



Determining Factors of People's Participation in the Community Forest Program in the Central Dry Zone during the Rural Livelihood Transition in Myanmar

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Abstract: The Forest Department initially facilitated the Community Forest (CF) program. People participation is more critical, and local people ideally implement and manage the CF. In Myanmar, a stagnant CF user group is one of the issues in CF program success after three decades of CF implementation. In the recent decade, rural livelihood strategies have been changing alongside political and economic reform since 2011. This research aims to explore the determining factors of local people's participation in the CF program. First, this research used binary logistic regression to understand people's decision to be part of the CF program through the socioeconomic characteristics of households. Then, multiple linear regression model was used to examine CF members' participation in the CF user group's collective activities. The following 7 factors among 10 independent factors determine CF membership: gender, education, the nonfarm income (remittance, wage labor income, salary) of the household, customary forest area, agricultural land-holding size, family labor, and livestock-holding unit. Then, among CF members, the increasing nonfarm income of households and CF members working outside the township area negatively affects CF members' participation in the collective activities of the user group, whereas family labor availability promotes participation.

Keywords: Community forest, Rural livelihood, Migration, People participation, Collective activities

The Community Forest (CF) program has been used globally to protect forests and enhance local people's livelihoods (Gilmour 2016). The first step of the CF program in Myanmar was the development of the Community Forestry Instruction (CFI) in 1995 (MoF 1995). CF is the first breakthrough participatory forest management program in history. A part of the state-owned forest was officially transferred to Community Forest User Groups (CFUGs) for its development, conservation, utilization, and management. CFUGs are recognized as independent, autonomous, and self-governing institutions.

As of January 2021, more than (6,000) CFUGs with a total forest area of 352,163 ha (870,215 acres) were established, which is significantly less than the national target (919,000 ha (1.36% of land area) by 2030), according to an internal report of the Forest Department of Myanmar. A CFUG is a self-established group of community members responsible for forest management and benefits from forests. Interested villagers can apply the CF user certificates for 30 years by developing a Community Forest Management Plan.

Sustainable forest management (SFM) can be achieved through the active involvement of forest users, particularly in the CF program (Ostrom 1990, Glasmeier and Farrigan 2005, Maryudi et al 2012). Most CFUGs in Myanmar ended with stagnant user groups due to inactive people's

participation in CFUG's activities after decades of CF program establishment (Springate-Baginski et al 2011).

Although local people's participation in CF programs is one of the policy challenges of the government of Myanmar, very limited research regarding people's participation in CF programs in Myanmar has been conducted. Hlaing and Inoue (2013) explored the relationship between people's social/institutional and physical factors and CF users' participation in the CF program. They found that social and institutional factors are the most important factors that determine people's participation in the collective activities of CF in dry forest. After that, Soe and Sato (2010) analyzed the socioeconomic condition of CF user group members and non-CF members and the reason that non-CF members were not involved in the CF program.

Rural livelihood transformation is underway in the CDZ in Myanmar, including increasing migration, mechanization of agriculture, livelihood diversification, development of the banking system, and increased accessibility to schools and transportation (Belton and Filipski 2019, CSO 2019). Concurrently, the population has also increased from 124 people per square kilometer in 1983 to 200 people per square kilometer in 2014, according to the national census in 2014, which resulted in the tightening of agricultural land availability in CDZ. In fact, the availability of agricultural land has

declined by 10% compared with their parent's land (Hein et al 2017).

In Myanmar, Filipski et al (2021) found that rural livelihood had transitioned from farm related livelihoods to nonfarm livelihoods, such as migration, casual labor in nonfarm works, and salary occupations. Remittances are a major source of income for rural households in the dry zone, received by 32% of households and accounting for 15% of total household income in the CDZ (Filipski and Belton 2019).

Previous research on people's participation in the CF program was conducted in the old livelihood setting and legal framework. As changes in Myanmar's rural livelihood are underway, the local people are facing opportunities and challenges during this transition period. Although Myanmar is an agrarian country, agriculture-based families rely on the forest for their livelihood. Together with changes in rural livelihood settings in Myanmar, the CF policy was reformed with the revised CFI in 2019, which aims to improve local people's livelihood through community forestry enterprise (World Bank 2019).

