, but efforts are underway to increase sustainable contributions from timber sales (*see below*).

Figure 2 | Map of VLFRS where MCDI works in southern Tanzania.

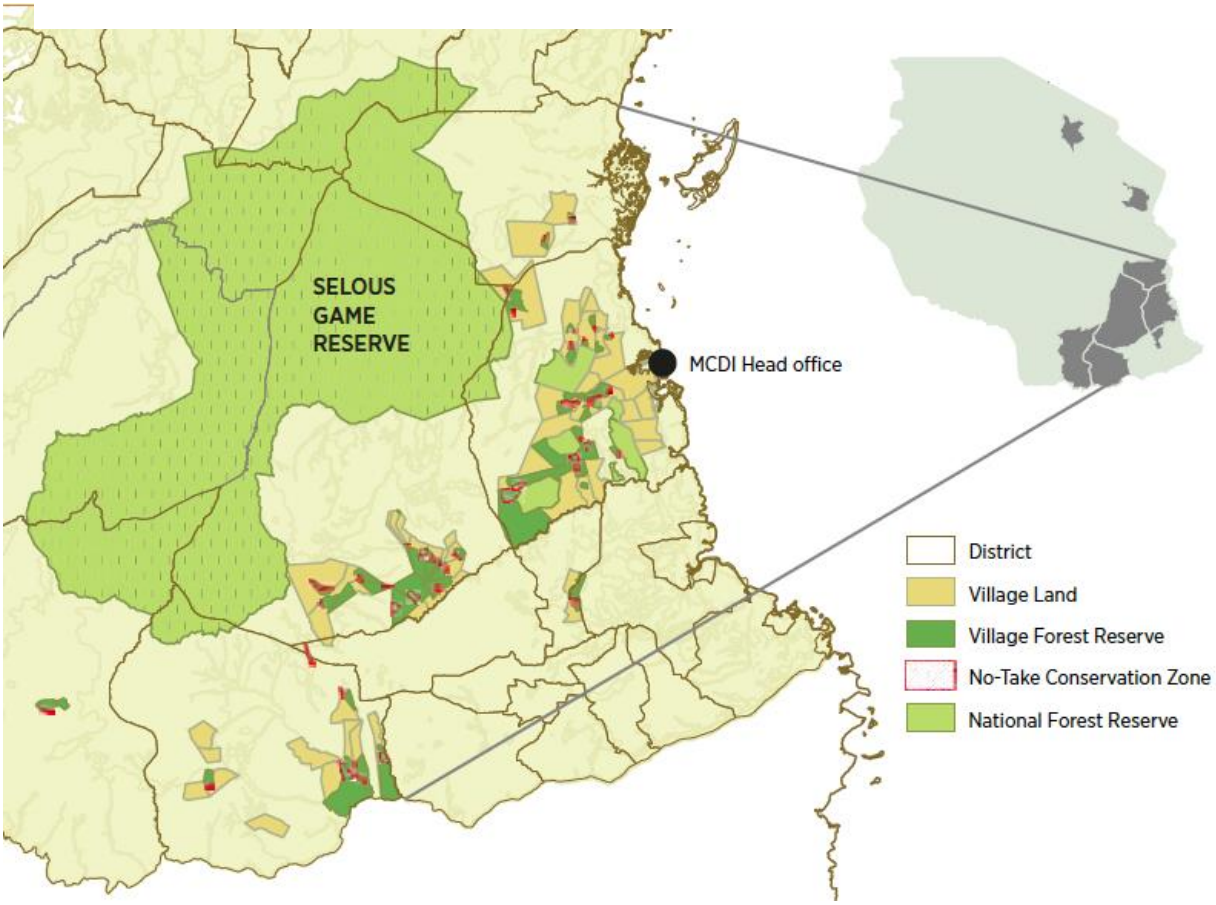
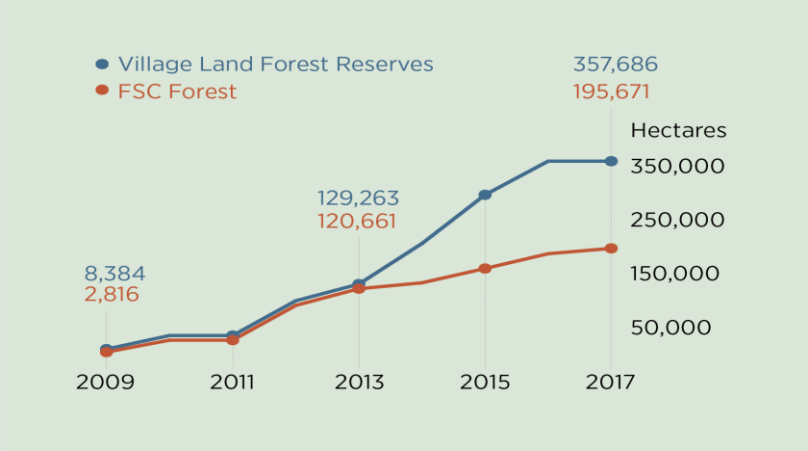


Figure 1 | Growth of VLFRs, including FSC-certified VLFRs, supported by MCDI, 2009-2017.



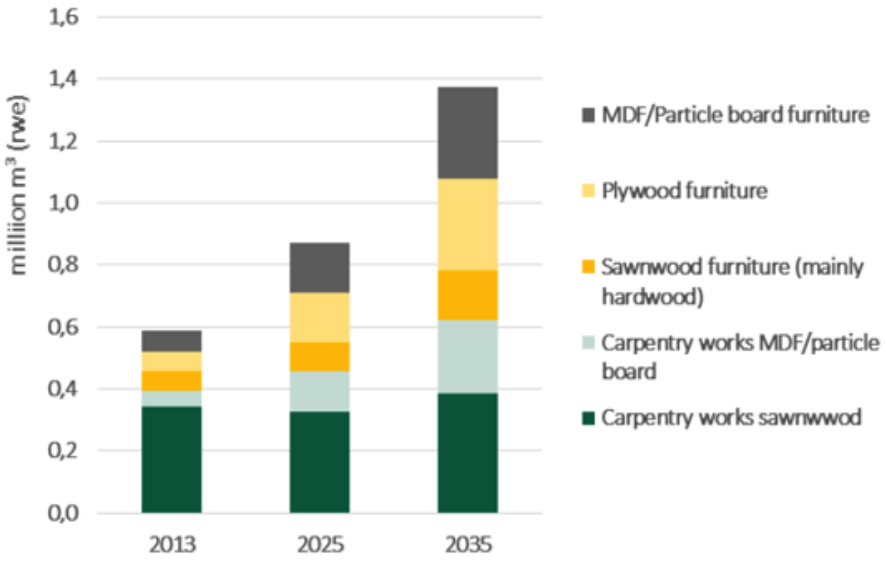
3.1 MARKET CONTEXT

Timber is one of the most valuable natural resources found on village lands in Tanzania, and income from sustainably harvested timber is a potentially important source of incentives for forest conservation at the local level. Overall timber market trends and dynamics are therefore an important contextual factor for community-based forest enterprises.

Local demand for hardwood sawn timber in Tanzania is growing rapidly, driven by the construction and furniture sectors. A 2017 report by the Forestry Development Trust predicts that wood product demand in 2035 will be more than double the demand in 2013 (*see Figure 3*). A big part of this growth will be construction industry demand for plantation-sourced sawnwood – currently 44 percent of local consumption, with hardwood sawnwood following at 20 percent of current local consumption (Held et al., 2017).

In addition to demand for construction, the report predicts a demand increase of 250 percent in the furniture and carpentry industries. These industries still consume large volumes of natural forest timber, though imported furniture is increasingly competitive. Prices for natural forest timber have been rising as availability of these species declines, pushing more consumers to purchase imported low-quality furniture. Nevertheless, a real substitute for natural forest timber has not been identified.

Figure 3 | Demand forecast for carpentry and furniture in Tanzania 2013 to 2035.



Source: Held et al. 2017.

Internationally, Tanzanian wood exports are increasing slowly, with India and China as the biggest consumers of hardwood sawn timber. Tanzania has low export quantities of all wood products, though quantities have been increasing slightly since 2011. Hardwood is also the main type of wood exported from Tanzania to other East African countries.

3.2 MCDI'S MODEL

The core of MCDI's model can be distilled into four basic parts:

1. Assist villages to secure legal rights over their forests by establishing VLFRs;
2. Establish a system of participatory forest management through which villages manage and protect their VLFRs from illegal harvesting, encroachment and forest fires;
3. Establish a system for sustainably harvesting and selling timber to generate income for the community. As part of this effort, MCDI has helped some villages to achieve Forest Stewardship Council (FSC) certification in order to facilitate greater market access and potential price premiums for certified timber; and
4. Strengthen village level governance of VLFRs to ensure transparent decision-making processes, including around allocation of revenue earned from sustainable timber harvesting.

These four components reinforce each other and catalyze community-level behavioral changes that result in villages valuing and protecting their forests.

Community members harvesting a tree in Ngea VLFR, Kilwa District. Photo Credit: Roshni Lodhia

3.3 SECURING LEGAL RIGHTS

Establishing a VLFR is a multi-step process in which MCDI supports village leadership through facilitating community meetings, liaising with government authorities, and supporting the drafting of required legal documentation such as village by-laws. Steps to establishing a VLFR followed by MCDI, based on national forest law and regulations, and government guidelines, are as follows:

1) **Awareness raising**. The process begins with awareness-raising through a Village Assembly, in which village members discuss how they currently use and benefit from forests and MCDI advises on potential benefits and costs of community-based forest management (CBFM) under a VLFR.
2) **Forming the Village Natural Resources Committee (VNRC)**. The community then elects a group of 12 or more people (at least a third of which should be women) to a Village Natural Resources Committee (VNRC), which will manage the forest, with training and support from MCDI, and will report to the village government. VNRC members are elected every three years, with half of the committee remaining to be able to pass on institutional learning to the new cohort.
3) **Establishing village boundaries**. Village leadership meets with neighboring villages to confirm the village boundaries, signing meeting minutes to document their agreement. These minutes are submitted to a District Land Officer, who works with the village and a surveyor to create a Global Positioning System map of the village boundary.
4) **Village Land Use Plan (VLUP)**. Working with facilitators from the District Land Use Planning Team and community members, the VNRC creates a map for how various portions of the village land will be used, including what area will be set aside for the VLFR, and which areas within the reserve will be designated as "no-take conservation zones." These are chosen for their high conservation value in terms of the unique biodiversity they contain, key ecosystem service provision, their importance as cultural sites and/or because they contain key habitat types representative of forests in the area.
5) **Forest Area Demarcation and Inventory**. Boundaries of the VLFR are surveyed and physically marked, and facilitators assist villagers in taking an inventory of timber stocks in the VLFR.
6) **Creating a forest management plan and approving the VLFR**. With MCDI and District Officers support, the VNRC creates a forest management plan and by-laws governing how the VLFR will be used, how harvests will be conducted, and the quota of trees that can be harvested each year. The plan is valid for the following five years, at which point a new inventory will be conducted. The plan and by-laws are approved in order by the Village Council, the village as a whole, the Ward Development Committee (WDC), the District Forest Officer and finally the District Full Council. Once the village by-laws are approved by the District Full Council the VLFR is legally registered.

3.4 COMMUNITY FOREST MANAGEMENT

Once a VLFR has been established, MCDI continues training the VNRC in forest management, visiting multiple times per month during the first few months.

MCDI supports the VNRC through activities such as:

- Implementing an enrichment planting programme whereby communities raise and plant indigenous and economically-valuable timber trees to improve the future productivity of their VLFRs, and for forest restoration purposes;
- Mitigating forest fire – the most significant driver of forest degradation in the Kilwa area - through "early burning" of forest brush;
- Repeating inventories of timber stocks and revisions of forest management plans every five years;
- Conducting sustainable harvesting;
- Conducting fortnightly patrols to monitor and enforce the Village Land Use Plan, arresting violators and documenting any cases of violation; and
- Conducting quarterly biodiversity monitoring.

MCDI plays a key role facilitating community forest management, including training village institutions on forest management and resource planning, as well as managing revenue and harvests. Photo Credit: Roshni Lodhia.

For sustainable timber harvesting, MCDI provides training and supervision on legal, health and safety procedures for logging, as well as providing harvesting equipment and safety gear. Communities that have started generating sufficient revenues from timber sales are now funding this themselves.

Typical violations of the land use plan vary by community and can include cattle incursion, or illegal agriculture or logging. Where a perpetrator is caught, village by-laws dictate the fine that must be paid and how to resolve any disputes that arise. Cattle that have been grazed illegally may be impounded

with owners paying a fine. Villages may also call on police and local government to help resolve more serious incidents. Communities are vigilant against degradation and illegal logging; as illegal harvests are counted against their quota of harvestable trees.

These management systems deliver both environmental and socioeconomic benefits by protecting woodlands that have previously been degraded by fire, preventing illegal logging and shifting cultivation that degrade forests, increasing valuable timber stocks, and thus maximizing community revenue potential per hectare of forest.

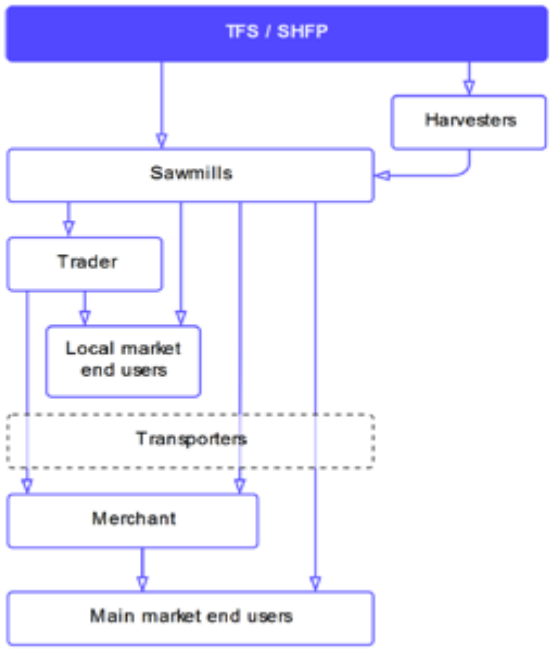
3.5 CONVERTING FOREST ASSETS TO REVENUES

3.5.1 The VLFR timber value chain

Once VLFRs are established and forest management systems are put in place, MCDI supports communities in sustainably harvesting and selling their timber. The basic timber supply chain begins with harvesting of standing trees in woodlands or forests. The newly cut logs are then either sawn into planks outside the forest using a mobile sawmill or transported as logs to a stationary sawmill. Once cut into planks, timber is transported to main markets in urban centers, particularly Dar es Salaam, to be sold to end users.

VLFRs have mostly sold timber in the forest as "standing trees" which the buyer then harvests, saws and transports. In the last year and with MCDI support, some communities have begun reaching higher up the value chain, sawing a portion of their timber themselves using a shared community owned mobile sawmill sourced by MCDI, and selling it as planks. The value chain in Figure 4 presents both scenarios.

Figure 4 | Simplified value chain for forest timber.



The timber buyers in these VLFRs have spanned a range of actors from various points along the supply and value chain:

1. Traders who purchase in order to resell to merchants in urban centers, particularly Dar es Salaam.
2. Merchants who sell directly to end-consumers through timber yards in Dar es Salaam (ultimate uses are typically small-scale furniture and construction).

3. Large companies purchasing timber for international export (mainly mpingo) or for sale locally in the construction and furniture industries.
4. Small-scale end-users who purchase for niche and specialty products, e.g., jewelry makers, eco-tourism companies.

Most current VLFR buyers fall in the first category: traders who purchase standing trees from VLFRs, harvest and mill themselves, and then transport as planks to Dar es Salaam to resell to merchants.

Villages' rural location and inadequate sales and marketing capacity present challenges for finding timber buyers. MCDI markets VLFR timber on its website, through door-to-door marketing and in annual trade-shows, and has also contacted buyers through lists supplied by district governments. Ultimately, however, most buyers have found MCDI through word-of-mouth.

3.5.2 Revenues and profits to communities

The prices (per cubic meter of wood) received by VLFRs vary based on species and on whether the timber is sold as logs or as sawn planks. Revenues from the point of sale from sawn timber are often higher per cubic meter than revenues from logs. The recent Tanzanian wood product market study (Held et al., 2017) notes:

> ***The value addition by milling is substantial, i.e., the price of sawn timber is around twice as high at the point of sale than the round wood timber value. If using band saws rather than ding dong or similar saws [the type sourced by MCDI] the added benefit can be twofold: (i) reduced losses during conversion; and (ii) better sawn timber quality which can result in higher prices depending on the point of sale.***
>
> *In the regional market, prices for high quality and poor-quality timber differ by approximately 20 percent between ding dong sawn timber and timber processed with a band saw. Timber traders reported that high quality timber sell faster than poor quality. In Dar es Salaam, there are reports of significant price differentiation, with high quality timber fetching about 20 percent to 27 percent higher price (PFP, 2016 and INDUFOR, 2011)*.

Despite the greater value achieved from sawmilling, use of a sawmill requires major capital investment. MCDI succeeded in 2016 in securing external donor funding to purchase one mobile sawmill for use across VLFRs in Kilwa District and neighboring areas. Given operating constraints (e.g., half the year being taken out by the rainy season), this sawmill can process only around 650 m3 per year, amounting to an annual limit of 50 cubic meters per village currently harvesting. Thus, while having a sawmill at all is a significant benefit for villages, its capacity still presents a limiting factor to increasing village profits.

