

Research

Community forests, timber production, and certification: success factors in the African context

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ABSTRACT. In Africa, forest tenure reform to decentralize forest management from central governments to local communities has been occurring since the 1990s to promote forest conservation, poverty alleviation, and sustainable forest-based livelihoods. African governments and donor organizations continue to invest in community forestry, raising the question of what contributes to "success." The present study examines social, economic, and biophysical factors that contribute to success, or lack thereof, in community forestry in southeastern Tanzania. There, community forest enterprises produce commercial timber from natural stands in community forests certified by the Forest Stewardship Council. We compare success across 14 certified community forests using local criteria, emphasizing total revenue earned because half of this revenue is invested in creating community benefits, which incentivize sustainable forest management. Our methods include financial analysis, analysis of potential linkages between success outcomes and attributes of villages and community forests, key informant interviews, and a survey of forest managers. We found that for community forestry with community forest enterprises that produce commercial timber to be most successful, success factors for both community forestry and small-scale, forest-based enterprises must be present and co-occur. In particular, we highlight the importance of having large community forests with a high natural endowment of merchantable timber species for success. A favorable national policy environment, good governance and support at the community and district government levels, secure tenure, tangible benefits, and long-term technical and financial support from a local organization were also important. In addition, we examine the role of forest certification in contributing to success, finding it does so by reinforcing many other success factors. We draw insights from the Tanzanian case that may be relevant for community forestry elsewhere in Africa where community forest enterprises producing commercial timber operate or are desired.

Key Words: *community forest enterprise; community forestry; forest conservation; Forest Stewardship Council; Tanzania*

INTRODUCTION

Since the late 1970s, many low- and middle-income countries worldwide have decentralized forest governance to address deforestation, forest degradation, and poverty among forest peoples (Charnley and Poe 2007). Often referred to as "community forestry," these efforts entail formal devolution of some degree of responsibility and authority for forest management by governments to local communities, with the goals of creating benefits for communities while fostering ecologically sustainable forest use and management. In Africa, tenure reform to decentralize forest management has been occurring since the 1990s (Barrow et al. 2016) to promote conservation of existing forests, restoration of degraded forests, poverty alleviation, and sustainable forest-based livelihoods. Nevertheless, only ca. 7.4% of forests in low- and middle-income African countries ($n = 11$) were designated for or owned by communities and/or indigenous peoples in 2017, compared with 32.6% in Asia ($n = 13$) and 36.2% in Latin America ($n = 9$) (Ginsburg and Keene 2020). Given the potential for expansion and ongoing investment in community forestry by African governments and donor organizations, of interest are the factors that contribute to "success." To date, most research on this topic comes from Latin America and Asia.

Community forestry takes many forms and may entail establishing community forest enterprises (CFEs). We define CFEs as collective community-based businesses that are directed by community governance bodies, are managed for multiple goals, and produce commercial products or services from community forests to benefit community members (Antinori and Bray 2005). Community forest enterprises ideally generate profits, are

financially and ecologically sustainable, and create both monetary and non-monetary benefits for communities (Peredo and Chrisman 2006, Soviana 2015, Foundjem-Tita et al. 2018). Revenue from sustainable production of forest goods and services creates community benefits via diverse pathways (e.g., direct payments to community members, income earnings for CFE workers and shareholders, reinvestment of profits in community development projects) (Antinori and Bray 2005). These benefits in turn incentivize community forestry.

This study examines factors that contribute to success in community forestry where CFEs produce commercial timber from natural forest stands. To our knowledge, the only countries in Africa with this model are Tanzania and Cameroon. Nevertheless, some countries have provisions to help local communities benefit from commercial timber production on state lands, including Mozambique (Sitoe and Guedes 2015), Ghana (Agyei and Adjei 2017), and Ethiopia (Ameha et al. 2014, Gatiso 2019). There is potential to expand this model to incentivize sustainable forest management through community forestry in Africa.

There is also potential to adapt and expand forest certification in Africa in the community forestry context. Forest certification is a voluntary tool that producers use to demonstrate that their forests are managed in a socially, economically, and environmentally sustainable manner (Vogt et al. 2000). They do so by labeling their products using the name of the organization whose certification standards and criteria they meet. Certification incentivizes sustainable forest management by providing financial

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Table 1. Success factors in community forestry

Success factor	Sources
Secure tenure rights over land and trees	Pagdee et al. 2006, Brooks et al. 2012, Baynes et al. 2015, Gilmour 2016, Hajjar and Oldekop 2018, Hajjar et al. 2020
Supportive government policies and programs	Blomley and Ramadhani 2006, Baynes et al. 2015, Gilmour 2016, Hajjar and Oldekop 2018, Frey et al. 2019
Meaningful devolution of forest management responsibility and authority from state governments to local communities	Charnley and Poe 2007
Effective community-level forest governance institutions	Pagdee et al. 2006, Oldekop et al. 2010, Brooks et al. 2012, Baynes et al. 2015, Brooks 2017
Education and training to develop individual, organizational, and community capacity for effective forest management	Pagdee et al. 2006, Brooks et al. 2012, Brooks 2017
Tangible community benefits that are equitably distributed among community members	Pagdee et al. 2006, Brooks et al. 2012, Baynes et al. 2015
A “community of practice” consisting of community members and external entities (e.g., governments, development partners, conservation organizations) with common interests who work together to achieve goals	Pagdee et al. 2006, Arts and de Koning 2017, Segura Warnholtz et al. 2020

or reputational benefits (Ehrenberg-Azcárate and Peña-Claros 2020). To date, Tanzania is the only African country where CFEs produce timber from community-managed natural forest stands that have been certified by the Forest Stewardship Council (FSC). In Cameroon, national certification standards for community forests were developed by the FSC in 2010 but have not been applied (Minang et al. 2019). Forest certification in contexts other than community forestry has waxed and waned in Africa since the 1990s and been more prevalent in southern than eastern Africa (Kalonga et al. 2019). As of 2016, there were 17 FSC certificates for the management of natural tropical forests in Africa, representing 5.45 million ha of forest area, occurring mainly in Gabon and Republic of the Congo (Ehrenberg-Azcárate and Peña-Claros 2020). Most of these certificates were held by private companies (Ehrenberg-Azcárate and Peña-Claros 2020).

In this article, we investigate what success in community forestry means as locally defined; the social, economic, and biophysical factors that enable it; and the role of forest certification in contributing to it. We draw insights from the Tanzanian case that may be relevant elsewhere in Africa.

BACKGROUND

Success Factors in Community Forestry and Community Forest Enterprises

Case studies of community forestry in low- and middle-income countries have been the object of numerous comparative and meta-analyses to identify factors, or enabling conditions, contributing to success (Table 1). Success is typically evaluated in terms of achieving environmental goals such as forest conservation and carbon sequestration, economic goals associated with poverty alleviation, and social goals such as increasing land and resource tenure security and equity. It is important that these factors co-occur; if only some are present, success will likely be more limited (Baynes et al. 2015, de Jong et al. 2016). A recent meta-analysis of the outcomes of community forestry finds that it often meets environmental and income-related goals but has more negative outcomes for forest resource access rights (Hajjar et al. 2020).

Another body of work examines aspects of CFEs that lead to revenue generation and prosperity (Hajjar and Oldekop 2018).

Community forest enterprises engaged in commercial timber production usually generate more income than CFEs based on other forest products (de Jong et al. 2016). As with community forestry, researchers have undertaken comparative and meta-analyses of individual CFEs, and small and medium-size forest enterprises (not run by community forest groups), to identify factors underlying success (Table 2). Some are the same as those identified for community forestry: secure tenure over forest resources, a supportive national policy environment, and effective community organizations for managing forest resources. Again, these conditions operate together; if only some are present, success is likely to be compromised (Sanchez Badini et al. 2018).

A related literature pertains to governance institutions for common-pool resource management. Community forests are common-pool resources (it is difficult to exclude people from benefiting from them, and resource consumption by one person subtracts from resource benefits to others) (Ostrom 1990). Since Ostrom’s (1990) seminal work on this topic, numerous researchers have investigated design principles that lead to enduring institutions for sustainably governing common-pool resources (see Agrawal 2001 for a review). Community-scale resource governance institutions are an important success factor for community forestry and CFEs, thus these design principles add insight. However, this literature does not consider the broader suite of conditions that underlie successful community forestry or CFEs.

