

Contents lists available at ScienceDirect

Forest Policy and Economics



journal homepage: www.elsevier.com/locate/forpol

Community perceptions: A comparative analysis of community participation in forest management: FSC-certified and non-certified plantations in Mozambique

Mohammed B. Degnet^{a,*}, Edwin van der Werf^{a,b}, Verina Ingram^c, Justus Wesseler^d

^a Environmental Economics and Natural Resources Group, Wageningen University and Research, Hollandseweg 1, 6706 KN Wageningen, the Netherlands

^b CESifo, 81679 Munich, Germany

^c Forest and Nature Conservation Policy Group, Wageningen University and Research, Droevendaalsesteeg 3, 6700 AA Wageningen, the Netherlands

^d Agricultural Economics and Rural Policy Group, Wageningen University and Research, Hollandseweg 1, 6706 KN Wageningen, the Netherlands

ARTICLE INFO

JEL codes: L20 M14 Q01 Q15 Q23 Q24 Keywords: Forest plantations Forest plantations Forest certification Responsible forest management Weak participation Mozambique

ABSTRACT

With the increasing expansion of large-scale forest plantations in developing countries, concerns are rising about relationships between plantations and local communities. Community participation in forest plantation management can improve relationships between forestry companies and adjacent communities and affect the distribution of benefits from plantations. The social dimension of the Forest Stewardship Council's (FSC) responsible forest management standard targets the participation of local communities in plantation management. Using household survey data from villages adjacent to plantations owned by two private forest companies in Mozambique, we assess households' perceptions about their participation in plantations' activities. We compare the perspectives of households in villages adjacent to FSC-certified plantations with those of households in villages adjacent to non-certified plantations. Our quantitative analyses show that communities adjacent to the certified plantations are more likely to perceive that they participate in activities of plantations. In terms of socioeconomic characteristics, male-headed households and households with plantation employees were more likely than their counterparts to participate in plantations' activities. However, we did not find statistically significant relationships between the perceptions of communities near the certified plantations and those near the noncertified plantations regarding their satisfaction with their participation, the extent to which they consider the plantation a 'friendly good neighbor' and whether households have benefitted from the plantations. Our results suggest that market-based approaches of forest governance, such as forest management certification, can complement state policy towards responsible forest management.

1. Introduction

Since the 1990s forest certification has gained importance as a market-based, non-state forest governance system to promote sustainable forest management (SFM) (Arts, 2014; Cashore, 2002; Cashore et al., 2007). SFM is generally defined as maintaining and enhancing the economic, social and environmental values of all types of forests, for the benefit of present and future generations (UN, 2007). Forest certification seeks to encourage forest owners to comply with standards of SFM through the provision of financial or reputational incentives (Ehrenberg-Azcárate and Peña-Claros, 2020; Miteva et al., 2015). Incentives include price premiums and increased market access for certified products by appealing to consumers' preferences towards certified forest products on

the basis of their social, economic and environmental attributes (Blackman and Rivera, 2011; Ehrenberg-Azcárate and Peña-Claros, 2020; Nussbaum and Simula, 2013; van der Ven and Cashore, 2018). The most prominent forest certification schemes in the world are the Forest Stewardship Council (FSC) and the Programme for the Endorsement of Forest Certification (PEFC), with a total certified area of about 219 million ha and 330 million ha, respectively (FSC, 2022; PEFC, 2022). In Africa, FSC is the dominant scheme with a total certified forest area of about nine million ha as of May 2022 (FSC, 2022). FSC is an independent global not-for-profit organization that sets standards and criteria for responsible forest management (FSC, 2018).

With the increasing expansion of large-scale forest plantations in developing countries, concerns are rising in particular about the

* Corresponding author. *E-mail address:* mohammed.degnet@wur.nl (M.B. Degnet).

•

https://doi.org/10.1016/j.forpol.2022.102815

Received 15 September 2020; Received in revised form 13 July 2022; Accepted 14 July 2022 Available online 24 August 2022

1389-9341/© 2022 The Authors. Published by Elsevier B.V. This is an open access article under the CC BY-NC-ND license (http://creativecommons.org/licenses/by-nc-nd/4.0/).

relationship between plantations and adjacent local communities endangering SFM (Dare et al., 2011; Szulecka et al., 2016). For example, Dare et al. (2011) indicated that rapid expansion of plantations were associated with perceived environmental and social impacts by communities. Another concern was related to plantations' handling of their relations with adjacent communities (Dare et al., 2011). Forest certification can potentially improve social aspects of forestry operations such as plantation-community relations (Cubbage et al., 2010). For example, the FSC standard of responsible forest management has a strong social aspect that purports to improve relationships between forest owners and local communities (Cerutti et al., 2017; Payn et al., 2015). Principle 4.2 of the community relations standard of FSC states that "the organization shall recognize and uphold the legal and customary rights of local communities to maintain control over management activities within or related to the management unit to the extent necessary to protect their rights, resources, lands and territories" (FSC, 2018; Payn et al., 2015). The organization refers to "the person or entity holding or applying for certification and therefore responsible for demonstrating compliance with the requirements upon which FSC certification is based" and the management unit is" a spatial area or areas submitted for FSC certification with clearly defined boundaries managed to a set of explicit long term management objectives which are expressed in a management plan." (FSC, 2015).

Whether forest certification is associated with positive changes in outcomes of forest management has been contested (Romero et al., 2017; Tricallotis et al., 2018). While some studies found no or little evidence of improved outcomes in forest management associated with certification (Blackman et al., 2018; Doremus, 2019; McCarthy, 2012; Stringer, 2006), others have documented a positive role of forest certification in enhancing positive outcomes of forest management (Cerutti et al., 2017; Cubbage et al., 2010; Dare et al., 2011; Degnet et al., 2020; Miteva et al., 2015; Rametsteiner and Simula, 2003; Tsanga et al., 2014). For example, McCarthy (2012) contends that FSC certification did not improve community participation in Indonesia. Blackman et al. (2018) used rich forest management unit-level panel data along with matched difference-in-differences models and found no evidence that FSC certification affects deforestation. Using data from the boundary of a certified and an uncertified forest in the Republic of Congo, Doremus (2019) found no evidence of increased material wealth associated with forest certification. On the other hand, Miteva et al. (2015) used triple difference matching estimators to compare the performance of FSC-certified and non-certified timber concessions. The authors reported that FSC certification reduced aggregate deforestation, firewood dependence, respiratory infections and malnutrition. Furthermore, Heilmayr and Lambin (2016) reported that nonstate, market-driven (NSMD) governance regimes such as FSC certification improved environmental outcomes and reduced deforestation in Chile. In addition to these inconclusive and contradicting findings, some of these studies (Cubbage et al., 2010; Dare et al., 2011) rely on interviews with plantation managers and key informants, with little emphasis on local communities. Local communities are communities of any size that are in or adjacent to a forest plantation, and also those that are close enough to have a significant impact on the economy or the environmental values of the forest plantation or to have their economies, rights or environments significantly affected by the management activities or the biophysical aspects of the plantation (FSC, 2015). Using a qualitative study of plantation managers and community members together with a document analysis of relevant regulations and forest certification standards, Dare et al. (2011) found that forest certification improved community engagement processes in plantation management in Australia. In a study of impacts of forest management certification in Argentina and Chile, Cubbage et al. (2010) found that certified forest plantations reported improved community relations.

There is a dearth of quantitative studies on the relationship between forest certification and community participation in management of private forest plantations in the global south. Motivated by the finding

that households nearby FSC-certified privately owned plantations were more likely than households nearby a non-certified, state-owned plantation to participate in the activities of plantations in Tanzania (Degnet et al., 2020), this study empirically explores the correlation between FSC-certified forest plantations and community participation in plantation management in rural Mozambique. Unlike the study by Degnet et al. (2020), we compare community participation in the context of private forest plantations that fall under different certification status. Specifically, we compare the perceptions of households about their participation in the activities of plantations in villages adjacent to FSCcertified, private forest plantations with those in villages adjacent to non-certified, private plantations. This comparative approach enabled us to separate the specific correlation between forest certification and community participation from ownership of plantations. In addition, we study the relation between households' socio-economic characteristics (sex, age, level of education and income) and their perceived participation in plantation management. This is novel because while studies have documented correlations between socio-economic characteristics (sex and income) and participation in the management of community and natural forests (Agrawal and Gupta, 2005; Ribot et al., 2010; Szulecka et al., 2016), it is not known whether or not this is the case in largescale private forest plantations. To explore the role of socioeconomic factors in community participation, we examine whether or not the experiences of households about their participation in the activities of plantations vary across socio-economic characteristics.