Fixed costs include forest maintenance activities such as forest patrols and early burning of forest brush, as well as allowances and equipment for the VNRC. MCDI has in the past provided a number of services free of charge to communities, including boundary maintenance and budgeting/planning meetings, which reduced villages' fixed costs by more than half. To help improve MCDI's own sustainability, villages have agreed to pay for more services once their VLFRs have begun earning substantial revenues. Variable costs cover harvesting activities and, for sawn timber, sawmilling. So far VLFRs have not

attempted to transport timber to Dar es Salaam for sale directly to merchants or consumers though this is being explored as a way of capturing more of the value chain.

Other factors also affect the profits that VLFRs are able to generate, including prices for different types of hardwood and the prices they can command. Table 1 shows log prices in 2017 for common timber species.

Table 1| Average prices received by VLFRs for three common timber species in 2017.

Species Name	Average price (USD/m3) in 2017
Mkongo	$108
Mpingo	$108
Mninga Jangwa	$111

Source: MCDI, VLFR Quota Management.

3.5.3 FSC Certification

MCDI has helped 14 villages to acquire FSC certification to differentiate their timber from that which is frequently illegally or unsustainably felled, or from which the owners have not received a fair price. The FSC is an international not-for-profit, multi-stakeholder organization that aims to promote environmentally appropriate, socially beneficial, and economically viable management of forests through forest management certification standards. FSC's certification scheme is based on ten principles that cover social, economic, ecological and cultural issues; they include managerial aspects, as well as

Box 1 | Sound and Fair, and Nanjirinji A

Sound and Fair LTD is a key business partner collaborating with MCDI, with a business model aimed at making community forest management in Tanzania economically viable. They have focused to date on sales of FSC-certified timber into the international market. These efforts have centered on African blackwood or Mpingo (*Dalbergia melanoxylon*), MCDI's flagship species, which has unique properties and is used in particular in musical instrument manufacturing Sound and Fair have developed links with guitar and woodwind manufacturers and managed to sell FSC-certified Mpingo directly to these manufacturers.

Sound and Fair are stepping up their efforts to increase timber sales from the forests supported by MCDI, and in 2018 completed installation of a fixed sawmill operating center next to Nanjirinji A village. Nanjirinji A is the largest VLFR supported by MCDI, with over 83,000 hectares set aside. The village has sold a total of $417,859 in harvested timber since 2012, a significant sum for a village of 5,691 people in a relatively remote rural area.

Sound and Fair are now seeking to sell FSC-certified timber sourced from Nanjirinji A into further segments of the international market whilst also exploring opportunities within Tanzania and East Africa.

environmental and social requirements. It is widely recognized as being the global gold standard for responsible forest management – and is the only timber certification system supported by many international conservation NGOs. MCDI was the first organization in Africa to secure a Forest Stewardship Council Group Certificate for community-managed natural forests, which currently covers about 180,000 hectares of forest in southern Tanzania.

3.6 IMPACTS OF COMMUNITY FORESTRY IN SOUTHERN TANZANIA

3.6.1 Expanding Community Forest Protection

MCDI set up its first VLFRs in 2006 and 2007, working with two villages on just 2,420 hectares. In this early period, villages were skeptical of MCDI's approach and few were willing to participate, in part due to failed previous development and conservation interventions. Confidence grew as the first local revenues from improved forest management began to arrive. MCDI began to receive regular requests from villages and local governments to help set up new VLFRs or to expand existing VLFRs. Larger areas of VLFR began to be set aside by communities in Kilwa, including Nainokwe village setting aside 15,512 hectares of forest in 2010, and Nanjirinji A is setting aside 83,000 hectares in 2012. MCDI now works with nearly 40 villages, with VLFRs covering about 350,000 hectares, or around 14 percent of all the area under VLFRs in Tanzania.[3]

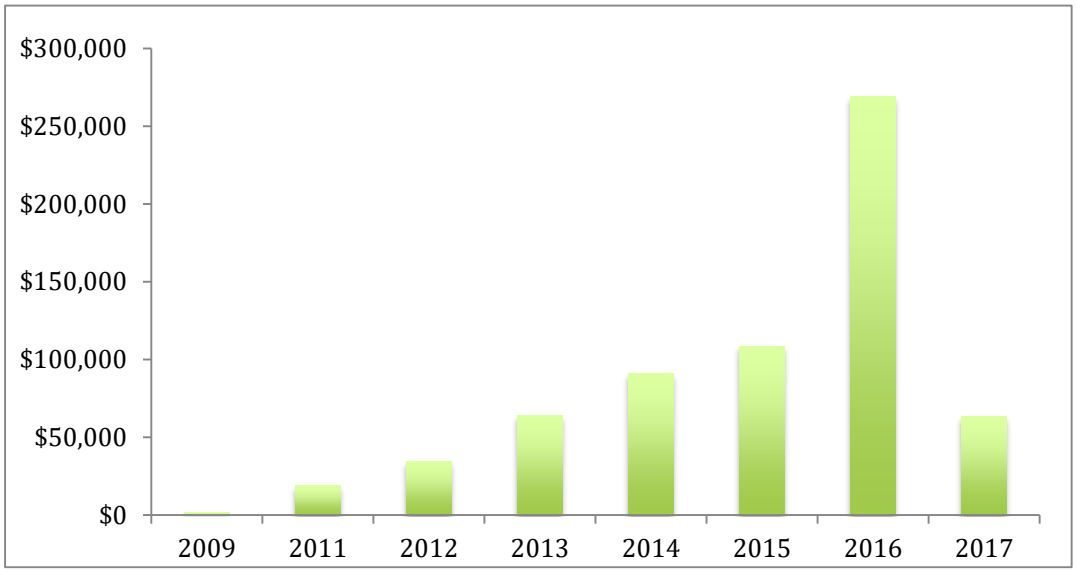
Villages' efforts to protect their forests have shown results. Evidence is emerging that the land protected through VLFRs, particularly those areas that have also been FSC-certified, have experienced better environmental outcomes. A 2015 study found that the FSC-certified forests in Kilwa District where MCDI has worked possess better forest structure, greater regeneration, and lower fire incidences than open access forests and state forest reserves (Kalonga et al., 2015).

Villages monitor incidents of illegal use through regular patrols, record these incidents and compensate for any illegal logging in annual forest harvesting quotas. Levels of potential leakage or displaced forest

[3] MCDI has evolved preconditions over time on village size – any village that joins must have at least 2,000 hectares of forest since less than this means timber quantities would be too low to provide a decent income for the community.

use are unclear as yet. Nevertheless, the large land area that is now covered by VLFRs helps prevent leakage and has a greater impact on the natural ecosystem and biodiversity.

Figure 5 | Total annual timber sales from VLFRs facilitated by MCDI, 2009-2017.



3.6.2 Community Benefits

Communities have seen increasing revenues from timber sold from their VLFRs during most years since MCDI's work began. The first commercial timber sale from a VLFR was in 2009, and earned a price that was 100 times more per log than the previous local price earned before VLFR establishment. By mid-2017, 2018 VLFRs had earned $626,000 in timber sales.

These revenues have enabled communities to address long-standing development challenges and have brought about a shift toward long-term planning and more strategic thinking. Each village receives its share of income from sales and then allocates the funds through a Village Assembly meeting. About half of timber revenues are reinvested in forest management – including in paying villagers for activities such as forest patrols – and the other half is invested in community-selected public-benefit projects (Williams, 2017). In some cases, this has been the first time a particular need has been addressed, as when a village began to support secondary school students whose families could not afford the costs of their bursaries. This village also set up a fund to help cover hospital and emergency expenses for families without the means to cover those costs.

Villages have become more business-like in their planning, and more willing to invest in long-term forest management enterprises. For instance, villages in Kilwa have advocated for the shift to sawn timber rather than logs, recognizing that despite significant upfront expense, this will result in greater profits and a larger market in the future. In 2017, five villages decided to expand their locally-protected forest reserves by more than 30,000 hectares, covering expenses for the expansion themselves.

Villages have even been willing to take on more of the costs of managing forests by paying for more of MCDI's support services, which also provides a strong indication of the value of these services. Since 2013, MCDI has been working to develop alternative revenue streams that will reduce its organizational reliance on external grants and donor funding. A part of this has been developing new cost-share arrangements with communities that are now earning revenue from timber sales, so that those communities can help cover the costs of MCDI's support rather than depending on external donor funding. Through consultative discussions, communities agreed to contribute a share of timber revenues to cover MCDI's services through a five percent levy on forest revenues. MCDI has made further advances in 2018, with villages adopting business plans that will see them taking on a much greater percentage of forest management costs in line with increasing timber sales. The target is that by 2023 villages are taking on half of the direct forest management costs. Nevertheless, this would still not be providing MCDI itself with real sustainability as only around 11 percent of its full budget would be met if projections hold.

As these investments illustrate, communities have developed an increased sense of ownership and a stronger appreciation of the value of their forests. "Before, local people weren't aware of the importance of the forest," observes Mama Hadija Makokoto, a resident of Nainokwe Village. "Now they are more conscious, because of education in the village. I know the value of the forest, so I will protect it." MCDI's participatory and democratic process of creating VLFRs have helped ensure a sense of the legitimacy of the land use plan, while timber sales have created a strong incentive for communities to enforce the plan and maintain their forests.

3.7 STRENGTHS OF THE MODEL

In enabling a growing number of rural communities to earn income from the sale of sustainably harvested timber, MCDI has achieved what no other organization in Tanzania has managed, despite the breadth of VLFRs established around the country over the past 20 years. The following are key strengths of MCDI's sustainable timber and community forestry model that have underpinned this important achievement:

- **Supportive legal and policy structure.** Tanzania's Village Land Act of 1999 and the Forestry Act of 2002 together provide the critical foundation that has allowed for the creation of VLFRs, enabling and incentivizing communities to stop illegal harvesting and land degradation through their tenure over forests. Having legal rights to their forest resources has given communities the authority to prevent loggers harvesting unsustainably and illegally, and has also given them a reason to do so as they now have a stake in the health and survival of their forests over the long-term. Finally, legal access to forest resources provides the basis from which communities can seek to generate funds needed to effectively manage and protect their forests.
- **Long-term partnership with local communities.** Built initially upon effective stakeholder engagement, consensus building, and testing PFM at small scale, trusting relationships with communities have blossomed as economic benefits have started to flow. Communities are now starting to cover some of the costs of the process, which is critical to the future sustainability of the model, and requests for support from additional communities have been increasing.
- **Direct link between forest protection, sustainable harvesting and community benefits**. VLFR establishment permits communities to own and manage their forests, allowing them to

generate vastly higher income from sustainable timber harvesting than was possible through previous illegal logging operations. These profits are then converted into benefits that are community wide, through employment in forest management and logging operations, and through investment in village development projects such as schools and clean water. A direct link between forest protection and livelihood improvement is thus created.

- **Strong relationships with government.** MCDI works closely with district forest offices in the field, and maintains close relationships up to the highest level of national government. The district receives a five percent contribution from community timber sales, and district officers are compensated for supporting harvesting in the field. This has been key to navigating a complex institutional context that has impeded the success of other natural resource enterprises.
- **Support from a range of partner organizations.** MCDI has developed a wide network of organizations providing technical expertise, strategic input, and funding links that have been crucial to its incubation of community forestry in southern Tanzania.
- **Strong scientific grounding.** FSC certification has provided external validation of MCDI's technical capacity and credibility for developing sustainable harvesting plans and processes, lending support to the biological sustainability of this harvesting model. More recent peer-reviewed studies have confirmed that these community-managed VLFRs are being managed better than adjacent open-access or state-managed forest reserves (Kalonga et al., 2015).
- **High demand for the core product.** There is a large potential market both nationally and internationally for the timber from Tanzania's southern forests and woodlands, which has allowed sales of over $620,000 so far, even without a fully effective sales and marketing strategy. Locally, demand for all types of wood products is expected to rise significantly, more than doubling in round wood equivalent over the next twenty years.

3.8 CHALLENGES OF THE MODEL

While the strengths above highlight the successes of the VLFR sustainable timber model to date and its potential for growth, the model has also encountered a number of challenges. A key symptom of these challenges has been the low sales of timber relative to standing and harvestable stocks, and thus the continued dependence on external donor funding to MCDI to support sustainable forest management. Sales have brought in significant profits but communities were still only able to sell about five percent on average of their "annual allowable cut" quotas in 2016 and 2017. In addition, while sales grew markedly from 2009 to 2016, sales fell significantly in 2017. These limitations on existing sales volumes and trends are the greatest challenge facing MCDI and the communities that it works with, and to scaling up this model for community forest management in Tanzania.

Challenges impacting on the level of timber sales are detailed below.

- **High cost of harvesting in VLFRs.** Harvesting sustainably from VLFRs entails a high number of costly restrictions. Buyers must have supervision when harvesting, and so must pay for every tree they cut regardless of the quality of the wood, as well as supervision of harvesting by government officers. For buyers who are not receiving a premium price for FSC certified wood or seeking sustainably-sourced timber there is little incentive to purchase from VLFRs. Sometimes the only reason a buyer might purchase timber from a VFLR is if the species of tree they want is not available on government or open land.
- **Competition with cheaper legally-harvested timber from Tanzania.** Harvesting on government forest reserves and "open land" often occurs without supervision due to limited resources, which allows buyers to fell as many trees as they like, but only pay for the logs they deem to be of good quality, leaving the rest in the forest. In addition, due to weak enforcement, buyers allegedly often under-report the amount that they harvest.
- **Competition with illegally-harvested timber.** Timber buyers often choose to purchase timber outside of VLFRs due to the high harvesting and transaction costs within VLFRs. Illegally-harvested timber offers the highest profit margins as buyers can avoid paying any royalties, and can use unsustainable, cheaper harvesting practices including clear-cutting. The markets in Dar es Salaam and other major cities also receive large quantities of hardwood timber being imported from neighboring countries, particularly Mozambique. This undercuts the price of legally-harvested Tanzanian timber by a large amount.
- **Insufficient premium for FSC certification/sustainably harvested wood.** MCDI originally pursued FSC certification in the expectation that it would drive international timber sales, especially of its flagship species, *Mpingo* (*Dalbergia melanoxylon*), and to help timber from community forests to hold its value in a market dominated by illegally-harvested wood. The FSC certificate has boosted the overall credibility of MCDI and its work. To date, however, communities have only captured a negligible premium for FSC-certified timber as very few buyers have been found who are willing to pay the extra price.
- **Certain timber species not yet used by markets.** Many of the species common to the VLFRs are relatively unknown internationally and even locally, which limits harvesting potential.

3.8.1 Internal Capacity Challenges

- **Difficulty of producing quality sawn timber in sufficiently large quantities.** Only sawn timber can be exported and locally there is greater demand for sawn timber than for logs. Traditionally, communities have used mobile 'ding dong' type sawmills, which produce low quality planks and have low recovery rates – 20-35 percent; these are now banned by the government. MCDI received donor support in 2016 to invest in the purchase of a mobile sawmill that can produce much higher quality planks. Nevertheless, the mill is only able to saw around 650 m^3 per year, amounting to about one week's worth of harvesting per VLFR each year. For the rest of a VLFR's harvest, the community must sell logs.
- **Marketing and sales capacity.** VLFRs don't have the capacity to conduct their own marketing and sales, especially from their location in the village. MCDI has provided most connections to buyers up to this point but there is no systematic sales or marketing strategy targeting specific buyers or segments of the market. MCDI is a rural-based NGO and has long-standing expertise in

PFM and associated skills. Developing the business skills required to effectively market and sell timber has been a challenge.

3.8.2 Policy & Legal Issues

- **VLFR Boundary disputes.** Disagreements over forest boundaries between different communities and with the state can be a significant risk for VLFRs and investors, potentially impacting the amount of timber available for harvesting.
- **CBFM is receiving insufficient support in implementation.** Implementation of policies around the timber industry has been more negatively impacting VLFRs relative to other types of forests. Laws around harvesting are not enforced in government-owned forests and open land, making it much cheaper to harvest there, rather than in VLFRs. Buyers note that they have difficulty acquiring transit permits from the Tanzanian Forest Service when purchasing timber from VLFRs. These delays can cause significant expense and risk for buyers.
- **There is a risk of policy changes affecting viability of the model.** Current policy discussions taking place in Tanzania during the past year surrounding the need to take forests on community lands back into more direct government control and management threaten the legal and institutional basis of VLFRs. Less damaging but problematic debates around taxation policy for VLFRs threaten the revenue base for communities. Beyond these, despite evidence of improved forest health and reduced deforestation in VLFRs, government has not sought to expand or financially support CBFM. Instead, CBFM has thus far depended primarily on donor funding and support from NGOs like MCDI, the World Wide Fund, and others.

3.9 GOING FORWARD: OPPORTUNITIES TO STRENGTHEN THE MODEL

A key to the future of community-based forest management in Tanzania is finding ways to dramatically scale up revenues earned by communities from sustainable management of VLFRs. MCDI has built critical technical and institutional foundations for sustainable timber harvesting in VLFRs, but existing barriers to higher levels of sale of sustainable timber need to be overcome. This is a critical priority for conservation organizations, development partners, and government agencies at multiple levels, particularly given the importance of reducing deforestation in Tanzania in the context of both national economic interests and climate change mitigation goals.

The key to unlocking timber value chains in ways that benefit communities lies in finding new business models that can better access the value chain and link communities to growing national and international demand for high-value hardwood. Organizations such as MCDI need to work with established businesses that have expertise in marketing and sale of timber in order to find new ways of marketing community timber products, finding greater pricing efficiencies and economies of scale, and improving market access. Ultimately, more creative business models and new market linkages will be

the key to catalyzing a next phase of community forestry in Tanzania that leverages growing timber markets for community-level conservation action and development interests.

At the same time, the policy and legal environment that has supported VLFR development in Tanzania for the past two decades needs to be further strengthened. Government has a key role to play by increasing investments in VLFRs as a way to support the rural economy and create new economic opportunities for villages to capitalize on their timber assets. This is also essential for driving down existing levels of deforestation, which is best addressed by supporting and strengthening VLFRs.