Community Forestry in Tanzania

In Tanzania, community forestry—or “participatory forest management,” the term used there—was formally adopted with passage of the 2002 Forest Act. Its purpose is threefold: (1) to ensure that forests are protected and well managed, increasing forest conservation; (2) to provide sustainable benefits to local communities from forests, such as timber, firewood, honey, and revenue from forest products, thereby reducing poverty and improving rural livelihoods; and (3) to strengthen village institutions for natural resource management by giving villages more management responsibility over local forests (United Republic of Tanzania (URT) 1998). There are two approaches to participatory forest management. Joint forest management

Table 2. Success factors for community forest enterprises

Success factor	Sources
Secure tenure over forest resources	Cubbage et al. 2015, Sanchez Badini et al. 2018, Segura Warnholz et al. 2020
Supportive national policy environment	Cubbage et al. 2015, Sanchez Badini et al. 2018, Segura Warnholz et al. 2020
Effective community organizations for managing forest resources	de Jong et al. 2016, Sanchez Badini et al. 2018
A high endowment of forest products that can be harvested and sold	Blomley and Ramadhani 2006, Macqueen 2013, Anderson et al. 2015, Cubbage et al. 2015, de Jong et al. 2016, Sanchez Badini et al. 2018, Duguma et al. 2018, Segura Warnholz et al. 2020
The ability to produce diverse forest products	Foundjem-Tita et al. 2018
A positive business environment in which to operate	Cubbage et al. 2015, de Jong et al. 2016, Sanchez Badini et al. 2018, Foundjem-Tita et al. 2018, Gnych et al. 2020
Favorable market conditions for the product being sold and access to markets	Gilmour 2016, Sanchez Badini et al. 2018, Segura Warnholz et al. 2020
High-capacity community-level organizations for managing the enterprise	Macqueen 2013, Gilmour 2016, Sanchez Badini et al. 2018, Foundjem-Tita et al. 2018
Access to development assistance or affordable financial capital	de Jong et al. 2016, Sanchez Badini et al. 2018, Segura Warnholz et al. 2020
Compatibility with the sociocultural characteristics of the community	de Jong et al. 2016
Clustering of producers, organizations, networks, or associations to help CFEs share costs, gain easier access to capital and services, build capacity, and increase bargaining power	Sanchez Badini et al. 2018, Segura Warnholz et al. 2020

occurs when communities enter into a joint forest management agreement with the central government or local district council to co-manage a government-designated forest reserve. Community-based forest management occurs when communities designate “village land forest reserves” on village lands. Reserve management is conducted by village governments or other specified entities for production and/or protection based on sustainable management objectives and forest management plans. We focus on the second approach. We use the terms “community forestry” instead of community-based forest management, and “community forest” instead of village land forest reserve, because these terms are common in the international literature and reflect the same concepts as the Tanzanian terminology.

As of 2012, an estimated 546,000 ha of forestland in 381 villages throughout Tanzania had been designated as community forests (Pailler et al. 2015). Community forestry in Tanzania appears to function better than in several other African countries (Duguma et al. 2018). One reason is favorable national laws and policies that support secure forest tenure, effectively devolve forest management authority and responsibility to the community level, and enable villages to fully retain financial benefits from CFEs (Alden Wily 2011, 2018). Blomley and Ramadhani (2006) highlight three such laws. The Local Government Act of 1982 gave Village Councils (elected village government bodies) the authority to make bylaws regulating natural resource access and use within village boundaries. The Village Land Act of 1999 called for villages to survey their boundaries and formally register as villages, giving them official tenure rights over village lands and resources, and authority to manage them. The Forest Act of 2002 allowed registered villages to gazette community forests within village boundaries to be managed by the Village Council under a forest management plan, and villagers to harvest forest products there consistent with the plan. Importantly, villages do not have to pay royalties or taxes to the district, regional, or national governments on products harvested and sold, including timber, which allows them to retain all earnings (Blomley and Ramadhani 2006). As of 2017, an estimated 45.6% of Tanzania’s forestlands (22 million ha) were owned by or designated for local

communities, compared with 5.2% of forestlands averaged across 11 African countries (including Tanzania) (Ginsburg and Keene 2020).

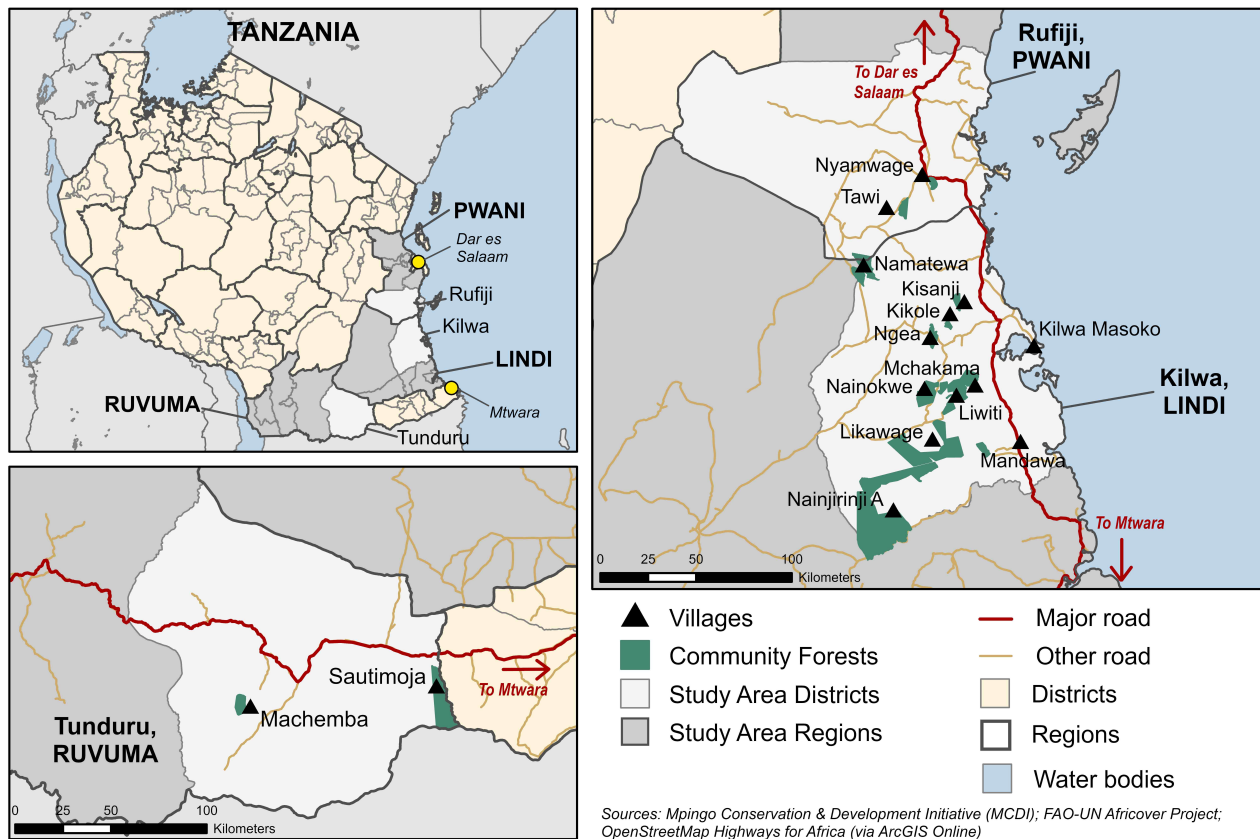
Nevertheless, community forestry in Tanzania is not without challenges. These include limited financial and technical capacity for sustainable forest management at the village level; lack of adequate staffing and resources in district government forestry offices to provide technical support to villages (Duguma et al. 2018); complex bureaucratic process requirements for initial establishment (Gross-Camp 2017); unsustainable levels of tree harvesting for charcoal production close to urban areas (Treue et al. 2014); potential land shortages outside of community forests to accommodate community needs (Brockington 2007); and encroachment by livestock into community forests in some areas (Duguma et al. 2018). Villages may also have limited ability to generate revenue from community forests owing to lack of merchantable timber, or high biodiversity or watershed protection values that create restrictions on forest products harvesting (Blomley and Ramadhani 2006, Gross-Camp 2017).

The Mpingo Conservation and Development Initiative

This study focuses on community forestry in 14 villages located across three districts and three regions of southeastern Tanzania (Fig. 1). Forests in the project area are predominantly miombo woodland and East African Coastal Forest. Numerous commercially valuable hardwoods occur there, the most important of which is East African Blackwood (*Dalbergia melanoxylon*), known as “mpingo” in Kiswahili. Mpingo is the national tree of Tanzania, has wood qualities that make it valuable for manufacturing woodwind instruments such as clarinets, oboes, and bagpipes, and is one of the most expensive timber species in the world by volume (Ball 2004). Because of its high value and slow growth rate (70–100 yr to reach a merchantable size), the only places in Africa where a commercial trade in mpingo remains viable are southern Tanzania and Mozambique (Ball 2004).

Community forestry in southeastern Tanzania arose partly to conserve mpingo and encourage its sustainable harvest (Gross-

Fig. 1. The study area. (Credit: Abigail Kaminski)



Camp et al. 2019). The region's forests have been under threat from improvements in transportation infrastructure that increased connectivity to Dar es Salaam (Tanzania's largest city) and Mtwara (the regional center in southeastern Tanzania), forest conversion to agriculture, illegal logging, charcoal production, and fire (Ahrends et al. 2010, Miya et al. 2012, Dokken et al. 2014). In 2004, these drivers led to establishment of the Mpingo Conservation and Development Initiative (MCDI), a Tanzanian non-governmental organization (NGO), with support from international donor organizations. The MCDI's mission is "to advance forest conservation and community development in Tanzania by facilitating sustainable and socially equitable utilization of forest resources," with timber serving as an economic tool for advancing conservation (MCDI 2021).

Between 2006 and 2018, MCDI facilitated establishment of community forests encompassing 413,700 ha in 43 villages in southeastern Tanzania following the process set forth in Tanzania's Forest Act. As of 2018, 14 of these (totaling 197,435 ha) were certified by the FSC under a group certificate, with standards developed for Tanzania as part of FSC's initiative for small or low intensity managed forests (SLIMF). The MCDI obtained the group certificate in 2009 and is responsible for managing it. Village natural resource committees (VNRCs), part of the Village Council and comprising 17–20 elected members serving 3-yr terms, are responsible for community forest

management. The MCDI provides training to VNRCs to build capacity for forest management and ensure it meets FSC standards. It also pays all costs associated with forest certification, subsidizes the cost of forest management, and supports all aspects of the CFEs, including marketing wood products.

At the time of this study (2017–2018), CFEs in the MCDI project area operated by selling roundwood to timber buyers, who undertook harvests with oversight from VNRC members. Since then, CFEs themselves have conducted some harvests and processed the wood using a portable sawmill purchased by MCDI. Other sources of revenue (non-timber forest products, tourism) largely have not developed. The potential for payments for carbon offsets generated by implementing fire management practices designed to reduce forest losses to wildfire was evaluated under a REDD+ pilot project but deemed unrealistic (Khatun et al. 2015).