The relationship between the changes in rural livelihood and local people's participation is varied based on the socioeconomic and biophysical conditions of the study area in Nepal (Tamang et al 2014, Shahi et al 2022, Fox 2018). In Nepal, changes in rural livelihood with increasing migration and a decline in farm income at the household level have resulted in a decrease in forest dependency and changes in local people's forest management (Tamang et al 2014). Out-migration, which increases nonfarm income and livelihood diversification, did not negatively affect local people's participation in CF, although a significant decrease in forest dependency was found (Shahi et al 2022). By contrast, Fox (2018) found that nonfarm livelihood diversification has a negative impact on forest conditions and local people's participation in CF.

Socioeconomic and biophysical factors affect users' participation in CF activities (Agrawal and Gupta 2005, Coulibaly-Lingan et al 2011, Hlaing and Inoue 2013). Numerous studies emphasize that local people's socioeconomic factors determine people's participation in CF programs (i.e., to become a CF member) (Coulibaly-Lingan et al 2011). Hence, this study used the socioeconomic characteristics of the individual household as determining factors in people's participation in the CF program. Beyond that, the study considered new variables that highlight local people's livelihood diversification into a non-agrarian livelihood.

This paper explores the determinant of the socioeconomic characteristics of households to become CF members and further participation in the collective activities

of the CFUGs. First, the socioeconomic model was used to analyze factors to become CF members using a binary logistic regression model to reach the primary research objective. Then, a multiple linear regression model was applied to explore the relationship between CF member participation in collective activities and members' socioeconomic characteristics.

MATERIAL AND METHODS

Study site: The Central Dry Zone (CDZ), the research area, is situated in the central part of Myanmar between 19°27' and 23°16' in the north latitude and 94°18' and 96°24' in the east longitude. As of January 2021, approximately 43% of the total CF area (152,201.761 ha of forest) is handed over to local people in the CDZ of Myanmar, according to Forest Department internal data. The CDZ receives an average of 672 mm of rainfall per year. The temperature ranges from 12°C to 42°C. April is the hottest month of the year. The study area is shown in Figure 1.

In 2013, the Forest Department implemented a

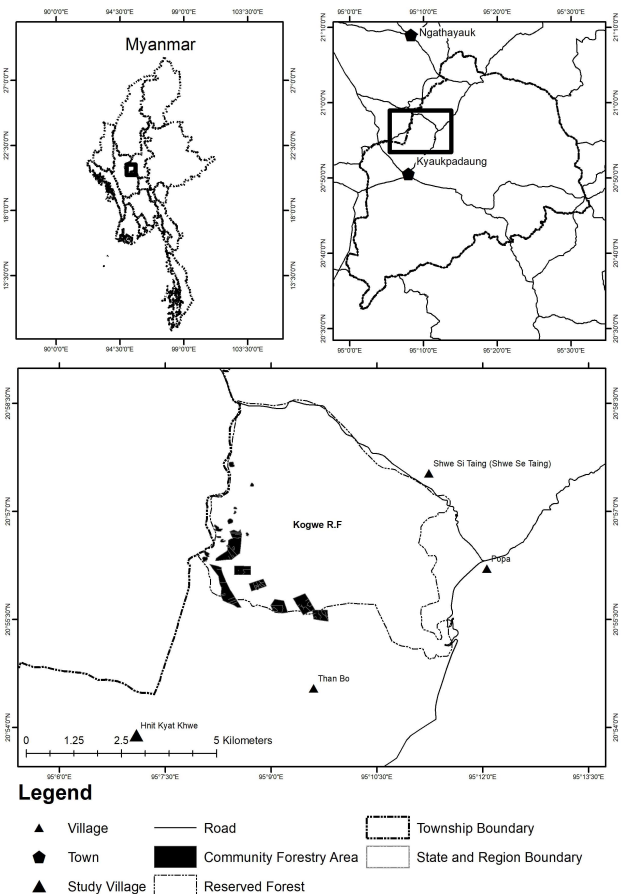


Fig. 1. Map showing the study village, which is located in Kyaukpadaung Township, Mandalay region, Myanmar

departmental instruction to provide CF certificates to local informal landowners if the land is in the Permanent Forest Estate (PFE). Consequently, interested customary forest owners in the village applied for the CF certificate in 2015.