The study thus seeks to add to the scant literature on relationships between forest certification and community engagement in plantation management in two ways. First, we quantitatively assess the correlations between forest certification and community participation in forest plantation management. Unlike previous studies (Cubbage et al., 2010; Dare et al., 2011), we use a large sample of household data collected in two villages adjacent to large-scale FSC-certified and two villages adjacent to non-certified private plantations in Mozambique. This quantitative analysis provides insights about the perspectives of the main categories of stakeholders affected by plantations - local communities living adjacent to plantations - regarding their engagement in plantations' management. Improved understanding of the relation between forest certification and community participation in plantations' activities informs the discussions about the role of certification in promoting responsible forest management. Second, we triangulate our quantitative results from household surveys with qualitative analysis of information from focus group discussions in the study villages. The qualitative analysis will complement our quantitative analysis and thereby improve the robustness of our results (van der Ven and Cashore, 2018).

The paper unfolds as follows. In Section 2, we explain the conceptual framework. This is followed by a description of the study context, data and methods of analyses in Section 3. In Section 4, we present the results. We end with discussions and conclusions in Section 5.

2. Conceptual framework

Natural resource governance is concerned with how power and responsibility are used to make decisions that influence how citizens including local communities access, participate and benefit from natural resources (Nunan, 2018). Two major trends that characterize natural resource governance since the 1990s are the increased emphasis on community participation and the uptake of certification schemes that brought the private sector and market-type instruments into governance arrangements (Cashore et al., 2004; Matzdorf et al., 2013; Mwangi and Wardell, 2012; Nunan, 2018). Forest governance is defined as the way in which public and private actors (including large enterprises) and stakeholders negotiate, make and implement decisions about the management of forests (FAO, 2020). Stakeholders include individuals and organizations, such as local communities and indigenous people, with an interest in the products provided by a forest (Nussbaum and Simula, 2013). The concept of forest governance has evolved to comprise various actors at different levels and includes state regulations about the use of forests as well as non-state mechanisms, such as the use of voluntary forest certification to support responsible forest management (FAO, 2020). Forest management is implemented at a forest unit and "deals with the administrative, economic, legal, social, technical and scientific aspects of managing natural and planted forests" (FAO, 2020). FSC recognizes forest owners who comply with predefined standards of responsible forest management. Compliance with standards of FSC is theoretically expected to derive from market benefits of certified plantations and timber (Carlson and Palmer, 2016; Cashore, 2002).

A forest governance approach that gained prominence since the 1990s in the Global South is participatory forestry (Lund, 2015). Participatory forestry refers to a forest governance mechanism that involves people living in and around forests in forest management (Lund, 2015). This approach of forest governance has been advocated by many academics and the international donor community to enhance forest resource sustainability with concerns for peoples' forest based livelihoods and their rights to be involved in forest management (Ostrom, 1990; RIBOT, 2004). Participatory forestry exists in various forms of forest management regimes including decentralized forest management, participatory forest management, joint forest management and community-based forest management (Lund, 2015). Participatory forest management (PFM) or community participation is required and promoted in forest plantation management as part of forest certification (Dare et al., 2011). Principle 3 of the responsible forest management principles of FSC stipulates that forest owners recognize and respect indigenous people's rights. Principle 4.1 of community relations states that "the organization shall identify local communities that are affected by management activities and shall then through engagement with these local communities, identify their customary rights and legal rights and obligations, that apply within the Management Unit." (FSC, 2018). Plantations' investors and shareholders may view compliance with these FSC principles as an indicator of responsible forest management (Garforth et al., 2013). In addition, forest regulations in Mozambique recognize community participation and consultation as rights of communities in the management of nearby forest industries (Mustalahti and Lund, 2009).

Community participation entails various activities depending on the extent of community involvement and power (Arnstein, 1969; Berkes et al., 2000; Freeman, 2010; Handberg, 2018; Ribot et al., 2010). These activities range from community consultation (termed weak participation) to community decision making (termed strong participation) (Handberg, 2018). According to Handberg (2018, p.436), "weak participation is consultation, where stakeholders inform decision makers but have no direct influence over decisions."

This study focuses on weak community participation in the activities of private forest plantations as communities are not expected to have decision-making rights about the management of plantations owned by private companies (Dare et al., 2011; Barrow et al., 2002). We use the perception of households in two villages nearby FSC-certified plantations and two villages nearby non-certified plantations regarding whether they have a say in the activities of plantations as an indicator for community participation in plantation activities. As a follow up question, we asked respondents how they participate in the activities of the plantation company. In addition, we assess households' satisfaction with their participation in the management of nearby plantations and whether households benefitted from plantations operating in their villages. We further developed an additional indicator of community participation based on insights from Good Neighbor Charters (GNCs). GNCs aim at enabling local people to participate in company decisions and practices that can potentially affect local communities or the environment (Dare et al., 2011). Accordingly, we use the response of households regarding whether they consider plantations in their villages as "friendly good neighbour" to assess households' experience with their participation in plantation activities that can potentially affect their communities.

Guidelines for responsible forest management embody principles of participation and equity in managing forests (Capistrano, 2010; European Commission, 2010; FAO, 2011; Finance Alliance for Sustainable Trade, 2014; Lawson and MacFaul, 2010). Increased capacity for consultation and collaboration with local communities is identified as one of the social impacts of certified forests (Nussbaum and Simula, 2013). The Engagement pathway is one of FSC's pathways for reaching its objective of enhancing socio-economic values of forest management (FSC, 2015). The Engagement pathway states that FSC brings together stakeholders with opposing interests in forests to identify risks, opportunities and solutions related to forest management (FSC, 2015; Kalonga and Kulindwa, 2017). It is envisaged that discussion and consensus among a broad set of stakeholders results in broadly supported implementation of responsible forest management, initiating relevant improvements in certified forestry operations (Kalonga and Kulindwa, 2017). Since FSC certification requires community engagement in forest management, we expect households in villages nearby FSC-certified plantations to be more likely to participate in the plantations' activities than households in villages nearby non-certified plantations. Similarly, we expect households in villages nearby certified plantations to be more likely to report satisfaction with their participation in the plantations' activities. In addition, we expect households in the villages adjacent to the certified plantations to be more likely than households adjacent to the non-certified plantations to consider the plantation in their village as "a friendly good neighbor" and report that they benefited from the plantations.

Responsible forest management entails opportunities for participation by all community members (FAO, 2020). However, studies on community participation in community-owned and natural forests have shown that socio-economic characteristics are correlated with the likelihood of villagers to participate in forest management. Agrawal and Gupta (2005) found that the likelihood of participation in environmental management is positively related with wealth and social status while it is negatively related with education. Ribot et al. (2010) reported that social stratification dictates who participates in forest governance. Szulecka et al. (2016) observed that an FSC-certified forest plantation company was positively rated by stakeholders in terms of participation (access to training and information regarding the plantation to workers). Degnet et al. (2020) found that male-headed households, and households with plantation workers, were more likely than their counterparts to participate in plantations' activities in Tanzania. Following the findings of these studies, we expect that male-headed households, richer households and households with plantation workers to be more likely than their counterparts to participate in the activities of plantations.

3. Study context and methods

3.1. Overview of forest governance policies in Mozambique

Mozambique is endowed with a significant amount of forest cover. By 2015, the country's natural forest cover was estimated to be around 34 mill. ha (about 43% of the total land area) while its planted forest cover was around 75,000 ha (FAO, 2015; World Bank, 2018). The country's share of planted forests are expected to increase further in the face of depletion of natural forests (FAO, 2015). The World Bank (2018) estimates 267,000 ha (0.79%) of forests are lost per year in the country. Mozambique has favorable conditions, such as growing regional and international demand for forest products and availability of land, for the expansion of forest plantations. The country's National Reforestation Strategy envisages to increase the country's plantation area to more than one million ha by 2030 which would generate 250,000 jobs and create US\$1.5 billion worth of manufactured products and exports (World Bank, 2018). The Land Law of 1997 of Mozambique recognizes communities' rights to land and puts community consultation as a requirement when assigning rights of use to another party. The Forest and

Wildlife Law of 1999 establishes state ownership of forests and wildlife (Mustalahti and Lund, 2009). It promotes the establishment of forest industries and export of manufactured wood products. The Law delineates the rights and benefits of forest-dependent local communities, covering subsistence level use of resources, participation in the comanagement of forest resources, and community consultation and approval prior to allocation of exploitation rights to third parties. It establishes two types of licenses for legal timber production: forest concessions and simple licenses. Forest concessions are granted to domestic and foreign operators for areas larger than 20,000 ha with an approved management plan, and can be allocated for up to 50 years. Concessionaires are required to have an annual harvesting license which specifies the volume and species they fell. The Law outlines development benefits (such as, investments in village infrastructure) derived from timber production under a concession regime. Simple licenses offer harvesting quotas of 500 cubic meters per year or less across 10,000 ha for five years and exclusively to domestic operators. While these simple licenses require a simplified management plan, no area mapping takes place; essentially it is a harvesting license (Mustalahti and Lund, 2009).

