

The socio-economic contributions of large-scale plantation forests: perceptions of adjacent rural communities in the Northern Province of Sierra Leone

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ABSTRACT

The rapid demand for wood products globally has put pressure on natural forests. Therefore, global efforts are now being directed toward establishing plantation forests to fill the wood supply gap while reducing the pressure on natural forests. This study conceptualized the socio-economic contribution of large-scale plantation forests to adjacent rural communities in the Northern Province of Sierra Leone based on the local perceptions of 125 households interviewed during data collection. To complement the household survey data, two forest-plantation experts were interviewed. The study found that local communities mainly benefit from plantation forestry through employment, improved road conditions, and water well constructions. However, the delivery of these benefits differed among the communities depending on the spatial distance from the plantation forestry central office. Benefits related to improvements in road conditions were perceived higher in the more far away communities. The trend is similar for the perception of benefits from plantation forestry activities: the farthest community with limited opportunities for alternative livelihood options appreciated the plantation forestry benefits highly and as fairly distributed. The results further revealed that perceived benefits from the plantation forestry industry, specifically employment and income, were rather unevenly distributed because the elites were able to capture more benefits than the others. These people were also identified to be influential in the distribution of benefits from the plantation industry. It is suggested that the plantation industry makes a conscious effort to extend the delivery of benefits to more community members regardless of their landholding, social status, or education level to ensure equal access to employment and land lease income, as well as CSR benefits.

1. Introduction

Globally, there has been a growing concern for establishing plantation forests to meet the increasing demand for timber, poles, biomass, and for restoring environmental services (Evans and Turnbull 2004). The concern is due to the rapid conversion of natural forestlands to other land uses, mainly agriculture, oil palm plantations, industrial development, and settlements. Nevertheless, independent of the aforementioned, the rate of deforestation and forest degradation, particularly in the tropics, is alarming and is considered one of the main contributors to global warming (Pearson et al. 2017). According to Zhang and Stanturf (2008), the global pressure of logging from natural forests could be reduced by half from about 1.3 billion m³ in 2000 to about 600 million

m³ in 2025, provided the current expansion rate and productivity of global plantation forests continues unabated. This is important because as more new plantation forests are developed, more natural forests can potentially be conserved (Bull et al. 2006). This proposition has been subject to debate, with Pirard et al. (2016) positing that plantation expansion could potentially relieve the degradation of natural forests but under the absence of an integrated policy, could similarly trigger their exploitation.

Africa's wood demand has far surpassed the supply that its natural forests can provide, not only due to the conversion of forest lands into other land uses, also due to rapid population increase and the evolving economies of the countries on the continent (Jacovelli 2014). Therefore, to bridge the wood deficit gap, wood has to be produced from sources

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other than natural forests. This has triggered private sector investments into commercial plantation establishment in many African countries because it presents an opportunity with a high return on investment. Governments and development actors share the opinion that investments in plantation forestry could potentially trigger regional and community development if there are associated social, economic, and environmental benefits (Hayter 2003). Plantation forests may be a promising option to upscale wood production and to reduce the exploitative pressure on natural forests while also generating significant jobs and subsequent socio-economic benefits for both local communities and national economies (Jacovelli 2014). Despite the aforementioned benefits, negative impacts of large-scale plantation forests have been the subject of a debate that has attracted global research focus to understanding the consequences of these impacts on proximate rural communities (van der Meer Simo 2020).

In Sierra Leone, much of the nation's forests have disappeared due to the widely unsustainable practiced traditional slash-and-burn shifting cultivation, uncontrolled logging, mining, grazing as well as timber and fuelwood extraction (Aliou 2001). Over time, these activities have historically been responsible for reducing the nation's total forest cover to 14.7% of the land area (FAO 2020). However, historical deforestation records and forest cover estimates for Sierra Leone and the underlying causes of forest cover changes spanning from the colonial to post-colonial era have been the subject of a major debate in the academic literature (Fairhead and Leach 2003; Munro and van der Horst 2016). In the Northern part of the country, there has been a surge in the establishment of new large-scale plantation forests to fill the wood supply deficit in the country. The current land use there includes subsistence agriculture, where the landholding families typically allot portions of land to other community members to farm on a subsistence basis. The produce from the annual harvest is often shared with the landholding family, as a reminder that the farmer is a tenant of the landholding family (Asiama 2003). Grazing of livestock is not a predominant land use in the region since most people practice subsistence farming. In fact, grazing livestock is perceived as a threat to their farming activities since the cattle can potentially destroy food crops which can escalate into conflicts.

Consistent with land concessions being one of the predominant models for plantation development in the global south (Bissonnette and De Koninck 2017; van der Meer Simo 2020), more than 20,000 hectares of land within the Northern region has been leased out under long-term agreements to private investors for tree plantation establishment. These agreements involve landholding families, traditional leaders, government, and private investors. In view of this, there has been rapid land-use change in the region: degraded savannah grasslands are converted to commercial plantation with *Eucalyptus*, *Acacia spp.*, and *Gmelina arborea* tree species. The wood product outputs from these large-scale plantation forests feed into the local, national, regional, and international timber markets. Sawmills and wood processing plants have been set up to transform the wood into value-added products such as treated transmission poles, lumber (sawn timber), edge glue panels, and plywood intended for both the domestic and international markets. The plantation industry's wood transformation activities have supported the development of wood processing and treatment infrastructure in the locality, which has the potential to add a lot more jobs. Malkamäki et al. (2018) also shared this perspective that local wood processing could generate significant positive impacts on employment even though that may not be sufficient to address the employment needs. However, with the wood processing and manufacturing infrastructure already in place, the region's plantation forestry industry can potentially contribute to bridge the wood supply deficit in the local area and the country while also addressing the employment needs of the people.

The introduction of the plantation forestry industry in the Northern province of Sierra Leone is expected to potentially improve the living conditions of the people in the area. This is in line with acclaimed promises by plantation forestry businesses to deliver infrastructural

benefits and employment in rural areas (Andersson et al. 2015; Pirard et al. 2017). Plantation activities can create jobs, particularly wood transformation activities such as treatment of transmission poles, wood-based panel production, door and furniture production, which can stimulate economic growth in the region. In addition to the direct job creation potential, forest plantation industries, through their Corporate Social Responsibility (CSR) programs, are required to undertake projects to provide and improve amenities and social services in their operational areas. CSR projects are mandated as part of the concession agreement through a Community Development Action Plan (CDAP), which provides a framework for implementing the plantation industry's CSR obligations in accordance with the government's Environment Protection Agency regulations. The CDAP requires the plantation industry to implement specific suggested community development projects to benefit the local populations around the concession areas and to foster economic growth. Any other projects in the communities that need intervention are optional for the plantation industry, except for the community development projects included in the CDAP. However, in the study area, the list of CSR development projects specified in the CDAP includes the construction and maintenance of water wells, schools, community centers, feeder roads, emergency transportation and scholarships for local pupils and students.

In this paper, we argue that the establishment of these large areas of commercial tree plantations may contribute to socio-economic development in the rural communities living adjacent to the plantation forests, but details on quantity and quality are not known. We further argue that there are external factors influencing the delivery of socio-economic benefits from the plantation forestry activities to the communities and the distributional pattern of these benefits among the community members.

We aim to answer the following research questions: (1) what are the particular benefits that the rural communities in Northern Sierra Leone obtain from plantation forestry activities and how are these benefits shared among them? (2) what features of community members, local institutions, and power relations explain the benefit-sharing pattern? (3) What are the perceived contributions of plantation forestry activities to the wider socio-economic and rural development in Sierra Leone?

Our research is intended to contribute to the body of knowledge on the nexus of large-scale commercial plantation forestry and local communities' benefit-sharing mechanisms and governance arrangements. Hence, the results are useful for fine-tuning cooperation agreements between the forestry industry and landowners, as well as for supervising and supporting government and non-governmental organizations, and last but not least, for research, and academic institutions.