4. CASE STUDY 2: SUSTAINABLE CHARCOAL PRODUCTION

4.1 CHARCOAL AND COMMUNITY BASED FOREST MANAGEMENT

Since 2012, the Tanzania Forest Conservation Group (TFCG) and the Tanzania Community Forest Network (MJUMITA) have been promoting sustainable charcoal production in Kilosa, Mvomero, and Morogoro Rural Districts. Charcoal is the primary source of cooking energy in Tanzanian urban areas. In 2016, Tanzanian households spent an estimated $767 million on charcoal, which was 1.6 percent of the country's GDP (*see Table 2 for calculations on charcoal value based on Tanzanian markets*). The charcoal value chain injects millions of dollars a year into rural economies.

However, charcoal production is also causing widespread forest degradation. All of the national forest reserves within 100 kilometers of Tanzania's two largest cities (Dar es Salaam and Mwanza) have been heavily degraded by illegal charcoal production. Charcoal consumed in Dar es Salaam is now being produced in forests and woodlands up to 700 kilometers away. Demand for charcoal in 2016 stood at 2.6 million tons, which is equivalent to the standing biomass of about 350,000 hectares of woodland (MNRT, 2015).

Charcoal is an easily produced, low-cost forest product, with great untapped potential to provide sustainable revenue flows from community-managed forests in Tanzania under the right management and institutional conditions. Photo Credit: MJUMITA.

However, under the right conditions, charcoal can help protect forests in Tanzania. While a comparatively low-value forest product, sustainable charcoal can still be a good source of revenue for villages. All sources of revenue contribute to the sustainability of VLFRs and will encourage villages to put more forest into these community-protected forests. However, charcoal has some particular advantages. The market is local and relatively easy to access. Charcoal production is non-technical and requires little starting capital. And, charcoal harvesting is comparatively easy to monitor and manage in comparison to timber harvesting. Sustainable charcoal harvesting can often be started within one year of establishing a VLFR. Thus, sustainable charcoal harvesting may be the easiest source of revenue for VLFRs to develop and can play an important role as an early source of revenue while villages develop other sources of revenue from their forests.

Between June 2013 and December 2017, 13 village councils earned a combined total of $203,000 from charcoal royalties. In addition to generating income for villages, the model is also helping to protect forests. As of December 2017, 22 villages across the three districts adopting the sustainable charcoal model have put 109,540 hectares of forests into VLFRs and deforestation has declined steadily since the introduction of the model. This model provides an example of how communities can, when provided with legal opportunities to sustainably manage and regulate charcoal harvest, use this important source of energy as a means to improve local forest management.

4.2 TRANSFORMING TANZANIA'S CHARCOAL SECTOR

4.2.1 Location and Project Scope

TFCG and MJUMITA began working to promote sustainable charcoal in 2012 through a project called Transforming Tanzania's Charcoal Sector (TTCS). The project was funded by the Swiss Development Cooperation. The first phase of the project (2012-2015) established sustainable charcoal production in ten villages in Kilosa District. The second phase of the project (2016-2019) is introducing the project model to ten more villages in Kilosa District, five in Morogoro Rural District, and five more in Mvomero District. Additionally, the project model was introduced to five villages in northern Mvomero District through the Adding Value to the Arc (AVA) project, which was funded by the European Union. Figure 6 shows a map of 27 villages where the sustainable charcoal model had been introduced by TFCG and MJUMITA by the end of 2017.

4.2.2 Project Model History

The initial TTCS project plan included interventions to develop a supply of, and a special market for, sustainable charcoal. However, plans for development of a premium market were abandoned after two developments. First, a TTCS-funded market study by Camco Clean Energy (‘Camco’) in 2013 showed that there was not enough demand to support a premium market for sustainable charcoal. Second, the project discovered that some charcoal traders selling into the regular charcoal market were willing to pay fees to villages that were high enough to support community forest management. This is because

they were already paying fees to the Tanzania Forest Service (TFS), and by paying fees to the village instead, they could legally avoid payments to TFS. Therefore, the TTCS project abandoned plans for market interventions and instead focused on improving forest management systems, revenue collection, and governance at the community level. The project also worked with the Tanzania Traditional Energy Development Organization (TATEDO) to promote Improved Basic Earth Mound Kilns (IBEK).

Prior to the TTCS project, TFCG and MJUMITA developed a new system of integrating CBFM and land-use planning, as part of their efforts to establish REDD+ (Reduced Emissions from Forest Degradation and Deforestation) projects working with villages in Kilosa and Lindi Districts. While working on REDD+ in Kilosa district, the project partners found substantial amounts of forest degradation caused by charcoal production in some villages. The sustainable charcoal project was developed in part to address this challenge and also as a means of preventing deforestation leakage from REDD+ villages to neighboring villages. Four of the ten phase one TTCS villages were previously part of the REDD+ project, while the other six were seen as potential leakage villages. Charcoal making was already a common activity in all of the villages, though unregulated and unmanaged.

4.2.3 Establishing Community-Based Forest Management

With limited resources, it makes sense to target community forest management interventions to villages that will be able to see the biggest returns from sustainable forest use and where the interventions are likely to protect more forest. The TTCS project uses the following criteria to prioritize villages within a district:

1. Remote Sensing and GIS Data

    - **Significant Miombo Woodland Cover (>1000 hectares).** The project maps forest types for an entire district using Landsat or Sentinel-2 data less than one year old. The forest cover map is then compared with village boundaries from the Ministry of Lands to quantify the relative forest cover of each village.
    - **Low slope (<30 percent).** The project uses digital elevation models to map the slope of the Miombo woodland portions of each village. Areas with greater than 30 percent slope will not be suitable for sustainable charcoal production.
    - **Accessible (<1 km. from road).** Roads are mapped for the villages that look most promising based on the first two criteria. The roads layer from www.openstreetmap.org is used as a starting point, and then smaller roads are digitized from high-resolution imagery in Google Earth.

2. Ground Data

    - **Communal Village Land without conflicts.** Historically, forested village land was almost always communally owned as villagers would only claim customary right of occupancy over areas where they had established farms. However, villages in many parts of the country are now selling land to private individuals and corporations from outside villages. Many of these land purchases are speculative, so it is not uncommon to find the areas still covered in forest

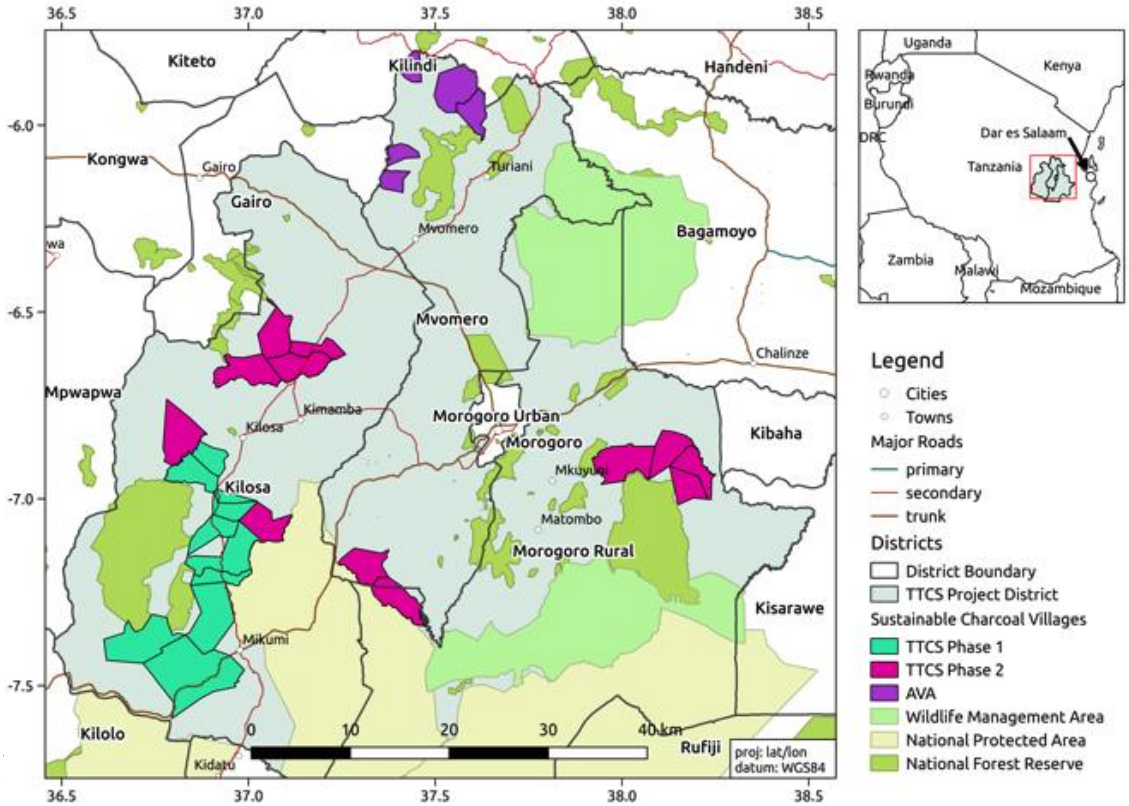
even after they have been sold. There is no way to know about most of these sales without visiting the village and the specific area. So, project staff members, accompanied by a district forest officer and village leaders, visit the areas identified as most suitable for CBFM to confirm that they are still communal village land. They also check to make sure that the area is not claimed by multiple adjacent villages, as is often the case with village boundary conflicts.

- **Existing Charcoal Making.** The project does not introduce charcoal making to villages. Existing charcoal making shows that there are already people who know how to make charcoal in the area and that there is already an accessible market.

4.2.4 Nesting Community Forest Management within Land Use Plans

TFCG and MJUMITA believe that land-use planning can strengthen community-based forest management (CBFM). It puts CBFM within the context of land management for the entire village and makes it easier for villages to plan larger VLFRs while remaining confident that they have sufficient land for their other priorities. Also, many of the initial steps for the two processes are redundant, such as confirming the village boundaries. The process for integrating CBFM and land use planning was originally developed for REDD+ projects in village land (TFCG and MJUMITA, 2011), but is applicable for a wide variety of conditions including sustainable charcoal. District officials lead the field activities associated with land use planning and community based-forest management, with support from project staff members.

Figure 6 | Map of TTCS and AVA project villages managing forests for charcoal.



4.3 FOREST MANAGEMENT

The forest management plans for the project villages that have adopted sustainable charcoal are not limited to managing forests for charcoal. Most also have management plans addressing other sustainable uses including timber harvesting, beekeeping, firewood collection, and collecting medicinal and edible plants and fungi. However, for this report, only the parts of the management plans that refer to charcoal are described.

The model for charcoal forest management plans was developed through consultation with villages and district forest officers. It was also revised in response to suggestions from national forest authorities, and the findings of the initial regeneration study conducted by the project in 2015. The goal was to create a system that was sustainable, but also practical and not a dramatic departure from the way in which charcoal was already being harvested. The model is described in more detail in two manuals produced by the project.[4]

4.3.1 Forest Management Plan

In the forest management plan, VLFRs are divided into different and sometimes overlapping forest management units (FMUs) for different forest uses. The land-cover maps that are developed to support land use and CBFM planning are used in combination with GIS data to identify the most suitable areas for charcoal FMUs. Then, the village, working with the district forest officer and staff members from the TTCS project, decide on the final FMU boundaries. The following criteria are used to decide where charcoal FMUs should be:

- Forest type should be Miombo woodland dominated by Brachystegia species.
- The area should have a slope of less than 30 percent and ideally less than 20 percent.
- Grass in the understory should not be too dense or tall.
- The area must be accessible for charcoal makers and not too difficult to transport charcoal from. Ideally there should be a road passing through or within one kilometer of the area.

The total area of all of the charcoal FMUs cannot exceed 20 percent of the total area set aside for VLFRs in the village. This allows for potentially increasing the size of the charcoal forest management units at a later date if it is necessary to extend the rotation age.

[4] These manuals are only available in Kiswahili. See: http://www.tfcg.org/what-we-do/develop/sustainable-charcoal/ttcs-publications/

4.3.2 Harvesting Plan

4.3.2.1 Rotation

The TTCS project model uses a 24-year harvesting rotation with natural regeneration for areas managed for sustainable charcoal. This rotation is not long enough to regenerate 100 percent of the starting biomass in mature Miombo forests, but was selected in order to maximize biomass production in charcoal forest management units over successive harvests. While producing Miombo trees large enough to harvest for timber (dbh > 45 cm) requires 80 to 120 years depending on the location (Stahle et al., 1999; Trouet et al., 2006), producing trees large enough for charcoal harvesting (dbh > 15 cm) can be accomplished in as little as 15 years after clearing for charcoal harvesting or shifting cultivation (Syampungani et al., 2010; Kalaba et al., 2013). This is because the dominant species in Miombo are light-dependent species that can grow rapidly from coppices, root suckers, and previously suppressed saplings in open sunlight during the early stages of regeneration. In phase one TTCS project villages, 67 percent of stumps reproduced vegetatively after harvesting, with the oldest stumps being most likely to die. Wet Miombo annual biomass growth peaks at about 18 years and average annual growth peaks at 24 years (Frost, 1996). The biomass of a 24-year miombo stand can be up to 80 percent of the biomass of a mature stand. After 30 years, Miombo hardly accumulates any biomass. Instead, as trees die or become suppressed in the understory, larger trees expand to fill their space. Thus, it only makes economic sense to use a very long harvesting rotation if trying to produce trees for timber.

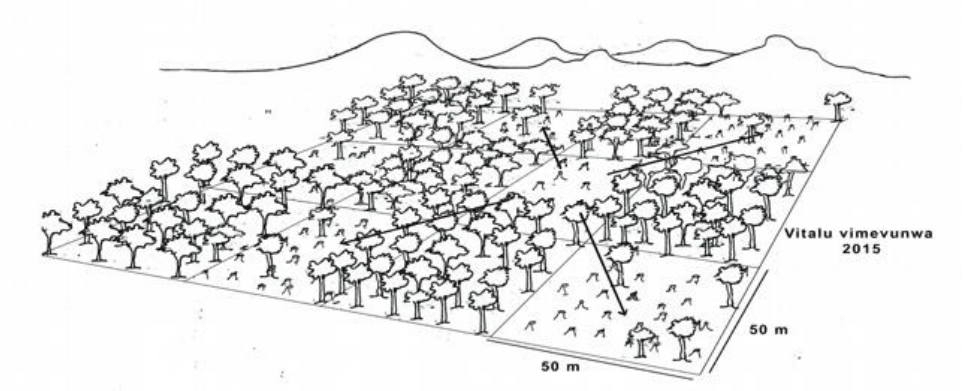
4.3.2.2 Harvesting Coups

In order to make it easy to track the amount of harvesting each year, create a significant light gap, and to reduce the impact of harvesting on the environment, the charcoal FMUs are divided into 50x50 meter 'coups' using a grid generated by GIS software. The total number of 50x50 meter coups that can be harvested in on year is the total number of coups in an FMU divided by 24. To reduce erosion, harvesting should be done in a checkerboard pattern moving from one side of FMU to the other (*see Figure 7*). Then, at year 13, when half of the FMU has been harvested, villagers can return to the side of the FMU where harvesting started and proceed to harvest the previously unharvested coups. This way, the harvested coups will have 12 years to regenerate before the unharvested coups start to be harvested, helping to make sure that the soil around harvested coups is well stabilized.

4.3.2.3 Charcoal Harvesting Quotas

In addition to tracking harvesting by area, harvesting is also tracked by the number of charcoal bags that the VNRC issues licenses for. The potential annual harvest in terms of bags of charcoal is calculated using above ground biomass (AGB) plot data for trees that meet the criteria for charcoal harvesting. The calculations assume that 90 percent of the charcoal tree biomass in an FMU will fall in parts of the FMU that can be harvested, e.g., not in gullies, and that 20 percent of that biomass will be turned into charcoal using improved basic earth mound kilns. Finally, the total potential charcoal yield is converted to bags of charcoal using a standard charcoal bag size of 50 kilograms.

Figure 7 | Checkerboard Harvesting Pattern in Charcoal Forest Management Units.



For instance, if a village has an average harvestable charcoal tree biomass of 40 tons per hectare and a 500 hectares charcoal forest management unit, then the potential annual charcoal harvest will be:

- 40 tons per hectares of charcoal tree AGB x 0.9 = 36 tons per hectares harvestable charcoal tree AGB
- 500 hectares / 24-year rotation = 20.8 hectares harvested per year
- 36 tons per hectares x 20.8 hectares = 748.8 tons of harvestable charcoal tree AGB per year
- 748.8 tons x 0.2 kiln efficiency = 149.8 tons of charcoal per year
- 149.8 tons x 1,000 kg. per ton / 50 kg. per bag = 2,996 50 kg. bags of charcoal per year

4.4 CHARCOAL MARKET

4.4.1 Market Segments, Demand, and Value

The current market for sustainable charcoal is the same as for other charcoal. Charcoal is predominantly an urban cooking energy source. In Dar es Salaam, Tanzanian's largest city, the proportion of households using charcoal as a primary source of cooking energy increased from 46 percent to 76.5 percent between 2002 and 2012 (NBS, 2014). Charcoal is also primarily consumed by the richest Tanzanians, with 83.7 percent of the richest quintile reporting using charcoal and 57.5 percent of the second richest quintile reporting using charcoal (NBS, 2017).

Table 2 shows estimates of the size of different charcoal market segments in 2016. The results suggest that there were 18 million Tanzanians living in households that used charcoal at least occasionally in 2016 and that they consumed 2.6 million tons of charcoal for which they paid about $767 million. This was 1.6 percent of Tanzanian's GDP in 2016. By comparison, Tanzanian's biggest export crop for 2016 was tobacco, which earned $517 million.