The total CF members are 78 out of 954 households in the study village. The CF certificates were issued in 2017 to eight user groups, with a total area of 280.64 ac (113.57 ha). The land allocation of CF members is based on traditional land ownership in the Kogwe Reserved Forest area. The type of CF in this study village is agroforestry, where CF members use nearby farmland for cash crops such as sesame, green gram, maize/sorghum, chickpeas, groundnuts, and pigeon pea. The CF is the source of firewood, fodder, and cash crop income from agroforestry. However, there has yet to be a cash return from the forest because the forest has been degraded because of the overexploitation of firewood in the past.

Research methodology and analysis: A semi-structured questionnaire, a key informant interview, and a focus group discussion were used for primary data collection. Before the full household survey was conducted, a preliminary survey was conducted in October 2021 with 10 households and 1 focus group discussion to get the baseline information of the study village to structure the questionnaires. After that, a structural interview with 189 households was conducted in December 2021 and March 2022 through stratified random sampling to get quantitative data on socioeconomic data, natural resources ownership, awareness of CF, and participation in the collective activities of CF.

For statistical analysis, we used SPSS 28.0.0.0. In model 1, binary logistic regression was used to examine the influencing factors of local people's decision to become a member of CFUGs. Then, in model 2, multiple linear regression model was used to explore factors affecting CF members' participation in collective activities. Focusing on the findings from the previous literature, we selected socioeconomic characteristics of households related to the livelihood of local people affecting people's participation in the CF program, shown in Table 1. Then, the research aimed to explore the impact of the socioeconomic characteristics of rural households under rural transition on people's participation in the CF program. Household incomes were divided into farm and nonfarm incomes in the analysis to know the impact of increasing nonfarm livelihood activities under rural transition.

For model 1, the model's goodness of fit was assessed using Nagelkerke R^2 and chi-square values. To check the multicollinearity assumption of model 2, the variance inflation factor (VIF) test was conducted, and the VIF values of the independent variables in model 2 are from 1.05 to 5.5.

RESULTS AND DISCUSSION

Socioeconomic profile of the study area: Table 2 shows the socioeconomic profile of the respondents. Most of the households in our sample were dry land farmers with diverse livelihood systems that combined incomes from dry land agriculture, rearing livestock, migration, casual labor (nonfarm), farm labor, nonfarm employment (school teacher and administration staff of government/private businesses), and small businesses (e.g., incomes from small grocery shops, food services in town, and agricultural machine rental services). The income of CF members from farms is 74%, whereas nonfarm income contributed 26% of CF members' total gross household mean income. In the case of a non-CF member family, farm and nonfarm incomes contributed equally to a household's gross mean income.

Since the early 2000s, some toddy palm climbers have started working in foreign countries, Malaysia, Thailand, and cities in the country such as Yangon, Mandalay, and Naypyidaw due to the low price of toddy palm sugar. Then, with the connection of returnees, the number of households working outside of townships has increased, thereby increasing the nonfarm income of families in the study village. Before that, the village only depends on dry agriculture, toddy palm sugar production, and small-scale livestock. Owing to increasing investment cash for agriculture, many families pursue nonfarm income activities, mainly domestic and international migration, in this study area. However, farm income is still a significant contribution to most households.

Household food security levels were calculated based on sampled households' annual per capita income compared with the regional food poverty line (277,768 Myanmar Kyats, MMK/year = US\$518.60/year) for the study area in the Mandalay region (Schmitt-Degenhardt 2013). Our analysis showed that CF and non-CF members' households in the study village had food security levels but were just above the food poverty line.

CF members (2.6 ± 1.3) are less occupied with family labor than non-CF members (3.2 ± 1.1). However, 30% of CF members work outside the township area, whereas 46% of non-CF members' families work outside the township. Non-CF members have more average school years in their families than CF members. Non-CF members owned bigger agricultural land than CF members did, whereas CF members kept more livestock and large customary forest areas.