2. Background to the study

The plantation industry in the Northern Province of Sierra Leone started a little over a decade ago, and the plantation activities have continued to expand, warranting more land in the rural communities. The plantations are being established on land acquired under long-term agreements between private investors and landholding families in the communities. In Sierra Leone, there is a dual land tenure system (Mabikke et al. 2020), in which lands in the Western Area (capital city) are held under a freehold system while the lands in the rest of the country (Provinces) are administered by traditional leaders under customary land tenure. Provincial land is generally regarded as 'chieftaincy land' since it is held in communal ownership under customary tenure with the Paramount Chiefs as the custodians (Asiama 2003). Therefore, the Paramount Chiefs have the authority to allocate portions of land to extended families, lineages, or individuals (USAID 2010). The individualization of 'chieftaincy land' to families gives the families the right to access, use and transfer by lease (Unruh and Turay 2006; USAID 2010). For foreign investors, the national laws restrict them from purchasing land; they can only acquire land rights through leasehold for up to 99 years (USAID 2010). This is exemplified in our study where the

duration of the land lease agreements between the plantation forestry investors and landholding families was negotiated for 50 years with the option to renew for two further periods of 21 years plus seven years thereafter resulting in a total period of 99 years. This indicates that tenure security is required for any land-based investment to be well protected against external forces (Chan Ko Ko et al. 2017). This is because, in order to safeguard plantation forestry investments and future profits, a secured access to land and well-defined tenure systems for resources (land and trees) coupled with fair compensations in the event of loss of land are important to create an enabling environment for large-scale plantation forest establishment (Bodegom et al. 2008).

However, in the case of leasing land out for large-scale commercial plantation forestry development, formal arrangements exist under which land can be leased, particularly to foreigners. Although there is evidence of investors engaging in informal land lease arrangements with the heads of land-owning families (Asiama 2003), in the study area, the procedure of land lease was formally arranged between the private investors and the land-owning families under the supervision of the Chiefdom Council represented by the Paramount Chiefs and the government. The Paramount Chiefs, in this case, only administer the process of the lease transaction by signing the lease documents as proof of authenticity since all community lands are under their jurisdiction. This is crucial because no land transaction is valid until it is approved by the Paramount Chiefs (Unruh and Turay 2006). However, the right to lease family land for any use, including plantation development, relies solely on the decision of the heads of the various landholding families (Asiama 2003). Therefore, the proceeds and rewards from the land lease go to the landholding families, although a part of the proceeds from the lease transaction is allotted to the Chiefdom Council which is administered by the Paramount Chiefs. In the case of plantation forestry development, the private investors pay lease income to the landholding families. The income is divided into parts, with the large portion going to the landholding families and the rest to the Paramount Chiefs (Chiefdom Council), District Council, and the central government. However, within the landholding families, the family heads mostly receives the lease income from the private investors on behalf of their families, acting in the capacity of the principal land signatory. Other family members can also receive the lease income as agreed by the landholding family. This is usually common when such family members are educated or influential in society; then, the landholding family can appoint them to become the signatory to the land agreement to receive the lease income on their behalf. The most predominant practice within the study communities is to have two or more family members, including the family head, as co-signatories to the land lease agreement so that the lease income can be paid in the presence of several family members to ensure transparency.

The lease agreement spells out the land lease conditions, duration of lease term, cost of land lease per hectare, payments for crop compensations, annual surface rents, developed land fee, employment arrangements, and future benefits from the plantation proceeds to name but a few. The terms and conditions of the lease agreement, including the payments, are negotiated between the private investors and the representatives from the landholding families with the approval of the Paramount Chiefs (USAID 2010). The representatives from the landholding families are required to comprehend the lease agreement if need be utilizing the support of an external third party, either a lawyer or an educated person, and then sign the agreement. Once the agreement has been signed, the plantation enterprise is committed to employing a certain number of individuals from the landholding families based on the quantity of land leased out. The employment term is mostly between 9 -11 months, depending on the investment phase of the plantation enterprise, since land clearing and planting are more labour-intensive than other operations. Afterward, the plantation enterprise takes over the plantation activities on the leased land utilizing their own production inputs and materials for tree growing and maintenance. At this point, the land is under the full administration of the plantation

enterprise, and the landholding families are no longer permitted to utilize the land for agriculture, fuelwood gathering, charcoal production, or livestock grazing. Fuelwood collection can only be possible with prior permission from the plantation enterprise and based on the availability of stumps or thinning residues from the plantation activities.

Several perspectives must be considered to determine a tree plantation enterprise's contribution to the development of a locality. Depending on the actor groups, observed perceptions are:

- access to land is a scarce resource for the poorer segment of local people, particularly when large areas are converted from open access to intensively cultivated land. For rural communities, the lease out of larger chunks of land for tree plantation constitutes a trade-off between jobs and benefits versus access to land for subsistence farming activities. Although the land leased out is mostly degraded lands and unsuitable for commercial agriculture, some local people do still use it, e.g., for extensive grazing or cropping. In addition to land, most of the workers employed in the tree plantation activities are hired from rural communities, where wages are comparatively low. Compared to subsistence farming, livestock grazing, fuelwood collection, and other income alternatives, the forest industry jobs are perceived as attractive by the locals. That is why many communities within the region are interested in leasing out land as well as supplying labor workforce for plantation work.
- local communities play a crucial role in providing support to tree plantation companies. These industries are obliged to function according to the norms and cultures of the communities in which they operate. For instance, there are special days when plantation activities are put on hold in some communities, particularly during traditional ceremonies such as secret society rites and rituals. The requirement by communities to preserve certain sacred groves and areas around the plantation areas represents norms that plantation forestry enterprises should adhere to for peaceful co-existence. However, this is more like a two-way street because the plantation industry also has its own set of rules that are imposed on the communities, e.g., employment terms. Traditional governance support gives the communities the power to hold the industry actors accountable for their conduct of operations and the impacts generated by their activities by channeling their dissatisfactions and complaints through their traditional leaders. The local people feel they are subject to their traditional leaders, who are under oath to govern and uphold their rights.

3. Materials and methods

3.1. Study area

The study was conducted in Tonkolili and Port Loko districts in the Northern province of Sierra Leone [Figure 1](#). The location of Tonkolili is between latitude 8°40' North and longitude 11°40' West. The district covers an area of 5,391 km². Port Loko district, on the other hand, lies between latitude 8°45' North and longitude 12°40' West, occupying a total area of 5,719 km². The climate of the two districts is similar, with average monthly temperatures ranging between 26°C and 36°C and an average rainfall of around 2,896 mm (Wadsworth et al. 2019). The area is characterized by two distinct seasons: a rainy season from May to November and a dry season typically from December to April. Both districts were previously forested, but the forest cover has declined dramatically due to slash and burn farming. Nowadays, the landscape consists of poor grasslands with few trees and shrubs.

3.2. Socio-demographic and economic profile of the study communities

According to [Statistics Sierra Leone \(2015\)](#), the demographic data for the Tonkolili District shows: a total population of 531,435, resulting in a population density of 98.58 persons per square kilometer; a gender

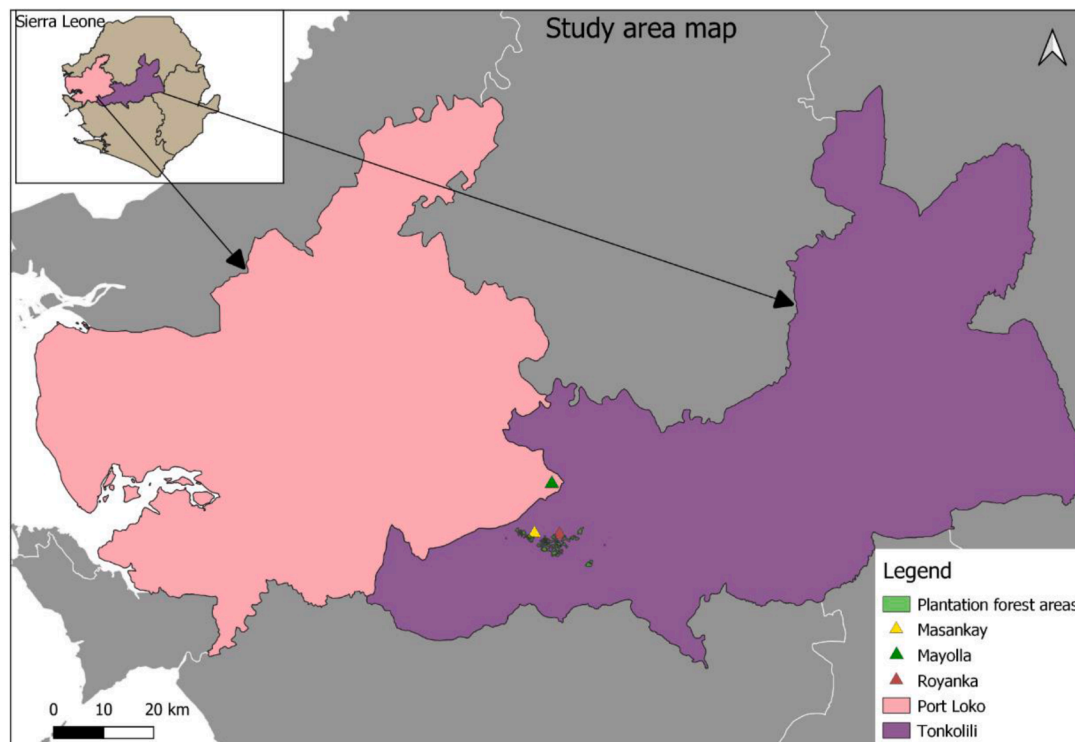


Fig. 1. Map showing the location of the three sampled communities in relation to the plantation forest areas

constitution of 50.8% females and 49.2% of males; and 0.5 annual percent increase in its population during the period from 2004 to 2015. Port Loko district has a total population of 615,376, which is the second-largest in the country after the capital city of Freetown (ibid).

