

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, Quaedvlieg 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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