To incentivize villagers to support community forestry, about 50% of community forest revenues go to the Village Council. The Village Council proposes how to invest the earnings, subject to approval by the Village Assembly (village residents 18 yr and older). Funds are usually invested in community development projects or community assistance programs. Examples include construction of community buildings, health care and water projects, support for education expenses and facilities, and financial assistance to people in need, such as expectant mothers.

Table 3: Village and community forest attributes examined for potential association with success.

Attribute	Rationale
<i>Village attributes</i>	
Village population	Larger populations reduce the likelihood that forest monitors are related to village residents who break bylaws, making enforcement easier. Larger populations may have more residents with the capacity to contribute to good governance and business operations.
Village size	Larger villages can create larger community forests with greater stocks of commercial timber.
Village population density	Villages with high population density may be unable to create large community forests and exert greater pressure to convert community forests to alternative land uses.
Proportion of village land in community forest	The more village land in a community forest, the larger the community forest, which may reflect a strong commitment to community forestry. But, higher proportions of community forest land leave less land available for alternative forest uses—increasing potential for illegal activity and pressure for conversion to other uses.
District in which village is located	District governments play an important role in supporting community forests and assisting with enforcement actions when bylaws are violated.
Distance of village to MCDI	The closer the village to MCDI, the easier it is for MCDI staff to provide support for community forestry.
<i>Community forest attributes</i>	
Year community forest created	Older community forests might have more experienced VNRCs, increasing capacity for good governance; better market connections; and have conducted more timber sales and community development activities.
Community forest size	Larger community forests likely have more diverse and greater volumes of merchantable timber species, increasing potential for revenue generation. Harvesting in large community forests is more efficient for buyers who can purchase multiple sales.
Size of community forest per capita	Community forest assets and revenue earned per capita can be meaningful indicators of success.
Productive area of community forest	The larger the productive area of a community forest, the greater the potential for revenue generation from timber sales.
Merchantable volume of mpingo	Mpingo has the highest market demand and commercial value and is preferred among buyers.
Merchantable volume of eight merchantable hardwood species [†]	The more merchantable timber in a community forest, the greater the potential for revenue generation.

[†] Kiswahili and scientific names of these species are Mpingo (*Dalbergia melanoxylon*), Mkongo (*Azizia quanzensis*), Mninga jangwa (*Pterocarpus angolensis*), Mninga bondi (*Pterocarpus tinctorius*), Mpangapanga (*Milletia stuhlmannii*), Msekeseke (*Bobgunnia madagascariensis*), Msenjele (*Acacia nigrescens*), Msufi pori (*Bombax rhodognaphalon*), and Mtondoro (*Julbernardia globiflora*).

Of the remaining funds, 40% fund forest management activities by VNRCs, 5% are voluntarily distributed to the local District Council, and 5% go to MCDI as partial compensation for technical assistance.

METHODS

We examine success through a comparative analysis of the 14 community forests participating in MCDI's FSC group certificate in 2017–2018, when we conducted fieldwork. Field visits to the MCDI office in Kilwa Masoko, the Kilwa District Office, and villages with certified community forests in Kilwa District occurred in October–November 2017 and July 2018. We solicited criteria for evaluating success, identified which community forests were successful or unsuccessful relative to others, and explored factors contributing to success or lack thereof. We also examined the role of FSC certification in contributing to success. We used four methods: (1) analysis of village-level financial data pertaining to community forest management and CFE operations; (2) analysis of linkages between success outcomes and social and biophysical attributes of community forests and associated villages; (3) key informant interviews with MCDI staff and partner organizations; and (4) a survey of VNRC members.

Financial Analysis

Key informant interviews led us to focus our financial analysis on how much revenue community forests generate as a key measure of success. Appendix 1 provides a detailed description of methods used for the financial analysis. In short, we compiled, categorized, and analyzed revenue data obtained from MCDI for

the 14 community forests for fiscal years 2011–2012 through 2017–2018, the years for which complete data were available at the time of fieldwork. Revenues mainly come from timber sales, but include other sources like fees, fines, and auction of confiscated timber or equipment from illegal loggers. We used the Green Value Tool (<https://www.green-value.org/home>) to compile and analyze the data. This tool was developed to help forest initiatives track costs and revenues, evaluate financial viability, and identify areas for improvement (Humphries and Holmes 2015). We used total revenue earned rather than average annual earnings because total revenue reflects a community forest's performance over time and a longer history of performance.

Village and Community Forest Attributes

We obtained data from the MCDI office for 12 social and biophysical attributes of the 14 certified community forests, and the villages where they are located, that might be linked to success (Table 3). We chose these attributes based on review of literature, discussions with MCDI staff during field visits, and data availability. We analyzed the attributes by developing matrices in Excel that enabled cross-village comparison by attribute, and by looking for those that were consistently associated with the successful and unsuccessful community forests, as defined by revenue earned. We estimated the Pearson correlation to identify potential linkages between success outcomes and ten of the community forest/village attributes. We did not correlate revenue outcomes with percentage of land in community forest because this variable is calculated from other variables (village size, size of community forest) that were tested individually. Location in

Kilwa District was not included in the correlation test because it is a binary variable, and thus not comparable with estimates for the correlation of other, continuous variables. Additionally, ten of the 14 villages are located in Kilwa District, indicating insufficient variation for running the test.

Key Informant Interviews

We supplemented the village and community forest attribute data by interviewing nine individuals in July 2018: six MCDI staff members, two Kilwa District Office employees, and one employee of Sound and Fair, a local organization that works closely with MCDI to market certified wood products internationally. Interviewees were purposively chosen for their knowledge of and involvement with MCDI and community forestry in the project area. Using a structured interview guide (Append. 1), we asked interviewees how they define “success” and what criteria they use for evaluating it; which villages were most, and least, successful in their view; and what factors account for the differences. We also asked them to list criteria they would use to decide which new villages should be added to the FSC group certificate, if any. Interviews were conducted in English, and detailed notes were taken to capture responses. We analyzed the interview data by compiling responses to each of the ten interview questions, identifying the range of responses to each question, creating matrices in Excel that cross-listed each response variable by village, and quantifying the number of interviewees that articulated a particular response variable for each village. We then summarized and interpreted the results.

Survey

We conducted a survey of VNRC members from the 14 villages with FSC-certified forests to investigate their perceptions of the costs and benefits of certification. Members of the VNRCs are more familiar with community forest management and certification than the general village population, so were most qualified to respond. We developed the survey in consultation with MCDI staff, pilot tested it in four villages, and trained MCDI staff to administer it during our 2018 field visit. It was administered between July and November 2018 in Kiswahili. Roughly 50% of VNRC members per village were randomly chosen to be surveyed, resulting in a sample size of 132 (87 men, 40 women, 5 missing gender data). Respondents were paid to participate, per MCDI protocol. Survey methods are described in full in Appendix. 1.

The survey contained both quantitative and qualitative questions that enabled respondents to scale their answers and explain their reasoning behind them. Questions solicited respondents’ perceptions of a range of activities required by certification, the benefits and drawbacks of these activities, the benefits and challenges of certification, and whether it should be continued (Append. 1). Quantitative data were entered into Open Data Kit software in the field, downloaded to Excel, and analyzed using STATA. Qualitative data were recorded by hand in the field, entered into Excel, and analyzed by identifying response categories for each question, and quantifying how many respondents mentioned each response category per question. For purposes of this study, we examined the data to gain insight into the role of certification in relation to success of community forestry and CFEs.

Limitations

Limitations of our methodological approach include the following:

- We did not compare success between certified and uncertified community forests in the MCDI project area because of challenges controlling for differences between them. Uneven record keeping and financial accounting among uncertified community forests also make it harder to get reliable data for them. In addition, we were concerned about selection bias. The MCDI may choose community forests with the most potential for success to include in the FSC group certificate. These community forests may also receive more support from MCDI, causing them to perform better.
- Only 14 community forests were included in the FSC group certificate. This small sample size limited our ability to perform statistical tests that might reveal significant correlations between success (total revenue earned) and social and biophysical factors contributing to it. However, this smaller sample size allowed us to explore the cases more in depth using a mixed-methods approach.
- We did not interview or survey community members at large about our research topics because of limited resources. Instead, we focused our investigation on individuals having the greatest familiarity with community forestry in the MCDI project area. Therefore, our results do not represent the full range of views held by community members.

RESULTS

Evaluating Success

The criterion for success most commonly cited by interviewees (8 of 9) was high levels of revenue generation from community forests. Their reasoning was that revenues invested in tangible community projects benefit communities, creating an incentive for village residents to support community forests and for VNRCs to enforce bylaws and manage them well. Only one interviewee mentioned financial self-sustainability as a criterion for success.

Five interviewees identified the number of community development projects as another important criterion for judging success. Seven of nine cited good forest management practices—especially patrolling and bylaw enforcement—as an additional criterion. Five interviewees viewed good governance as an important criterion for evaluating success because it underlies the ability of villages to manage community forests and income from them well. They cited effective leadership by VNRCs and Village Councils, transparent operations and decision-making processes, good financial management, high levels of engagement by village residents in community forest meetings and management, and low levels of internal political conflict within villages as indicators of good governance. Interviewees described unsuccessful community forests as having the opposite characteristics: low revenue generation, few if any community projects, weak governance, illegal logging activity, and poor forest conditions.

It was outside the scope of this study to independently evaluate forest management practices and governance. We rely instead on interviewees’ perceptions of how these variables influenced success. Our focus is on revenue generation and community payments as indicators of success.