At the time of the survey, out of more than 30 communities within a 20 km radius from the plantation industry administrative center with a land lease, three were selected as case studies based on accessibility and resource constraints. Two of the study communities, Royanka and Masankay are located in the Tonkolili district, while Mayolla is in the Port Loko district. The study communities were selected among the other communities following the selection criteria: (1) time span between the first land lease agreement with the plantation forest industry; (2) distance from the community to the plantation forestry central administration site and to the major highway. Royanka is among the pioneer communities to lease land out for plantation development in 2011; it is also nearest to the plantation forestry central administration site (< 2 km) and located along the Masiaka-Yonibana highway. Masankay belonged to the subsequent group of communities that leased out land following Royanka in 2016, and it is situated at a mid-range distance (5 km) from the plantation forestry central administration unit along the major highway. Mayolla represents the community that have recently leased out land for plantation development in 2018, with a remote location away from the major highway and relatively farther from the plantation forestry central administrative site (15 km). This indicates that plantation forestry activities started more recently in Mayolla since the other communities entered into lease agreement with the plantation industry before Mayolla.

Both Royanka and Masankay communities are small in area, with average populations of 301 and 250 inhabitants, respectively. Most people in these communities are engaged in petty trading, mostly along the highway, which is an important transportation route to the capital city of Freetown. Others are mainly farmers involved in subsistence production. Firewood collection and charcoal production are also commonly practiced as a safety net to complement their income earnings from farming and petty trading. The Mayolla community is larger in area and population than the other two communities. The residents are

predominantly farmers and petty traders. Generally, most people from the three study communities belong to the Temne ethnic tribe and are mainly Muslims by religious denomination. Quite recently, some of the residents in the study communities have become involved in plantation forestry work as labourers and low-skilled workers.

3.3. Sampling design

Data for the research was obtained through two sets of interviews. The first was a household survey of 125 randomly selected respondents from the study communities (Table 1). Royanka community is located less than 2 km, Masankay is approximately 5 km, and Mayolla is approximately 15 km from the plantation enterprise's central administration unit. The sampling units in these communities are households from which two adult respondents were randomly selected, resulting in 41 respondents each in both Royanka and Masankay communities and 43 respondents in Mayolla, corresponding to 12% of the total population in the three selected communities (see Table 1).

Second, semi-structured expert interviews were conducted with two experts from the forestry enterprise who are knowledgeable about the forestry industry's contribution to the communities. Due to the COVID-19 restrictions, the interviews were conducted virtually. The information from the expert interviews were used for triangulation of the survey data and to frame our discussion of the results.

3.4. Sampling methods

For the household survey, a semi-structured questionnaire was developed (Refer to Appendix 1). The questionnaire covered general information on the socio-economic structure of the households (e.g., member's age, gender, marital status, average monthly household income, education level, employment, land ownership, and housing conditions); perceived benefits obtained from the forest plantation enterprise; their perceptions of how these benefits are shared and appropriated as well as their perceptions concerning the contribution of the plantation forestry activities to the wider socio-economic and rural

Table 1
Sampled communities and the corresponding number of households and respondents

District	Community	Total population	No. of HH	No. of HH sampled	No. of respondents sampled	% of pop. sampled	% of HH sampled
Tonkolili	Royanka	301	43	22	41	14	51
Tonkolili	Masankay	250	36	18	41	16	50
Port Loko	Mayolla	540	76	38	43	8	50
Total		1091	155	78	125		

Source: Field survey 2021

development in their communities. The perceived direct and indirect benefits that are relevant to the households in the study communities, were predefined in closed questions, following [Ahammad et al. \(2019\)](#). These benefits were defined into direct and indirect benefits, using the experience of the authors with the plantation forestry activities in the study area for categorizing. Distinguishing the perceived benefits into direct and indirect categories made it easier for the respondents to understand the questions. Therefore, we asked the respondents to select the direct and indirect benefits they perceive from plantation forestry for someone, even if they or their households did not obtain these benefits. The answers to the questions on the perceived benefits were limited to 'yes' or 'no' ([Ahammad et al. 2019](#)).

Negative perceptions about the plantation forestry industry were also investigated by asking the respondents open-ended questions. The responses from the open questions were aggregated into themes to group similar responses. For the questionnaire administration, the free KoBo Collect Toolbox (www.kobotoolbox.org) was used, with a pre-test of the questionnaire, and the interviews were conducted in the local language of Temne by two hired enumerators who were familiar with the communities. To adhere to the national COVID-19 laws, the interviews took place outside the households in a fully air-ventilated space outdoors, and both the respondents and the enumerators wore face masks. Each respondent was interviewed separately to avoid large groups, keeping a minimum distance of 1.5 m between each person. The respondents were not required to fill in any questionnaire to prevent the exchange of questionnaire forms, so the responses to the questions asked by the enumerators were directly entered and saved in the KOBO Collect Toolbox. All this was carried out to minimize contact between the enumerators and the respondents.

3.5. Data analysis

Data were grouped into three categories of variables: socio-demographic, socio-economic, and rural development variables. The variables were analyzed using descriptive statistics in R Studio Version 3.6.2 and Microsoft Excel. Chi-square test of independence and Fisher's exact test were used to analyze the associations between the different categories of variables across the communities. Analyzed variables include the structure of the household's members and their perceptions of benefits from plantation forestry activities were presented in descriptive statistics as figures and tables showing frequencies, percentages, and means.

4. Results

4.1. General characteristics of respondents' households

In the two communities of Royanka and Mayolla, 59% and 56% of respondents were males, respectively; in Masankay, there were more female respondents (54%). This is the typical pattern for sub-Saharan African households, where traditionally men hold the land titles; therefore, men exert control over the particular land utilization (farming for cash or subsistence, or leasing the land out) often without using their land resources to care adequately for their spouse(es) and children. Similarly, [Posel \(2001\)](#) postulated that gender is a determinant in household decision-making.

The highest proportion of respondents was aged 29-39 years; the common marital status was "married". The education level was low in all three communities, with 78% of respondents having no formal education in both Royanka and Masankay and 72% in the Mayolla community. The main occupation of the sampled respondents was subsistence farming, with 72% of them deriving their household income from subsistence farming. In comparison, a small proportion (6%) derived their household income from the forestry enterprise through salaries and leases.

House ownership status was quite high among most of the respondents, while land ownership was reported for 32% of the total respondents that belonged to land-owning households across the communities. This comprised 15.2% of the respondents in Mayolla, 10.4% in Masankay and Royanka, with 6.4%. Similarly, as construction material used by the respondents, mud instead of bricks as primary wall material, and iron zinc instead of palm leaves as roof material for housing construction, were widely practiced in the study area.

4.2. Benefits delivered by plantation forestry industry in the study area

4.2.1. Perceived direct benefits from plantation forestry to households

[Figure 2](#) shows the direct benefits that households in the communities perceived from engaging in plantation forestry activities: land lease income, employment, fuelwood, and capacity building. Across the three communities, approximately 32% of the total respondents belonged to land-owning households. Most of the respondents from Mayolla and Masankay communities felt that plantation forestry activities did not benefit their households in terms of income from land lease. This was different for Royanka where a larger percentage of the respondents agreed to have derived lease income from plantation forestry activities ([Figure 2](#)). The trend of not obtaining land lease income benefits from plantation forestry activities is similar to the other benefit categories, such as fuelwood and capacity building. Employment was the only benefit category that respondents from Royanka and Masankay perceived to a greater extent. However, the respondents from Mayolla perceived that plantation forestry activities had not created extra employment.