Table 2 | Estimated number of charcoal consumers, consumption and value in 2016 by segment using National Bureau of Statistics 2016 population estimates, and charcoal usage and expenditure reported from 2016 Energy Access Situation Report (NBS, 2017).

Segment	Total Population	% Population Using Charcoal	Number Using Charcoal	Consumption (tons)*	Value
Dar es Salaam	5,465,420	88.2%	4,820,500	698,973	$333,388,859
Other Urban	10,111,124	79.3%	8,018,121	1,162,628	$325,394,859
Rural	33,100,155	16.3%	5,395,325	782,322	$108,352,520
Total	48,676,699	37.0%	18,010,379	2,611,5050	$767,136,238

*Assumes annual per capita consumption of 145 kg. of charcoal per year amongst charcoal consuming households (Mwampamba, 2007; Ajao, 2011; GVEP, 2012)

4.5 CHARCOAL VS. COMPETING PRODUCTS

Charcoal is the most popular form of cooking energy in urban areas because it is the cheapest form of cooking energy apart from firewood, which is not convenient to use in an urban environment. Historically, a much greater number of households in urban areas cooked using kerosene, but switched to charcoal as kerosene prices rose (NBS, 2014). Today, Liquid Petroleum Gas (LPG) is the next cheapest source of cooking energy after charcoal. The real price of LPG declined 21 percent since 2012 and annual reports of the Energy and Water Utilities Regulatory Authority (EWURA) show LPG imports increased 279 percent from 28,286 MT to 107,083 MT between 2012 and 2017. The 2016 EASR report found that 26.7 percent of households in Dar es Salaam and 20 percent of all urban households are using LPG. These households adopted LPG as a more convenient cooking fuel, and many continue to also use charcoal due to its affordability, but at a reduced rate (Alem et al. 2017).

4.6 CHARCOAL PRICE TRENDS

Nominal charcoal prices in Dar es Salaam have increased steadily for the past decade (*see Table 3*). However, after adjusting for inflation, a more complicated picture emerges.

There was a near doubling of charcoal prices between 2006 and 2007 after a two-week charcoal ban in 2006 and the passing of the 2006 charcoal regulations, which increased bag fees and established checkpoints for royalty collection. Then, between 2010 and 2014, the real price of charcoal declined almost back to 2006 levels. According to Camco Clean Energy (2013), during that period, the charcoal market became much more efficient with the entry of many small-scale charcoal traders using motorcycles, small vehicles, and non-dedicated lorries. It is likely that these new traders also found it easier to avoid royalty collection checkpoints. The average charcoal bag size increased from around 56 kilograms to 90 kilograms during this period, which may reflect an effort by traders to avoid some per bag fees and royalties. The period from 2010 to 2013 also encompassed the period when the responsibility for charcoal revenue collection was transferred from the Forest and Beekeeping Division to the Tanzania Forest Service, which may also have played a role in the price decline. However, since 2013, prices have risen again, likely due to improved revenue collection by the Tanzania Forest Service and supply constraints caused by overharvesting.

Table 3 | Dar es Salaam Retail Charcoal Prices (2006-2018)

	Retail per kg. Price (TSH)	
Year (source)	**Nominal**	**Real (May, 2018)**
2006 (Malimbwi, 2008)	232	585
2007 (Malimbwi, 2008)	393	925
2009-2010 (Schaafsma, 2012)	501	890
2013 (Camco, 2014)	444	604
May, 2018 (own data)	800	800
% Change (2006-2018)	223%	28%

As charcoal demand continues to rise with urban population growth, supplies near urban areas continue to decrease, and as TFS continues to improve charcoal revenue collection and increase license fees, prices are likely to continue to rise annually.

4.7 FUTURE TRENDS

If the consumption patterns in Dar es Salaam, other urban areas, and rural areas remain the same as in the 2016 EASR, total household charcoal consumption in 2030 would be over 4.8 million tons. That would be worth $1.9 billion using today's prices.

However, it seems unlikely that the charcoal market can expand much further. The current rates of harvesting are already unsustainable and have caused widespread forest degradation near urban areas

and major highways. Furthermore, deforestation caused by conversion to agriculture is preventing degraded forests from regenerating, further constricting supply.

Already, there is evidence of a massive shift afoot in the Dar es Salaam cooking energy market. In May, 2018, the TTCS project surveyed 32 charcoal sellers in the high-density areas of Dar es Salaam (MJUMITA, unpublished data). Seventy-two percent of charcoal sellers reported that it was more difficult to find charcoal to purchase than in the past for reasons not related to weather. The survey found that 50 percent of charcoal sellers said their business had decreased since last year, while only 6.25 percent said it had increased. Thirty-four percent of the sellers reported decreases in sales related to decreased demand from consumers. One of the biggest factors turning customers off of charcoal was the decrease in quality, with 62.5 percent of sellers reporting that the quality of charcoal in the market has declined since the previous year.

Due to decreased availability of native hardwoods for charcoal making, many charcoal makers have switched to using exotic species grown on farms and plantations. Seventy-eight percent of charcoal sellers reported that their customers preferred charcoal from native hardwoods, but more than half of the sellers said they were selling charcoal produced from cashews, mango, eucalyptus, and in particular, black wattle. Black wattle is grown in the southern highlands to produce tannins, which are found in the bark. However, there are no plantations producing wood primarily for charcoal making. Charcoal is produced as a side product. It is too expensive to grow trees in plantations exclusively for charcoal. Thus, charcoal supplies from plantations are limited by demand for the more valuable primary products produced from plantations.

Eventually, most charcoal will become more expensive than other sources of cooking energy, particularly LPG. It is likely that already more than 30 percent of households in Dar es Salaam are using LPG. At the current rate of annual charcoal price increases, LPG will become cheaper than charcoal before 2021. Global LPG prices will likely remain relatively stable to 2030. LPG prices are closely correlated with oil prices, which the World Bank predicts will rise by eight percent by 2030 (World Bank, 2018).

However, from the perspective of the villages producing charcoal sustainably from VLFRs, the future supply constraints are good news as it means that they will be able to increase the prices they charge for charcoal. Additionally, they are producing the type of charcoal which is most preferred in the market, but which is becoming more difficult to find, i.e., that produced from native hardwoods. Charcoal prices can rise by another 20 percent and still remain competitive with LPG, which has a substantial upfront cost that serves as an entry barrier (Alem et al., 2017). So long as villages can supply charcoal at a price that is competitive with LPG, they will continue to find an expanding market as other supplies of charcoal decrease and urban populations continue to grow.

4.7.1 Charcoal Market Value Chain

Charcoal from VLFRs is sold to the same traders and eventually reaches the same customers as charcoal produced elsewhere. There is currently no differentiation in the market, though the project is working with one trader in Dar es Salaam that plans to brand the charcoal and sell it at a premium through supermarkets. They also plan to offer producers a substantial increase in price.

The primary difference in the value chain for charcoal produced from VLFRs in relation to charcoal produced elsewhere from natural forests is that villages issue the harvesting licenses and keep the licensing fees. Elsewhere, outside of VLFRs, district forest officers issue the licenses and collect fees on behalf of TFS. Village license fees are 7,000 TSH per 50 kilograms bag, while TFS fees are 12,500 TSH per 50 kilograms bag. Traders would lose money if they had to pay an additional 5,500 TSH for their charcoal. Thus, the reason that final consumer charcoal prices are not higher is that traders often evade paying TFS royalties on charcoal produced outside of VLFRs. Additionally, there is reported to be a substantial trade in charcoal produced from wattle tress grown on private lands in Njombe and Iringa regions. TFS charges no licensing fees for wattle charcoal. Thus, villages managing VLFRs for charcoal have had to set their licensing fees lower than TFS in order to remain competitive in the market.

4.8 DEVELOPMENT AND CONSERVATION IMPACTS

4.8.1 Production and Earnings

Between June 2013 and December 2017, 13 village governments earned a combined total of $203,000 from charcoal royalties on 3,153 tons of charcoal. In general, earnings have been increasing as more villages have been added to the project. Sales might have been much higher by 2018, but charcoal harvesting was shut down entirely in project villages for the first half of 2015 by district government, and it took a long time to attract traders back to the project villages. Also, villages decreased the price they were charging for sustainable charcoal in an effort to attract back traders. Now that many villages are selling at capacity again, they should be able to raise their prices.

4.8.2 Development Activities

Villages decide how to spend revenue from sustainable charcoal harvesting licenses in Village Assembly meetings. Most of the money gets spent on improving local health, water, and education infrastructure. Examples of projects funded by charcoal revenue since 2014 include building school classrooms, housing for teachers, purchasing school desks, building health clinics, housing for doctors, bringing piped water to parts of villages, and adding hand water pumps to boreholes. Some villages have also elected to spend charcoal revenue on health insurance for all village residents making it free for them to visit local health clinics.

4.9 CONSERVATION OUTCOMES

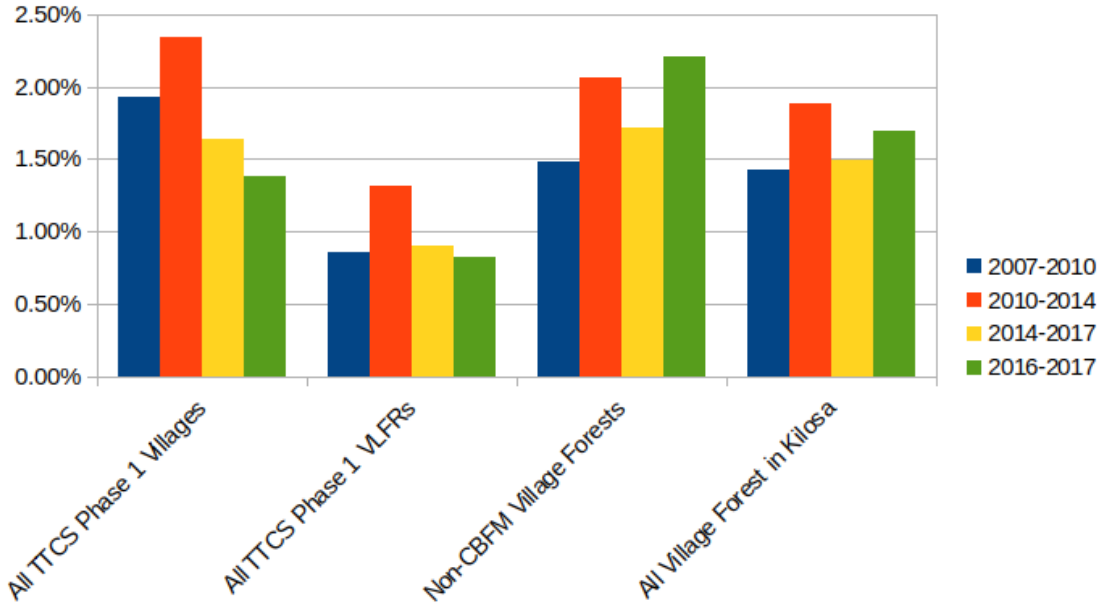
As of December 2017, TTCS project villages had put 109,540 hectares into VLFRs. About 10 percent of that area, 10,895 hectares, was put into FMUs that will be managed for charcoal production. Villages are also setting aside some charcoal revenue to pay for forest patrols and equipping VNRC members for

patrol activities. Some villages have even invested in a motorcycle for VNRC members so that they can more rapidly patrol the forest.

The TTCS project has mapped deforestation in phase one villages from 2010 to 2017. Figure 8 compares deforestation rates in TTCS villages for different time periods to those in other village forests in Kilosa District. On average, the deforestation rates in TTCS project villages prior to the project start were higher than in the rest of the district, which is part of the reason they were prioritized to be included in the project. Like elsewhere in the district, deforestation was increasing in TTCS villages prior to the project start. However, once the TTCS phase one villages were well established and began harvesting in 2014, deforestation began to decline, whereas deforestation rates in villages not practicing CBFM continued to increase. During the last monitoring period from 2016 to 2017, the deforestation rate inside TTCS phase one VLFRs (0.82%) was less than half of the deforestation rate in villages not practicing CBFM (2.21%).

The reduction in deforestation in TTCS project villages is most likely due to project interventions. Much of Kilosa is rugged and less attractive for agriculture. However, the project focused specifically on getting low slope forests into CBFM since they are the most suitable for sustainable harvesting. Thus, in the absence of the TTCS project, much more forest in the project villages would have been converted to agriculture. During phase two, the project has expanded to include almost all of the remaining low slope Miombo woodland in Kilosa district. As CBFM becomes well established in phase two villages, the rate of deforestation in Kilosa District as a whole should start to decline. The apparent leveling off of deforestation in the district as a whole may already be a sign that this is happening. In contrast, a separate deforestation analysis covering parts of Mvomero, Kilindi, and Handeni districts to the north of Kilosa District found that the deforestation rate there is continuing to accelerate, moving from 2.8 percent from 2010 to 2015 to 4.6 percent between 2015 and 2017. While this highlights that the model is likely protecting forest, it also shows that the window for expanding the model to protect more forests is rapidly closing as many villages will simply not have enough forest remaining to justify the cost of setting up VLFRs.

Figure 8 | Deforestation rates from 2007 to 2017 in TTCS phase one villages, TTCS phase one VLFRs, Non-CBFM Village Forests, and all village forests in Kilosa District.



Deforestation is still high in some individual TTCS project villages, where the model is not working as well. Msimba and Ihombwe village in particular struggle to reduce deforestation. Both have deforestation rates in their VLFRs of greater than one percent. It appears that the model is not working sufficiently well in villages very near urban centers and highways.

4.10 LESSONS LEARNED

4.10.1 Sustainable Charcoal Pays

Charcoal is typically seen as a low-value use of trees. However, many villages stand to earn more revenue from sustainable charcoal than they could from any other forest product or service. Here we present some of the advantages of charcoal in terms of income generation for villages and villagers.

- **Very low barriers for entry into charcoal production.** Charcoal making is already widespread across the country. Charcoal making is something often done by farmers in their spare time. It requires little technical ability and can be done with many of the same tools that farmers already have available to them. In just two days of training, charcoal makers from TTCS project villages learned how to make improved charcoal kilns that raise charcoal yields, improve charcoal quality, and lead to much more rapid carbonization.

- **Charcoal making offers a higher return for labor than casual farm labor.** While charcoal making is hard work and labor intensive, charcoal makers can earn up to 7,800 TSH a day compared to casual labor rates in most villages of around 3,000 TSH a day.
- **Charcoal traders already operate in many villages.** Many traders are willing to switch to buying sustainable charcoal from villages after CBFM is established, especially large-scale charcoal traders who would otherwise have to pay fees to TFS. With no external support for marketing, villages can potentially start selling sustainable charcoal within months of establishing a village forest reserve and harvesting plan. This contrasts with the timber market, which has been much more difficult for CBFM villages to access without external assistance.
- **Charcoal can often earn more than timber.** Many villages in the country have large areas of Miombo woodland, but poor timber stocks due to historical over-harvesting. Charcoal production, though, can be done with trees as small as 15 cm dbh. Furthermore, some of the most common Miombo species have no commercial value as timber. Thus, in many circumstances, villages may be able to earn more from sustainable charcoal than from timber. For instance, in Ulaya Mbuyuni, a TTCS village, 33 percent of the stems recorded on timber transects were *B. boemhii*, a species with no commercial timber value, but which makes excellent charcoal. The village has 3,066 hectares of VLFR that has been zoned for sustainable timber harvesting. The value of the annual harvesting quotas for commercial timber species is $9,590, though the village has not yet found a buyer. In comparison, the village has earned $4,519 annually from its 244-hectares charcoal FMU since 2015. If the village expanded its charcoal FMU to the limit suggested by the project (20 percent of total VLFR size), the village would earn $11,593 annually. Villages with poor timber stocks or difficulty accessing timber markets can use limited charcoal harvesting to make up the revenue gap while they wait for their timber stocks to improve or to find markets.
- **Sustainable charcoal is compatible with and pays more than REDD+.** Establishing sustainable charcoal under CBFM can stop forests from being converted to agriculture, and thus contribute to REDD+. However, any kind of harvesting reduces the long-term average carbon stock of a forest because while the trees may regrow, on average, there will be less biomass present during the re-growing period. In the case of Miombo forests managed on a 24-year rotation, the biomass stock may never return to the original biomass, which means that the long-term average is reduced even further. Assuming linear growth, and that roughly 60 percent of the harvested biomass will regenerate over 24 years, the long-term average biomass will be 30 percent of the starting biomass. Thus, the potential REDD+ payments for preventing deforestation would be reduced by 70 percent. However, earnings from sustainable charcoal production are competitive for villages at current REDD+ prices of less than $5/ton of CO2e.

4.10.2 Optimal conditions for sustainable charcoal

There are some places where the TTCS project model has not worked well. Here are the key ecological and economic factors that seem related to success.

4.10.2.1 Ecological Factors

- **Miombo Forest type.** Wet Miombo works best because all of the most popular charcoal species regenerate vegetatively from either coppicing or root suckers, helping to ensure rapid regeneration without planting.
- **Low slope.** Areas on steep slopes seem more prone to excessive grass growth and intense fires. Therefore, it is best to locate sustainable charcoal harvesting in areas with less than 30 percent slope and ideally less than 10 percent slope.
- **Low grass.** Harvesting opens up the under story and encourages grass growth which can hinder regeneration though competition for resources with young trees and providing fuel for more intense fires. Thus, areas that already have tall thick grass growth before harvesting should be avoided.