Regarding forest dependency, fuel wood and fodder for livestock are the main products of forests that contribute to local people's livelihood in the study village. Although the non-CF user group used $3.6 \text{ m}^3/\text{year}$ of firewood, CF members consumed $4.8 \text{ m}^3/\text{year}$ of firewood. As per the field survey, the commercial income of the villagers from selling

firewood is not found at the time of the survey. Villagers traditionally used wood to cook toddy palm sugar (jaggery). In addition, villagers largely depend on small-scale livestock for livelihood. At least a couple of draught cattle are owned by each household for agricultural labor and transportation

purposes. Villagers rear goats, pigs, dairy cattle, and chicken, which they can sell when in need of cash and which they use for subsistence consumption. CF members owned more livestock than non-CF members because CF provided more grazing land and fodder during summer.

Table 1. Description of coding and previous literature of dependent and independent variables used in the analysis

| Variables | Description and coding in the analysis of models 1 and 2 | Literature |
|------------------------|--|--|
| AGRILAND | Agricultural land-holding size (ha) | Positivity toward forest conservation programs is connected with agricultural land ownership (Cynthia et al 2012). |
| LSU | Total livestock-holding unit (LSU) ¹ (number) | Livestock fodder and firewood are the only forest products that local people get from the forest in CDZ. The more livestock a family reared, the more grazing land they needed, which encouraged them to participate in CF (Khaing 2018). |
| CUF | Area of customary forest (ha) | Recognizing customary rights and arrangements motivates customary forest owners to be involved in the institutionalized forest management system (Poudel, 2019). When customary land is part of the Permanent Forest Estate (PFE), CF is the only option for the informal land owners to formally establish land ownership (Lin 2018). |
| EDU | Education The average school year of household member (year) | People with more education are more aware of the value of protecting forests and are more likely to participate in participatory forestry conservation programs (Jumbe and Angelsen 2007, Lise 2000, Oli and Treue 2015). The presence of highly educated family members in families has a positive effect on environmental conservation (Agarwalla & Saha 2021). Higher education levels lead to better employment and less reliance on forest resources, which decreases motivation to participate in actions to forestry activities (Agrawal and Gupta 2005). People who are more educated and aware of the environment's current condition are more likely to participate in conservation projects and implementation plans (Alkan et al 2009, Htun et al 2012). |
| FIREWOOD | Total firewood consumption of household (m ³ /year) | Participation in forest management is motivated by high dependence on forests (Coulibaly-Lingani et al 2011, Dolisca et al 2006, Jumbe and Angelsen 2007, Oli and Treue 2015). |
| GEN | Gender of household head, Female =1, Male =0 | Compared to female-headed households, male-headed households are more willing to assist in forest conservation (Coulibaly-Lingani et al 2011, Kugonza et al 2009, Oli and Treue 2015). Women's engagement in CF is nevertheless restricted by traditional gender stereotypes, and women with migratory husbands significantly burden their participation in activities in local community forest institution activities (Lama and Ghale 2017). |
| WOT | Family working outside of township area. Households have at least one household member working outside of township area at least 6 months in a year (Yes=1, No=0) | CF is affected by labor migration in terms of participation and forest condition (Fox 2018). When migration out of the community is low and resource dependence among users is strong, community-based natural resource management can be sustained (Ostrom 1990, Agrawal 2001). |
| FL | Family labor. Working age household member (16–62 years old) | The more working age household members a family has, the more likely to engage in labor-intensive forest conservation work (Coulibaly-Lingani et al 2011, Jumbe and Angelsen 2007, Maskey et al 2006, Soe and Yeo-Chang 2019). |
| Collective activities* | No. participation in collective activities CFUGs because CF certificate was granted in 2017. | Participation is defined as the households' involvement in CF activities by Lise (2000), where participation comprises resource utilization, forest protection, and decision-making. |
| FI | Farm income, including agriculture, agroforestry, toddy palm sugar, livestock, casual labor (agriculture+ toddy palm+ livestock) | Decreasing farm related income such as agriculture and forestry, families' attendance at CF meetings, and the average amount of time spent at each meeting have remained constant, and there has been a decline in their reliance on the forest (Tamang et al 2014). Agricultural cash income from agroforestry-type CF in the dry zone is one of the factor to participate in CF activities (Hlaing and Inoue 2013). |
| NFI | Nonfarm income, including remittance, casual labor (non-farm), small business, nonfarm employment (salary jobs) | Increasing opportunities in nonagricultural livelihood like the service sector, businesses, and migration (including the remittances from it) is triggering labor availability in the forest sector (Tamang et al 2014). |

¹Calculation of livestock using the Eurostat coefficient to get the common value of livestock based on the type of livestock