4.2.2. Perceived indirect benefits from plantation forestry CSR projects

Respondents were asked about the indirect benefits derived from CSR projects implemented by the forestry enterprise. Royanka was the only community where the respondents felt that roads had not been improved ([Figure 3](#)). This might be because they do not have a challenge with road conditions due to the proximity to the main Masiaka-Yonibana highway. None of the three communities agreed to have benefitted from ambulance emergency transportation in case of sickness, accidents, or child delivery. Masankay was the only community where respondents stated that water wells had not been constructed in their locality. The results again suggest that the proximity to communal centers explains the differences.

4.3. Perception on the distribution of benefits from plantation forestry

The respondents were asked about the fairness of the distribution of benefits from the CSR projects of the plantation forestry industry perceived within their communities. More than 50% of the respondents

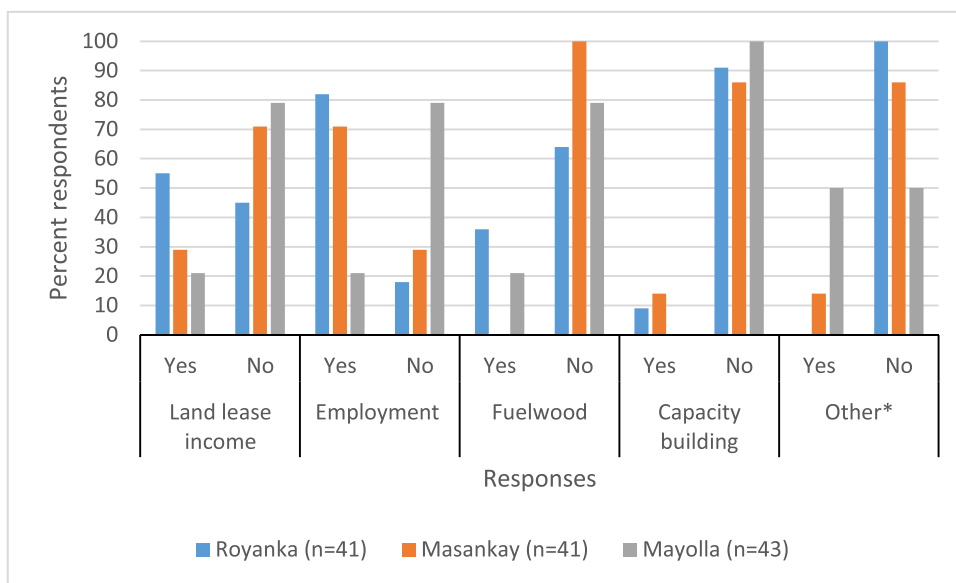


Fig. 2. Summary of the perceived direct benefits from plantation forestry to households
*Other includes food

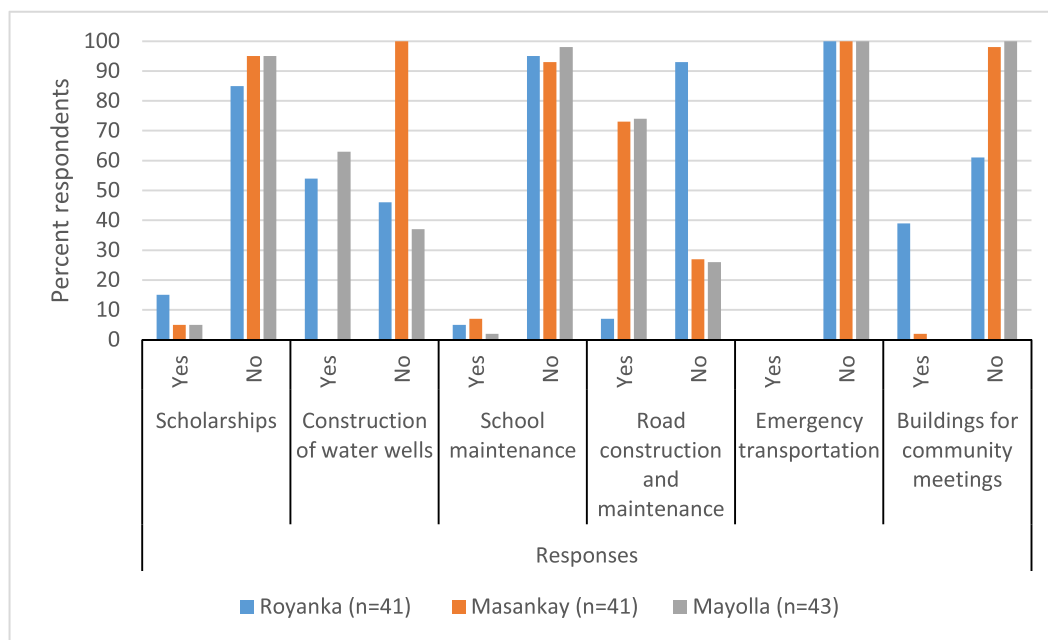


Fig. 3. Summary of the perceived indirect benefits from plantation forestry CSR projects to communities

in Royanka and Masankay felt that the distribution of benefits arising from plantation forestry activities was 'very unfair' because certain people benefit far more than others. These were land-owning households, educated community members, and traditional leaders, at the expense of people from vulnerable groups such as women, youths, the aged, and migrants who are rather resource poor and have less access to land. In comparison, the respondents in Mayolla had a contrasting view that the distribution of benefits from plantation forestry activities was 'fair' in their community, with 42% agreeing to this, complemented by an additional 12% who thought it was very fair (Figure 4). However, a small number of respondents in Mayolla also shared similar perceptions as in Royanka and Masankay, describing the distribution of benefits as 'very unfair' and 'unfair.'

The results may be explained by a pattern of the distance of the

respondents' dwelling place to the more communal centers. The dwellers in the rather remote village of Mayolla perceived the opportunities and choices made available by the forest plantation industry as of higher value than the ones in the other places studied.

4.3.1. Determinants and features of community members that influence the benefit-sharing pattern

Most respondents cited the 'hectares of land leased out for tree plantations' as the primary determinant for benefits sharing (Figure 5). This means that households able to lease out land for tree plantations capture more benefits than those not able to lease out land. This is accelerated by the practice that those households leasing out land to the forestry enterprise are given priority for employment recruitment, and by this practice concentrating benefits in their households. Households'

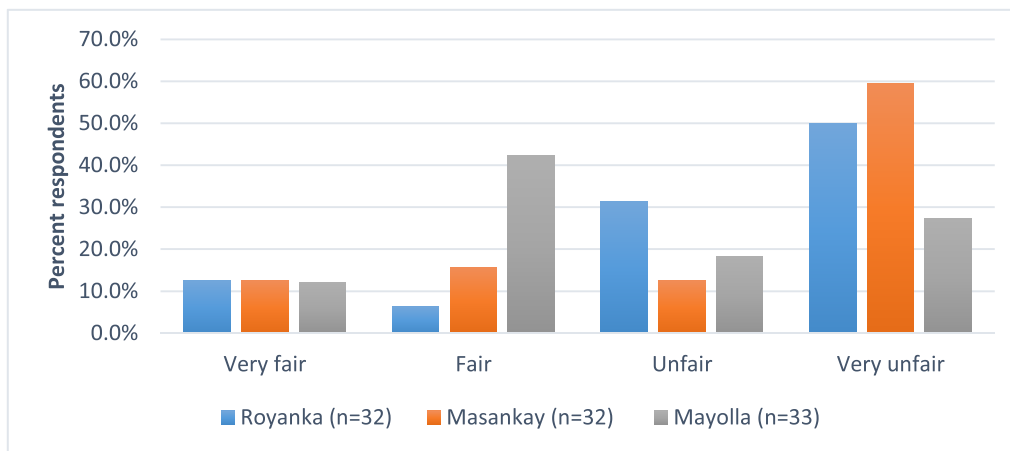


Fig. 4. Perception on the fairness of benefit distribution from plantation forestry in the communities