4.10.2.2 Economic Factors

- **Existing charcoal making.** The TTCS project model is easiest to introduce to villages where people already make charcoal. Existing charcoal making suggests that charcoal markets are already accessible from that village.
- **Accessible forests.** Charcoal FMUs should be located in portions of the forest that are accessible by vehicle or bicycle. It is hard to get charcoal makers to use forest management units that are difficult to access, especially if there is still lots of more accessible forest outside the VLFR.
- **Large-scale charcoal traders.** The model works best with large-scale charcoal traders because they are already likely to be paying fees to TFS and thus will be very willing to pay villages instead if it saves them money. These kinds of traders will want to ensure that the charcoal they buy is licensed by the village so that they can show the license at TFS checkpoints. Thus, revenue collection become fairly easy in villages where the main charcoal buyers are large-scale traders.
- **Not too close to a major highway or urban area.** While market access is important, too much market access can make it difficult to curb illegal charcoal making. For example, the Dar es Salaam – Mbeya highway runs directly through Msimba village. Charcoal makers in the village were accustomed to selling their charcoal on the highway before the project began. Most of their sales were to smaller vehicles and back haul trucks that were not likely to be stopped at TFS checkpoints and thus very unlikely to pay TFS fees. Furthermore, these buyers offered the charcoal makers higher charcoal prices than large-scale charcoal traders would. As a result, it is relatively easy in Msimba village to produce charcoal illegally, sell it quickly to buyers passing on the road, and avoid paying any royalties. In villages further from the highway, most of the charcoal buyers are large-scale traders who want charcoal that is properly licensed.

4.10.3 Risks

4.10.3.1 Economic

As described in the market section of this report, the economic picture for sustainable charcoal looks favorable. As the supply of unsustainable charcoal declines, prices will continue to rise and the market for sustainable charcoal will continue to expand (though perhaps contract overall due to switching to LPG). The main economic threat comes from the opportunity cost of agriculture, which is higher than the returns for timber and charcoal in most villages. Luckily, villages also place other values on forests are often willing to accept some opportunity costs in the name of conservation. However, in the long run, the pressure from agriculture will only increase. Therefore, it is important for villages to try to maximize their returns from CBFM. Combining charcoal harvesting and timber harvesting, along with other forest products, can help to do this and a more substantial market for REDD+ would also add value to CBFM in Tanzania.

4.10.3.2 Governance

The management systems are only as good as the village governments that implement them. There is often frequent turnover in Village Councils and VNRCs, which can significantly degrade capacity. There is a need for professional forest management service providers for villages. These services will include forest monitoring and periodic trainings. MJUMITA plans to start charging TTCS phase one village for support services in 2019 and phase two villages after that. Village income from charcoal and timber should be high enough to pay for these services without greatly reducing income for villages.

4.10.3.3 Ecological

The sustainable charcoal management system is based on a thorough review of the literature on Miombo ecology. However, it has not been previously implemented. Will the rate of regeneration match expectations? An adaptive management approach is required to mitigate this risk. Regeneration is already being monitored and must continue to be monitored throughout the first rotation and beyond. Already, there have been some changes to the model in response to the findings from regeneration monitoring – moving to areas less than 30 percent slope and without dense grass cover. Most importantly, TTCS villages have all constrained their charcoal FMUs to less than 20 percent of their VLFRs, which makes it possible to adjust the rotation length significantly if the regeneration does not meet expectations. Across all of the TTCS villages, only slightly more than 10 percent of total VLFR area has been put into charcoal FMUs. If villages decide to move to 30-year rotations, they would only need to put 2.5 percent more of the total VLFR area into charcoal FMUs.

4.10.3.4 Institutional

The biggest threat to the sustainable charcoal model is institutional. Despite being part of national forest policy since 1998, CBFM has not been fully embraced by national forest authorities, who often doubt that poor, undereducated villagers can effectively manage forests. There is no budgeting at National or District levels to directly support CBFM. There are now policy proposals being put forward for government to take back responsibility for forest management on village lands. Additionally, local TFS managers can see CBFM as a threat since it reduces the forest areas from which they can collect royalties. A big expansion of CBFM in a district might mean that the TFS district manager fails to meet his or her royalty targets.

Charcoal in particular is viewed negatively by many bureaucrats and politicians. Despite being the primary source of cooking energy for urban populations, a major income source for rural populations, and saving the country millions of dollars on imported energy costs, charcoal's reputation as being bad for the environment, dirty, and backwards dominates the policy discourse. In 2006, the Minister of Natural Resources and Tourism tried to introduce a ban on charcoal. It caused a massive black market overnight and dramatically increased the price of charcoal, but did not stop the trade. The ban was lifted after just two weeks. A similar proposal was discussed in 2017, but ultimately not implemented.

In December of 2014, the new District Commissioner of Kilosa District decided to introduce a ban on charcoal production in the district and specifically directed the TTCS project villages to stop harvesting. He said that he simply disapproved of charcoal since it was environmentally destructive and didn't want it produced in his district. However, in practice, the ban only affected charcoal production in project villages. Charcoal production elsewhere in the district continued as usual. The ban was eventually lifted later that year after the project organized a task force including outside experts from Sokoine University of Agriculture to review the model and lead the District Commissioners and others on a tour of the project villages.

The project is trying to mitigate this risk by educating policy makers about the TTCS project model and the true causes of deforestation in the country. However, this is likely to remain a major challenge for villages trying to produce charcoal sustainably in VLFRs.

5. CASE STUDY 3: MAKING FOREST CARBON OFFSETS DELIVER

As global concern around climate change has grown, there has been increasing focus on links between carbon emissions and the loss and degradation of forests. This is due to the fact that about 10 percent of total global carbon emissions come from land use changes, primarily the clearing and degradation of forests.

For over a decade it has been recognized that a key element of reducing global deforestation will be creating economic incentives that reward local and national actions that improve forest conservation and management, and thereby reduce the global carbon emissions from forests. A range of different exchange and market mechanisms have been established to allow individuals or entities to develop projects that deliver quantifiable reductions in carbon emissions and to sell 'offsets'[5] – effectively credits for carbon emission reductions – that can be purchased on emerging carbon markets by individuals, companies, or governments seeking to reduce their carbon emissions. REDD+ (Reduced Emissions from Deforestation and Forest Degradation) is the framework for designing projects that deliver quantifiable reductions in forest loss (deforestation) and degradation. Land protected through REDD+ projects generate certificates, each representing one tonne of CO2e sequestered, which are then sold to various buyers seeking carbon emission offsets.

REDD+ is now well-integrated into the global climate policy framework, including the UN Framework Convention on Climate Change (UNFCCC) and the Paris Declaration. REDD+ forms an important part of countries' efforts to reduce their global carbon emissions, particularly in developing nations with relatively low levels of industrial emissions. As part of the UNFCCC and Paris Declaration processes, Tanzania has committed to reducing its greenhouse gas emissions by 10-20 percent by 2030, although thus far the rate of deforestation continues to accelerate.

Despite this acceptance of REDD+ at the global policy level, and the widespread recognition that reducing forest loss is a key and relatively cost-effective way of reducing global carbon emissions, implementation of REDD+ has been slow to develop in practice. The greatest challenge is that while REDD+ is premised on relatively large-scale financial transactions or transfers between 'sellers' (projects or countries that reduce deforestation) and 'buyers', who either purchase offsets or, at the country level, fund national emissions reductions, these financing flows have been slow to develop at the scale required. There remains no international compliance market for REDD+ whilst large-scale public funding

[5] A carbon offset is a quantified (denominated in the equivalent of one tonne of carbon dioxide emissions) and documented reduction in carbon emissions, which can then be marketed and sold on various carbon markets and exchanges. Most carbon offsets must be validated and subsequently verified (after one or several years) by a third-party certifier, based on adherence to approved program development standards and methodologies.

for emissions reductions have also lagged behind expectations and envisioned timeframes, and the cost of establishing REDD+ remains very high.

The result is that many REDD+ projects have been developed over the past decade, but the overall market for carbon offsets, from REDD+ and other sources, has not kept up with the growing supply of these offsets. This has led to oversupply on global carbon markets – which remain predominantly voluntary markets, particularly in the case of REDD+ carbon forestry projects – and periodic drops in prices of offsets. The result has been widespread uncertainty for both producers and buyers within carbon markets, as well as policy makers seeking to create a regulatory environment for REDD+ and carbon markets more widely. For example, a review carried out by CIFOR in 2014 found that of 23 REDD+ projects included in its comparative study, only four had sold credits to date (Sills et al., 2014).

The overall volume of traded carbon decreased in 2016 by 24 percent from the year before and the average price fell from $4.80/tCO2e in 2013 to $3.00/tCO2e in 2016 – part of a trend in decreasing sales and prices due to continuing uncertainties over carbon markets globally. Globally, in 2016, 13.1M tCO2e of forest carbon was traded, valued at $67 million (Hamrick and Gallant, 2017). This figure is down from the 28M tCO2e of traded forest carbon in 2012. While these overall figures have decreased, REDD+ and forestry-focused carbon offset projects have among the largest shares of the market, with REDD+ being the most sought-after project type of the last several years. In addition, not all carbon credits are equal, with a price per credit ranging from 0.2 USD per tonne for credits from large hydro projects, to $9.50 per tonne for credits from improved forest management (Hamrick and Gallant, 2017). Both of these trends indicate an opportunity within the carbon market for smaller, community- and biodiversity-focused projects.

5.1 REDD IN TANZANIA

In Tanzania, there have been efforts to develop the structures and institutions necessary for REDD+ at both a national and sub-national level, supported by a number of international donors. In particular, at a sub-national level, the Norwegian Embassy funded nine pilot projects run by conservation NGOs from 2009 to 2014, constituting the largest REDD+ initiative in Tanzania to date at a total of $19 million. The purpose of these pilot projects was to develop a set of best practice models and methods for REDD+ in Tanzania, which could then be scaled up and integrated into national policy and practice (Blomley et al., 2016). However, by the end of the project period, most of these pilots had not successfully developed final Project Development Documents (PDDs) as required for project validation and credit issuance, and none had actually sold any offsets. Blomley et al. (2016) summarize these challenges:

> *Of the nine pilot projects that were originally supported by the Norwegian government, only three have produced final PDDs to support the sale of carbon credits (notably CARE Tanzania, TFCG/MJUMITA and AWF), of which a process of validation and verification is either ongoing or completed. Of these, no project has yet managed to sell credits on the voluntary market. This calls into question the implicit assumption that underpinned many of these projects – namely that donor funds provided for project development would be sufficient to bring projects to market and thereby secure sustainability.*

As a result, in Tanzania as in many other tropical forested countries, REDD+ has emerged as an important potential mechanism for creating greater economic value from forests, but practical efforts to convert the idealized premises and ambitions of REDD+ into impact on the ground have been more elusive. The challenge in getting REDD+ to deliver is tied to market constraints, including the lack of a formal regulatory compliance market for REDD+, as well as the relatively high cost and technical complexity of developing the REDD+ carbon offset product.

5.2 CARBON TANZANIA: PIONEERING REDD+ THROUGH PARTNERSHIPS

Carbon Tanzania, a social enterprise based in Arusha, works with community groups to sell carbon credits using the REDD+ model. In its flagship Yaeda Valley project, Carbon Tanzania partnered with another local organization – the Ujamaa Community Resource Team (UCRT) – which specializes in helping communities to secure land rights and manage their lands and natural resources, and had extensive prior experience and community trust in Yaeda as a result of many years of working there. This partnership has succeeded in selling all of the project's credits produced to-date on the voluntary carbon market, including advance sales through 2020. The project has demonstrably reduced the rate of deforestation and local communities have received substantial financial benefits that have been used transparently and democratically to address local development priorities. The project has also helped

The Hadza are a unique hunter-gatherer community that lives in the Yaeda Valley in northern Tanzania, which is now their most extensive remaining territory. Photo Credit: Carbon Tanzania.

protect one of the last remaining hunter-gatherer groups in the world by preserving their most significant remaining territory.

5.3 THE YAEDA VALLEY: HOME OF THE HADZA

South of Lake Eyasi, a large soda lake adjacent to northern Tanzania's Ngorongoro highlands, lies the Yaeda Valley – a semi-arid area of acacia and baobab forests and rangelands (*see Figure 9*). It is the last sizable territory of the Hadza, a hunter-gatherer people that are among the most ancient inhabitants of northern Tanzania. For several thousand years, since the wave of iron-wielding farmers and pastoralists began in East Africa, the Hadza have gradually been pressed back into smaller and smaller areas of increasingly marginal land. By the 1990s, this territory within the Yaeda Valley was virtually all that remained for the several thousand remaining Hadza (Peterson, 2013).

5.3.1 Deforestation in Yaeda

The rapid deforestation and land degradation occurring throughout Tanzania has begun to spread into the Yaeda Valley, driven by competition among different ethnic groups for increasingly scarce fertile land. Another ethnic group, the pastoralist Barabaig, also depends on the area's rangelands for their livestock. As they lose access to pastures in surrounding areas, they have become more compressed in the semi-arid Yaeda Valley, leading them to move into the Hadza's last remaining forests with their cattle.

Other groups are moving into the Yaeda Valley as a result of unsustainable agricultural practices and wider land degradation in northwestern Tanzania. The Sukuma agro-pastoralists have been encroaching on Hadza lands from the west, and the agro-pastoralist Iraqw have increasingly settled in Yaeda from the nearby Mbulu highlands. Land in Yaeda Valley is poorly suited to agriculture and becomes quickly exhausted, forcing Iraqw and others to move to new land every four to five years, clearing and burning forests as they go.

5.4 LAND RIGHTS AS A FOUNDATION TO REDD+

Ultimately a core need of local communities, such as the Hadza and the Barabaig, is to protect their forests and rangelands from overuse in the face of growing pressures from adjacent communities that seek to convert forest and rangeland to agriculture. This is particularly critical to the survival of the Hadzabe, as their culture and livelihood depends on harvesting wild foods including numerous tubers, berries and other plants; honey; and hunting wild animals.

Figure 9 | Map of Northern Tanzania, with the red circle indicating the Yaeda Valley area situated on the southwest corner of Lake Eyasi.

For these communities, managing and protecting natural resources requires the legal rights to plan and control how resources are used, which in turn requires establishing formal rights to govern land and control use. In recognition of this need, community rights activists founded the Ujamaa Community Resources Team (UCRT) in the 1990s, an NGO dedicated to helping marginalized groups – hunter-gatherers such as the Hadza and Akie, and their pastoralist neighbors such as the Barabaig and Maasai – to secure legal rights over their traditional lands. UCRT became highly specialized in land use planning and related work on community land rights and natural resource management, and its work rapidly spread over the next decade across northern Tanzania (UCRT, 2010).

5.4.1 Legal Title: The CCRO

UCRT began working with communities in the Yaeda Valley in 2000. Their effort focused on building the governance capacity of village councils, including helping villages develop land use plans and village by-laws to help communities better control and manage use of natural resources. Yaeda's villages approved a land use plan in 2007, dividing the entire valley and the adjacent Kidero Hills into nine land use zones. Areas with nutritious grass were zoned for pastoralism, areas with better soil were zoned for farming, and rocky hills and natural forests were set aside for wildlife and the Hadza. However, following a village government election in 2009, the village of Domanga voted to alter the land use plan, converting land previously designated for the Hadzabe to agriculture. UCRT realized that changing demographics – in particular the rising agro-pastoralist population within the community – meant that land use plans would not be sufficient to protect marginalized groups like the Hadza.

A land title for the Hadza would be ideal but no such provision existed in Tanzanian laws at the time. The closest approximation was a Certificate of Customary Right of Occupancy (CCRO) through which individual villagers could gain legal tenure of land their family had traditionally farmed. UCRT worked with Tanzania's Ministry of Lands to develop a new version of this certificate that would apply to group land tenure (Ole Parmelo and Lekaita, 2017). In 2011, they succeeded in establishing the first Group

Certificate of Customary Right of Occupancy issued in Tanzania, granting the Hadza legal tenure over land that had originally been designated for their use in the Yeada Valley Land Use Plan. The Hadzabe now had authority over about 20,000 hectares, including their most important remaining territory across the Kidero ridgeline. Since then, UCRT has continued to help create CCROs for other groups in the Yaeda area and beyond, by 2017 putting around 600,000 hectares in total across northern Tanzania under group CCROs for hunter-gatherers and pastoralist rangelands.

While legal land tenure and a land use plan with community buy-in are critical first steps, UCRT recognized that these structures would also require ongoing assistance to ensure enforcement and incentives to ensure the community's continued support. In Yaeda, an opportunity to build in economic benefit and incentivize enforcement came in the form of developing a new REDD+ project with Carbon Tanzania.

5.4.2 Piloting REDD+ with the Hadza

Carbon Tanzania was founded in 2010 with the aim of using carbon markets to incentivize and enable communities to protect their land and natural resources. Whilst tourism income has helped finance protection and sustainable management of Tanzania's landscapes within national parks, this incentive is not available to communities outside the parks where there is intense land use pressure.

The key criteria used by Carbon Tanzania in seeking to find communities with which to establish a REDD+ project were:

- Clear land and resource tenure, allowing the community to control resource access and use and enforce local forest management regulations;
- An area with high carbon storage potential that is under some level of threat – a critical element for satisfying the requirement of "additionality" in carbon markets; and
- A sufficiently large area (and large amount of stored carbon) to warrant the high up-front costs of project design and third-party verification and validation.

Carbon Tanzania met with UCRT and the Hadzabe in 2009 to discuss the possibility of a partnership. They developed a structure for the project, with roles and responsibilities for each party. In 2011, the Hadzabe signed a twenty-year contract with Carbon Tanzania to sell carbon offsets on their behalf from 20,611 hectares of the Hadzabe CCRO.