*Collective activities include nursery work, pruning, fire-break line, and gap filling

Factors affecting local people's decision to register as a

CFUG member: This section will explore the socioeconomic characteristics of households affecting people's decision to become CF members. Model 1 is significant at a 0.1% significance level, and Nagelkerke R^2 is 54%. According to model 1, in Table 3, the first factor is the customary forest area of local people. The larger the customary forest area have more inclination to become a CF member ($p < 0.001$). As explained in the characteristics of the study village, exclusively customary forest owners are invited to apply for CF certificates in this study area. According to the key informant interview with the township staff office of the Forest Department, the Forest Department aims to reduce land use change from forest cover to agricultural land in this study village. Therefore, informal landowners are invited to apply for a CF certificate to prevent further invasion into PFE.

Second, the livestock-holding unit (LSU) ($p < 0.01$) has a significant positive impact on joining CF members. Because the availability of fodder is one of the problems during summer, livestock-dependent livelihood households in the

study area have more probability of becoming CF members.

The third and fourth factors, namely, agricultural land-holding size of household ($p < 0.05$) and nonfarm income ($p < 0.05$), show a significant negative correlation to being a member of CFUGs. The fifth and sixth factors, which are the female household head ($p < 0.05$) and the average school years of the household ($p < 0.01$), are the social characteristics of the household. Both negatively affect local people's decision to participate in CFUGs. The seventh factor is the availability of family labor ($p < 0.01$), which negatively influences local people's decision to become CF members.

Factors influencing CF member participation in the collective activities of the CFUGs:

In this section, model 2 explains the factors influencing CF members' participation in the collective activities of the CFUGs. The model is significant at a 0.1% significance level, with an R^2 value of 68%. As shown in Table 4, in the case where the CF member family's income from nonfarm increases, the level of participation in collective activities ($p < 0.001$) tends to decrease. Furthermore, if the CF member family has

Table 2. Socio-economic profile of respondent households

| Variables | CF member status | N | Mean | SD | SE |
|---------------------------------|------------------|-----|----------------------|-------------------|---------|
| FL (No.) | No | 111 | 3.230 | 1.068 | 0.101 |
| | Yes | 78 | 2.630 | 1.300 | 0.147 |
| AGRILAND (ha) | No | 111 | 1.310 | 1.318 | 0.125 |
| | Yes | 78 | 1.275 | 0.726 | 0.082 |
| LSU (No.) | No | 111 | 2.788 | 2.861 | 0.272 |
| | Yes | 78 | 5.812 | 5.439 | 0.616 |
| INCOME (USD per capita/year) | No | 111 | 544.130 | 324.802 | 30.829 |
| | Yes | 78 | 544.093 | 320.785 | 36.322 |
| CUF (ha) | No | 111 | 0.263 | 1.201 | 0.114 |
| | Yes | 78 | 2.179 | 3.161 | 0.358 |
| EDU (year/HH member) | No | 111 | 6.939 | 2.169 | 0.206 |
| | Yes | 78 | 5.046 | 2.067 | 0.234 |
| FIREWOOD (m ³ /year) | No | 111 | 3.632 | 3.188 | 0.303 |
| | Yes | 78 | 4.888 | 3.540 | 0.401 |
| FI (USD/year) | No | 111 | 1086.455 | 770.298 | 73.113 |
| | Yes | 78 | 1469.417 | 905.161 | 102.489 |
| NFI (USD/year) | No | 111 | 1097.224 | 1276.896 | 121.198 |
| | Yes | 78 | 512.581 | 817.390 | 92.551 |
| Variables | Description | | CF member households | Non-CF households | |
| GEN (No.) | Female | | 14 | 38 | |
| | Male | | 64 | 73 | |
| WOT (No.) | Yes | | 24 | 51 | |
| | No | | 54 | 60 | |

*1USD= 1630 Myanmar Kyat in 2021; SD= standard deviation; SE= standard error

someone working outside the Kyaukpadaung township area, the CF member family has fewer records of participating in collective activities ($p < 0.05$). However, family labor availability promotes CF member participation in collective activities at a 0.1% significant level.