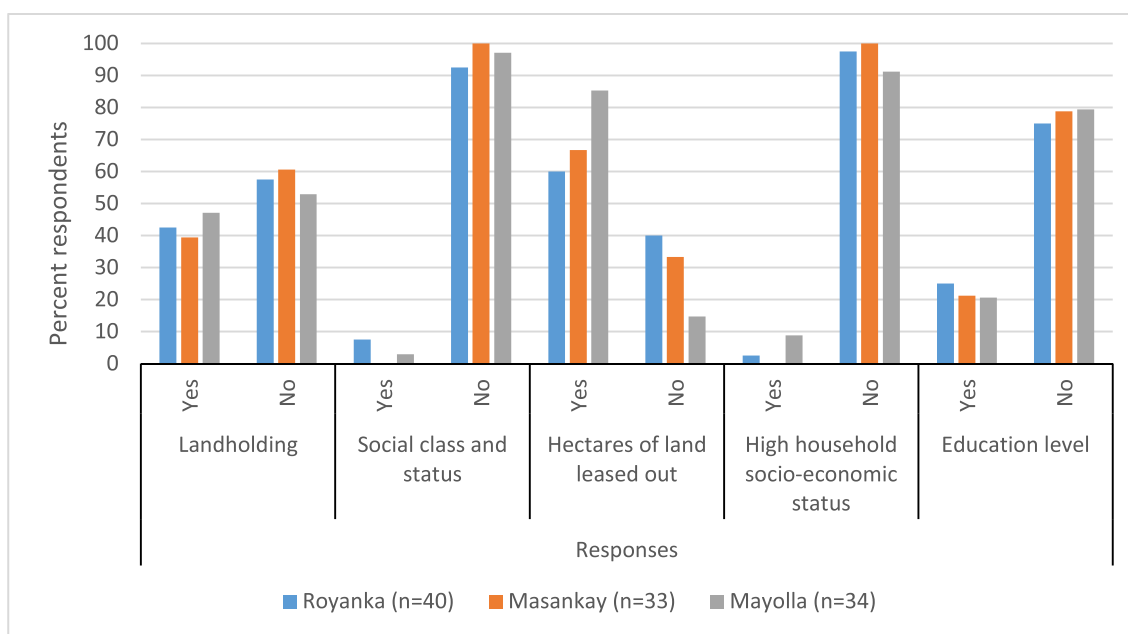


Fig. 5. Determinants and features that influence benefit distribution from plantation forestry within communities

ability to lease out land is a function of their landholding assets and collective decision based on the agreement of every family member. Conflicts among members of land-owning families can restrict their ability to enter into lease agreements.

Landholding was the second most crucial determinant influencing benefit distribution, because land-owning families are among the communities’ most influential stakeholders. Landholding accords the membership to community stakeholder groups where landowners can exercise their influence on plantation-related decisions and negotiations such as recruitment number per hectare of land, potential CSR projects to undertake in the communities, price setting for land lease, and fire management strategies. This gives them leverage over other community members, increasing their chances of gaining more benefits from the plantation forestry activities.

Although education level was the third most important determinant that influenced the benefit distribution process, it was only perceived this way by one quarter or less of the respondents interviewed. The explanation implies a chicken-egg problem because the first strand for interpretation suggests the higher the education level as cause for the better chances of gaining more benefits from the plantation forestry

activities. The other explanation strand suggests that most rich and powerful families have the resources to send their kids to school; therefore, most graduates belong to elite families. People with higher education are more likely to benefit from the plantation forestry activities through employment in better-paid jobs like team leaders, supervisors, and sawmill technicians compared to employment as ordinary workers. Therefore, members of a community’s elite household have better access to employment, reinforcing social stratification and the divide between community members.

However, both social and high socio-economic status were depicted to have an insignificant influence on benefit distribution within the communities. This is critical because both indicators are directly linked with landholding and the ability to lease out land. Therefore, the variation in the perceptions could be attributed to the assumption that a higher social and socio-economic status also places individuals or households in a position where they are less likely to participate in plantation forestry activities since they already have access to financial, educational, occupational, social and health resources.

4.3.2. Power relations and local institutions that control benefit distribution from plantation forestry activities

Respondents were asked to explain the influence of power relations and local institutions on the distribution of benefits from plantation forestry. Land-owning families were identified as the key beneficiaries of plantation forestry employment, followed by educated community members and traditional leaders within all three communities. Nonetheless, a large percentage felt that the least benefits from plantation forestry employment went to members of community associations and everyone else (Figure 6).

The perceptions of the respondents about the most influential group that controls the distribution of benefits from plantation forestry were similar: land-owning families were similarly indicated, followed by the educated community members and then the traditional leaders. The influential role of local community groups in the appropriation of benefits was perceived among a small number of households in Mayolla community (Table 2). The categories of beneficiaries and influential groups exhibit a marked similarity since traditional leaders and educated community members usually belong to land-owning families. However, there could be subtle differences among these categories responsible for their differentiation into separate categorical groups, as in Table 2. The reasoning behind this underscores the notion that traditional leaders are not always educated, and belonging to a land-owning family is not entirely a precondition for being educated. The correlation between being a traditional leader and belonging to a land-owning family is commonly observed in the study communities. Therefore, the interpretations of the results reflect these subtle differences among the various categories of beneficiaries and influential groups to reveal a nuanced perspective.

4.4. Perceived contribution of plantation forestry activities to rural development in the study area

We further asked the respondents to describe some of the areas that have been developed in their communities due to the plantation forestry industry. Improvement in road conditions was the most common rural development contribution expressed by the respondents. However, two

Table 2

Perception about groups of people that control the distribution of benefits from plantation forestry activities within the communities

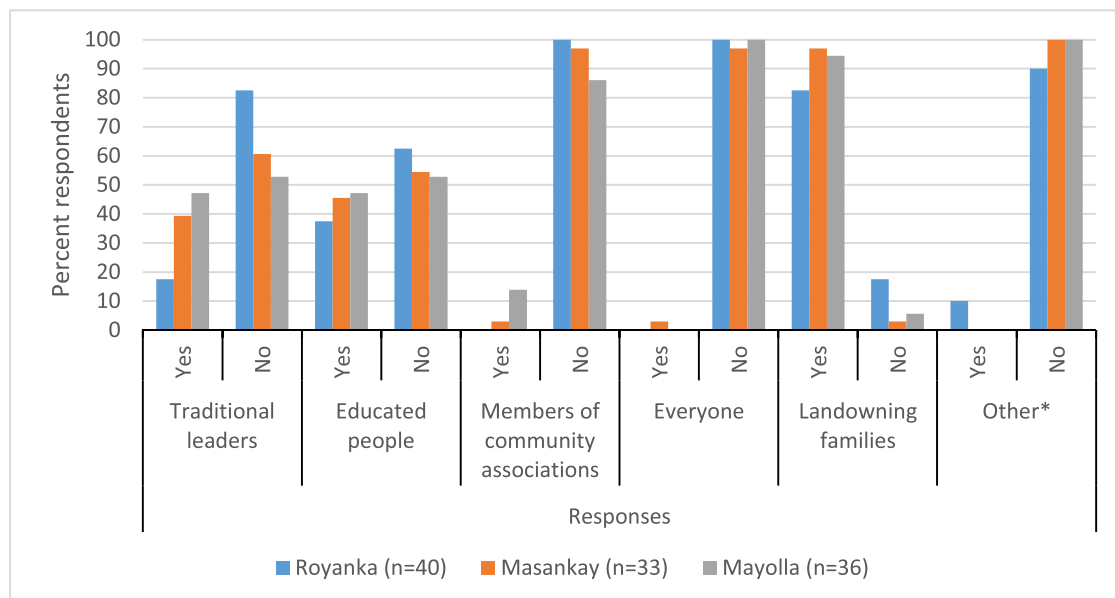
Responses	Percentage (%)					
	Royanka (n=40)		Masankay (n=33)		Mayolla (n=37)	
	Yes	No	Yes	No	Yes	No
Traditional leaders	30	70	39	61	47	53
Educated people	35	65	49	51	51	49
Members of community groups	0	100	0	100	14	86
Land-owning families	80	20	91	9	89	11
Other*	10	90	0	100	0	100

*Other includes; Plantation forestry investors

of the communities acknowledge improvements in road conditions. The respondents in the third community, Royanka had an opposing view that the plantation forestry activities have not improved road conditions in their community. Here the distance of the community to the central location of the plantation industry is explanatory. Since the Royanka community is close, approximately less than 2 km from the central location, the road is not of relevance, but the other two communities Masankay and Mayolla are far, about 5 km and 15 km respectively, so an improved road condition is essential.