Most and Least Successful Community Forests

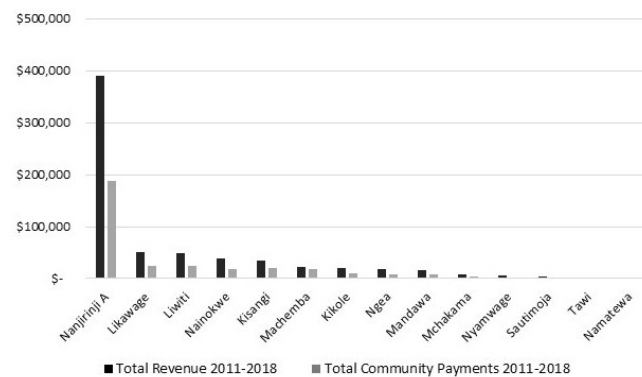
Revenue generation and community payments

We grouped the 14 villages with certified community forests into four categories based on CFE performance, measured by total earnings between 2011 and 2018 (Table 4). The most successful community forest in total revenue generation and community payments to Village Councils was Nanjirinji A, earning almost eight times as much as the next highest income earner (Fig. 2). At the other end of the spectrum, four community forests (Mchakama, Nyamwage, Sautimoja, Tawi) earned little if any income. Namatewa, also in the “poor” category, was in the process of establishing a community forest at the time of our study, and no timber sales had occurred there yet. We did not assess how revenues were invested in community projects.

Table 4. Relative financial performance of village CFEs, 2011–2018

Performance category	Community forest
Excellent (>\$60,000)	Nanjirinji A
Good (\$30,000–\$60,000)	Likawage, Liwiti, Nainokwe, Kisangi
Fair (\$10,000–\$30,000)	Machemba, Kikole, Ngea, Mandawa
Poor (0–\$10,000)	Mchakama, Nyamwage, Sautimoja, Tawi

Fig. 2. Total revenue earned from community forests and payments transferred to Village Councils, 2011–2018. Not all community forest data go back to 2011 because some were established later or did not have any revenue.



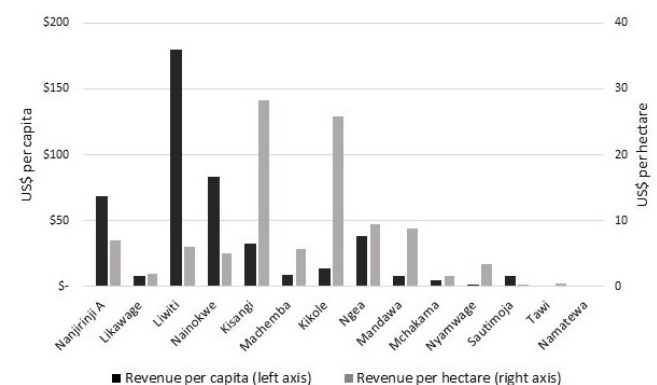
Community forests were established in different years, suggesting older forests may have higher total revenue. Table 5 compares total and average annual revenue earned by the 14 CFEs since year of establishment, or 2011 if older. The five highest total revenue earners (in consecutive order) were also the top five in average annual income earned (consecutively), with the exception of Machemba—now third in average annual income—one of our anomalous community forests (see below), and one of the newest. The four lowest total revenue earners also had the four lowest annual average earnings, despite large differences in year of creation. Thus, age of community forest did not appear to be linked to total revenues.

Table 5: Total and average annual revenue earned by community forests since 2011–2012 or year of creation (if more recent).

Village	Total revenue	Average annual revenue
Nanjirinji A	\$390,690	\$65,115
Likawage	\$51,723	\$10,345
Liwiti	\$49,836	\$6,230
Nainokwe	\$38,765	\$5,538
Kisangi	\$33,702	\$4,814
Machemba	\$23,200	\$7,733
Kikole	\$21,211	\$3,030
Ngea	\$17,870	\$4,468
Mandawa	\$15,733	\$3,933
Mchakama	\$7,932	\$1,983
Nyamwage	\$5,038	\$718
Sautimoja	\$5,015	\$1,672
Tawi	\$896	\$128
Namatewa	\$342	\$342

Comparing revenue earned per capita and per hectare of productive community forest area provides an alternative view of success (Fig. 3). Although Nanjirinji A had the highest total revenue, it has a large population and large community forest (Table 6). Therefore, in Nanjirinji A, revenue per capita totaled \$69 per person between 2011 and 2018. Liwiti, by comparison, has a very small population, so total revenue per capita over this time period was much higher, at \$180 per person, followed by Nainokwe (\$83 per person) (both classified as good performers in total revenue generation). Revenue per hectare demonstrates success at creating income from community forests independent of size. The two most successful community forests using this measure were Kisangi (\$28 per hectare) and Kikole (\$26 per hectare) (good and fair performers, respectively).

Fig. 3. Total forest revenues for 2011–2012 through 2017–2018 per capita (left axis) and per hectare of productive community forest area (right axis).



Interviews

The greatest number of interviewees identified Nanjirinji A (excellent, 9 of 9) and Likawage (good, 7 of 9) as having the most successful community forests of the group, followed by Nainokwe

Table 6: Variables examined for their relationships to success of community forests (CF). Villages are listed in descending order from the highest to lowest total revenue earners (2011-12 to 2017-18). Source: MCDI data from 2017-2018.

Village	Village population (2017)	Village size (ha)	Pop. density (ha/capita)	Year CF created	Size of CF (ha)	% Land in CF	CF size/capita (ha)	Productive area of CF (ha)	Volume mpingo (m ³)	Volume 8 spp. (m ³) [†]	District	Km to MCDI [§]
Nanjirini A	5,691	109,624	19.3	2012	83,538	76%	14.7	55,147	150,833	821,913	Kilwa	172
Likawage	6,649	119,784	18.0	2013	31,055	26%	4.7	27,905	26,368	212,435	Kilwa	126
Liwiti	277	27,894	100.7	2010	9,306	33%	33.6	8,375	645	82,696	Kilwa	110
Nainokwe	465	47,980	103.2	2010	10,131	37%	21.8	9,115	7,271	67,292	Kilwa	100
Kisangi	1,025	9,574	9.3	2007	1,900	20%	1.8	1,191	3,524	17,345	Kilwa	56
Machemba	2,560	18,198	7.1	2015	4,612	25%	1.8	4,117	0	127,110	Tunduru	589
Kikole	1,547	19,022	12.3	2006	916	5%	0.6	824	4,601	13,364	Kilwa	62
Ngea	469	9,521	20.3	2014	3,330	35%	7.1	1,893	2,432	34,287	Kilwa	78
Mandawa	2,062	10,568	5.1	2014	1,994	19%	1.0	1,795	2,154	12,708	Kilwa	105
Mchakama	1,592	6,648	4.2	2014	5,639	85%	3.5	5,010	788	31,296	Kilwa	70
Nyamwage	3,993	28,335	7.1	2006	1,644	10%	0.4	1,480	0	45,021	Rufiji	130
Sautimoja	640	28,183	44.0	2015	21,966	78%	34.3	19,769	3,463	147,209	Tunduru	500
Tawi	1,220	51,156	41.9	2006	2,787	5%	2.3	2,286	0	6,777	Rufiji	150
Namatewa	396	176,885	446.7	2017	10,015	6%	25.3				Kilwa	166

[†]Merchantable timber volume, calculated as 70% of standing stock volume.

[‡]The eight most marketable timber species (see Table 3).

[§]MCDI headquarters is located in Kilwa Masoko, Tanzania; distances are estimates obtained from MCDI driving records.

^{||}This community forest was new at the time of our fieldwork and a forest inventory had not yet been completed, explaining the lack of data for some variables.

(good), which 8 of 9 said had a successful community forest (but not “the most” successful). Criteria they used to judge were high levels of revenue generation from community forests, high levels of investment in community projects as a result, and good governance. Interviewees identified Machemba, Tawi, and Nyamwage as having unsuccessful community forests using the same indicators: low revenue, low community benefits, and low governance capacity. These perceptions were largely consistent with the results of our financial analysis (Table 4), except for Machemba, ranked fair instead of poor. Opinion was mixed about the success of the remaining community forests.

Success Factors

Community forest and village attributes

The correlation test found that volume of mpingo, volume of eight merchantable hardwood species, size of community forest, and productive area of community forest were positively correlated with total revenue and community payments (Table 7). Larger community forests likely contain more merchantable timber. Villages with the largest community forests were not necessarily the largest villages; the percentage of village land allocated to community forests varied widely (from 5% to 85%; Table 6). Nevertheless, the moderate correlation between village size and total revenue and community payments suggests that larger villages have more land to allocate to community forests, favoring larger community forest size and potential success. Variables with no apparent correlation to success were village population density, year community forest was created, community forest size per capita, and distance to MCDI. These findings underscore the importance of having high endowments of forest assets for CFEs to be successful.

Nevertheless, favorable forest assets do not ensure success. Timber must be marketed and purchased by buyers to produce financial

benefits. Most species harvest volumes were far below the allowable cut specified in community forest 5-yr management plans (Table 8). With the exception of *Bobgunnia madagascariensis* (having an extremely low allowable cut volume), the volume discrepancies in 2017–2018 were so large that they were unlikely to be substantially reduced within the lifetime of existing management plans. Thus, total merchantable timber volume, while important for success, did not always produce high earnings, as Table 6 reveals.