Model 1 found that customary forest owners have more possibility to become CF members. The result is similar to that of Lin (2018) in Myanmar and Dolisca et al (2006) in Haiti. The landless or small land-holding size family is more interested in joining the CF program to get cultivation land. The increasing population in the CDZ tightened the availability of agricultural land because more than 60% of agricultural land is inheritance (Hein et al. 2017). The result suggests that small agricultural landowners or landless families are more interested in joining the CF program. In this context, a bigger agricultural landowner has less possibility to become a CF member in model 1. The result is opposite to that of the previous study by Cynthia et al (2012) in Madagascar.

With limited agricultural land availability in the CDZ, a customary landowner is more likely to register as a CF member, according to model 1. According to a discussion with Forest Department staff and CF chairman, the Forest Department exclusively aims for an informal landowner in the PFE to join the CF program in this study village, which means that it excludes local people from entering the CF program if they do not have customary land (informal land) in PFE. During discussions with non-CF members, some were

interested in joining the CF program if the Forest Department allowed them to join, even though they do not have a customary forest in PFE, especially agricultural landless households. Therefore, the Forest Department should treat all villagers equally to join the CF program. If the Forest Department could provide a common pool forest area to interested villagers (local people) who are noncustomary forest owners, local participation in the CF program would be increased. Concurrently, local people can also earn cash income from agriculture while the forest is under rehabilitation.

Suppose that one of the family members works outside the township area and cannot commute daily, threatening family labor for the forestry sector, particularly for labor-demanding collective activities. Thus, CF member households with members working outside of the Kyaukpadaung township area show less participation in collective activities in model 2.

The increasing opportunities under the rural transformation with the improved banking system and transportation have been catalyzing local people to pursue nonfarm livelihood activities in the village and nearby town in Myanmar since 2011. Moreover, when the country opened to international communities in 2011, the increasing

Table 3. Result of the binary logistic model of factors affecting local people to become a CFUG member¹

| Variables (Model 1) | B | SE | p value |
|----------------------------------|-----------|-------|-----------|
| GEN | -1.106 | 0.506 | 0.029* |
| WOT | 0.523 | 0.573 | 0.362 |
| FL | -0.526 | 0.196 | 0.007** |
| AGRILAND | -0.66 | 0.269 | 0.014* |
| LSU | 0.201 | 0.066 | 0.002** |
| CUF | 0.374 | 0.108 | <0.001*** |
| EDU | -0.341 | 0.127 | 0.007** |
| √FI | 1.279 | 0.742 | 0.085 |
| √NFI | -0.398 | 0.194 | 0.04* |
| FIREWOOD | 0.035 | 0.065 | 0.595 |
| Constant | -0.236 | 2.201 | 0.915 |
| Prob > chi-square X^2 (10,189) | 79.886*** | | |
| Nagelkerke R^2 | 0.54 | | |
| No. of correct prediction | 79.4 | | |
| N | 189 | | |

Significance level: *5%, **1%, ***0.1%. ¹ Respondent is a CFUG member; B= coefficient of independent variables; SE= standard error

Table 4. Result of the multiple linear regression model of factors affecting CF member's participation in the collective activities of the CFUGs

| Independent variables | Model 2 (Collective activities) | | |
|-----------------------|---------------------------------|-------|-----------|
| | B | SE | p value |
| (Constant) | 7.316 | 1.292 | <0.001*** |
| √FI | 0.255 | 0.394 | 0.52 |
| √NFI | -1.977 | 0.181 | <0.001*** |
| FIREWOOD | 0.042 | 0.029 | 0.162 |
| AGRILAND | 0.114 | 0.138 | 0.411 |
| WOT | -0.738 | 0.297 | 0.015* |
| LSU | 0.009 | 0.022 | 0.674 |
| GEN | -0.194 | 0.235 | 0.413 |
| FL | 0.638 | 0.126 | <0.001*** |
| EDU | 0.011 | 0.062 | 0.858 |
| CUF | 0.009 | 0.033 | 0.781 |
| | R^2 | 0.683 | |
| | $F(10,77)=108.515$ | | |
| | p<0.001 | | |
| | N | 78 | |

Significance level: *5%, **1%, ***0.1%; B= coefficient of independent variables, SE= standard error

international investment in the factory and services sector in big cities persuaded young educated people in the village to work in the cities. Thus, the result showed that bigger households choose more stable jobs and better careers instead of forestry, particularly joining the CF user group in model 1.