Employment creation as a rural development contribution of the plantation forestry industry was perceived in similar terms by the respondents in Masankay and Mayolla communities (Table 3). However, employment creation was more highly perceived in Royanka than in the other communities. The respondents in Masankay showed mixed perceptions since approximately half of them did not attribute employment creation as a product of the plantation forestry industry. Also, the construction of new water wells was identified as a meaningful benefit by the respondents in Mayolla. The trend is, however, different for the other two communities (Masankay and Royanka), where the respondents did not attribute the construction of water wells to the plantation forestry industry.

Overall, more respondents thought schools were a benefit in Masankay than in the other communities, while scholarship benefits



*Other includes; migrants, the aged

Fig. 6. Perception of who benefits the most from plantation forestry employment in the communities

*Other includes; migrants, the aged

Table 3
Perceived contribution of the plantation forestry industry to rural development in the study area

Responses	Percentage (%)					
	Royanka (n=15)		Masankay (n=26)		Mayolla (n=36)	
	Yes	No	Yes	No	Yes	No
Schools	0	100	11	89	3	97
Roads	27	73	85	15	83	17
Employment	73	27	50	50	56	44
Housing	7	93	4	96	8	92
Scholarship	20	80	0	100	3	97
Construction of water wells	7	93	0	100	64	36
Local economy	0	100	0	100	3	97
Others*	7	93	0	100	3	97

*Other includes; petty trading, low crime, increase in social life

were perceived by more people in Royanka and the other communities. Generally, the respondents expressed concerns that the plantation industry has made minimal improvements in schools, housing, local economy, scholarships, and other aspects of development in all three communities (Table 3).

4.4.1. Rating of the perceived contribution of the plantation forestry activities to rural development in the study area

The rating of the contribution of the plantation forestry activities to the wider rural development in the study area was undertaken using four rating levels (very high, high, low, and very low). The contribution was rated 'low' and 'very low' in the two communities Royanka and Masankay. However, in Mayolla the plantation industry's contribution to rural development was rated 'high' and 'low' by an equal percentage of respondents (Figure 7). This result reflects a mixed perception of the plantation forestry industry's contribution in Mayolla. It could be that the contribution is low relative to the population of the inhabitants, which is seemingly higher than the others, suggesting that the perceived direct and indirect benefits from the plantation industry were not widely shared among the inhabitants of Mayolla. Moreover, plantation benefits are generated over time since tree plantations are long-term investments; hence, it could be possible that the contribution in Mayolla was perceived 'low' because plantation activities started quite recently in the community compared to the two communities. Therefore, it will take time to realize the full contribution to everyone. On the opposing end, it could be that the respondents far from the center perceive the development impact of the plantation industry as high. Since the other two communities close to the center seem to have many opportunities

for their businesses and livelihood activities. These include selling food, garments, luxury items; also donor-driven development projects are concentrated to the centers.

4.4.2. Perceived negative impacts of plantation forestry activities on study communities

Respondents described the perceived negative impacts caused by the plantation forestry industry in their communities. Approximately 58% of them expressed concerns regarding the increase in land disputes, followed by the destruction of the environment (10%) and restriction of livelihood activities (6%) (Table 4). However, 4% indicated limited employment for everyone, failure of the plantation industry to deliver on its promises to communities, increase in fire occurrence, and low agricultural production as some of the other negative impacts triggered by the industry in the communities. Furthermore, each of fuelwood shortages, limited benefit for everyone, increase in migration, high workload stress for plantation workers, increase in theft rate were also identified by 2% of the respondents (Table 4).

5. Discussion

5.1. Perceived benefits delivered by the plantation forestry industry to respondents' households

The most common benefit that the respondents mentioned was

Table 4
Summary of the perceived negative impacts triggered by plantation forestry activities in the communities

Negative impacts triggered by plantation forestry within the communities	Frequency (n=50)	Percentages (%)
Increase in land disputes	29	58
Destruction of the environment	5	10
Restriction of livelihood activities	3	6
Limited employment for everyone	2	4
Failure of the company to deliver on promises	2	4
Increase in fire occurrence	2	4
Low agricultural production	2	4
Fuelwood shortages	1	2
Limited benefit for everyone	1	2
Increase in immigration	1	2
High workload stress for plantation workers	1	2
Increase in theft rate	1	2
Total	50	100%

(n= 50; multiple answers possible)

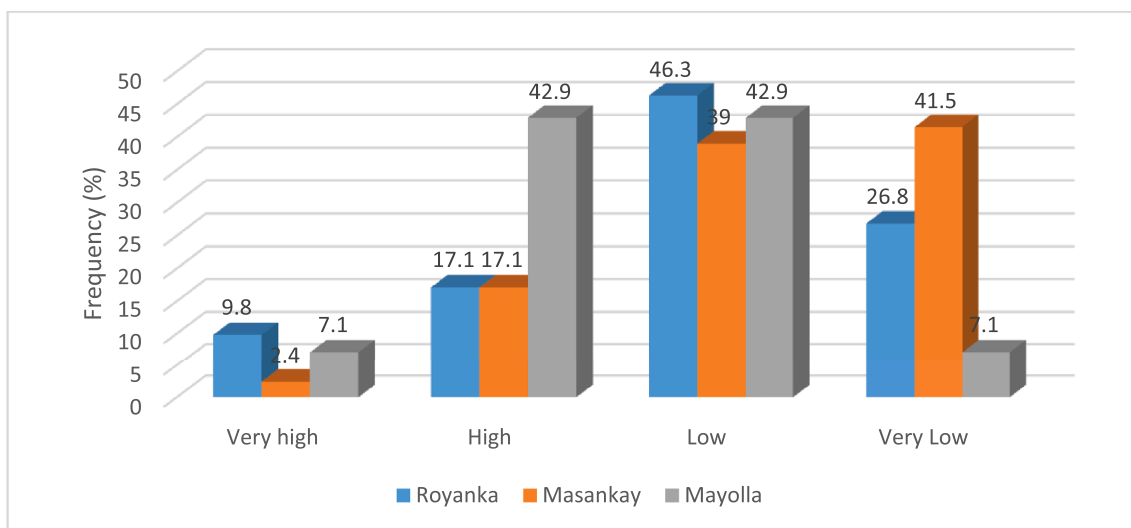


Fig. 7. Rating of the perceived contribution of the plantation forestry industry to rural development in the study area (n=125)

employment benefit (see Figure 2). The majority of the respondents agreed that the plantation industry had created employment opportunities in their communities irrespective of whether they or their household members benefitted from it or other community members. This confirms results from earlier studies, e.g., Landry and Chirwa (2011), Ofoegbu (2014), Schirmer et al. (2005), and Pirard et al. (2017). It is important to note that the jobs created by the plantation industry in the study communities had significant positive impacts since other sectors like agriculture, business, and public services did not provide sufficient jobs. This is in line with Mayers (2006), who reinforced the idea that the impact of jobs from forestry plantations are considered significant when the tree plantation takes place on degraded or unused land in regions with limited employment opportunities.

However, the delivery of employment benefits to households by the plantation forestry industry differed across the three communities studied. Respondents in Royanka and Masankay perceived more employment benefits than the ones in Mayolla (Figure 2). Mayolla is more populated than the others; therefore, the offered jobs might not be that visible for the residents. Another reason might be that in Mayolla, tree plantations have been started recently, and not many jobs have been generated until the time of the survey. Also, the number of jobs is correlated to the hectares of land leased out for tree plantation, suggesting that employment benefits are mainly a function of landholding status. Despite the perceived employment created by the plantation industry in the study area, the nature of the jobs was temporary, mostly from 9-11 months. This agrees with Malkamäki et al. (2018), that plantation jobs are predominantly temporary and part-time. Moreover, the temporary nature of plantation forestry jobs has been reported in studies from different parts of the world, such as Indonesia and Mozambique (Tynnela et al. 2002; German et al. 2016).