Distance to MCDI (in Kilwa District) did not predict success. Although we did not include location in Kilwa District in the correlation test, three of the four villages classified as poor performers (excluding Namatewa, too new to have begun producing timber) were located outside of Kilwa District. Kilwa District was the initial focus of the MCDI project, and villages there have received the greatest investment of resources from MCDI. Additionally, the Kilwa District government has been supportive of community forestry, and according to four interviewees, has occasionally intervened to help enforce bylaws and counteract village-level corruption. These factors likely contributed to success.

Interviews

Interview results were consistent with the above findings and added to them. Factors most frequently cited by interviewees as being associated with successful community forests were large size and high and diverse stocks of merchantable timber species. Associated high timber revenues that Village Councils prioritized investing in community development projects were also frequently cited success factors. These created a strong incentive among villagers to engage in community forestry activities and decision making, and to support their community forest. Another frequently cited success factor was good governance by VNRCs,

Table 7: Correlation between revenue outcomes and predictor variables. Variables with high correlation in bold.

	Village population	Village size	Population density	Year CF created	Size of CF	CF size/capita	Productive area of CF	Volume mpingo	Volume 8 merch. spp.	Distance to MCDI
Total revenue	0.54	0.64	-0.02	0.09	0.93	0.16	0.88	0.99	0.97	-0.03
Com. payment	0.53	0.62	-0.03	0.10	0.93	0.16	0.87	0.99	0.97	-0.01

including financial transparency. When asked what criteria they would use for adding community forests to the FSC group certificate, six of nine interviewees identified large community forests with high stocks of merchantable timber having high market demand, and one added that forests should be in good condition with no illegal activity. Three of nine emphasized the importance of secure land tenure as reflected by having demarcated village boundaries and a village land title, and no boundary disputes. Other criteria mentioned by one or two respondents were the potential for quick revenue generation to incentivize community support; location in Kilwa District, making it easier for MCDI to work there; and grassroots support among village residents.

Table 8: Total volume of timber sold from 13 FSC-certified community forests[†] for the five-year period, 2013-14 to 2017-18, and allowable cut volume over a five-year period. Data source: MCDI spreadsheets, 2018.

Species	Allowable cut (m ³) [‡]	Volume harvested, m ³
<i>Julbernardia globiflora</i>	30,921	744.7 (2.4%)
<i>Pterocarpus angolensis</i> & <i>P. tinctorius</i>	25,076	1,383.1 (5.5%)
<i>Millettia stuhlmannii</i>	16,463	40.5 (0.2%)
<i>Acacia nigrescens</i>	15,730	0
<i>Dalbergia melanoxylon</i>	9,310	1,455.8 (15.6%)
<i>Bombax rhodognaphalon</i>	8,625	212.3 (2.5%)
<i>Azelia quanzensis</i>	6,366	1,150.7 (18.1%)
<i>Bobgunmia</i>	164.5	147.4 (89.6%)
<i>madagascariensis</i>		
<i>Burkea Africana</i>	156	10.0 (6.4%)

[†]Namatewa is not included because the community forest was established in 2017 and the forest inventory had not yet been completed at the time of fieldwork.

[‡]These numbers represent the total allowable cut from the villages' most recent 5-yr management plans, combined.

Conversely, the reason interviewees most frequently cited for lack of success was small community forests without adequate stocks of merchantable timber that limited income generation and, consequently, motivation for community forestry. There were additional influencing factors, however. For example, the community forests in Tawi and Nyamwage (poor performers) were among the first established (2006) and certified (2010) but were established under the auspices of a World Wildlife Fund project. The MCDI subsequently inherited them, but would not have prioritized them for inclusion in the FSC group certificate, and has provided them with minimal support. Additionally, these are the only two villages located in Rufiji District, the closest district in the project area to Dar es Salaam. Although this geography may be beneficial for market access, it has subjected both community forests to illegal logging and charcoal

production. These activities have left them with few mpingo trees, and Tawi with the lowest volume of merchantable timber species in the group of 14. Consequently, little revenue is generated from timber sales, and there is low investment in community projects. The Nyamwage community forest also suffers from illegal livestock grazing by pastoralists searching for dry season forage, threatening its ability to remain in the group certificate. These factors combine to create little incentive for good forest management, and low levels of engagement by village residents. Low governance capacity was another problem cited. Illegal activities are difficult to control, calling for enforcement assistance from the Rufiji District office, which has not been forthcoming.

Anomalies

Despite the foregoing results, two community forests presented anomalies. One was Sautimoja, in the poor performance cluster but with the third largest community forest and productive area of the 14, the third highest merchantable timber volume, and ranking sixth in mpingo volume. The other is Machemba, identified by three interviewees as being among the least successful villages, although it was in the fair performance cluster and has the fourth highest merchantable volume of timber (but lacks mpingo). Both villages are located in Tunduru District. Villages in Tunduru District are 500 km or more from MCDI headquarters in Kilwa Masoko (the most distant of the group), making it challenging for MCDI staff to travel there and provide support. Few buyers or difficulty accessing timber were mentioned three times by interviewees, suggesting market access may be challenging in this district. Two interviewees reported that Tunduru District government officials don't support community forestry, leading to lack of bylaw enforcement and illegal activities, including illegal logging and livestock incursion into the Sautimoja community forest. Two interviewees explained that livestock herders are attracted to Sautimoja owing to the presence of dry season water resources there. But 85% of village lands are part of the community forest, creating a potential shortage of grazing land and contributing to the problem of illegal grazing, which is hard to control. In Machemba, one interviewee identified poor governance and corruption at the local level as problems. These findings underscore the importance of having strong governance institutions at the village and district levels, and support from MCDI, for success.

The Role of Forest Stewardship Council Certification

Quantitative and qualitative survey results provide insight into how FSC certification may contribute to the success of community forestry. Community forests that are part of MCDI's group certificate are classified as "high conservation value forests" (FSC 2020). As such, the certificate contains standards that require VNRCs to carry out specific conservation-oriented management activities: forest patrols, tree harvest supervision,

Table 9: Main benefits of forest management activities required by certification cited by VNRC members surveyed.[†]

Benefits	% of responses [‡]
Benefits of conservation-oriented management activities	
<i>Forest patrols</i>	
Protect the forest and forest products, and prevent illegal harvesting, criminal activity, and forest destruction	60%
Monitor overall forest conditions, including human activity, wildlife populations, tree growth, and when trees are ready to harvest	37%
<i>Harvest supervision</i>	
Ensure that the correct trees are harvested	28%
Ensure that the correct amount of timber is harvested	26%
Ensure customer follows harvest rules to prevent damage to the forest, ensure a sustainable harvest	23%
Ensure community benefits from timber harvests	8%
Ensure safety of the harvest, such as planning the direction in which trees are felled	6%
<i>Controlled burning</i>	
Protect the CF from wildfire; prevent fire from entering the forest	62%
Reduce wildfire severity and impacts by causing fires to occur less often, spread more slowly, burn less hot, and become easier to control	12%
Protect biodiversity, including insects, wildlife, and habitat	11%
Stimulate grass growth, beneficial to animals for forage	5%
Help seeds germinate and promote growth of small trees	5%
<i>Biodiversity monitoring</i>	
Monitoring forest health	28%
Monitoring forest growth	22%
Observing and monitoring bird populations	19%
Observing overall forest conditions	11%
Ensuring that the forest is being protected	11%
Monitoring animal populations and biodiversity	6%
Benefits of other required management activities	
<i>Road building and maintenance</i>	
Make it easier and faster for people and vehicles to travel through the forest	34%
Make it easier for forest monitors to patrol, helping to reduce crime	30%
They are good for business, i.e., make harvesting timber and transporting logs easier	20%
There are environmental benefits, i.e., less erosion, less tree damage	6%
<i>Record keeping</i>	
Having a record of past activities	58%
Having information readily available for responding to questions, reporting, providing guidance, and other needs	18%
Providing information that can be used by others in the future	14%
<i>Training</i>	
Learning how to manage the CF and conduct activities required for certification	30%
Learning new things and new skills	26%
Becoming more educated	25%

[†]The list does not represent verbatim responses, but shows similar answers grouped together post-survey by the research team.

[‡]Percentages indicate percentage of total responses for each benefit category. Responses with less than 5% frequency are not reported.

ecological monitoring, and early burning. The survey asked VNRC members whether they considered these activities worthwhile. On average, they said yes (Frey et al., 2021). They cited numerous conservation benefits of these activities, such as forest protection, preventing illegal activity, promoting awareness of forest conditions, ensuring proper harvest practices, and wildfire prevention (Table 9). They also identified conservation benefits of road construction and maintenance, another required activity (Table 9). Thus, VNRC members surveyed perceive some activities required by certification as helping to protect community forests from degradation.

Certification also requires VNRCs to keep records of management activities and participate in training activities. Quantitative survey results found that respondents also thought these activities were worthwhile (Frey et al., 2021), citing several ways in which they increase capacity for community forest and CFE management (Table 9). Doing so improves administration by the VNRC, contributing to good governance and building business capacity.

Finally, informal interviews with MCDI staff indicated that FSC certification helps attract funding from donor organizations because meeting certification standards increases the likelihood that community forestry will contribute to forest conservation, social equity, and community development goals. This support comes from organizations that share these goals (e.g., World Wildlife Fund, Fauna and Flora International, the Royal Norwegian Embassy, the U.S. Forest Service). The MCDI is entirely reliant on donor funding for its operations, and communities in turn are reliant on MCDI for technical and financial support. The survey asked VNRC members whether they could, as of 2018, manage their community forests without assistance from MCDI. In response, 81% said no, 17% said yes, and 2% were uncertain. Among those who said no, the main reasons were lack of knowledge, experience, and capacity (38%), and lack of sufficient funds for forest management and training (25%). Most who said yes believed they would not do a good job and would face many challenges.