5.5 THE REDD+ MODEL IN YAEDA

5.5.1 Certification & Sale of Carbon Credits

The Yaeda project is certified by Plan Vivo Foundation, a UK-based charity that provides certification of fairly traded carbon initiatives. Hadza members and Carbon Tanzania – with support from The Nature Conservancy – calculated the amount of carbon certificates that could be issued through an above-ground biomass survey,[6] and LandSat and Google Earth satellite imagery. This analysis established baseline estimates for the area's rate of deforestation, and for the amount of carbon stored within each hectare. Satellite imagery showed that deforestation in the surrounding region, or "reference area," was occurring at about 0.93 percent, or 191 hectares per year (*see Figure 2*). Above-ground biomass surveys and application of the below-ground root-to-shoot ratio, yielded a carbon content of 31.64 tC or 116 tCO2e7 per hectare, the equivalent of greenhouse gas emissions by 25 passenger cars over a year (Trembly and Lowry 2016b). At the 0.93 percent deforestation rate this translated to 444,744 tCO2e that would be released over the 20-year lifetime of the proposed project in the absence of improvements to forest management and conservation.

The carbon offsets are calculated based on a conservative estimate that the project will be successful in reducing deforestation in the project areas by 90 percent compared to the baseline scenario, thus taking into account the potential for leakage. Saleable carbon credits were reduced by a further 20 percent as a risk buffer in case of non-permanence – i.e., in case estimates of how much carbon emission reductions could be achieved proved inaccurate, or if forests were subsequently cleared due to unforeseen events. The remaining 320,216 credits were divided over the 20 years of the project, to reach 16,011 tCO2e in saleable carbon credits each year.

Carbon Tanzania submitted technical specifications and a Project Development Document in February 2012 and third-party validation was completed in February 2013, marking the beginning of the 20-year crediting period. The first verification was carried out in 2017, with verifications set to continue every five years as per Plan Vivo's requirements.

5.5.2 Land protection and land use monitoring

The basis for generating the offsets is the community committing to concrete measures that will improve forest management and reduce forest loss or degradation. The key actions revolve around enforcing community land use plans developed with UCRT, which is intended to maintain forest and rangeland and prevent clearing. The revenue paid to the community provides additional resources to invest in forest management and protection.

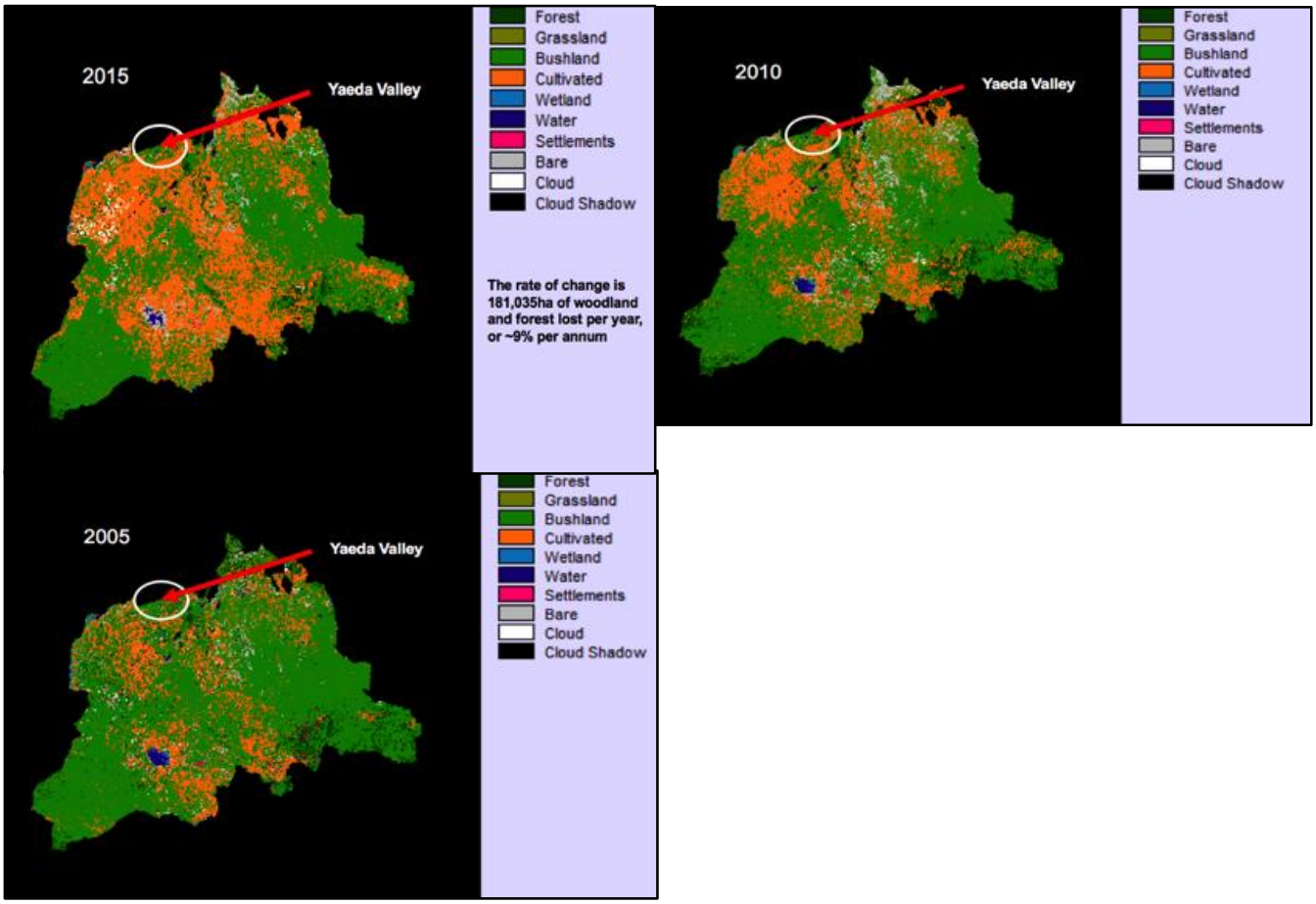
Land use is monitored by local community guards, who are elected by the community and trained in conducting patrols, monitoring, and enforcement. The guards record any violations of the land use plan

[6] Below ground carbon was calculated by applying the belowground root-to-shoot ratio.
[7] Carbon is converted to CO2e by multiplying the carbon by 44/12, the molecular weight ratio of elemental carbon to gaseous carbon dioxide.

and associated village by-laws, such as illegal settlement construction, illegal cattle incursions and poaching. The community by-laws established alongside the land use plan empower the guards to fine or arrest violators and small-scale meat poachers. The by-laws also govern the process for resolving disputes over land use through customary and legal dispute resolution.

The guards' reports, which are collected monthly by Carbon Tanzania, show that the most common violations are poaching bushmeat, and the grazing of cattle on protected lands, particularly during the dry season. These offenses do not impact above-ground biomass but do affect Hadzabe access to wildlife. In cases of armed poaching, the guards (who are unarmed) are tasked with raising the alert to district police.

Figure 10 | Northern Tanzania land cover change from 2005 – 2015. These Landsat images show increasing deforestation in northern Tanzania, with a focus area of 380,000 km2 (900,000 acres) outlined in red. This is a reference region for understanding landscape level land use change over 15 years. The Yaeda Valley is in the northwest corner of the reference region.



Source: Carbon Tanzania.

5.5.3 Payment for ecosystem services

Division of revenues from carbon credits and roles and responsibilities for managing the project are laid out in a contract between Carbon Tanzania and the Hadza community. Sixty percent of the revenue from the sale of offsets goes directly to the community, while 20 percent goes to support Carbon Tanzania's operational costs for the Yaeda project, and the remaining 20 percent supports Carbon Tanzania's administrative overhead, research, monitoring of carbon markets and policy, and investment into new carbon offset projects.

Of the 60 percent that goes to the community, there are regular payments made to cover costs of managing and protecting the project area, including a monthly salary to the 40 community scouts. The guards are paid a salary of 50,000 TSH per month (about $22) which they usually spend on food and clothing for their families. The breakdown of how community revenues, totaling about $219,000 over a five-year period, were allotted from 2012 to 2017 is shown in Figure 11.

Payments for carbon credits are tied to performance through activity monitoring indicators that lay out targets and responsibilities for the community and for Carbon Tanzania. If a problem arises that interferes with meeting a target – for instance, if patrolling is not carried out or if community guards find farming or land clearance approaching 10 percent in the leakage or project areas – issuance of carbon credits is withheld from Carbon Tanzania and payments are withheld from communities until the problem is resolved. So far, payments have been delayed only once, when community guards of one area failed to conduct one monthly patrol in 2015.

Carbon Tanzania presents the earnings in a community-wide meeting every six months (*see image below*), leaving halfway through for the community to hold its own meeting to decide how the funds should be spent. Funds are transferred to the community through M-Pesa payments, a money transfer system that works through mobile phones.

Community scouts play a key role in monitoring enforcement of land use plans and by-laws that provide the basis for the REDD+ project. Photo Credit: Carbon Tanzania.

5.6 REDD+ IMPACTS IN YAEDA

Carbon Tanzania presents the bi-annual profits from carbon sales during a community meeting in Monga Wa Mono village in Yaeda Valley. It is up to the community to decide how to spend the money. Photo Credit: Sophie Tremblay for Mongabay.

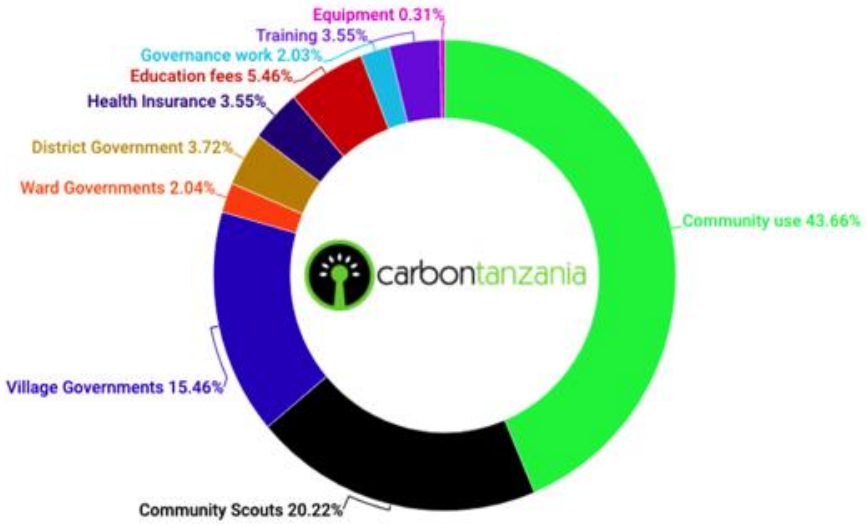
5.6.1 Community benefits

REDD+ has provided the funding required for land use patrols, and training and equipment for community scouts. This enforcement has been essential to making sure the land use plan is not merely an agreement on paper, but is actually implemented and enforced on the ground in the face of increasing pressures on Hadza traditional territories and land uses. Beyond financial support, REDD+ has created a shift in the way Hadza relate to management and governance of land. This can be seen in the way that Hadza now push back against incursions on their land, as opposed to avoiding conflict and moving away when other groups arrive, as per Hadza tradition and culture. Regular community members aid community scouts in reporting and arresting violators of the land use plan, including helping to capture poachers. Hadza have gained the confidence to defend their rights in village meetings and to bring disputes to village and district governments.

The sale of carbon offsets has generated around $219,000 in revenue for the community over the past five years (*see Figure 11*). This is the most significant financial income for the community and the only notable source of revenue from their communal natural resources besides cultural tourism. Revenues have increased steadily between 2014 to 2017, as Carbon Tanzania was able to sell a greater proportion of available offsets as it improved its sales channels.

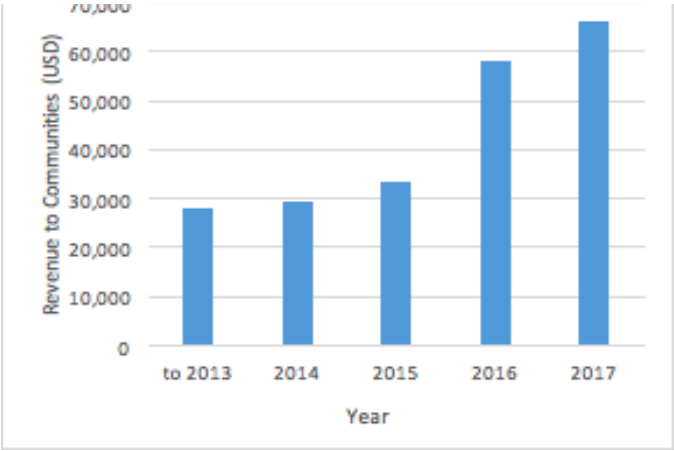
The whole community plans how funds will be used at bi-annual meetings – held in November and in May – which are times of peak needs for the community. All members of the community are involved, as well as representatives of the village government. A portion of the funds covers training and equipment for the community scouts. Funds are typically used for education needs such as school fees, healthcare, reserve supplies of food for the dry season, and ad hoc community development projects. One critical impact from the funds has been the establishment of the Haydom Medical Fund, which covers medical needs for members of the Hadza community at the local hospital.

Figure 11 | Distribution of community revenues, 2012-2017, amounting to a total of $218,876.



Source: Carbon Tanzania.

Figure 12 | Annual carbon offset revenues paid to communities since the start of the Yaeda REDD+ project in 2013.



5.6.2 Support from government

Revenue from the REDD project has provided critical support for enforcement by funding training, equipment and stipends for the community scouts, and by increasing the responsiveness of district-level government and police.

A proportion of the overall carbon revenues are paid as a revenue-share to district government. As revenues paid to the government come out of the community's funds, the community has authority to decide what percentage will be shared. The payment makes clear the value of standing forests and also serves to hold government accountable for its role in protection. In the past, where the government has been unreliable, the community has sometimes chosen not to share revenues from carbon sales.

In 2014, in a sign of increasing government responsiveness the district government agreed to the community's request to have a police officer stationed in Yaeda Valley, greatly improving response-time and viability of enforcement. A new police station was built in the local village in 2018, shown below.

New police station in Yaeda Chini Village built with a combination of district government funding and contribution of revenue from Hadza communities. Photo Credit: Carbon Tanzania

5.7 CONSERVATION IMPACTS: REDUCING DEFORESTATION

In 2017, Carbon Tanzania and Plan Vivo conducted a follow up on the initial baseline measurements from 2012 to assess the project's success in halting land conversion in the protected area. These measurements show a remarkable success within the early years of the REDD+ project in enforcing the Yaeda land use plan and protecting the project area. Remote sensing data shows that the core Hadzabe

territory of 20,790 hectares (the 'project area') has achieved a decline of about nine percent in deforestation rates over the past five years, even while deforestation has increased by over 50 percent in the wider region (the 'reference area'), as a result of increasing pressure on land and land use change (Figure 13 and Figure 14).

While some agriculture may have been displaced from the project to reference area, this is unlikely to account for the significant gap between the project and reference area deforestation rates. The increases in the reference area deforestation rates match increasing deforestation rates in northern Tanzania more broadly. The leakage area also has a substantially lower deforestation rate compared with the reference area. Here, the land use plan forbids grazing and agriculture but there is no enforcement, indicating that the land use plan itself has generally been working, though enforcement has an impact on adherence.

There is emerging evidence that the improvements in forest management have benefitted wildlife conservation in Yaeda Valley. Rare species such as lion, elephant and wild dog have been recorded recently in Yaeda, with wildlife possibly recovering as a result of improved enforcement, habitat condition, and anti-poaching measures. New efforts to collect better long-term wildlife data are underway which will better document these trends.