Income from leasing land for forestry plantations was perceived to be a lesser benefit for the majority of the respondents in the study area (see Figure 2). Approximately 32% of the respondents interviewed belonged to land-owning families; therefore, income benefits were concentrated to this small number of land-owning families because they had more access to jobs and other opportunities. This agrees with Tynnela et al. (2002), who reported an increase in average household income due to plantation forestry; however, the income was unevenly distributed among the households due to disproportionate access to jobs on acacia plantations in West Kalimantan. In a similar context in Laos, Baird and Fox (2015) found that employment in rubber plantations under land concession only generated cash income for a small proportion of the residents. These findings reinforce the notion that associating income benefits for locals with large-scale plantation forests is questionable. This is because most of the evidence where tree plantations have accrued income benefits for the locals is mainly for smallholder tree plantations (van der Meer Simo 2020). This has sparked debates about both the potential livelihood contribution and the support to socio-economic development of the two plantation types.

5.2. Perceived benefits delivered by the plantation forestry industry to communities

On a communal level, the most relevant benefit was the road construction and maintenance activities (Table 3). This supports Landry and Chirwa (2011) that providing better roads is a priority benefit that local people expect from forestry plantation investments. Differences in the perception of road construction and maintenance amongst the studied communities could be explained by the spatial distance of the communities to the central location of the area. Two of the communities, Mayolla and Masankay are quite far, approximately 15 km and 5 km, therefore good road condition is essential for them. Improved road conditions ease transportation of plantation workers and logistics for plantation operations. This agrees with Ofoegbu (2014), that bad road conditions cause workers to spend long hours commuting to their workplace and to return home. In addition, Portilla (2017) posited that

new road construction by plantation companies helps to open up trading and transportation routes that support the income diversification of farmers. In a different study in Indonesia, Pirad et al. (2017) found that acacia plantations contributed to opening up previously inaccessible areas. However, the road infrastructural development there was not undertaken by a plantation company.

Our results also revealed the benefits of the construction of water wells in the communities. This finding is consistent with that of Ofoegbu (2014), who found that the provision of water supply is an important benefit for rural households. Providing access to clean water for rural communities is so essential that it has become one of the United Nation's Sustainable Development Goals. A similar notion was also expressed by Malkamäki et al. (2018), that roads and other infrastructural developments by private investors offer economies of scale that generates significant benefits to rural areas because these areas are beyond the development reach of government-intervention projects. However, plantations also create trade-offs in rural development (e.g. in Peeters 2015).

5.3. Perception on the distribution of benefits from plantation forestry activities in the communities

More than 50% of the respondents in both Royanka and Masankay felt that the benefits were distributed in a very unfair pattern (Figure 4), while in Mayolla the distribution was perceived as "fair". Our results support Barr and Sayer (2012) that the unequal distribution of benefits represents one of the common drawbacks of large-scale forest plantations. The perception of an unfair distribution of benefits has roots in the influential role of elites who benefit far more than the others in the communities. This finding agrees with Tschirley and Benfica (2001) that social elites are the primary beneficiaries of the opportunities created by forestry activities in rural communities. This is why private investors always try to establish cordial relationships with influential elites in the communities responsible for resource and benefit allocation to support their interests. Land-owning families are the primary beneficiaries of the employment provided by the plantation industry since the industry tactically prefer to hire the providers of land. In the study area, it is a common practice by the plantation industry to distribute employment relative to the size of land leased out by that community. Since land-owning families lease out land for plantation establishment and not the community as a whole, they control the employment by providing a list with names of community members to be recruited by the plantation industry. Typically, this list consists of members from the households leasing out the land, making it very hard for other community members or migrants to access the jobs. Restrictions in accessing benefits from plantation forestry, such as jobs and other opportunities, were revealed by Malkamäki et al. (2018) as one of the underlying factors influencing the perceptions of fairness and the rate of tension and conflicts among locals, migrants, and investors.

For other benefits related to the plantation industry's CSR projects in the communities, the provision is not restricted, so everyone can fetch water from the wells that the plantation industry constructs, and anybody can use the roads or schools that the industry has maintained. There are cases where access to the infrastructure developed by the plantation forestry industry has been reported to be restricted (Malkamäki et al. 2018). The nature of the benefits and institutions determines if elite capture is easy, or rather not.

5.4. Contribution of plantation forestry to rural development in the study area

The most crucial contribution perceived was the improvement in road conditions, which is in agreement with Landry and Chirwa (2011). This was followed by employment creation in the study communities. Respondents felt that plantation forestry activities had created new jobs because there were hardly alternative job opportunities in their

communities. Our result confirms the belief by communities that forestry investments are expected to trigger development in rural areas (Tschirley and Benfica 2001)

The rating of the perceived contribution of plantation forestry to rural development in the study communities agree with Ofoegbu (2014), who reported infrastructural development related to schools, cemeteries, and boreholes through the social responsibility spending of plantation forestry companies in the rural communities of South Africa. Pirard et al. (2017) found contrary results showing low infrastructural development in roads and bridges in communities where teak and pine plantations were established in Indonesia. Similarly, van der Meer Simo's (2020) systematic review revealed four cases of land concessions for large-scale plantation forest out of seven publications which reported negative results on local infrastructure in countries of the global south.

A small percentage of respondents perceived that improvement in housing, schools, emergency transportation services, scholarships, and local economy are associated with the plantation forestry industry. This is similar to the findings of Pirard et al. (2017), where only 1- 18% of the respondents per village felt that plantation companies provided sufficient support services in their communities, with the majority expressing the need for the provision of support services by plantation companies in Indonesia.

5.5. Perceived negative impacts of plantation forestry in the communities

The respondents associated the plantation forestry industry with some perceived negative impacts in their communities. This agrees with other studies (Kusakabe and Myae 2018; Malkamäki et al. 2018; Pirard et al. 2017; van der Meer Simo 2020). Evidence from Southeast Asia and Africa portrays the potential of large-scale plantation forests to jeopardize customary land uses, particularly in rural areas in the absence of formalized title deeds (Malkamäki et al. 2018). There are several trade-offs associated with plantation development in rural communities. The opportunity costs of land concessions for large-scale plantation forests are mostly high because they are often established on lands previously used for farming, collecting non-timber forest products, and grazing (van der Meer Simo 2020). Typically, forest plantations are done on degraded, nutrient-mined agricultural land. Anyway, displacement of the previous land use results in land disputes, increased social tensions, fuelwood shortages, and low agriculture production. It seems that the investor is also blamed for the former unsustainable agriculture. Although the plantation industry in our study is being established on abandoned and degraded grasslands that are not any more productive for farming, their conversion still produces consequences for the locals, albeit on a small scale. Therefore, it is worthy to acknowledge the costs of this land conversion, even though our study did not focus on opportunity costs. We just asked about the perceived negative impacts of plantation forestry activities in the communities. As a negative impact of plantation forestry, the respondents perceived an increase in land disputes. Disputes are primarily among landholding families, sometimes escalating to the plantation industry through threats of arson fires which can potentially destroy the tree plantations. However, arson fires are not the principal cause of fire occurrences in the study area. The traditional practice of slash and burn farming is responsible for most wildfire cases reported in the study area. Fires that farmers set to burn their farmlands during the dry season often become uncontrollable due to strong winds and high temperatures, thereby escaping into the plantation forests where they damage trees resulting in huge economic losses. The collection of non-timber forest products such as honey and hunting activities are some other causes of fire in the study area. Smokers throwing cigarette butts in dry vegetation such as grasses on hot days have also been reported to cause fire incidences in the study area.