DISCUSSION

Our analysis of success factors in community forestry in southeastern Tanzania began by identifying measures of success as defined by MCDI staff and local partners interviewed for this study. Interviewees identified high levels of total revenue generation from community forests, leading to investments in tangible community projects that village residents benefit from, as the most important measure of success. Success at total revenue generation does not imply financial sustainability, however. Villages use 40% of their earnings to pay forest management costs, but actual costs are much higher. The MCDI paid 83% of total forest management costs for the 14 villages between 2015–2016 and 2017–2018 (Frey et al. 2021). Thus, financial success can be evaluated using different measures, with different results. These measures include total earnings since a community forest was established, financial self-sustainability, average profits or portion of years with an operating profit, activities undertaken at lower cost, amount of revenue earned per village resident, or revenue generated per hectare of community forest. The best way to evaluate financial success depends on project goals and how financial benefits are distributed.

In the MCDI case, typically 50% of community forest revenues are transferred to Village Councils for community investment. Most socioeconomic benefits of community forestry are experienced at the village—not household—level (Gross-Camp 2017). Total earnings are therefore an appropriate financial indicator of success for this study: the more total revenue, the more community-scale development investment. Because a fixed proportion of revenues, rather than profits, are transferred to Village Councils and management costs are subsidized by external donors via MCDI, there is little reason for communities to perceive cost as a barrier to success. If external subsidies were reduced in the future, there would be pressure to change the financial model and prioritize profits (i.e., low cost and high revenue) over high revenue alone.

We found that size of community forest, size of its productive area, volume of mpingo, and volume of eight merchantable hardwoods within community forests were the local-level community forest or village characteristics most highly correlated with financial success of those we measured. Although this finding is unsurprising, it emphasizes the importance of locating community forests with CFEs in locations that have a robust endowment of forest resources upon which the CFE is based, and where it is possible to delineate a large community forest area. The most successful community forest in our study was 83,538 ha, and those that were in the good performance category averaged 13,098 ha. By comparison, law in Cameroon stipulates that community forests with timber-producing CFEs may not exceed 5,000 ha, which can be a barrier to both production and certification (Alemagi et al. 2011). Moreover, community forestry is often implemented in forests having low commercial value, leaving communities to manage “leftovers” (Anderson et al. 2015). Poor forest stocks that take a long time or high investment to restore and regain value likely limit the success of CFEs and create low incentive to engage in community forestry (Anderson et al. 2015). Good governance at the village level, support from district-level government, tangible benefits from community forests, and MCDI technical and financial support (ongoing since 2004) were also important success factors in the MCDI case.

Limiting financial success of the CFEs were unfavorable market conditions and limited access to markets, lack of high capacity business organizations at the village level, and limited ability to diversify forest products beyond mpingo, despite availability of numerous merchantable hardwood species (Frey et al. 2021). Competition with timber harvested from government forest reserves and illegally harvested timber also depressed prices for FSC-certified wood from the project area, which was sold at government floor prices and did not bring a price premium (Frey et al. 2021). Our findings are consistent with the broader literature regarding conditions that limit the success of CFEs. These include poor market development and market access, low business and management capacity, an unfavorable policy environment (Hajjar and Oldekop 2018, Segura Warnholtz et al. 2020), and illegal timber harvesting that degrades forest resources and drives down prices for legally harvested wood (Blomley and Ramadhani 2006, de Jong et al. 2016, Sanchez Badini et al. 2018).

This study focused on local (community and district) level factors influencing success by comparing 14 community forests that participate in one initiative located in southeastern Tanzania. But multi-scalar factors influence success in community forestry. As discussed earlier, important national-scale factors that make community forestry in Tanzania successful relative to other African countries are national laws and policies that support secure forest tenure, effectively devolve forest management to the community level, and enable villages to retain financial benefits from community forests. These features operated in all 14 villages studied and were important in contributing to the potential for success.

Much of what we know about success factors in community forestry and CFEs comes from case studies conducted in Asia and Latin America. Success factors for community forestry identified in this literature were applicable in southeastern Tanzania (Table 10). Our study also considered the role of certification in contributing to success. We found that certification reinforces many other success factors for community forestry and small-scale forest-based enterprises (Table 10).

On the ecological side, certification standards are designed to promote sustainable forest management, practices to maintain biodiversity, timber harvest operations that take place in an environmentally appropriate manner, monitoring of forest conditions and enforcement of forest management bylaws, and annual third-party audits to ensure certification standards are met. Interviewed VNRC members identified numerous forest conservation benefits associated with the management activities they perform, as required by certification. Certification thus helps ensure that community forests maintain endowments of diverse and quality forest products that can be harvested and sold. Kalonga et al. (2016) found that FSC-certified forests in the MCDI project area performed better at conserving biodiversity than nearby government forest reserves and village forestlands located outside of community forests. They attribute this finding to good governance, including the presence of forest guards and enforcement of bylaws; effective forest management plans that reduce harvest intensity by stipulating selective harvest practices, allowable harvest quotas, and minimum diameters for tree harvest; and regulation of forest uses.

Table 10. Success factors in community forestry and CFEs, and supporting role of certification

Success factor	From CF literature	From CFE literature	Important in MCDI case	Supported by certification
<i>Ecological</i>				
High endowment of forest products to harvest and sell		X	X	X
Ability to produce diverse forest products		X		X
<i>Socioeconomic</i>				
Secure tenure over land and forest resources	X	X	X	X
Supportive government policies and programs	X	X	X	X
Meaningful devolution of forest management responsibility and authority from state to communities	X		X	
Effective community-level forest governance institutions	X	X	X	X
Education and training to develop capacity for forest management	X		X	X
Tangible community benefits equitably distributed among community members	X		X	X
A “community of practice” working together to achieve common goals	X		X	X
Positive business environment		X	X	
Favorable market conditions and access to markets		X	X	X
High-capacity community organizations for managing the enterprise		X	X	X
Access to development assistance or affordable financial capital		X	X	X
Compatibility with the sociocultural characteristics of the community		X	X	X
Clustering of producers, organizations, networks, or associations		X	X	X

Socioeconomically, VNRC members surveyed indicated that certification requirements such as training and administrative tasks contribute to capacity building for effective forest management, which likely contributes to effective forest governance institutions. The MCDI FSC group certificate can potentially facilitate clustering and networking among producers and help create a community of practice to achieve common goals. Frey et al. (2021) found that certification in the MCDI project area also supports some sociocultural characteristics of communities, access to development assistance, secure tenure rights over forestland, improved market access, and increased recognition and support from the Tanzanian government. Other research from the MCDI project area indicates that villages with certified community forests experienced less corruption and more equitable distribution of income from community forests (Kalonga et al. 2015, Gross-Camp et al. 2019). Elite capture and inequitable distribution of benefits were not topics of concern in most MCDI villages where they worked (Khatun et al. 2015, Gross-Camp 2017). Research has also found that in MCDI villages with FSC-certified community forests, average annual household income from forests is higher, community benefits in the form of development projects are greater, and forest governance is better than in villages without community forests (Kalonga and Kulindwa 2017). These researchers did not compare villages with certified and uncertified community forests, however.

Finally, certification may contribute to “investment readiness” among CFEs, attracting financial investment by private or government entities that might in turn increase their profitability (Gnych et al. 2020). Certification standards help mitigate the risks of over-harvesting and forest degradation, and poor forest and business management, decreasing business risk and increasing

assurances that certified operations are a good financial investment. Because MCDI and the FSC (via annual audits) oversee community forests to ensure they are meeting certification standards, investing organizations don’t have to, reducing their transaction costs. Consequently, certification can help overcome barriers to financial investment faced by CFEs (Gnych et al. 2020). Although external investment can increase access to capital, other resources, and market connections for CFEs, it may threaten the independence of CFEs and lead to inequitable benefit sharing (Gilmour 2016).

External investment is now happening in the MCDI case. In 2017, Yamaha Corporation—in the musical instrument business—began taking measures to develop private business operations in southeastern Tanzania in cooperation with MCDI and the Japan International Cooperation Association (Yamaha nd). Forest Stewardship Council certification attracted Yamaha to the project area because it helps ensure a sustainable supply of mpingo, which Yamaha uses to manufacture some woodwind instruments (Japan International Cooperation Agency (JICA) and Yamaha 2019). In 2018, Sound and Fair Limited completed construction of a sawmill in Nanjirinji A. Certification drew investment because Sound and Fair’s mission is to promote the fair and ethical trade of timber from community forests in Tanzania, which FSC certification promotes.

We conclude that, despite high transaction costs (Frey et al. 2021), FSC certification holds potential to promote the success of community forestry with CFEs that produce timber when other success factors are present by strengthening many of these factors. Whether certification in and of itself is a success factor is unclear. We did not compare certified and uncertified community forests in the MCDI project area. Nor is there sufficient literature from other countries to support such a finding. The literature that does

exist suggests that the benefits of certification for community forestry and CFEs are either uncertain or mixed, may be outweighed by its costs, and depend on other factors influencing successful operation (Frey et al., 2021). Additionally, certification often requires long-term technical and financial support from external organizations to be successful (Markopoulos 2003, Humphries and Kainer 2006, Hajjar 2013, Burivalova et al. 2017).