The 2002 Forest and Wildlife Regulation states that all timber operators, whether concessionaires or simple license operators, must consult with local communities and receive permission from these in order to exploit forest resources, and give precedence to local community members when employing relevant staff. The 2002 Regulation also creates local councils for the management of natural resources, composed of all relevant parties to timber trade, including local communities, all of whom are tasked with overseeing all timber operations in concessions and simple license areas. The Local Councils may suggest improvements to legislation and to forest management. In spite of this Regulation, forest governance in Mozambique in general has been characterized by a central government favoring commercial timber exploitation at the expense of communities' rights (Mustalahti and Lund, 2009).

3.2. Forest plantation management and community participation in Mozambique

The forest plantation sector in Mozambique is promising and has been recognized as a focal area for economic development by the government (World Bank, 2018). It is estimated that about 3.5 million ha of land is considered suitable for forest plantations in the central and northern areas of the country. The involvement of communities in plantation management is considered crucial for the future of plantation forestry in Mozambique (Serzedelo de Almeida and Delgado, 2019). Managing the relationship between plantation companies and communities poses a challenge and poor community engagement is considered one of the barriers for the expansion of forest plantations (Serzedelo de Almeida and Delgado, 2019). The case of Mozambique is relevant because the legislative framework for participatory forest management (PFM) in the country has limitations in terms of extending rights and powers to local communities, and the productive forest areas are reserved for private-sector development while the role of local communities is not clearly defined (Nhantumbo, 2000). Against this background, our empirical study purports to assess the correlation between the market-based instrument of FSC certification and perceived community engagement in plantation management.

3.3. Data collection

We used a multi-stage sampling technique for the selection of households for data collection. In the first stage, we identified Niassa and Nampula provinces as areas which have seen rapid expansions of plantations in Mozambique. The selection of the study villages was guided by the following criteria: proximity to forest plantations; plantations had started operations (such as planting trees and undertaking community projects) in the villages; plantations employ local villagers;

and sufficient distance (minimum of nine hours' drive by public transport) between the villages adjacent to the FSC-certified and the noncertified plantations to reduce spill-over effects. We identified villages that fulfil these criteria with the use of maps, company documents and information from plantation managers. Three of the study villages (Malulu, Naconda and Namuanica) are located in Niassa province and one (Namina) is located in Nampula province (Fig. 1). Malulu and Namina are adjacent to FSC-certified private plantations and Naconda and Namuanica are adjacent to non-certified private plantations. In the second stage, we obtained a list of households for each village from the village chiefs. We then selected every third household on the list for our survey. Accordingly, we selected 80 households in Malulu, 80 households in Namina, 63 households in Naconda and 103 in Namuanica to participate in the survey. In each household, we interviewed the household head as designated by the household. If the household head was not present at the time of the interview, we interviewed an adult member of the household after discussing with the household regarding the ability of the person to answer the questions.

The FSC-certified plantations (the Mecuburi forest plantation in Nampula province and the Malulu forest plantation in Niassa) are forest concessions owned by Green Resources AS (GR hereafter), a privatelyowned forest company operating in East Africa. Between 2006 and 2016, the company developed about 20,000 ha of standing eucalyptus and pine trees in Mozambique on about 252, 000 ha of land. It acquired the rights to use the land on a 50 year concession basis, renewable for the same period, after community consultations and final approval by the Council of Ministers in 2009 (Green Resources, 2017). The non-certified plantations (Naconda and Namuanica) were owned by Florestas De Niassa, a private plantation project of the Rift Valley Corporation. Florestas de Niassa started in 2006 in north-western Mozambique and had planted over 7000 ha of eucalyptus and pine trees between 2010 and 2016, on greenfield land (Rift Valley Corporation, 2016).

Data were collected between February and April 2016 through structured questionnaires from 326 households and through focus group discussions (FGDs). We collected data on the socio-demographic and economic characteristics of households and their perceptions about their participation in the activities of plantations adjacent to their villages. The activities of plantations include planting trees, tree management practices, community development projects and production of wood products. We asked respondents whether they have a say in the activities of the plantations and to rate their satisfaction with their say in plantations' activities on a five point Likert scale (1 = very dissatisfied, ..., 5 = very satisfied). We use households' responses regarding having a say as a proxy for their participation in plantation activities. As a follow up question, we asked respondents: "how do you have your say in the activities of the plantation company?" We further asked respondents to rate their agreement with the statement: "The plantation company is a 'friendly' good neighbor." on a five point Likert scale (1 = strongly)disagree, \dots , 5 = strongly agree), and whether they agree that their household has benefitted from the plantation. Benefits from plantations include community development projects such as schools and health centres, support by plantations in land registration of households and obtaining birth certificate. The survey questions are provided in Table A1 in Appendix A. The questionnaires were first prepared in English and then translated into Portuguese. The paper questionnaires were converted into tablet versions using the Open Data Kit (ODK) software and were pretested with five households in Malulu village. The survey was administered by two enumerators per respondent to minimize bias and errors from fatigue. A focus group discussion (FGD) was held using semi-structured qualitative interviews in each village to discuss community perceptions about the management of the plantations. To gain a nuanced understanding of what participation exactly entails and how communities participate, we asked participants in the FGD in each study village whether villagers were consulted before the plantations started, whether the village has a say in community projects of plantation companies and whether the village has benefitted from the



Fig. 1. Map of study villages, Mozambique.

community projects of plantation companies. In addition, we asked participants the land use type and the land use category of the plantation sites before the establishment of plantations. As our study is based on perceptions of villagers, it is important to get the perspectives of villagers on the opportunity cost of the village land used by the plantations because these perspectives might affect the responses of villagers about other questions regarding the plantations. The World Bank (2018) notes that local community issues should be carefully taken into account in the very early stages of plantation development project during land rights acquisition because the start of forest plantation is the beginning of longterm relationships between local communities and plantation companies. The FGDs took place immediately after the surveys were completed and were intended to complement the results from the household surveys. Village leaders and key informants suggested representative groups of people in the villages (in terms of profession, gender, age and wealth) for the FGD and we selected the final participants in such a way that each group has at least one representative. The focus groups consisted of 10 to 20 individuals to allow for detailed discussion and active participation and lasted on average 1.5 h. The household surveys and FGDs were conducted by enumerators fluent in the local languages, Portuguese and English. Transcripts of the semistructured qualitative interviews were made capturing comments, consensus as well as differences in perceptions reported in the discussions.

3.4. Methods of analysis

Our main analysis draws on the quantitative household survey data. We estimated four logistic regressions with relevant household covariates to assess the perception of households about their participation in the activities of the private, FSC-certified plantations and the noncertified, private plantations. We used the software STATA 15 to estimate the regression models. We clustered the standard errors at the village level because unobservable characteristics of households in a village may be correlated. We checked whether multicollinearity is a problem in the logit regressions using the correlation matrix and the Variance Inflation Factor (VIF). Both show that there is no high correlation between the explanatory variables. The correlation matrix shows that the correlation between the explanatory variables is always lower than 0.5 (in absolute value terms). The VIF of the explanatory variables is always lower than 3 and the mean VIF is 1.68. Thus, multicollinearity is not a concern in the regressions. The correlation matrix and VIF tables are given in Tables A2 and A3 respectively in Appendix A. The dependent variables include responses to the following four survey questions which serve as the proxies of outcomes of community participation in forest management:

- 1. Do you have a say in the activities of the plantation company in your village? (1 = yes and 0 = no);
- If yes to 1, to what extent are you satisfied with your say in the activities of the plantation company? (5-point Likert scale ranging from 1 = very dissatisfied to 5 = very satisfied); As this question is asked to

only those respondents who replied "yes" to question 1, the regressions related to this dependent variable is performed on very few observations (32, see Column (b) of Tables 2 and 4). A rule of thumb in econometrics is to have at least 5 and preferably 10 or more observations per explanatory variable. Otherwise, the standard errors could be very large, which would lower the statistical power of the estimated model. However, our regression models are not completely saturated, i.e., we have more observations (32) than parameters to fit (14 and 16 respectively in Tables 2 and 4), thus we can obtain asymptotically unbiased parameter (slope) estimates (Kelley and Maxwell, 2003).

- 3. To what extent do you agree with the following statement: "The plantation company is a 'friendly' good neighbor."? (5-point Likert scale ranging from 1 = strongly disagree to 5 = strongly agree); As the dependent variables related to questions 2 and 3 are based on responses to five-point Likert scale questions, we used an ordered logistic regression model to estimate the relationship between the households in the villages nearby the FSC-certified plantations and the dependent variables.
- 4. Do you agree with the statement: "My household has in general benefitted from the plantation company in my village."? (1 = yes and 0 = no)

Deriving from the theoretical insights of our conceptual framework, we developed the following hypotheses to be tested empirically:

Households in villages adjacent to the FSC-certified private plantations are more likely than households in villages adjacent to the noncertified private plantations:

H1. To perceive to have a say in the activities of the plantations.

H2. To perceive higher satisfaction with their say in the activities of the plantations.