Another negative perception expressed by the respondents was that plantation forestry activities have led to the destruction of the environment in the study area. This was similarly reported by Pirard et al. (2017). Although our study did not specify environmental impacts, the

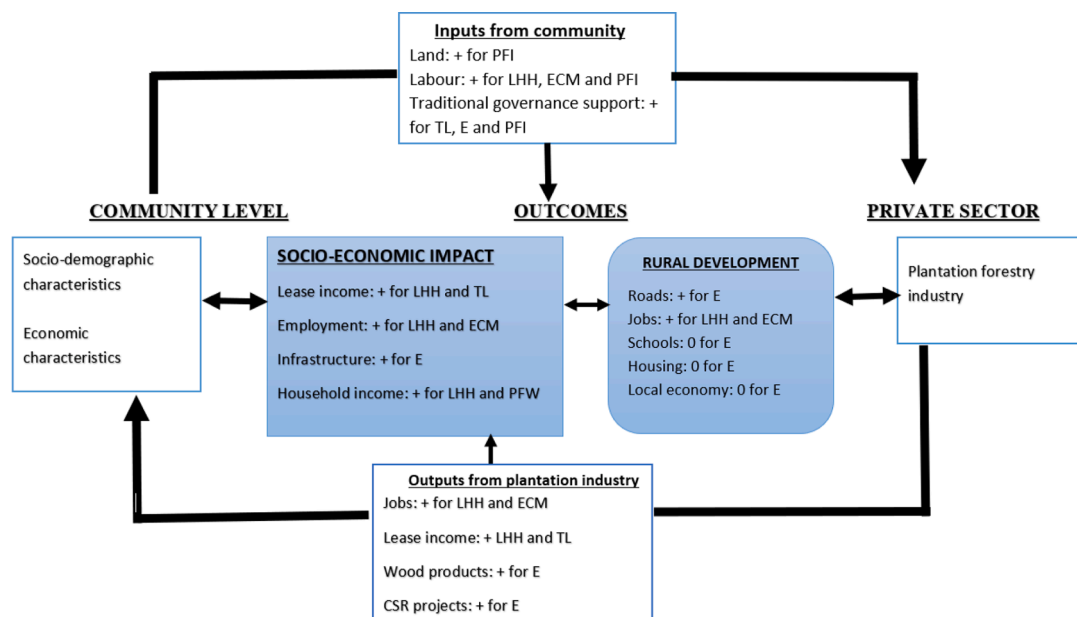
most common negative environmental impacts reported by Pirard et al. (2017) were loss of biodiversity, pollution, dust, and noise from the movement of plantation trucks and continuous operation in short rotation plantations. Impacts related to the restriction of livelihood activities due to loss of access to land for farming and grazing are also predominant in the literature (Friis et al. 2016; Kusakabe and Myae 2018; Pirard et al. 2017). Although the perceived negative impact on restriction of livelihood activities from our study was reported by a rather small percentage of the respondents, this, together with unsustainable agricultural practices, can possibly generate negative impacts with ripple effects on well-being and agricultural productivity. Therefore, the benefits gained from the new land use should be higher than those from the previous land use. Some authors see this as typically not the case, particularly in lower-income countries where approximately 28% of the local livelihoods obtain a substantial share of their income from natural open access areas (Angelsen et al. 2014). The conversion of such natural open access areas to large-scale plantations does not necessarily create more economic value than the previous livelihood activities. Van der Meer Simo (2020) questions if the employment provided by large-scale plantations can compensate for the loss of access to natural areas. In the study here, a small number of respondents perceived that employment was not for everyone (see Table 4). This supports Pirard et al. (2017), who found that a minority of 16% cited lack of employment as a negative impact of teak plantations in Indonesia. In Laos, the loss of access to grazing land led to the cessation of buffalo rearing, which in turn negatively affected rice production due to increased weed infestation, since there were no buffaloes to graze the weeds (Friis et al. 2016).

A small percentage of the respondents reported an increase in fire occurrence, with fires mainly linked to the slash and burn farming practices in the local communities. Our in-depth expert interviews provided information on the fire situation in the local communities and identified wildfires as one of the major threats to the plantation forestry investments. The experts mentioned that wildfires in the area had been a challenge for them every year, particularly during the dry season; therefore, they have engaged the local communities to work together to address the issue. The plantation forestry industry is offering to support local farmers in burning their farms with a standby crew and firefighting equipment to prevent the fire from escaping into their plantations. According to one of the experts, this approach has seen reductions in reported fire cases from slash and burn farming in the study area because it offers a win-win solution for both parties.

6. Summary of key findings linked to the conceptual framework

We developed a conceptual framework (Figure 8) based on our key findings to represent the interrelationship between the plantation forestry industry and the local communities that illustrates the two-way exchange between them. The private sector, represented by the plantation industry, provides income from land leases, jobs, value chains for timber and wood products, capacity building for both employees and non-employed community members, and several CSR projects for the communities (construction of schools, scholarships for schooling, water infrastructure, road construction and graveling). Therefore, the general hypothesis was that plantation forestry activities would have positive socio-economic impacts on the communities, influencing rural development outcomes either positively, negatively, or neutral. From our results, it is clear that the plantation forestry industry's impact on socio-economic outcomes (household income, employment, and lease income) was positive for community members that belonged to land-owning households, traditional leaders, and those doing plantation forestry work, while it was neutral for the other community members. The benefit of infrastructure improvements is accessible to everyone, irrespective of the individual landholding.

Additionally, other options to promote rural development in the study communities were perceived to have not been significantly improved by plantation forestry. These include scholarships for pupils



E = Everyone, ECM = Educated Community Members, LHH = Land Holding Households, PFW = Plantation Forestry Workers, TL = Traditional leaders, PFI = Plantation Forestry Industry, + = Positive impact, 0 = Neutral, - = Negative impact

Source: Compiled by the authors

Fig. 8. Conceptual framework developed based on key results
Source: Compiled by the authors

and students, housing, emergency transportation, and buildings for community meetings.

Conclusions and recommendations

Most respondents felt that the plantation forestry industry created some employment and infrastructural development for the locals in the study communities. However, the study revealed that not everyone in the communities benefitted from the employment provided by plantation forestry due to unequal access. Some factors were determinants that influence the power dynamics of individuals to exert control over the distribution of benefits. Elite groups of community members captured more benefits from plantation forestry activities belonging to land-owning households. The study found these community members to be the greatest beneficiaries of the plantation industry’s operation in the locality.

More importantly, the flow of benefits from plantation forestry activities to the community was perceived to be mainly location-dependent. The far-away community of Mayolla rated the benefits higher than the communities near the plantation industry administrative center. It seems that forest plantation enterprise’s benefits are more obvious in more rural situations, where less choices are accessible to dwellers. However, typically, any profitable land cultivation favors educated people, elite families, and traditional leaders over the other community members.

Therefore, it is suggested that the plantation industry makes conscious efforts to extend the delivery of benefits to every community member devoid of their landholding characteristics, social status, or education level to ensure equal access to employment, income, and CSR

benefits. One fundamental step to expand the potential contribution of the plantation industry is to improve their level of engagement with the local communities. This is essential to promote communication and dialogue for better socio-economic outcomes. The plantation industry could also utilize such engagement opportunities to assist the communities in setting up an ad hoc committee to channel their issues to the industry actors and to address wildfire challenges. The plantation industry should endeavor to support the local committee to organize a fire standby crew in the communities, thereby extending employment to other community members, such as youths, who are suitable for the physically demanding task of firefighting. More important, the management of the plantation industry should consider adapting its business model to cushion the effects of land conversion and restricted access to land on the locals by empowering them to participate in tree growing and maintenance through the implementation of schemes such as contract farming or out-grower programs. Through this approach, local people no longer need to lease their land, but they can grow trees along with their food crops and then sell them to the plantation industry at an agreed price, benefitting from knowledge, training, and innovation transfer. There is enough evidence in the literature (Pirard et al. 2017; van der Meer Simo 2020) that shows tree plantations are economically profitable for local communities when the locals are the ones that own and manage the trees. This represents win-win solutions for the plantation forestry industry and the local communities. Furthermore, it is important for the plantation industry to firmly commit to continue leasing only land that is unproductive for farming to minimize the negative impact of their activities on the displacement of other local livelihood uses of land.

Furthermore, the local policy could also be revised to implement

robust traditional governance arrangements for benefit-sharing based on equity and to provide security for the plantation forestry investment against arson fires, land-related conflicts, and other illegal activities that can undermine the success of the plantation investment in the study area. At the community level, a committee should be set up with the support of the plantation industry to supervise the industry's CSR projects to minimize the disparity in accessing these benefits for everyone. The committee should further formulate local by-laws regarding the enforcement of regulations. Such a committee could also address verification of land claims and land dispute resolution at the village level before getting to the Paramount Chiefs.

An interesting focus for future research would be to conduct further study to understand some of the socio-demographic and economic changes occurring in the communities as a result of the plantation forestry activities. How has plantation forestry affected the rural-urban migration or vice versa? It would be interesting to compare these socio-demographic and economic changes in a community that leased their land for plantation forestry and another that did not lease their lands (Fig. 1).

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.

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Supplementary materials

Supplementary material associated with this article can be found, in the online version, at doi:[10.1016/j.tfp.2022.100329](https://doi.org/10.1016/j.tfp.2022.100329).

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