To our knowledge, the model of community forestry that includes CFEs based on commercial timber production has yet to develop in Africa other than in Tanzania and Cameroon. Although there have been benefits, overall the Cameroon experience has largely been considered a failure (Movuh and Schusser 2012, Oyono et al. 2012, Lescuyer et al. 2016, Piabuo et al. 2018). The MCDI case offers insights for community forestry elsewhere in Tanzania, in Cameroon, and in other African countries seeking to pursue this model. These include:

- establishing large community forests where possible;
- ensuring community forests contain a substantial quantity of merchantable timber;
- enacting policies that promote secure tenure over community forests, exclusive rights to manage them, and retention of benefits;
- providing early, tangible, and locally supported social and economic benefits to community members;
- engaging partner organizations over the long term to provide financial and technical assistance;
- providing support from government entities to backstop village institutions in enforcing rules; and
- adopting certification, where possible and appropriate, to reinforce success factors.

CONCLUSIONS

This article investigates success factors for community forestry with timber-producing CFEs in southeastern Tanzania through a comparison of 14 FSC-certified community forests. It finds that to optimize success, this model of community forestry must exhibit features associated with both successful community forestry and successful small-scale forest-based enterprises. If only some success factors are operative, outcomes are likely to be compromised. Success factors for community forestry and small-scale forest-based enterprises identified in the literature—largely from Asia and Latin America—also apply to the Tanzanian case. Forest Stewardship Council certification reinforces several of these success factors and contributes to investment readiness, helping draw financial investors and improve community forestry outcomes.

Community forestry and CFEs in southeastern Tanzania continue to develop. Despite challenges, the 14 community forests we studied have been relatively successful in achieving desired outcomes where there is broad community support. This community support is heavily dependent on current and future prospects for generating revenue through timber-based CFEs to fund community development projects that provide tangible benefits to community members. Revenue generation in turn relies on having a high natural endowment of timber, good governance,

effective forest management institutions, secure forest tenure, a strong support organization, a favorable policy environment, and markets for products.

This article contributes to the literature on success factors in community forestry and CFEs in six ways. First, it uses a locally defined measure of success for evaluating it and points to the importance of critically assessing the use of financial measures of success. Second, it takes a comprehensive look at success factors rather than focusing on one type (e.g., governance institutions, business operations), as is common in the literature (Baynes et al. 2015). Third, it examines both biophysical and social factors influencing success (much of the literature focuses only on social factors; Baynes et al. 2015, Hajjar et al. 2016). Fourth, it highlights the importance of having a large and high-quality endowment of forest resources in community forests where CFEs are established. Fifth, it explores the role of FSC certification in contributing to the success of community forestry with CFEs. Finally, it provides a case from Africa to broaden the existing knowledge base and provide insights that can inform future community forestry initiatives there.

Responses to this article can be read online at:

<https://www.ecologyandsociety.org/issues/responses.php/13101>

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Data Availability:

The data/code that support the findings of this study are available on request from the corresponding author, SC. None of the data/code are publicly available because of restrictions that could compromise the privacy of research participants. Ethical approval for this research study was granted by the Mpingo Conservation and Development Initiative and the Tanzania Commission for Science and Technology.

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Appendix 1. Methods and research instruments used in this study

A. Financial analysis methods

To conduct the financial analysis, we sought comprehensive income and expense data related to the 14 FSC-certified community forests for the five most recent fiscal years (FY 2013-14 to 2017-18). FY 2017-18 was an appropriate cut-off as it was the last year before MCDI began full-scale implementation of a portable sawmill and kiln for adding value to standing timber. Up through 2017-18, all of the community forest enterprises primarily sold standing timber to third parties. Data were available from before 2013-14 for some, but not all, community forests. Although five years is a relatively short period of time for trend analysis, it is sufficient for understanding general status. This study reports revenue data but not expense data; the following methods pertain to revenue calculations.

We examined financial data regarding revenues received by Village Natural Resource Committees (VNRCs) from timber harvests and other sources (income), and transfer payments from the VNRC to the Village Council for the benefit of the community (community transfer payments). All VNRCs record their expenses and revenues in ledgers maintained on site in village offices, in the Kiswahili language, using Tanzanian Shillings as the monetary unit. For auditing purposes, MCDI annually compiles these expense and revenue data from each community forest by activity type and translates them to English. We used these annual MCDI compilations for the financial analysis. We obtained the compilations during site visits to the MCDI office in Kilwa Masoko during October/November 2017 and July 2018. A few years had missing information or questionable data; in these cases MCDI staff returned to the villages to compare the compilations to the original ledgers for verification and to fill in data gaps. We obtained additional data to fill in gaps and clarified data quality issues during late 2018 and 2019 via email and skype calls with MCDI staff. Three of the community forests were not in the FSC group certificate for the entire five-year period, and were excluded from the analysis in those years: Machemba and Sautimoja (2013-14), and Namatewa (2013-14 through 2015-16). Other community forests had no accounted VNRC costs or revenues for entire years that they were in the FSC group certificate. MCDI staff indicated that the VNRCs most likely had no revenues in these years. For years when revenue was generated, the financial compilations recorded the sources, which were divided into two main categories: timber sales and other. Timber sales accounted for 96% of total revenues. These were reported by sales volume in cubic meters, price per cubic meter, and total sales price. Other revenue sources included fines, fees, and sales of other products (such as non-timber forest products or auction of tools or timber confiscated from illegal loggers).

Financial compilations also included the community transfer payments from the community forest account to the village account for community development projects. Generally, these were a fixed percentage (often 50%, but variable by village) of the revenue received. Occasionally, the VNRCs would make *ad hoc* additional payments for community projects, which were recorded in the financial compilations and added to community payments for our analysis.

Monetary values in Tanzanian Shillings for each fiscal year were converted to United States Dollars (\$) using the exchange rate for December 31 of the relevant year (the approximate midpoint of the fiscal year).

B. Interview guide used for key informant interviews

Factors Influencing Success of MCDI Community Forests: Interview Guide

Interviewee: _____

Position: _____

Length of time in position/in employment: _____

Date: _____

1 – When you think about which FSC-certified community forests are most successful, and which are not as successful, what criteria do you think of for judging success?

2 – Which specific FSC-certified community forests do you think have been most successful to date?

3 – In what ways have these community forests been more successful than others?

4 – Why do you think these community forests have been successful? What factors help to explain their success? (biophysical, social, economic)

5 – Which specific FSC-certified community forests have been least successful?

6 – In what ways have these community forests been less successful than others?

7 – How would you explain the lack of success of these community forests – why haven't they been more successful? (biophysical, social, economic factors)

8 – If you think about which community forests in the MCDI project area that are not yet FSC certified should be added to the FSC group certificate, how would you decide which to add? What criteria would you use to make this decision?

9 – For the community forests performing poorly, what do you see as their future?

- What would help them to improve?
- Do you think they will be dropped from the FSC group certificate? Why?

10 – Do you have any final thoughts you'd like to share?

C. Survey methods and instrument

The process of becoming and staying certified by the FSC involves numerous activities, and creates potential costs and benefits, some of which are monetary in nature and some of which are not. We conducted a survey of Village Natural Resource Committee (VNRC) members to obtain information about their perceptions of certification and its advantages and disadvantages. The survey targeted VNRC members rather than village residents as a whole because these individuals are most familiar with certification, being responsible for community forest management. Consultations with MCDI staff led us to believe that most village residents would have only superficial, if any, understanding of certification and its implications.

The survey had both quantitative and qualitative components and was developed jointly with MCDI. To meet certification standards, VNRCs must conduct specified forest management activities designed to encourage and monitor sustainable forest management and promote safe working conditions (Table A1.1). For each of these activities, we asked respondents whether they thought they were worthwhile or not by providing one of four responses: 1) cost and difficulty of the activity outweighs the benefits of the activity; 2) is equal to the benefits; 3) benefits are greater than the costs and difficulty; or 4) don't know. We tested a 5-point Likert scale for responses during our pilot survey work, but found it was difficult for people to make finer distinctions in their responses, rendering them not meaningful.

Table A1.1. Forest management activities associated with FSC certification included in the survey

Variable	Description
Forest patrol	Conduct forest patrols to monitor activities occurring in community forest and ensure no prohibited activities are taking place
Supervise timber harvest	Supervise tree harvesting to ensure that harvests comply with specifications laid out in timber sale contracts
First aid provider	Ensure first aid provider is on site during tree harvesting in case of injury
Early burning	Perform burning of understory vegetation in community forest early in the dry season to prevent high-intensity wildfire later in the season
Bird monitoring	Monitor specific bird species populations and distribution as an indicator of biodiversity
Road repair and maintenance	Repair and maintain community forest road system to facilitate access and transportation of wood products. Keep roads accessible to prevent diversions around obstacles
Record keeping	Maintain administrative records associated with community forest activities and finances, up to the standard prescribed by government rules and the certification body
Training	Participate in trainings on forest administration, planning, management, and certification

A second series of statements asked respondents about their perceptions of potential benefits and challenges of FSC certification. The potential benefits and challenges were identified in advance through review of the literature (Burivalova et al. 2017, Humphries and Kainer 2006, Molnar 2004, Quaedy et al. 2014, Romero et al. 2017, Wiersum et al. 2013) and discussion with MCDI staff and others (Table A1.2). Potential positives and negatives were asked in the order shown in Table A1.2, which mixed positives and negatives. We asked survey respondents to rate the frequency of the various potential benefits and challenges using a 4-point scale (never, rarely, mostly, always, or unsure/don't know).

Table A1.2. Potential benefits and challenges of certification included in the survey

Variable	Description
Attract buyers	Certification helps us attract timber buyers.
Price premium	Timber buyers are willing to pay more than the government price for wood from our VLFR.
Better administration	Because of certification, we do administrative tasks better.
Expensive	Certification is very expensive.
Pride	Certification brings pride to my village.
Dependent on donors	Certification makes my village depend on help from organizations like MCDI.
Attract visitors	Certification helps us attract visitors to our village.
Restricts timber sales	Certification limits the places where, and amount of wood that, the VNRC can sell.
Manage differently	Without certification, we would manage our forest differently.
More work	Certification creates too much work for the VNRC.
Better recognition	Because of certification, we are better recognized by the government (district, regional, or national).
Complexity	It is difficult to understand the requirements of certification.