H3. To perceive the plantations in their villages 'a friendly good neighbour'.

H4. To perceive that their household has in general benefitted from the plantation company in their village.

In addition to these quantitative analyses, we analyzed qualitative

data from open questions in the FGDs as follows. First, we reviewed and combined the responses into coded themes, regarding community perceptions about consultation in plantation activities (if they were consulted, how and when), the type of land tenure (customary or formal title, private or state ownership), and land use type of the plantation sites in the villages before the plantations started operations (agriculture, fallow, forest, grassland, residential or other). Then, we organized and summarized the responses based on phrases and keywords related to the themes. In addition, we analyzed information from company documents regarding number and types of forest certifications of the companies as demonstration of responsible forest management and adherence to corporate responsibility standards.

4. Results

4.1. Descriptive statistics of study variables

Table 1 provides the descriptive statistics of the variables used in the study. The table shows that a higher percentage (21%) of households in the villages near by the FSC-certified, private plantations reported to participate in the activities of the plantations (planting trees, tree management practices, community development projects and production of wood products) in their villages as compared to households nearby the non-certified, private plantations (6%). However, on average, those households nearby the FSC-certified plantations who report that they have a say in plantation activities are less satisfied with their participation than households nearby the non-certified plantations. On average, both categories of communities agree with the statement that the plantation in their village is a friendly good neighbor. While 31% of the households in the villages nearby the certified plantations reported that their household benefitted from the plantation company, the percentage is 38% in the villages nearby the non-certified plantations (Table 1).

The households in the two groups of villages have similar sociodemographic and livelihood characteristics. The average age of the household heads and average household size of the households in the two categories of villages are almost similar. The majority of the heads of the households in the study villages are male. Households in villages

Table 1

Descriptive statistics of variables.

Variable	Mean		Std. deviation		Min.		Max.		Ν	
	FSC	Non-FSC	FSC	Non-FSC	FSC	Non-FSC	FSC	Non-FSC	FSC	Non-FSC
A. Dependent variables										
Household has say in the activities of plantations ^a	0.21	0.07	0.41	0.25	0	0	1	1	140	138
Extent of household satisfaction with say in plantation activities b	2.71	3.33	1.01	0.87	1	2	4	4	28	9
Household considers plantation 'a friendly good neighbor' c		3.48	1.08	0.96	1	1	5	5	139	161
Household benefitted from plantation ^d	0.31	0.38	0.46	0.49	0	0	1	1	161	165
B. Household (hh) characteristics										
Age of head (in years)	41.22	43.09	13.98	15.74	18	20	76	82	157	149
Gender of head ($0 =$ female, $1 =$ male)	0.89	0.84	0.31	0.37	0	0	1	1	161	165
Education of head e (1-3)		1.62	0.66	0.59	1	1	3	3	161	165
Household size (in number)		5.39	2.14	2.41	1	1	13	15	161	165
Total farm size (in hectares)	2.39	2.08	3.38	1.45	0.16	0.2	36	8.5	147	154
Employed by plantation $(0 = No, 1 = Yes)$	0.11	0.06	0.32	0.24	0	0	1	1	161	165
Forest use $(0 = No, 1 = Yes)$	0.86	0.98	0.35	0.15	0	0	1	1	159	165
Total hh income (in thousand MZN)	42.56	31.27	102.61	79.25	0.55	0	948	500	127	142
Share of agricultural income (%)	57.45	57.01	44.16	45.97	0	0	100	100	159	165
Share of business income (%)	11.58	8.13	28.99	25.64	0	0	100	100	159	165
Share of forest income (%)	2.89	3.98	12.86	17.55	0	0	100	100	159	165
Share of off-farm income (%)	18.32	11.45	34.64	29.36	0	0	100	100	157	165

Note: ^a binary variable: 1 =Yes, 0 =No.

 $^{\rm b}$ categorical variable:1 = very dissatisfied, 2 = dissatisfied, 3 = neutral, 4 = satisfied, 5 = very satisfied.

^c categorical variable: 1 = strongly disagree, 2 = disagree, 3 = neutral, 4 = agree, 5 = strongly agree.

^d binary variable: 1 =Yes, 0 =No.

^e categorical variable:1 = no schooling, 2 = primary, 3 = Secondary and above.

nearby the certified plantations.

4.2.1. Community perceptions about participation in forest planation

Table 2 presents the odds ratios of the estimated logistic regressions.

Note that we compare the responses from households in two villages

nearby FSC-certified plantations against those from households in two

villages nearby non-certified plantations. The results in column (a) show

a statistically significant positive relation between households living in

the villages adjacent to the FSC-certified plantations and the odds of

households to report that they participate in plantation activities. The

odds ratio of 5.71 implies that the odds of reporting that they participate

in plantations' activities (vis-a-vis not participate) were 471% higher for

communities nearby the FSC-certified plantations than for communities

nearby the non-certified plantations (Column (a) of Table 2). Hence, we

4.2. Econometric results

management

adjacent to the certified plantations farm on average a larger area of land than households in the villages nearby the non-certified plantations. The villages adjacent to the certified plantations have a higher portion of households (11%) with at least one member working at the plantation than the villages adjacent to the non-certified plantations (6%) (Table 1). A higher share of the households in the villages nearby the non-certified plantations than in the villages nearby the certified plantations had collected some forest products (mostly fire wood) in 2015. Households in villages adjacent to the certified plantations on average earned higher self-reported incomes for the year 2015 than households in the villages adjacent to the non-certified plantations. Agriculture was the main source of income in both categories of study villages. In 2015, households in the villages adjacent to the certified plantations earned a larger share of their income from business and off-farm income sources than households in the villages adjacent to the non-certified plantations did. The share of income from forest was higher for households in the villages nearby the non-certified plantations than that of households

Table 2

Odds ratios of estimated logit regressions.

Variables		Household has a say in plantation activities	Extent of household satisfaction with its say in plantation activities	Extent to which household agrees that plantation is a 'friendly good neighbor'	Household benefitted from plantation company	
				(c)		
			(b)			
		(a)			(d)	
FSC-certified (1 =	yes)	5.712*** (3.311)	0.754 (0.543)	0.793 (0.274)	0.931 (0.644)	
Age of head		1.002 (0.022)	0.914*** (0.027)	0.995 (0.004)	0.986*** (0.003)	
Gender of head (1	= male)	- ^a (-)	-	1.039 (0.312)	2.079** (0.759)	
Education of	Primary	0.718 (0.315)	1.197 (1.095)	1.130 (0.262)	1.455 (0.433)	
head ^b	Secondary and	1.742 (1.229)	2.576* (1.349)	1.318* (0.214)	1.021 (0.378)	
	above					
Household size		1.149*** (0.035)	0.914 (0.122)	1.089 (0.840)	1.007 (0.069)	
Total farm size 1		1.077 (0.078)	1.488* (0.347)	0.940** (0.026)	0.922 (0.089)	
Employed by plantation $(1 = yes)$ 5		5.368*** (3.005)	0.484 (0.401)	2.170 (1.041)	4.112*** (1.689)	
Forest use $(1 = yes)$ - ^a		- ^a (–)	-	3.686*** (0.873)	2.313** (0.790)	
Total household income		1.002 (0.001)	0.975 (0.022)	1.007*** (0.002)	1.003 (0.002)	
Share of agriculture income		0.989 (0.014)	1.022*** (0.007)	0.989** (0.004)	0.981*** (0.002)	
Share of business income 0		0.985** (0.007)	1.007 (0.012) 0.982* (0.009)		0.993 (0.008)	
Share of off-farm income 0.		0.992 (0.011)	1.015** (0.007)	0.988* (0.007)	0.981*** (0.004)	
Share of forest income 0.99		0.993 (0.014)	0.914 (0.055)	0.981*** (0.004)	0.972*** (0.007)	
Constant 0.0		0.053*** (0.051)	-	-	0.957 (0.722)	
Pseudo-R ² 0.1		0.177	0.189	0.045	0.130	
Ν		172 ^c	32 ^d	211 ^c	229 ^c	

Note: Robust standard errors in parentheses clustered at village level. *, **, *** signify p < 0.10, p < 0.05 and p < 0.01 respectively. The odd ratios are values across households living in villages adjacent to the two FSC-certified plantations and the two non-certified plantations.

^a 'Gender of head' = 0 (female) is a perfect predictor, i.e., all (19) respondents in the female-headed households answered "No" to the survey question: "Do you have a say in the plantation's activities?" and hence Stata excludes these 19 observations from the regression. Similarly, 'forest use' = 0 is a perfect predictor, i.e., all (10) households who did not collect forest products in 2015 responded "No" to the survey question: "Do you have a say in the plantation's activities?" and accordingly Stata excludes these observations from the regression.

^b Reference category: 'No schooling'.

^c Because some households responded "Do not know" or "Do not want to answer" to some of the survey questions, the estimations were performed on a smaller number of observations than the total number of households interviewed in the survey.