By contrast, in model 2, the availability of family labor among CF member families has a positive relationship with CF member participation in the collective activities of the CFUGs. Similar results were found by other scholars (Jumbe and Angelsen 2007, Coulibaly-Lingani et al 2011, Soe and Yeo-Chang 2019). Generally, a CF member does not consider forestry activities as a livelihood priority to share labor due to limited earnings from the forest in the study village. Thus, sharing family labor to participate in CFUG's activities is considered a voluntary contribution to the user group's development. In this context, if CF members have limited family labor, sharing labor to collective activities of CF is considered after agriculture and other livelihood work. Meaning that the lesser the family, the lesser the participation in CF collective activities. Thus, this study suggests that creating alternative income opportunities through participation in CF activities is urgently needed to give incentives to CF members to boost people's participation in CF activities.

In model 2, the CF member's farm income and agricultural land-holding size are found to have a positive relationship with the CF member's participation in the collective activities of the user group. However, these factors are not statistically significant. The finding is similar to that of the previous study by Hlaing and Inoue (2013) in the dry zone: agricultural income from the CF area is one of the main incentives to participate in CF collective activities, which means that if CF members' main livelihood is farm livelihood, they need more agricultural land from the CF area to increase household income. In addition, rural household wealth in Myanmar is generally measured by agricultural land-holding size. Therefore, creating socioeconomic opportunities, such as a revolving fund for poor CF members and a common livestock farm, would encourage participation by low-income families among CF members.

Model 1 shows that increasing nonfarm income significantly affects local people's decision to be CF members. All classes of wealth engage in nonfarm livelihood activities under the rural transformation: poor households are in the form of distressed livelihood diversification, and the well-off are in progressive livelihood diversification (Martin and Lorenzen 2016).

For the well-off and educated people, migration is for better job opportunities and stable income, which

encourages them to work in urban areas instead of agriculture, forestry, and toddy palm. The trend is similar in Nepal; education catalyzed local people to grab regular salary jobs, which has a negative impact on local people's interest in forest management (Agrawal and Gupta 2005). Thus, the result suggests that educated households, largely dependent on nonfarm income are less interested in participating in CFUGs. The trend is opposite to that of previous studies by Soe and Yeo-Chang (2019). They mentioned that educated families are more interested in forest conservation.

Taking advantage of rural transformation, model 1 suggests that families with more educated members are less likely to join CFUGs, which means that educated households opt for nonfarm income opportunities such as salary jobs (teacher and regular clerk in a government department) and working outside the township area for better careers and a stable income.

The low interest of educated persons in the CF program in this study area will become an institutional challenge for the sustainability of CFUGs because the involvement of educated members is critical in communicating with external stakeholders and expanding user group networks to grab future economic opportunities for CF enterprises.

For poor people, irregular rainfall and the unstable price of agricultural commodities push them to pursue out-migration and nonfarm livelihood activities (low-income generating activities). However, most of the respondents keep agriculture as their main livelihood. They use the remittance and other nonfarm income as a cash investment for dryland agriculture, livestock, and the toddy palm sugar industry. Hence, this trend of livelihood transition to nonfarm livelihood makes them tighten labor availability to share with the forestry sector, which negatively impacts people's decision to be part of CFUGs.

Similarly, the increasing nonfarm income of CF members' households contributes to less participation in collective activities by its members in model 2. The result is the opposite to that of Shahi et al (2022) in Nepal: changing the livelihood of CF members to non-forest-dependent livelihood did not seem to reduce the participation records by CF members due to a clear CFUG fine rule for the absence of participation in meetings. However, owing to the absence of a clear institutional structure of CFUGs in the study village, CF member participation in collective activities is found to decrease when the nonfarm income of CF members increases, which means that if CFUGs have clear sanctions and fine systems in CFUGs, the participation of CF members in collective activities can be strengthened.

In addition, model 1 displayed a negative sign on the

female household head. The result is consistent with that of previous studies in Nepal and West Africa (Coulibaly-Lingani et al 2011, Oli and Treue 2015). In Myanmar, the result can be explained by the custom way of choosing livelihood: women think that forestry work is more relevant to males. However, model 2 shows that gender is not a significant factor determining CF member participation in collective activities, although women CF members show less participation in CFUGs.