Figure 13 | Annual rate of forest conversion in project, leakage, and reference areas (2005-2015).
Source: Carbon Tanzania

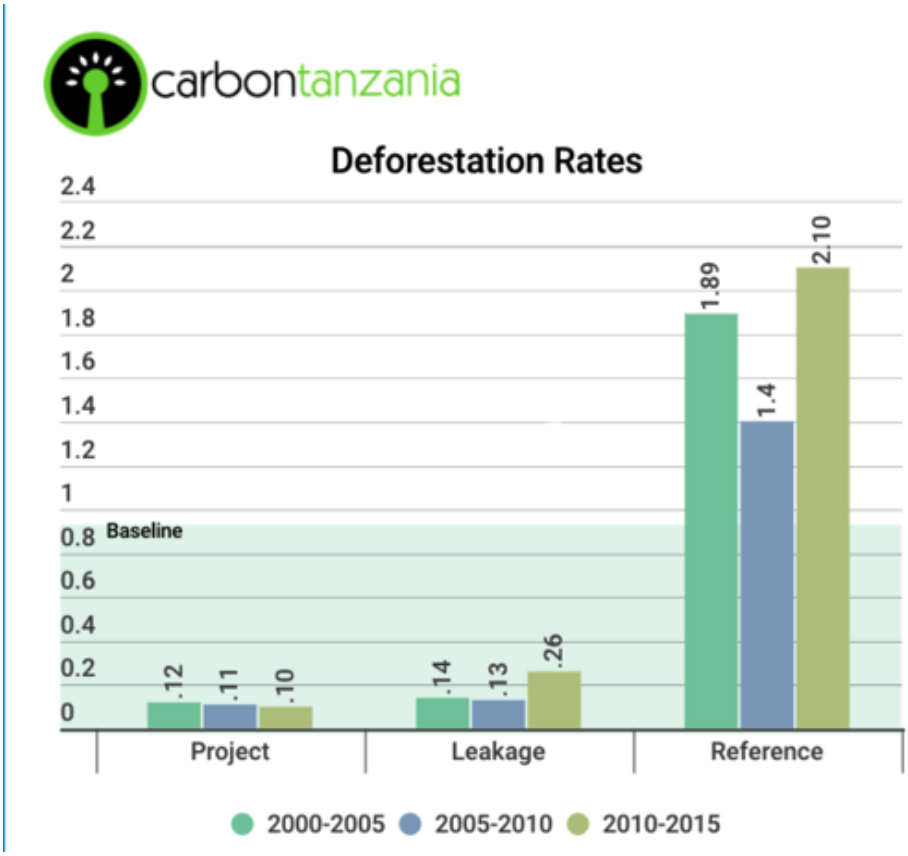
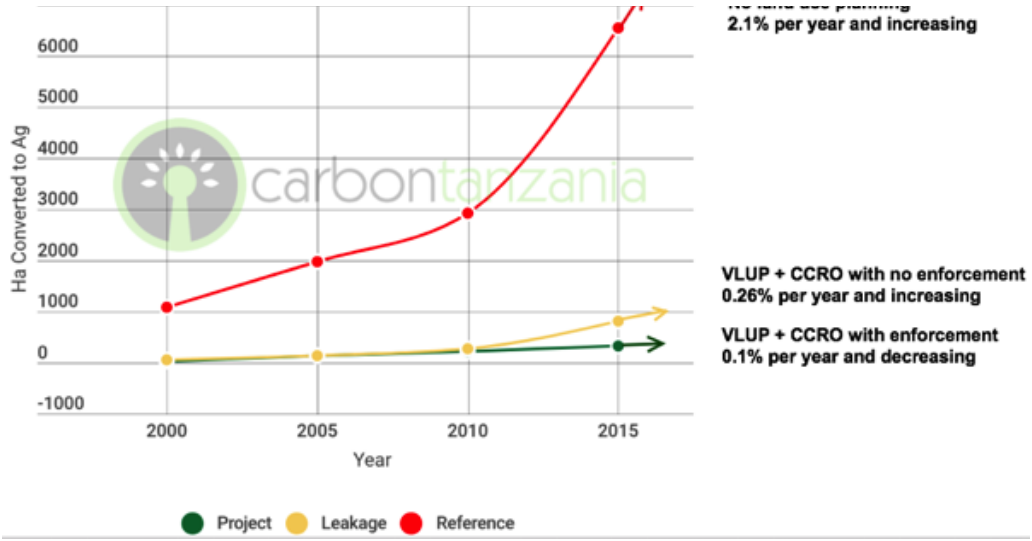


Figure 14 | Comparative forest loss in Yaeda (2000-2015).



Source: Carbon Tanzania.

5.8 STRENGTHS OF THE MODEL

Carbon Tanzania's REDD+ project in Yaeda has succeeded in delivering significant income to indigenous local communities; helping those communities better protect their lands and natural resources; and resulted in tangible reductions in deforestation and improved conservation outcomes. These outcomes

Recent camera trap photographs of an African elephant and wild dog, two threatened species of conservation concern, moving through forested habitat in Yaeda Valley. Photo credit: Brian Wood, UCLA.

would not be possible without several key conditions and actors that have come together in a mutually supportive way:

- Willing community partner;
- Legal context that supports community land and resource tenure and governance;
- Partner and facilitator with the trust of the community and of government; and
- Connector able to reliably bring in outside revenue and technical support.

5.8.1 Community Partner

The Yaeda project model depends upon the community's desire and capacity to protect their land. The project has had the advantage that the Hadza already have an intrinsic desire to protect the forest that they depend on for their way of life. This presence of a willing community partner is one that is often lacking in REDD+ projects. The Hadza have still had to adapt as protecting and defending land was unfamiliar to them culturally. Yet they have been able to grasp the importance of these activities to ensuring their survival and have been willing to adopt them.

Carbon offset income has served as an additional incentive for the Hadza and cover the expenses of monitoring and managing the land. They are also critical to gaining the buy-in of village government, which includes members of other tribes – pastoralists and agro-pastoralists – who experience an opportunity cost in protecting forests.

5.8.2 Legal Context

The legal rights secured by the Hadza over their land through the CCRO has made the Yaeda Project possible by granting the Hadzabe secure land tenure over 20,790 hectares. Without this tenure a group as marginalized as the Hadza would be subject, as before, to the will of other neighboring communities, many of whom are newcomers to the Yaeda Valley in search of grazing land. Secure tenure has often been seen as a "precondition" for addressing deforestation drivers, and has been a major focus of other REDD+ projects in Tanzania.

5.8.3 UCRT's Role

A critical component in any community development project, especially those involving land rights, is gaining the trust and support of the community. The review of the Norwegian-funded REDD+ pilots found that conservation NGOs attempting to establish REDD+ pilot projects often lacked the experience and skills needed to build this trust and address various drivers of deforestation, noting that pooling resources and creating partnerships with other kinds of organizations can be an important approach (Blomley et al., 2016).

By the time Carbon Tanzania launched REDD+ in Yaeda Valley, UCRT had been building their knowledge of the local political environment and creating a high-degree of trust with the local community for over a

decade. UCRT reached a point where their support of the REDD+ project was enough to dispel doubts from most community members.

This has been particularly crucial in Tanzania, where many rural communities fear land grabs by outsiders and with good reason – there have been many disputes between investors, the government, and communities surrounding land allocation, access, and ownership. In this context even, the step of analyzing carbon content in Yaeda could look suspicious to community members.

On top of this, carbon offsets are a difficult concept to explain, particularly to rural people with little formal education. Literal translation of concepts such as carbon offsets has often resulted in misunderstandings and so Carbon Tanzania prefers to rely on local individuals and organizations – such as UCRT – who are familiar with carbon offsets and local culture and can translate both linguistically and culturally.

UCRT has remained involved and continues to mediate disputes, as when some pastoralists recently tore down poles marking the border of the project, claiming that this was an attempt at appropriation.

UCRT has likewise built strong relationships with local government officials, at village, ward, and district levels. This was key to establishing a CCRO in the first place, obtaining government support for the carbon offset project, and enlisting local government aid in combating poaching and adjudicating disputes over the land use plan.

5.8.4 Selling Offsets

Many REDD+ projects have typically failed to find sufficient buyers at a viable price for their carbon credits. Carbon Tanzania has successfully financed the Yaeda project through its focus on building a strong sales pipeline, beginning first with local buyers.

Carbon Tanzania's objective was to test their product value early by selling credits "ex-ante" or before the credits had even been created. These early sales would be used to help fund project start-up costs. The founders of Carbon Tanzania – Marc Baker and Jo Anderson – possessed prior experience in the tourism industry in northern Tanzania and the relatively large community of ecotourism companies in Tanzania made these companies a natural place to start. Beginning with 382.8 tCO2e in sales in 2009, they increased sales each year, ultimately raising $50,440 by 2012. The early fundraising success through advance sales was a positive indication of market potential and, significantly, raised the stakes for Carbon Tanzania to succeed as a business.

In early 2013, Carbon Tanzania completed the Yaeda Project certification and validation process with Plan Vivo, allowing them to start selling ex-post carbon credits on the voluntary carbon market. Native Energy, a US re-seller, became their first international buyer through Jo Anderson's prior professional connection to National Geographic Expeditions, a Native Energy client. Most of Native Energy's projects are based in North America, but the company was drawn to the Yaeda Project. In January 2016, Native Energy signed an agreement to purchase all of the Yaeda Project's credits for the following five years. The combination in the Yaeda Valley REDD+ project of strong participation by indigenous people, clear adherence to social safeguards related to community participation and land tenure, and high

conservation value related to rare and charismatic wildlife species, have all helped build the profile of the project and market demand, and enabled Carbon Tanzania to sell offsets at a relatively high price.

Carbon Tanzania had found its earliest buyers through existing connections, but knew this would not sustain them if they expanded. In early 2015, following their first external investment, a loan from Dutch social impact investor, Hooge Raedt Social Venture B.V. (HRSV), Carbon Tanzania hired a business development manager. Anderson credits this step as key to Carbon Tanzania's success in finding a long-term buyer for the entire set of credits of a new carbon offset project – in the Ntakata Forest of western Tanzania.

5.8.5 Starting Small

Many REDD+ initiatives start as large projects as a way to improve economies of scale due to the high upfront costs of verifying a new project. However, starting at a large scale likely means working with multiple communities at once, complicating (and raising the cost) of the process of ensuring their understanding, consent and support of the project. In addition, a larger area may experience more varied types of deforestation drivers, requiring a more complex project model. Finally, the drive to sell a larger number of credits may lead project developers to target larger markets, where it is harder to compete and maintain a relatively high price for credits. If Carbon Tanzania had started with a large-scale project – rather than a relatively boutique project with only 16,011 offsets to sell annually – it might well have failed to deliver on project goals or to sell all offsets. Starting small gave Carbon Tanzania the time to learn by doing and adapt along the way. By the time it began expanding its projects, Carbon Tanzania had already achieved two years of high value international sales, had secured external investment, and had established a sales and marketing function.

5.9 SCALING UP CARBON TANZANIA'S REDD+ MODEL

5.91. Expansion of Yaeda

Following the initial 20,790 hectares protected in Yaeda, Carbon Tanzania responded to demand from agro-pastoralist communities in the neighboring village of Yaeda Chini by expanding the project by 13,283 hectares to a total of 34,073 hectares. Adding to the REDD+ project area carried few risks – community support was already obtained as communities had witnessed the benefits received by the Hadzabe; increasing sales from the first Yaeda project indicated there was sufficient demand for the additional credits; and project management costs could be kept low as the new area could be managed through the existing management structure of the Yaeda project as a whole. At the same time, the project extension had numerous benefits since the neighboring communities are now incorporated into the land use plan and see its benefits, reducing the risk to the original project and leakage areas.

5.9.2 Ntakata and Makame Projects

Following the success of the Yaeda Project, Carbon Tanzania has launched REDD+ projects in two new areas in Tanzania, Ntakata Forest and Makame, working alongside UCRT in the case of Makame. Both of these areas are much larger than the Yaeda Valley project, and have exceptionally high conservation values as well as continued strong community engagement and prospective benefits.

Makame, a roughly 400,000 hectares area of Acacia-Commiphora woodland, supports both Maasai pastoralists and wildlife populations but faces the threat of rapidly increasing deforestation driven by shifting agriculture. Makame forms the southern edge of the ecosystem of Tarangire National Park and is still largely intact woodland, making it a priority conservation area for preserving biodiversity. Makame is also home to Maasai pastoralists and was designated a Wildlife Management Area (WMA) to enable the Maasai to manage their own natural resources through a land use plan. The Makame REDD+ Project will bring financial and technical assistance to monitoring land use and enforcing Makame's land use plan, as well as revenues to support community development and compensate for the opportunity cost of leaving forests untouched.

Carbon Tanzania has launched a third REDD+ project in the Ntakata Forest, an area of miombo woodlands to the east of Mahale National Park in western Tanzania. The forest holds the largest known population of Eastern Chimpanzee, whose habitat is only partially protected by the national park and is facing the threat of rapid deforestation.

Carbon Tanzania's new project in Makame Wildlife Management Area is focused on reducing deforestation in pastoralist rangelands and forests in the southern Maasai Steppe. Photo Credit: Carbon Tanzania.

5.10 CHALLENGES TO CONSIDER IN SCALING THE REDD+ MODEL

5.10.1 Community Challenges

- **Alignment with group interests.** Aside from the Hadza, whose hunter-gathering way of life has almost no ecological impact on their environment, most groups in Tanzania practice pastoralism, crop farming or some combination of the two. There is thus an inherent opportunity cost to these groups when participating in REDD+ and compensation in the form of carbon credit revenues may or may not be sufficient to overcome this lack of alignment.
- **Altering traditional and norms of resource use.** Pastoralists and some agriculturalists are traditionally nomadic or semi-nomadic – an adaptation which allowed land to recover given lower population density in the past. In Makame, committing to hard boundaries on resource use has been a difficult cultural shift, though the community overall has accepted the change as necessary.

5.10.2 Institutional Challenges

- REDD+ is a complicated, costly and technical field and requires significant investment and upfront costs before it yields fruit.

5.10.3 Policy Challenges

- **Institutional memory in local government.** Project set-up can involve months of briefings with local government authorities at village, ward and district level, for the purpose of conveying how the model works, and gaining government support and collaboration. However, natural resource officers and other government officials are frequently rotated to new posts, resulting in a loss of institutional memory and requiring the project briefing process to begin again.
- **Explicit policy on tenure over carbon credit resources.** The Tanzanian government has yet to release an explicit policy around community rights to carbon credit resources on their lands. Nevertheless, groups' access to carbon credit revenues is in keeping with the land tenure framework established by the Village Land Act of 1999 and the Forestry Act of 2002, and is supported by statements in various REDD+ strategy documents. Tanzania has also signed on to the Paris Agreement, which provides for private sector and NGO involvement in developing REDD+ projects.

5.10.4 Business Challenges

- **Communicating the impact of REDD+ –** The development of REDD+ as a method of addressing global warming has obscured one of the key impacts that REDD+ can achieve. Beyond offsetting carbon emissions, income from Carbon Tanzania's REDD+ projects has had a transformative impact on community development – funding education and healthcare, providing employment and microfinance. These impacts address a fundamental concern expressed by developing countries – that they not be expected to bear the burden of developed countries' emissions – by meeting global carbon emission reductions through socioeconomic development, and not despite it. Nevertheless, communicating these impacts is a challenge in the context of a global dialogue that focuses on emissions reductions and does not distinguish between carbon credits based on their development value. This lack of distinction can lead to an undervaluing of carbon credits.

6. SYNTHESIS: COMMUNITY-BASED FOREST ENTERPRISES IN TANZANIA

6.1 THE EVOLUTION OF COMMUNITY FOREST MANAGEMENT

Over the past 20 years, Tanzania has emerged as an African leader in participatory forest management. The policy and legal changes instituted between 1998 and 2002 provided a clear framework for communities to secure rights over forests on village lands, through VLFRs, as well as providing communities with clear legal rights to harvest forest products. Tanzania is one of the few countries in Africa that has created such a clear legal framework for community rights to forests and forest products.

While communities and their partners in government and civil society have used these policy and legal changes to create VLFRs across several million hectares of land, the major challenge facing community forest management in Tanzania has been helping communities increase their economic benefits from sustainable local forest management. Increasing local economic and financial returns from forests is critical as rural populations grow, and pressures increase for alternative land uses such as small-scale agriculture or commercial plantations. While VLFRs provide important subsistence opportunities and values to communities, such as building materials, woodfuel, wild foods, and protection of watersheds, developing new economic opportunities from commercial forest enterprises that generate cash income for communities and for individuals is important to expand the overall value of forests. Income from forest products also provides resources that can be invested in forest protection. This is a core premise behind REDD+ and similar incentive-based programs: to increase the overall economic value of forests and expand incentives for local communities to manage and protect their forests.

As these three case studies demonstrate, community-based forest management in Tanzania has started to evolve beyond subsistence and non-commercial uses to start to capture more significant economic and commercial values of forests. This review demonstrates that timber, charcoal, and carbon offsets are all forest products that are, in different contexts, delivering significant economic benefits to local communities in different parts of Tanzania, while providing clear evidence of improving forest condition and conservation outcomes.

These cases demonstrate the potential for a diverse range of forest products to support a widening synergy between local forest management, conservation, and community livelihood benefits. They also demonstrate clear, proven models for communities taking actions, supported by the appropriate incentives and management practices that reduce deforestation and improve forest conservation outcomes. The case studies thereby demonstrate the potential for community-based forest management to deliver on national goals related to forest protection, poverty reduction, and climate

change mitigation. Although the scope of local production remains limited, this illustrates the potential for community forest management to branch out into more lucrative forms of forest utilization and value addition.

6.2 LIVELIHOOD IMPACTS

The community forest enterprises described in the case studies have all emerged during the past five to ten years as pilot initiatives that are gradually scaling up and delivering greater revenues to local communities in different parts of Tanzania. These enterprises are enabling rural communities to access new (carbon offsets) or growing (timber, charcoal) markets for different forest products – whilst supporting forest restoration and protection.

These enterprises have thus far been able to generate relatively small but significant total revenue from sustainably harvested forest products to communities. Hadza indigenous communities in the Yaeda Valley are now earning upwards of $50,000 annually from sales of about 7,500 carbon offsets per year. This is similar to the highest annual returns from sustainable timber harvesting in the communities in southeastern Tanzania where MCDI works; Nanjirinji A village in Kilwa District has earned more than $69,000 in a single year from timber harvested on its exceptionally large VLFR.

Charcoal is nominally a lower-value resource but is produced more intensively from much smaller areas; VLFRs where MJUMITA has developed sustainable production systems are now generating around $5,000 annually in community revenue. The major advantage of charcoal, compared to timber and even more so in contrast to carbon offsets, is that charcoal is a widespread and easily harvested product, with readily accessible markets for rural producers.

Table 4 | Total revenues to communities from community forest enterprise as documented by the case studies.

Case Study	Revenue	Time Period	Number of villages
Sustainable timber- MCDI	$626,000	2009-2017	18
Sustainable charcoal- MJUMITA	$203,000	2013-2017	13
Carbon offsets- Carbon Tanzania	$218,000	2013-2017	2

The revenue earned from forest product sales is generating an important new source of cash income at the community level. Revenue from sustainable timber in rural villages in southern Tanzania has become the most significant source of cash income for Village Councils in these areas, giving them revenue to support community level social services such as health and education. Forest carbon revenue in Yaeda Valley has complemented previous revenue sources from carefully managed community-based tourism to provide a significant source of annual income for the Hadza. These funds play a key role in resourcing improved forest management and protection, through salaries and field expenses paid to community scouts or forest guards. In the case of the Hadza, the revenues from forest carbon play a key role in enabling them to enforce their land use plans and land rights.