^d As the question in Column (b) is asked to only those respondents who replied "yes" to the question in column (a), the regression in Column (b) is performed on very few observations.

In column (a), the dependent variable is the answer of the respondent to the question: "Do you have a say in the activities of the forest plantation in your village", (1 = yes).

In column (b), the dependent variable is the extent of satisfaction of a household with its say in the activities of the plantation in its village (i.e., if the household reported to have a say in plantation activities). The regression in column (b) is based on 32 observations (N = 32) and contain 14 independent variables (parameters), including the constant. A rule of thumb in econometrics is to have at least 5 and preferably 10 or more observations per explanatory variable. Otherwise, the standard errors could be very large, which would lower the statistical power of the estimated model. However, our regression model is not completely saturated, i.e., we have more observations (32) than parameters (14) to fit, thus we can obtain asymptotically unbiased parameter (slope) estimates (Kelley and Maxwell, 2003).

In column (c), the dependent variable is to what extent a household agrees with the statement: "the plantation in your village is a friendly good neighbor".

As the dependent variables in Columns (b) and (c) are based on responses to five-point Likert scale questions, we used an ordered logistic regression model to estimate the relationship between the households in the villages nearby the FSC-certified plantations and the dependent variables.

In column (d), the dependent variable is the response of a respondent to the question: "Do you agree with the statement: 'My household has benefitted from the plantation company in my village'?", (1 = yes).

find support to our hypothesis regarding the higher likelihood of perceived community participation in FSC-certified plantations than non-certified plantations. Most commonly ways of having a say as cited by the respondents are in meetings and through village chiefs. Respondents who reported that they participate in plantation activities were asked to rate the extent of satisfaction with their participation in the activities of the plantation in their village. The results in column (b) of Table 2 show that there is no statistically significant relation between the odds of households reporting that they are satisfied with their participation in plantation activities and communities nearby the FSCcertified plantations. Similarly, the results in columns (c) and (d) respectively show that there are no statistically significant relations between communities nearby the FSC-certified plantations and the odds of households reporting that they consider the plantation company a 'friendly' good neighbor and that they benefitted from the plantation. Hence, we neither find support nor reject our hypotheses regarding the relation between FSC-certified plantations and household perceptions about their satisfaction with their participation and outcomes related to their perceptions of engagement with plantations (such as sense of 'friendly' good neighbor and benefits to households from plantations).

Regarding the socio-economic characteristics, the results in column (a) of Table 2 show that having a female head of household and not having collected a forest product in 2015 are perfect predictors of reporting not to participate in plantation activities. That is, all female-headed households and all households who did not collect a forest product in 2015 reported that they do not participate in plantations' activities. In addition, large size households and households with at least one plantation worker were more likely to report to participate in the activities of the plantations. For other socio-economic characteristics, we do not find a clear pattern.

4.2.2. Focus group discussions about participation and benefits from plantations

Table 3 reports results from our FGDs and document analysis. While participants in the FGDs in the villages of Namina (adjacent to an FSCcertified plantation) and Naconda (adjacent to a non-certified plantation) reported that village members were consulted prior to the establishment of plantations, participants in the villages of Malulu (adjacent to an FSC-certified plantation) and Namuanica (adjacent to a noncertified plantation) reported that this was not the case. With regard to the land use category of the plantation sites before the plantations were established, FGDs participants in the villages of Malulu, Namina and Namuanica reported that the land before the plantation sites was used for agriculture. In the village of Naconda, it was indicated that the plantation site was grassland before the plantation started (Table 3).

With regard to community participation in community development projects (such as construction of schools, teachers' houses, roads and bridges, health centers and provision of agricultural seeds) implemented by the plantations, only participants in the FGD in one village-Malulu, adjacent to an FSC certified plantation, indicated that they perceive to they have a say in the community development projects of the plantation. These village level results regarding community participation suggest that our results regarding household participation in plantation activities reported in Column (a) of Table 3 might be driven by responses from Malulu. We test whether this is the case in Section 4.2.3. Participants in all villages except Naconda reported that they perceive their villages to have benefitted from the community development projects of the plantations. In Section 4.2.3, we check whether this finding at the village level corresponds to the result obtained from the household survey reported in Table 2.

4.2.3. Robustness checks

As the results in Section 4.2.2 show, FGDs participants in Malulu (nearby an FSC-certified plantation) reported that villagers have a say in the community projects implemented by plantations. Participants in all villages except Naconda reported that their villages have benefitted from the community projects of the plantations. We examined whether the results from the household surveys confirm these findings from the FGDs as follows. We re-estimated the regressions of Table 3 by including a dummy variable for each of the four villages instead of a dummy for the villages nearby the FSC-certified plantations. As FGD participants in Malulu reported having a say in community projects of plantations, we used Malulu (which is located nearby an FSC-certified plantation) as the reference village in the estimations. The results in Column (a) of Table 4 show that respondents in all villages are less likely to state that their household has a say in plantation activities than respondents in Malulu. Even though the odds ratios for Namina (FSC-certified) are less than one (i.e., relative to the odds ratios of Malulu (FSC-certified)), we expect the odds ratios for Naconda and Namuanica (non-certified) to be statistically lower than the odds ratios for Namina. Statistical tests on the odds ratios of Namina vs Naconda and Namina vs Namuanica show that we reject the null hypotheses of equal odds ratios at 1% level of significance (p-value = 0.000) and accept the alternative hypothesis that the odds ratios for Namina are statistically larger than the odds ratios for Naconda and Namuanica. The timing of certification of the plantations may explain the result we obtained in Column (a) of Table 4, i.e., households in the village of Namina (the plantation certified in 2014) are less likely than households in Malulu (the plantation certified in 2011) to participate in plantation management (yet households from both villages are more likely than households from the two villages nearby the non-certified plantations to report that they have a say). The results in Column (d) of Table 4 show statistically significant positive correlations between the households in the villages of Namina (FSC certified) as well as in Namuanica (non-certified) (again relative to the reference village Malulu (FSC certified)) and households' responses regarding whether they benefitted from plantations. The dummy for Naconda (non-certified) is not statistically significant. We statistically tested the equality of the odds ratios and the results show that we reject the null hypotheses of equal odds ratios of Namina vs Naconda and Naconda vs Namuanica (p-value = 0.000) and of Namina vs Namuanica (p-value = 0.031). Thus, the villages ranked in decreasing magnitude of odds ratios are Namina, Namuanica and Naconda. This shows that households in Namina (a village adjacent to the FSC-certified plantation) are more likely than households in Namuanica and Naconda (the villages adjacent to the non-certified plantation) to report to participate in plantation activities (construction of schools, teachers' houses, roads and bridges). This finding is in line with the results from the qualitative interviews reported in Table 3 that focus group participants in villages

Table 3

Community perceptions about participation, pre-plantation land use type and benefits from plantations.

Village	Certification	Land use type before plantations	Were villagers consulted before the plantations started?	Does the village have a say in the community projects of plantations?	Do you think that the village has benefitted from the community projects of plantations?
Malulu	FSC certified, 2011	Agricultural	No	Yes	Yes
Namina	FSC certified, 2014	Agricultural	Yes	No	Yes
Naconda	Non-certified	Grass	Yes	No	No
Namuanica	Non-certified	Agricultural	No	No	Yes

Source: FGDs and Green Resources, 2013, 2016.

Table 4

Odds ratios of logit estimations using individual dummies for each village.

Variables		Household has a say in plantation activities	Extent of household satisfaction with its say in plantation activities (b)	Extent to which household agrees that plantation is a 'friendly good neighbor'	Household benefitted from plantation company	
					(d)	
				(c)		
		(a)				
Malulu (FSC cer	tified) ^a	-	_	_	-	
Namina (FSC ce	rtified)	0.414*** (0.047)	0.198*** (0.066)	0.464*** (0.099)	12.889*** (3.194)	
Naconda		0.042*** (0.005)	0.186*** (0.099)	1.335*** (0.096)	1.375 (0.269)	
Namuanica		0.178*** (0.009)	1.830* (0.669)	0.656** (0.139)	7.381*** (3.622)	
Age of head		1.002 (0.019)	0.908*** (0.017)	0.992** (0.003)	0.986*** (0.003)	
Gender of head	(1 = male)	- ^b	-	1.142 (0.349)	1.881* (0.707)	
Education of	Primary	0.841 (0.417)	2.247 (1.455)	1.119 (0.272)	1.377 (0.599)	
head ^c	Secondary and	1.779 (1.362)	4.681*** (2.186)	1.229 (0.183)	1.323 (0.745)	
	above					
Household size		1.121*** (0.027)	0.942 (0.096)	1.055 (0.083)	1.123* (0.072)	
Total farm size		1.098 (0.098)	1.604* (0.417)	0.934** (0.026)	0.865 (0.136)	
Employed by plantation $(1 = yes)$		5.709*** (2.987)	0.715 (0.565)	2.194* (0.978)	5.019** (3.185)	
Forest use $(1 = yes)$		_b	-	3.119*** (0.903)	6.059*** (0.601)	
Total household income		1.002 (0.001)	0.966* (0.019)	1.007*** (0.002)	1.008** (0.004)	
Share of agriculture income		0.989 (0.014)	1.010 (0.008)	0.988*** (0.004)	0.980*** (0.001)	
Share of business income		0.982** (0.008)	0.992 (0.007)	0.978** (0.009)	1.002 (0.010)	
Share of off-farm income		0.991 (0.013)	1.000 (0.007)	0.984** (0.006)	0.987* (0.007)	
Share of forest income		0.993 (0.017)	0.915 (0.066)	0.974*** (0.005)	0.987 (0.014)	
Constant		0.448** (0.181)			0.044** (0.055)	
Pseudo-R ²		0.207	0.229	0.054	0.229	
Ν		172	32	211	229	

Note: Robust standard errors in parentheses clustered at village level. *, **, *** signify p < 0.10, p < 0.05 and p < 0.01 respectively.