Livestock rearing is one of the most critical livelihoods in this study area. Owing to severe weather and the uncertain yield of dry agriculture, most respondent families traditionally rear livestock, which can quickly be monetized as urgent needs arise. In summer, people need to depend on the forest for fodder and bedding due to limited fodder availability from agricultural products. Hence, livestock holding unit significantly influences people's decision to be CF members in model 1. However, the livestock-holding unit is not a significant factor in CF member participation in CFUGs' collective activities in model 2. The reason behind this is the CF management model of the study area, which is individual ownership and collective management (Feurer et al 2018). In the management plans of CFUGs, the land is allocated to each user individually as per traditional land ownership before CF was established. Eventually, land management is under each user's decision for grazing and cultivation of agricultural crops. The CF management committee cannot intervene in grazing land management once the CF management plan is approved. Only forest management activities especially silvicultural works are collective in the study area.

Another forest dependency of local people's livelihood in the study area is firewood collection for toddy palm sugar and cooking. In models 1 and 2, the firewood consumption rate of households is not statistically significant in becoming a CF member and in CF member participation in CFUG's collective activities. The result suggests that firewood consumption has no relationship with people's participation in CF in the study area. To explain this, toddy palm climbers who are agricultural landless consume more firewood in this study area, and only a few have access to customary forests. According to an interview with one of the toddy climbers, one firewood cart (0.509 m³ of wood) can feed fuel for only two days for a toddy palm climber who can climb approximately 80 palms, which means that a toddy palm climber needs at least 25 to 27 m³ of solid wood for one toddy palm season. The firewood consumption for household cooking between CF and non-CF members is similar. In this regard, people's participation in the CF program is not determined by firewood consumption in this study area. Thus, the result differs from that of previous studies in West Africa and Nepal (Oli and

True 2010, Coulibaly-Lingani et al 2011): people's willingness to participate in the CF program is determined by forest dependency.

Conclusion and recommendation: The primary purpose of this paper is to explore the determinant of the socioeconomic characteristics of households to become CF member and further participation in the collective activities of the CFUGs. Among 10 independent factors, 7 factors determine local people's decision to become CF members: gender of household head, customary forest area, livestock-holding unit, education, agricultural land-holding size, family labor, and nonfarm income.

Among 10 independent characteristics of CF member households, the nonfarm income of the household, working outside of the township, and availability of family labor determine CF member participation in collective activities.

In contradiction to previous studies, the firewood dependency of local people does not influence local people's willingness to join the CF program due to changes in livelihood under the rural transformation in the CDZ. However, changes in rural livelihood from forest-dependent to non-forest-dependent livelihood determine people's willingness to join the CF program and to participate in the collective activities of the CFUGs.

The result is similar to that of Filipiski (2019): the livelihood diversification of rural households to nonfarm livelihood has a negative impact on farm labor availability in the agricultural sector in the CDZ. This study found that the rural transition setting will have a negative effect on CF implementation due to reduced interest by local people in the forestry sector with limited labor availability. Local people cope with farm labor scarcity using mechanization in the agricultural sector because agricultural income is essential for their livelihood. However, in community forestry in the dry zone, where local people did not receive immediate income from CF, the less participation of CF members in CF management activities is the result of rural livelihood transformation.

Three recommendations are suggested to boost the participation of local people in the CF program in the CDZ. First, the Forest Department should consider a fair ground for noncustomary forest owners, particularly landless vulnerable households with a limited option to diversify their livelihood to join the CF program as an equal opportunity, and should then provide a shared pool CF area for them to manage.

Second, rural livelihood development programs should be considered in cooperation with the CF program, such as the introduction of community-owned livestock farms and skill development programs for women CF members to produce handicrafts from nontimber forest products or toddy palms.

Lastly, strengthening the institutional rule of CFUGs is

urgently needed to prevent from becoming stagnant user groups. User group participation will increase if there is a clear rule for the fine system.

Although this study only covered a sample population from the CDZ of Myanmar, the result can be applied to similar socioeconomic conditions in Myanmar, particularly the CDZ area, where the majority of the CF area is located. However, the CF model's land tenure, governance, and institutional factors are excluded from the study because the study wants to focus on the socioeconomic characteristics of local people regarding participation in the CF program.

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