The qualitative survey questions aimed to get respondents to explain what they viewed as the costs and benefits of the forest management activities required to meet certification standards; to probe their understanding of FSC certification and how certified VLFRs differ from those that are not certified; and whether they saw value in continuing to have a FSC-certified VLFR, and why. We also asked for their suggestions about how VLFRs could become more financially self-sustaining, and how VNRCs could obtain more money to cover the costs of forest management and certification, of which MCDI currently pays the majority.

The survey was conducted in all 14 villages with VLFRs that are part of the FSC group certificate. Our goal was to survey 50% of VNRC members in each village. We obtained lists of VNRC members' names from MCDI or on site in the villages, numbered them, and then randomly selected names from each village list using a random numbers table. If someone was unavailable while researchers were in the field or did not give their informed consent to be surveyed, we randomly selected alternates. Each person who participated was compensated for

their time (5,000 T Sh), per MCDI protocol. Altogether, we surveyed 132 VNRC members from the 14 villages; 87 men and 40 women (5 missing gender data).

The survey was administered by two MCDI staff members in Kiswahili. The Forest Service researchers worked with MCDI to develop the survey, pilot test it in four villages (two in November 2017, two in July 2018), and train MCDI staff on implementation in July 2018. A team of two MCDI staff members administered the survey between July and November 2018. While the survey was being administered, one team member entered responses to the quantitative questions into Open Data Kit software that was loaded onto their cell phone, while the other wrote responses to the qualitative questions in a notebook.

The quantitative data were downloaded to Excel and analyzed for statistically-significant differences in mean response levels between variables using STATA's Wilcoxon signed-rank test. We also used STATA's ordered logistic regression to test for influences of various respondent- and village-level factors on the responses. We tested for potential effects of more successful or less successful villages (more successful = Nanjirinji A, Likawage, Liwiti, and Nainokwe; less successful = Tawi, Sautimoja, Nyamwage, Mchakama), between male and female VNRC members, between VNRC officers and non-officers, and between newer (less than 5 years) and longer-term (5 or more years) VNRC members.

The qualitative data were translated into English by MCDI staff who administered the survey, and entered into Excel for analysis. We reviewed the responses to each question, identified response categories/key points, and quantified how many respondents mentioned each point. This was possible because many people gave similar responses to the questions. We then synthesized and interpreted the results.

Forest Certification Survey Questions for Village Natural Resource Committee Members¹

Name of village: _____

Date of interview: _____

Person conducting interview: _____

Introduction

The Mpingo Conservation and Development Initiative (MCDI) is collaborating with the United States Forest Service on a research project about Village Land Forest Reserves (VLFRs)² in Kilwa, Rufiji, and Tunduru Districts. The purpose of this survey is to better understand the costs and benefits of forest certification by the Forest Stewardship Council (FSC). This will help villages make better decisions about FSC certification going forward. We are asking how Village Natural Resource Committee (VNRC) members in several villages view activities related to the VLFR, and FSC certification in particular. Your participation in this research is voluntary. You may choose to stop the survey at any time, or ask the interviewer to destroy the records of your interview. All information gathered will be kept confidential, but we will ask for your name in case we have any follow up questions later on. Nobody other than the people participating in today's meeting with you, MCDI staff members, and the U.S. Forest Service researchers will see this information, and they will not share it with anyone else. For reporting, your answers will be combined with those of everyone else who is surveyed in this village. The survey has 30 questions and should take approximately 1 hour of your time, for which you will be paid.

Are you willing to participate in the survey?

Yes No

If no, stop the interview.

¹ A Kiswahili version of this survey was administered in the field. It is available from the lead author upon request.

² VLFR is the Tanzanian term for community forest.

I. Introductory Questions [open ended]

1. What is your name?
2. Circle whether male or female: M F
3. What is your position on the VNRC?
4. How long have you served on the VNRC?
5. Your village has a VLFR. Many villages in Tanzania have VLFRs. But the VLFR in your community is “certified” by the Forest Stewardship Council, an international organization. What is your understanding of what certification means? How is a certified VLFR different from a VLFR without any certification? (Record response in detail.)

II. Costs and Benefits of Specific Management Activities

Your committee conducts many activities that are required in order to have a VLFR certified by the FSC. These activities have costs, such as the money the VNRC pays people to do them, and the time and effort that it takes. These activities may also provide benefits to the community. Now we are going to ask you some questions about the costs and benefits of these activities. Please choose one answer for each question:

- (a) Not worthwhile (cost more than benefit)
 - (b) Neutral (cost equal to benefit)
 - (c) Worthwhile (benefit more than cost)
 - (d) I don't know
6. Are there benefits of conducting forest patrols? If yes, what are they?
What are the expenses associated with conducting forest patrols?
And what are some of the difficulties or challenges of conducting forest patrols?

Now, if you compare the benefits of doing forest patrols with the expenses and the difficulties, do you think that the costs are greater than the benefits; the costs are equal to the benefits; the benefits are greater than the costs; or you don't know?

7. Are there benefits of supervising tree harvests? If yes, what are they?
What are the expenses associated with supervising tree harvests?
And what are some of the difficulties or challenges of supervising tree harvests?

Now, if you compare the benefits of supervising tree harvests with the expenses and the difficulties, do you think that the costs are greater than the benefits; the costs are equal to the benefits; the benefits are greater than the costs; or you don't know?

8. Are there benefits of having someone provide first aid during forest management activities?
If yes, what are they?
What are the expenses associated with having someone provide first aid during forest management activities?
And what are some of the difficulties or challenges of having someone provide first aid during forest management activities?

Now, if you compare the benefits of having someone provide first aid during forest management activities with the expenses and the difficulties, do you think that the costs are greater than the benefits; the costs are equal to the benefits; the benefits are greater than the costs; or you don't know?

9. Are there benefits of conducting early burning? If yes, what are they?
What are the expenses associated with conducting early burning?
And what are some of the difficulties or challenges of conducting early burning?

Now, if you compare the benefits of conducting early burning with the expenses and the difficulties, do you think that the costs are greater than the benefits; the costs are equal to the benefits; the benefits are greater than the costs; or you don't know?

10. Are there benefits of conducting the bird monitoring work? If yes, what are they?
What are the expenses associated with conducting bird monitoring?
And what are some of the difficulties or challenges of conducting bird monitoring?

Now, if you compare the benefits of doing bird monitoring work with the expenses and the difficulties, do you think that the costs are greater than the benefits; the costs are equal to the benefits; the benefits are greater than the costs; or you don't know?

11. Are there benefits of conducting road building and maintenance in the VLFR? If yes, what are they?
What are the expenses associated with conducting road building and maintenance in the VLFR?
And what are some of the difficulties or challenges of conducting road building and maintenance in the VLFR?

Now, if you compare the benefits of doing road building and maintenance in the VLFR with the expenses and the difficulties, do you think that the costs are greater than the benefits; the costs are equal to the benefits; the benefits are greater than the costs; or you don't know?

12. Are there benefits of doing the required record keeping? If yes, what are they?

What are the expenses associated with doing the required record keeping?

And what are some of the difficulties or challenges of doing the required record keeping?

Now, if you compare the benefits of doing the required record keeping with the expenses and the difficulties, do you think that the costs are greater than the benefits; the costs are equal to the benefits; the benefits are greater than the costs; or you don't know?

13. Are there benefits of participating in required training activities? If yes, what are they?

What are the expenses associated with participating in required training activities?

And what are some of the difficulties or challenges of participating in required training activities?

Now, if you compare the benefits of doing required training activities with the expenses and the difficulties, do you think that the costs are greater than the benefits; the costs are equal to the benefits; the benefits are greater than the costs; or you don't know?

III. General questions about FSC Certification

For each of the following statements, please tell us whether you agree or disagree with them. If you agree, please tell us how often you think each of these statements is true:

(a) Never

(b) Rarely

(c) Mostly

(d) Always

(e) Unsure/Don't know

(If they offer an explanation for why they have answered the way they have, write it down.)

14. FSC certification helps us attract more timber buyers.

15. Timber buyers are willing to pay more than the government price for wood from forests that have FSC certification.

16. FSC certification causes us to do general administrative tasks better.

17. FSC certification is expensive to obtain and maintain.
18. FSC certification makes me proud of my community.
19. FSC certification makes my community dependent on partner organizations and financial donors, such as MCDI.
20. FSC certification helps us attract more visitors to our community.
21. FSC certification restricts where and how much timber we can sell.
22. We would manage our forest differently if we did not have FSC certification.
23. FSC certification creates too much work for the VNRC.
24. FSC certification gives us better recognition and support from the government (district, regional, or national).
25. It is difficult to understand the requirements of FSC certification.

IV. Final Wrap Up Questions [open ended]

26. Are there any other costs or benefits of FSC certification that we haven't talked about that you would like to mention?
27. If you could choose to continue or discontinue the FSC certification, what would you choose? Why?
28. MCDI has been helping your village pay some of the costs of forest management and forest certification. But it would be better if the village could be financially independent, and pay these costs itself. Right now, does your VNRC have enough money to pay for these expenses by itself?

If not, what ideas do you have for how the VNRC could get more money to pay for forest management and certification?
29. If your community did not receive technical support from MCDI, would it be able to continue managing the VLFR, and maintaining certification, independently? Why or why not?
30. Do you have any final thoughts you would like to share about your VLFR?

We are done. Thank you!

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