^a Malulu is omitted because it is the reference category for the village dummies.

^b 'Gender of head' = 0 (female) is a perfect predictor, i.e., all (19) respondents in the female-headed households answered "No" to the survey question: "Do you have a say in the plantation's activities?" and hence Stata excludes these 19 observations from the regression. Similarly, 'forest use' = 0 is a perfect predictor, i.e., all (10) households who did not collect forest products in 2015 responded "No" to the survey question: "Do you have a say in the plantation's activities?" and accordingly Stata excludes these observations from the regression.

^c Reference category: 'No schooling'.

In column (a), the dependent variable is the answer of the respondent to the question: "Do you have a say in the activities of the forest plantation in your village", (1 = yes).

In column (b), the dependent variable is the extent of satisfaction of a household with its say in the activities of the plantation in its village (i.e., if the household reported to have a say in plantation activities). The regression in column (b) is based on 32 observations (N = 32) and contain 16 independent variables (parameters), including the constant. A rule of thumb in econometrics is to have at least 5 and preferably 10 or more observations per explanatory variable. Otherwise, the standard errors could be very large, which would lower the statistical power of the estimated model. However, our regression model is not completely saturated, i.e., we have more observations (32) than parameters (16) to fit, thus we can obtain asymptotically unbiased parameter (slope) estimates (Kelley and Maxwell, 2003).

In column (c), the dependent variable is to what extent a household agrees with the statement: "the plantation in your village is a friendly good neighbor".

As the dependent variables in Columns (b) and (c) are based on responses to five-point Likert scale questions, we used an ordered logistic regression model to estimate the relationship between the households in the villages nearby the FSC-certified plantations and the dependent variables.

In column (d), the dependent variable is the response of a respondent to the question: "Do you agree with the statement: 'My household has benefitted from the plantation company in my village"?, (1 = yes).

adjacent to the certified plantations are more likely to perceive that they participate in activities of plantations. For completeness, we provided the results of the regressions related to the other outcome variables (Columns (b) and (c)) in Table 4.

5. Discussions and conclusions

With the inadequacy of traditional state-led governance structures to enhance sustainable forest management, market-based non-state instruments, such as FSC's voluntary certification, and adherence to responsible investment guidelines have gained uptake. The objective of this study was to assess the relationship between FSC-certified forest plantations and community participation in plantation management. Using data from communities living nearby two FSC-certified and two non-certified private plantations in Mozambique, we explored differences in weak communities adjacent to the FSC-certified plantations are more likely than communities adjacent to the non-certified plantations to participate in plantations' activities. Our results do not lend statistical support to our hypotheses that communities nearby the FSC-certified plantations are likely to be satisfied with their participation in plantations' activities, or to perceive that the plantation adjacent to their village is a 'friendly good neighbor', or to have benefited from plantations.

In recent years, relations between forest plantations and local communities have increasingly attracted the attention of researchers and NGOs (e.g. De Vos et al., 2018; Lyons and Westoby, 2014). Our evidence (albeit weak) regarding the positive relation between forest certification and community participation can be explained by the motives of plantation companies to reap the theoretically expected market benefits of certification (Kollert and Lagan, 2007; Oliver, 2005; Varangis et al., 1995), adhering to principles of forest certification that require community participation. Even if the empirical evidence does not conclusively support the market benefits of certified timber, forest certification is theoretically expected to lead to price premiums and increased market share for certified timber. As a non-state, market-driven approach, forest certification acts as a form of governance of the timber product value chain to shape and demonstrate plantation companies' compliance with principles and criteria of sustainable forest management (Cashore, 2002; Overdevest, 2010). Shareholders, donors and investors in plantation companies may set community participation as a condition for responsible investments (Tumlinson and Morgan, 2013; Zivin and Small, 2005). This was the case for the FSC-certified plantations, with voluntary certification being a precondition of financing in the company that

owns the FSC-certified plantations, and as a symbol of SFM (FinnFund, 2017; FMO, 2017). The company stressed the importance of FSC certification for its objective of economic and social development of the communities around its plantations (Green Resources, 2016). The participation of local communities in the activities of forest plantations may be expected to reduce plantations' susceptibility to conflicts with communities and related costs resulting from pressures from socially and environmentally oriented NGOs (Cerutti et al., 2017).

Our finding regarding the positive correlations between forest certification and community participation in plantation management is consistent with the findings of Cubbage et al. (2010), Dare et al. (2011), Degnet et al. (2020) and Szulecka et al. (2016) who reported that FSCcertified forest plantations were positively evaluated in terms of participation and engagement by stakeholders. Our study adds to this literature by comparing FSC-certified and non-certified private plantations to identify the correlation between certification and community participation using a quantitative data set. A comparative approach aids the understanding of relations between forest certification and community participation in plantations' activities and thus can inform the design and implementation of effective governance structures to promote sustainable forest management.

Despite the statistically significant relationship between certified plantations and community participation, the share of households (21%) in the villages adjacent to the certified plantations who reported to participate in plantations' activities is not high, taking into account the requirements of FSC certification. In addition, we did not find statistically significant differences between the certified and non-certified plantations regarding the other outcome variables. These results can be related to weak implementation and enforcement that characterize forest governance in Mozambique (World Bank, 2018). The obstacles that result in low participation of local communities in decisions regarding resource management and the challenges of managing plantation company-community relations in Mozambique have been welldocumented (World Bank, 2018; Mustalahti and Lund, 2009). An alternative explanation for the low participation rate relates to the opportunity costs of households. While households may appreciate the possibility to participate, they might receive higher gains from alternative allocation of their labor time such as farming activities.

NGO publications and media coverage report on land-related conflicts, reduced access to natural resources for locals, unresolved compensation for land, low salaries and poor working conditions related to the plantations of GR in Mozambique (World Rain Forest Movement, 2018). However, reports of 'land grabbing' have subsequently been found to be based on inadequate data and research, leading to unclear conceptions regarding the status and actual impact of (proposed) investments in forestry and agriculture (Locher and Sulle, 2014; Schoneveld, 2014).

Our results suggest strong statistically significant relations between socio-economic characteristics (gender, household size, employment at plantations and dependence on forest products) and likelihood of participation in plantation activities. Male-headed households, large size households, households with at least a plantation worker and households who collected forest products are more likely than their counterparts to report to participate in plantation activities. The differences in the likelihood to participate in plantations' activities for households with different socioeconomic and demographic characteristics indicate that some social groups (e.g., women headed-households) are less likely to participate in plantation activities. These findings are consistent with the results of studies on community participation in the management of forests and other natural resources (Agarwal, 2001; Agrawal and Gupta, 2005; Botchway, 2001; Degnet et al., 2020; Zulu, 2008). According to FAO (2020), women's participation in governance of community forests in developing regions was restricted due to conservative gender norms and even in situations when women participate, they have a passive role. Studies have shown that women in many developing countries have limited participation in the use of land related

resources due to cultural constraints (Watts, 2008).

The results of the FGDs regarding land use prior to the start of the plantations are in line with the findings of previous studies. Ecological surveys conducted in 2008 and 2009 in the study sites indicated that prior to the GR plantations the landcover was composed of shifting small- scale cultivation, short and tall grasslands, shrub savannah and woodland (miombo and riverine forest), which were easily identified in the field and in satellite images from 2005 (Sitoe, 2008; Sitoe et al., 2009). The tall grasslands were typically abandoned 'machambas' (agricultural land) with a few exotic species such as mango and cashew trees (Sitoe et al., 2009; Green Resources, 2013). The FSC-certified plantation sites were reported as degraded or abandoned land that does not qualify as areas of special interest or high conservation value forest (Green Resources, 2019). Florestas De Niassa (2016) report that the non-certified plantations (Naconda and Namuanica) were on "greenfield" land.