Some of these enterprises have also generated some individual household benefits as well, particularly in the charcoal pilot villages where charcoal production is carried out partly by local residents. In Yaeda, the carbon offset initiative provides employment for community scouts. However, overall employment and multiplier benefits from these forest enterprises has been limited, as they tend to primarily involve harvesting or lightly processing (in the case of charcoal) a natural product, with limited local value addition or spin-off enterprises. MCDI is currently working, through the community-owned mobile sawmill, to develop greater value addition, but overall these opportunities remain at a remedial stage of development.

The revenues earned from these enterprises are therefore an important new source of community-level income, and complement the non-commercial benefits that communities capture from their forests. It is important to emphasize that non-commercial benefits from forests, such as subsistence uses related to food, water supplies, and household energy (fuelwood) and building materials, are critically important livelihood benefits from VLFRs. Thus, it is important to view the overall benefits from these forest enterprises as encompassing the wider suite of commercial and non-commercial benefits that communities capture from improved forest management.

6.3 FOREST CONSERVATION IMPACTS

The forest enterprises in all three case studies are based on clear and legally supported steps to improve forest management through community-level planning and regulations (e.g., village by-laws, land use plans, VLFR designation etc.). The development and implementation of new legal protections and local regulations for managing lands and resources, as put in place by a VLFR or CCRO, is supported by increased local capacity for enforcing their local rules and procedures. Through MCDI's work on sustainable timber production, and MJUMITA's charcoal project, nearly 600,000 hectares of VLFRs have been established over the past five to ten years. This constitutes perhaps 15-20 percent of all the VLFR area in the country, and represents a significant contribution to Tanzania's protected forest estate. It does this without creating any additional fiscal burden on government's part in terms of protecting and managing these forests.

In both VLFR and CCRO/carbon offset models, local scouts are responsible for enforcing forest governance rules, levying fines on transgressions, and collaborating with other government law enforcement bodies. A key to all these models is that the community-level revenue from forest enterprises is partially used to provide additional resources to support enforcement. This is most visibly the case in the carbon offset initiative, where carbon revenue provides funding to pay community scouts, and supplies them with resources to enforce land use rules and by-laws. A key part of this enforcement system is better enabling local scouts to collaborate and communicate with district government and external law enforcement institutions.

Another important factor in both the MCDI sustainable timber case and the carbon offset initiative in Yaeda Valley is third-party certification schemes that provide external verification – and require external accountability for results on the ground – of local forest management performance. MCDI's use of FSC certification for about half (180,000 hectares at present) of all the VLFRs that it has helped establish provides external verification of the quality of management of these forests, and their conservation benefits. One peer-reviewed study (Kalonga et al., 2015) comparing government forest reserves, the

FSC-certified VLFRs that MCDI has helped establish, and open access village forests in Kilwa District concludes as follows:

> "*The FSC-certified forests have better forest structure, appropriate regeneration, and lower fire incidences than open access forests (non-FSC) and state forest reserves (non-FSC). Certified forests also provide additional economic benefits to communities compared to non-FSC forests*."

Similarly, the third-party certification provided by Plan Vivo for the Yaeda Valley carbon forestry project requires independent validation and verification of quantifiable reductions in deforestation as forecast by the project, and as used to calculate the offsets that are sold on the voluntary carbon market. This is a strong point in favor of externally-verified carbon offset projects; they are, by definition, required to document and verify that they result in drops in deforestation against a measured baseline. Carbon Tanzania's Yaeda Valley project has done this by demonstrating a nine percent drop in local deforestation rates within the project area over the first five years of the project. This is attributed to improved local incentives and resources to enforce the community land use plan boundaries.

Beyond improving forest condition in documented ways, the establishment of these community-protected areas and improved local resource management capacity benefits conservation more widely. Many of the VLFRs that MCDI has established in southern Tanzania are located near the Selous Game Reserve, Tanzania's largest wildlife protected area and a World Heritage Site. This includes establishing VLFRs between Selous and Niassa Reserve in northern Mozambique, along the Tanzanian border, and considered one of the country's most important wildlife corridors.

Similarly, the CCRO in Yaeda has helped to re-establish wildlife populations and migration corridors connected to Ngorongoro Conservation Area to the north. Rare or endangered species such as elephant, lion, or wild dog appear to be returning to Yaeda, with evidence of recovering wildlife populations. Carbon Tanzania's new, larger projects in western Tanzania and in Makame WMA both have the potential to have much higher wildlife conservation benefits as those projects approach validation. Makame is an expansive community-protected area (WMA), part of the much larger Tarangire ecosystem, and home to several hundred elephants and important populations of large carnivores. The Ntakata Mountains REDD+ project in western Tanzania will protect important habitats on village lands for the eastern chimpanzee.

6.4 KEY FACTORS IN UNLOCKING FOREST VALUES

Above all, what distinguishes the three case studies profiled here is that they have been successful in beginning to tap into major local and global markets for forest products, and enable rural Tanzanian communities to access those markets, where many other initiatives have tried and failed to do this over the past 20 years. It is important to analyze what accounts for the emerging and relative success of these three models in actually enabling communities to capture a growing share of the local value chains for these forest products.

The ability to facilitate sustainable production combined with reliable sales channels is key to any forest-based enterprise. The key to Carbon Tanzania's success to date has been not only the ability to develop

and certify a carbon forestry project; other REDD+ projects based on community-based forest management have been certified in Tanzania. The real key for Carbon Tanzania has been its ability – unique amongst market players in Tanzania thus far – to cultivate a market for its product and generate consistent and growing sales. This has resulted from its development of a local, domestic set of carbon offset buyers – primarily actors in the Tanzanian tourism industry – and strong partnerships with overseas buyers such as Native Energy in the US and other partners in Europe.

This has enabled Carbon Tanzania, operating largely as a start-up social enterprise with very limited capital, to achieve what much better-resourced REDD+ projects in Tanzania have not: to consistently sell a growing supply of carbon offsets that deliver quantified reductions in deforestation. Indeed, it seems likely that a key to Carbon Tanzania's success has been that they had so few resources and as a result that their social enterprise was totally dependent for its survival on the success of its first and then-only project; if they could not find a way to sell that product, the project and their company would not survive. This created an extremely strong and clear incentive for the company to find creative ways to market and sell their offsets, drawing initially on their strong networks within the tourism industry.

MCDI and MJUMITA have similarly been successful in enabling significant new levels of community income to flow from sustainable timber and charcoal harvesting, respectively. In both cases a key has been a commitment from the facilitating organizations that VLFRs need to generate revenue for resident communities in order to be viable in the long run, and to developing innovative and market-based approaches to forest conservation. MCDI has worked for over a decade to refine its methods for facilitating community forestry; MJUMITA has more recently developed a clear and relatively accessible set of methods for enabling sustainable charcoal production in VLFRs. MCDI is also exploring how it can become a more sustainably financed provider of community forestry facilitation services, based on its unique skillset surrounding sustainable timber management in VLFRs.

In all three cases, strong, dedicated, and skillful community facilitation, driven by entrepreneurial local organizations, has been a key to the progress that has been made. MCDI has focused intensively on the development and refinement of its model through close community partnerships with a handful of villages in Kilwa District, only moving beyond Kilwa to new areas during the past five years. This has enabled MCDI to shepherd the communities it works with through the procedural hurdles and changes that they have confronted in order to establish their timber sales and marketing channels. This has included periodic logging bans, regulatory questions about how communities can harvest and transport timber, and challenging negotiations with both government and timber traders. MCDI's role has been critical, as with MJUMITA's role in the charcoal project, in negotiating external challenges and enable communities to overcome these barriers. In other areas, where external support has not been sustained, such as SULEDO VLFR in Kiteto District, initially successful community timber harvesting has not been able to overcome internal and external conflicts as readily as in Kilwa District.

New collaborations and partnerships have also played an important role in some instances. Carbon Tanzania observes that the Yaeda Valley REDD+ project was only possible because of the role played by UCRT, as an expert in community land tenure, governance, and overall facilitation of village level processes. The unique combination of UCRT's field-leading expertise in community land rights and land use planning, and their long-term role working with the Hadzabe in Yaeda, with Carbon Tanzania's technical expertise in carbon project development and offset sales, is what has made the Yaeda project successful. Few individual organizations have the combination of local facilitation skills and technical expertise.

6.5 FROM PROMISE TO POTENTIAL: SCALING UP COMMUNITY FOREST ENTERPRISES

Despite the important steps made in developing these economic opportunities and delivering conservation results from these community forest enterprises, all three models are as of yet relatively limited in their overall reach, both spatially in terms of the number of participating communities and VLFRs, and in terms of overall market reach and access. These models are showing critical promise in reducing deforestation through effective community management under VLFRs and in generating new economic opportunities from forests for communities in remote rural areas. But to deliver on their potential to play a much more meaningful rule in addressing current levels of deforestation in Tanzania, improving the management on the millions of hectares of forests on village lands that are currently not within VLFRs, and making forests a much more important part of rural economies, these models need to be scaled up dramatically.

Sustainable timber harvesting in VLFRs and the sustainable charcoal production model developed by MJUMITA and TFCG are both currently capturing minute proportions of enormous and extremely valuable markets for their products. While the sustainable charcoal model generates relatively high revenues on a per hectare basis, it takes place on relatively small areas thus far. The primary barriers to its expansion thus far have been institutional, with a reluctance by district and national authorities to support sustainable charcoal production and encourage this form of forest use by local communities.

Timber has been constrained by both institutional and market factors. Both timber and charcoal markets are dominated by unsustainable and often illegally-harvested products from unprotected community lands. Sustainable production from VLFRs has an extremely difficult time competing with illegally harvested charcoal and timber, which avoids licenses, taxes and other costs that drive up sustainable production costs. In addition, transporting timber is costly and harvesting timber selectively and sustainably increases costs, and can be heavily constrained by the lack of infrastructure – particularly passable roads during the rains – in rural areas.

Sustainable charcoal and timber production have, by contrast, not yet been able to attract a price premium associated with their environmental sustainability. This price premium was the original impetus for MCDI to obtain FSC certification for the VLFRs where it works in Kilwa starting nearly a decade ago, but this price premium for FSC certified hardwoods from these VLFRs has never materialized.

Table 5 | Per hectare revenue (actual and potential) from different community forest enterprises in select villages across the three case studies.

Enterprise	Village	Revenue/Ha (actual)	Revenue/Ha (potential)	Assumptions/Notes
Timber	Nanjirinji A	$0.83	$8.30	Timber sales are only about five percent of harvest quota; potential to increase sales by at least ten-fold if market barriers can be overcome. Additional potential earnings from increasing prices, e.g., through FSC price premium.
Charcoal	Ulaya Mbuyuni	$18.50	$18.50	$4,519 in revenue from a 244 hectares FMU; potential to increase the total area harvested sustainably but not the per/hectares revenue.
Carbon offsets	Yaeda Chini	$3.25	$3.25	All offsets produced annually from Yaeda Valley REDD+ are now being sold at a relatively high market price

The result is that timber harvests in VLFRs where MCDI works remain around five to ten percent of the total potential annual harvest, and their earnings are consequently vastly lower than they could be based on the timber they have available for sale. Communities in Kilwa district could easily be earning upwards of $100,000 annually from their VLFRs, or closer to $500,000 annually for exceptionally large and timber-rich VLFRs as in Nanjirinji A, based on their existing timber quotas.

6.6 OPPORTUNITIES AND RECOMMENDATIONS

Tanzania's framework for community-based forest management presents enormous opportunities for integrating forest conservation, climate change mitigation through reduced deforestation, and poverty reduction in rural communities. Community forest enterprises play a pivotal role in enabling CBFM to deliver real economic benefits to communities and providing the financial resources needed to improve forest management in ways that reduce deforestation. The forest enterprise models documented in this report have established clear methods for increasing forest revenues to communities and delivering forest conservation outcomes. The core challenge now is to overcome the core barriers to scaling these models up; this report concludes by offering a number of opportunities and recommendations for doing this in a practical manner.

6.7 MARKETS AND ENTERPRISE

The key to scaling up community forest enterprises in Tanzania is achieving greater market access and market share from sustainably products such as timber and charcoal, as well as growing the overall size of the emerging and newer market for carbon offsets.

Opportunities to grow these markets arise from the expanding market demand for charcoal and timber, both domestically and internationally in the case of timber. The challenge is for community products to compete within these marketplaces, often with cheaper products that are harvested illegally. Community forest enterprises need to develop strategies for both reducing their costs, and for increasing their prices and returns.

Improved marketing and business partnerships are an important potential means of increasing market share and potentially improving prices as well. Strong global marketing relationships and partnerships has been a key to Carbon Tanzania's initial success in marketing and growing their carbon offset sales within a competitive global marketplace. Their company's internal experience with sales and marketing from within the tourism sector helped inform those approaches.

Although FSC certification has thus far not been able to attract a price premium to community timber from southern Tanzania, it remains possible that improved marketing and business partnerships could attract price premiums for both timber and charcoal. MJUMITA is exploring opportunities for a price premium attached to sustainable charcoal from VLFRs, as has been developed with other charcoal products in East African urban areas.

Another opportunity for community timber enterprises lies in the potential for more value addition through local manufacturing, links with local artisans, furniture-makers, and other trades. There is growing demand for many wood products involving skilled crafts in Tanzania, but local production remains limited.

For carbon offsets, the opportunity lies in expanding what is currently a very small and nascent marketplace. Carbon offsets as a commercial product have only existed for a decade, fundamentally tied to global efforts to address climate change and reduce carbon emissions. Although the emergence of this market has been somewhat fitful in recent years, there are reasons to believe that there are substantial opportunities for more rapid growth. The Paris Declaration formally integrates REDD+ into global emission reduction plans and commitments, and more national and regional governments are developing carbon pricing schemes and creating carbon markets. Some of these, such as California's regulatory carbon market, are starting to include forest carbon offsets. Other business-led initiatives, such as the planned adoption of an internal emission reduction and carbon-trading framework by the global aviation industry, slated for implementation by 2020, may also significantly increase the market for offsets. Products such as those developed by Carbon Tanzania, with very strong social and environmental co-benefits linked to local communities and indigenous people, and ecologically important forests and wildlife areas, should be well-positioned at least within certain segments of these growing markets.

Perhaps the most critical priority in Tanzanian forestry today is for individual organizations and stakeholders connected through different networks and collaborations to find ways of expanding markets for community forest products. This needs to be informed by strong market analysis and

business-based approaches to marketing and value addition. Investments in marketing community forest products, such as by international groups like the World Wide Fund and FSC, could support these efforts. International organizations and networks such as ABCG and its members can support local social enterprises such as Carbon Tanzania or Sound and Fair that are taking on these challenges, and the associated business risks, of trying to create and expand these markets. Development partners and other funders also have a key role to play in helping to finance the growth of these markets for community forest products and enterprises that are working to develop them.

6.7.1 Integration and Collaboration

The experiences of MJUMITA, MCDI, Carbon Tanzania, and the roughly 35-40 villages that they have worked with to develop community forest enterprise models, provide a set of refined methodologies for adapting and scaling up these models to other parts of the country, and for these models to be taken up by other governmental and non-governmental partners. These models have all been developed independently and in different locales, but over time the greatest returns to communities from their forest resources will come from integrating multiple resource uses and forest products in complementary ways. For example, charcoal production could potentially be integrated into sustainable timber harvesting in villages where MCDI works.

Carbon offsetting projects can be layered onto existing sustainable community forest management, as MCDI has attempted to do in Kilwa District, though without yet succeeding to take their REDD+ project through certification. There is an immediate opportunity for stakeholders in the forestry arena to collaboratively work towards integrating these different models so as to increase the overall community returns from forest management through a diversified portfolio of enterprises. Networks such as MJUMITA can provide the platform for different organizations and initiatives to share and adapt models to different contexts and thereby help them to scale up. External funders can support this process by explicitly targeting resources towards integration of different community forest enterprise models.

6.7.2 Policy and Institutions

Tanzania's policy and legal framework for village lands, and the management of forests on those village lands through VLFRs, is a foundation for all of the community forest enterprises described in the cases. VLFRs provide a relatively simple, low-cost framework for communities to protect and manage their forests, and enable communities to capture all the revenue from harvesting products including timber and charcoal. The legal framework for governing village lands also provides the basis for developing carbon offset projects. However, legal and regulatory uncertainty is also a significant constraint to community forest enterprises. Initial carbon offset initiatives such as the Yaeda Valley REDD+ project have emerged based on existing natural resource governance institutions, but without specific regulations around carbon rights related to forests that could provide greater security to carbon project developers and local communities seeking to benefit from carbon offset initiatives under REDD+.

Community-based forest management which currently receives limited government investment, and support by foreign development agencies has declined precipitously compared to a decade ago.

Regulatory barriers such as licensing requirements for communities to transport charcoal and timber have been a major risk for these enterprises, and have been a constraint to the ability to grow and scale these models thus far.

Possible changes in Tanzania's forest policy and law in ways that reduce community rights to harvest and sell charcoal or timber sustainably, or curtail community rights in VLFRs or village lands more broadly, could reverse the gains of these initiatives and the potential to scale up community benefits from forests on village lands. This could have a very negative impact on Tanzania's efforts to sustain its forests, and the economic values they possess, and to deliver greater livelihood and development benefits to local communities from forests.

Tanzanian government policy has an opportunity to build on and support the country's proven and successful models to community-based forest management and to enhance the contribution of VLFRs to forest conservation and to rural development. This can be done not only by maintaining the existing policy and legal framework for VLFRs, but providing additional incentives and support to community forest enterprises. Providing tax exemptions to community forest products and enterprises, similar to those provided to certain foreign investors as a way to attract investment, would be one way of encouraging greater investments in community forests. Ensuring policy and regulatory support for trade in sustainably harvested community forest product such as charcoal is another important way that government action can increase earnings by rural communities and the critical links between forest enterprise and forest conservation.

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