Finally, the following points need to be stressed regarding our results. First, our results show correlations, not causal relations, between FSC-certified plantations and community participation. Despite the role of the study site selection procedure in identifying comparable villages and plantations, it is difficult to exclude other (un)observable differences between the villages and plantations that could be related to community participation. Furthermore, the choice to get certified by plantations is not random and is likely to be influenced by administrative, socio-economic and policy factors. This suggests that the certification status of plantations is endogenous. Thus, in our study context, it would be difficult to disentangle the effects of factors other than certification of plantations that could potentially be related to community participation. Future studies could employ quasi-experimental techniques (such as combining difference-in-difference and propensity score matching methods) to control for selection on (un)observables and tease out the impact of forest certification on community participation in plantation management. Second, we quantified community participation using subjective measures based on perceptions of households about their participation. Perceptions are liable to be shaped by factors not directly linked to community participation in plantation activities such as, income and employment opportunities in plantation companies or reduced access of households to forest resources due to the presence of plantations (Nube et al., 2016). Potential exists for further work on the topic by incorporating objective measures of community participation (such as counting the number and type of participants in community meetings, the frequency of community meetings, and the gender composition of (active) participants) to complement results of perceptions-based measures. Third, the study is based on a limited number of plantations and villages, and hence our findings cannot be generalized to other plantations in different contexts. Further research on the topic based on a larger number of plantations and villages with different contexts would show whether our results also hold beyond the setting of our study.

Funding

This study was part of a project financed by the Netherlands Development Bank (FMO). FMO was one of the investors in Green Resources AS. Neither FMO nor Green Resources was involved in the design of the study, data collection, analysis, interpretation of the results or writing of the paper. The views expressed in this paper are those of the authors and do not necessarily reflect the views of the funding organization or of Green Resources AS.

Author contributions

Mohammed B. Degnet: Conceptualization, Methodology, Data curation, Formal analysis, Writing- Original draft preparation, Writing-Review and editing of the paper.

Edwin van der Werf: Conceptualization, Methodology, Writing-

M.B. Degnet et al.

Review and editing of the paper, Supervision, Funding acquisition.

Verina Ingram: Conceptualization, Methodology, Writing- Review and editing of the paper, Supervision, Funding acquisition, Project administration.

Justus Wesseler: Conceptualization, Methodology, Writing- Review and editing of the paper, Supervision, Funding acquisition, Project administration.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Data availability

Data will be made available on request.

Acknowledgements

We would like to express our gratitude to our partners from University of Eduardo Mondlane, Maputo, Mozambique and the team of enumerators, especially Almeida Sitoe and Estêvão E. Chambule, who assisted us in undertaking the field work for the study. We thank the plantation managers and communities for their hospitability and cooperation during our stay in the villages.

Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.forpol.2022.102815.

References

- Agarwal, B., 2001. Participatory exclusions, community forestry, and gender: an analysis for South Asia and a conceptual framework. World Dev. 29, 1623–1648.
- Agrawal, A., Gupta, K., 2005. Decentralization and participation: the governance of common pool resources in Nepal's Terai. World Dev. 33, 1101–1114. Arnstein, S.R., 1969. A ladder of citizen participation. J. Am. Inst. Plann. 35, 216–224.
- Arts, B., 2014. Assessing forest governance from a 'Triple G' perspective: government, governance, governmentality. Forest Policy Econ. 49, 17–22.
- Barrow, E.G., Clark, J., Grundy, I., Kamugisha-Ruhombe, J., Tessema, Y., 2002. Analysis of Stakeholder Power and Responsibilities in Community Involvement in Forest Management in Eastern and Southern Africa. Forest and Social Perspectives in Conservation No. 9. IUCN, Nairobi, p. 167.
- Berkes, F., Folke, C., Colding, J., 2000. Linking Social and Ecological Systems: Management Practices and Social Mechanisms for Building Resilience. Cambridge University Press Cambridge, UK.
- Blackman, A., Goff, L., Planter, M.R., 2018. Does eco-certification stem tropical deforestation? Forest Stewardship Council certification in Mexico. J. Environ. Econ. Manag. 89, 306–333.
- Blackman, A., Rivera, J., 2011. Producer-level benefits of sustainability certification. Conserv. Biol. 25, 1176–1185.
- Botchway, K., 2001. Paradox of empowerment: reflections on a case study from Northern Ghana. World Dev. 29, 135–153.
- Capistrano, D., 2010. Gouvernance forestière et décentralisation en Afrique. Enjeux et tendances. In: German, L.A., Karsenty, A., Tiani, A.-M. (Eds.), Gouverner les forêts africaines à l'ère de la mondialisation. CIFOR, Bogor, Indonesia, pp. 426–446.
- Carlson, A., Palmer, C., 2016. A qualitative meta-synthesis of the benefits of eco-labeling in developing countries. Ecol. Econ. 127, 129–145.
- Cashore, B., 2002. Legitimacy and the privatization of environmental governance: how non-state market-driven (NSMD) governance systems gain rule-making authority. Governance 15, 503–529.
- Cashore, B., Auld, G., Newsom, D., 2004. Governing through Markets: Forest Certification and the Emergence of Non-state Authority. Yale University Press, New Haven.
- Cashore, B., Auld, G., Bernstein, S., McDermott, C., 2007. Can non-state governance 'ratchet up' global environmental standards? Lessons from the forest sector. Rev. Eur. Comp. Int. Environ. Law 16, 158–172.
- Cerutti, P.O., Lescuyer, G., Tacconi, L., Eba'a Atyi, R., Essiane, E., Nasi, R., Tabi Eckebil, P.P., Tsanga, R., 2017. Social impacts of the Forest Stewardship Council certification in the Congo basin. Int. For. Rev. 19, 50–63. Commission, European, 2010. Regulation EU no 995/2010 of the European Parliament
- Commission, European, 2010. Regulation EU no 995/2010 of the European Parliament and of the Council Laying down the Obligations of Operators Who Place Timber and Timber Products on the Market, 995/2010. Brussels.

- Forest Policy and Economics 143 (2022) 102815
- Cubbage, F., Diaz, D., Yapura, P., Dube, F., 2010. Impacts of forest management certification in Argentina and Chile. Forest Policy Econ. 12, 497–504.
- Dare, M.L., Schirmer, J., Vanclay, F., 2011. Does forest certification enhance community engagement in Australian plantation management? Forest Policy Econ. 13, 328–337.
- De Vos, R., Köhne, M., Roth, D., 2018. "We'll turn your water into Coca-Cola": the atomizing practices of oil palm plantation development in Indonesia. J. Agrar. Chang. 18, 385–405.
- Degnet, M.B., van der Werf, E., Ingram, V., Wesseler, J.H., 2020. Do locals have a say? Community experiences of participation in governing forest plantations in Tanzania. Forests 11, 782.
- Doremus, J., 2019. Unintended impacts from forest certification: evidence from indigenous Aka households in Congo. Ecol. Econ. 166, 106378.
- Ehrenberg-Azcárate, F., Peña-Claros, M., 2020. Twenty years of forest management certification in the tropics: major trends through time and among continents. Forest Policy Econ. 111, 102050.
- FAO, 2011. Framework for Assessing and Monitoring Forest Governance. The Program on Forests (PROFOR). Food and Agriculture Organization of the United Nations, Rome
- FAO, 2015. Global Forest Resources Assessment 2015 Country Report Mozambique. Food and Agriculture Organization of the United Nations, Rome, Italy.
- FAO, 2020. Forest Governance. Forest Governance Contribute to SDGs. Food and Agriculture Organization of the United Nations, Rome, Italy.
- Finance Alliance for Sustainable Trade, 2014. Impact Indicators for Sustainable Forestry. Market Research for Sustainable Investment, Montreal.
- FinnFund, 2017. Why Sustainable Forestry Is Good Business? Chris Burchmore from FSC® Africa Explains. Helsinki.
- FMO, 2017. Investing in Local Prosperity. The Dutch Entrepreneurial Development Bank, The Hague, The Netherlands.
- Freeman, R.E., 2010. Strategic Management: A Stakeholder Approach. Cambridge university press, New York.
- FSC, 2015. FSC Principles and Criteria for Forest Stewardship. Forest Stewardship Council, Bonn, Germany. Available at: https://fsc.org/en. accessed on 10 March 2020.
- FSC, 2018. International Generic Indicators. Forest Stewardship Council, Bonn, Germany.

FSC, 2022. FSC Facts & Figures. Forest Stewardship Council, Bonn, Germany.

- Garforth, M., Landell-Mills, N., Mayers, J., 2013. Plantation development and management: Drivers, governance and changing roles. In: Plantations Privatization Poverty and Power. Routledge, pp. 55–100.
- Green Resources, A.S., 2013. Climate, Community and Biodiversity Standards Project Design Document Form for Afforestation and Reforestation Project Activities (CCB-AR-PDD), Second edition. Niassa Forest Project. (28 March 2013).

Green Resources, A.S., 2016. Annual Report 2014/2015. London, UK. Green Resources, A.S., 2017. Environmental and Social Impact Report January–December 2016.

Green Resources, A.S., 2019. GR (Mozambique) Forest Management Plan 2018–2022 (Version July 2019). Retrieved 25 August 2020 from. https://greenresources.no/wpcontent/uploads/2019/10/GR-Mozambique-Forest-Management-Plan-2018-2 022-public-summary.pdf.

Handberg, Ø.N., 2018. No sense of ownership in weak participation: a forest conservation experiment in Tanzania. Environ. Dev. Econ. 23, 434–451.

Heilmayr, R., Lambin, E.F., 2016. Impacts of nonstate, market-driven governance on Chilean forests. Proc. Nat. Acad. Sci. 113 (11), 2910–2915.
Kalonga, S.K., Kulindwa, K.A., 2017. Does forest certification enhance livelihood

Kalonga, S.K., Kulindwa, K.A., 2017. Does forest certification enhance livelihood conditions? Empirical evidence from forest management in Kilwa District, Tanzania. Forest Policy Econ. 74, 49–61.

Kelley, K., Maxwell, S.E., 2003. Sample size for multiple regression: obtaining regression coefficients that are accurate, not simply significant. Psychol. Methods 8 (3), 305.

- Kollert, W., Lagan, P., 2007. Do certified tropical logs fetch a market premium?: a comparative price analysis from Sabah, Malaysia. Forest Policy Econ. 9 (7), 862–868.
- Lawson, S., MacFaul, L., 2010. Illegal Logging and Related Trade. Indicators of the Global Response. Chatham House, London, p. 154.
- Locher, M., Sulle, E., 2014. Challenges and methodological flaws in reporting the global land rush: observations from Tanzania. J. Peasant Stud. 41, 569–592.
- Lund, J.F., 2015. Paradoxes of participation: the logic of professionalization in participatory forestry. Forest Policy Econ. 60, 1–6.
- Lyons, K., Westoby, P., 2014. Carbon colonialism and the new land grab: plantation forestry in Uganda and its livelihood impacts. J. Rural. Stud. 36, 13–21.
- Matzdorf, B., Sattler, C., Engel, S., 2013. Institutional frameworks and governance structures of PES schemes. Forest Policy Econ. 37, 57–64.
- McCarthy, J.F., 2012. Certifying in contested spaces: private regulation in Indonesian forestry and palm oil. Third World Q. 33, 1871–1888.
- Miteva, D.A., Loucks, C.J., Pattanayak, S.K., 2015. Social and environmental impacts of forest management certification in Indonesia. PLoS One 10, e0129675.
- Mustalahti, I., Lund, J.F., 2009. Where and how can participatory forest management succeed? Learning from Tanzania, Mozambique, and Laos. Soc. Nat. Resour. 23, 31–44.
- Mwangi, E., Wardell, A., 2012. Multi-level governance of forest resources (editorial to the special feature). Int. J. Commons 6 (2).
- Nhantumbo, I., 2000. The new resource tenure framework in Mozambique: does it real give the tenancy to the rural communities. In: 8th Biennial Conference of the International Association for the Study of Common Property (IASCP), vol. 31.
- Nube, T.G., Santos, A.S.J., Timofeiczyc Junior, R., Silva, I.C., 2016. ImpactosSocioeconômicos das Plantações Florestais no Niassa, Moçambique. Floresta e Ambiente 23 (1), 52–60.

M.B. Degnet et al.

Nunan, F., 2018, August. Navigating multi-level natural resource governance: an analytical guide. In: Natural Resources Forum, vol. 42, No. 3. Blackwell Publishing Ltd, Oxford, UK, pp. 159–171.

Nussbaum, R., Simula, M., 2013. The Forest Certification Handbook. Taylor & Francis, London.

- Oliver, R., 2005. Price premiums for verified legal and sustainable timber. In: Report for the UK Timber Trade Federation (TTF) and Department for International Development (DFID). North Yorkshire, United Kingdom.
- Ostrom, E., 1990. Governing the Commons: The Evolution of Institutions for Collective Action. Cambridge university press.
- Overdevest, C., 2010. Comparing forest certification schemes: the case of ratcheting standards in the forest sector. Soc. Econ. Rev. 8, 47–76.
- Payn, T., Carnus, J.-M., Freer-Smith, P., Kimberley, M., Kollert, W., Liu, S., Orazio, C., Rodriguez, L., Silva, L.N., Wingfield, M.J., 2015. Changes in planted forests and future global implications. For. Ecol. Manag. 352, 57–67.
- PEFC, 2022. PEFC Global Statistics. The Programme for the Endorsement of Forest Certification. Geneva, Switzerland.
- Rametsteiner, E., Simula, M., 2003. Forest certification—an instrument to promote sustainable forest management? J. Environ. Manag. 67, 87–98.
- RIBOT, J., 2004. Waiting for Democracy: The Politics of Choice in Natural Resource Decentralization. World Resource Institute Report. http://www.wri.
- org/publication/waiting-democracy-politics-choice-natural-resource-decentralization. Ribot, J.C., Lund, J.F., Treue, T., 2010. Democratic decentralization in sub-Saharan Africa: its contribution to forest management, livelihoods, and enfranchisement. Environ. Conserv. 35–44.
- Rift Valley Corporation, 2016. Forestry. Retrieved 16 November 2016. http://www.riftvalley.com/forestry-2/.
- Romero, C., Sills, E.O., Guariguata, M., Cerutti, P.O., Lescuyer, G., Putz, F.E., 2017. Evaluation of the impacts of Forest Stewardship Council (FSC) certification of natural forest management in the tropics: a rigorous approach to assessment of a complex conservation intervention. Int. For. Rev. 19, 36–49.
- Schoneveld, G.C., 2014. The geographic and sectoral patterns of large-scale farmland investments in sub-Saharan Africa. Food Policy 48, 34–50.
- Serzedelo de Almeida, L., Delgado, C., 2019. The Plantation Forestry Sector in Mozambique: Community Involvement and Jobs. The World Bank, Washington.
- Sitoe, A.A., 2008. Ecological Identification and Characterization of the Ecosystems of the Sanga Area Held by Malonda Tree Farms. Departamento de Engenharia Florestal, Universidade Eduardo Mondlane.

- Sitoe, A., Guedes, B., Awasse, A., Nacamo, E., 2009. Ecological Survey of the Reforestation Sites in Nampula Province. FINAL REPORT. Study Prepared for Lurio Green Resources. Maputo, November 2009.
- Stringer, C., 2006. Foresterrification and changing global commodity chains. J. Econ. Geogr. 6, 701–722.
- Szulecka, J., Obidzinski, K., Dermawan, A., 2016. Corporate-society engagement in plantation forestry in Indonesia: evolving approaches and their implications. Forest Policy Econ. 62, 19–29.
- Tricallotis, M., Gunningham, N., Kanowski, P., 2018. The impacts of forest certification for Chilean forestry businesses. Forest Policy Econ. 92, 82–91.
- Tsanga, R., Lescuyer, G., Cerutti, P.O., 2014. What is the role for forest certification in improving relationships between logging companies and communities? Lessons from FSC in Cameroon. Int. For. Rev. 16, 14–22.
- Tumlinson, J., Morgan, J., 2013. Corporate provision of public goods. In: Academy of Management Proceedings, vol. 2013, No. 1. Academy of Management, Briarcliff Manor, NY 10510, p. 13507.
- UN, 2007. Non-Legally Binding Instrument on All Types of Forests. Available at: https://www.un.org/en/ga/search/view_doc.asp?symbol=A/RES/62/98. Accessed on 6 April, 2020.
- van der Ven, H., Cashore, B., 2018. Forest certification: the challenge of measuring impacts. Curr. Opin. Environ. Sustain. 32, 104–111.
- Varangis, P., Crossley, R., Braga, C., 1995. Is there a commercial case for tropical timber certification?. In: World Bank Policy Research Working Paper 1479. World Bank, International Economics Department. Commodity Policy and Analysis Unit, Washington D.C.
- Watts, S., 2008. Institutional constraints on interactive community participation in forest conservation in Mozambique. J. Sustain. For. 26 (4), 301–327.
- World Bank, 2018. Mozambique Country Forest Note. Washington DC, USA. World Rain Forest Movement, 2018. Green Resources Mozambique: More False
- Promises!. Available at: https://wrm.org.uy/articles-from-the-wrm-bulletin/section 1/green-resources-mozambique-more-false-promises/. accessed on 10 June 2020. Zivin, J.G., Small, A., 2005. A Modigliani-Miller theory of altruistic corporate social
- responsibility. BE J. Econ. Anal. Policy 5 (1). Zulu, L.C., 2008. Community forest management in southern Malawi: solution or part of
- Zulu, L.C., 2008. Community forest management in southern Malawi: solution or part of the problem? Soc. Nat. Resour. 21, 687–703.