Study on Socioeconomic Impacts of Private Forest Plantations on Local Livelihood in Pyu Township, Taungoo District, Bago Region, Myanmar

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Abstract: Forest Department of Myanmar has called for private investment in plantation forestry by granting forest land concession right since 2006-07. On the other hand, rural peoples of the country, representing about 70% of total population, rely on forest resources and forest land for their livelihood. This paper explores the socio-economic impacts of private forest plantations on rural communities in Pyu Township, Taungoo district, Bago Region, Myanmar. According to our results private forest plantations have the potential to positively impact on local people's wealth and well-being, if enough emphasis is paid attention to minimize the negative impacts. The household survey data of 213 observations from two villages were analyzed using binary and multinomial logistic regression analyses. The study reveals that forest plantations make threat the basis of traditional rural livelihoods by reducing the availability of natural resources. However, investments gave also supported the diversification of livelihood strategies in the communities by providing formal employment and by increasing business and trading activities. As a rapid growth of populations and traditional agricultural practices have led to the overexploitation of natural resources, non-natural resource-based livelihood strategies increase the resilience of a household. Most respondents give the facts on plantations to have either no overall impact or a positive impact on the well-being of their household. According to our results, socio-economic household characteristics only marginally point out respondents' perceptions of the impacts of forest plantations but perceptions differ significantly between individual villages.

Keywords: Forest Department, socio-economic impacts, Private investment, Private Forest Plantations, Land concession right, Logistic regression analyses, Myanmar

1. Introduction

The Republic of the Union of Myanmar, with a total area of 676,577 km^2, is still one of the counties in South-East Asia Region possessing rich forest resources. According to forest resource assessment (2015), about 42.92 percent of the total land area is still covered with forest. Forest resources make a substantial contribution to country's economic sector both at subsistence and commercial scale, as well as in a tangible and intangible way. It also contributes to meeting forest product demand of the country for the domestic use. In addition, it provides wood fuel and charcoal which are the main sources of the bio-energy used in Myanmar. The total population of the country is about 51 million (Population Census, 2014) and 68 % of this population were classified by the World bank as rural people who residing in areas through depending heavily on the forests for their basic needs, especially for shelter, fodder, fuel wood, seasonal food and hunting for their livelihoods. The annual consumption of wood fuel per household is estimated to be 2.5 cu-tons (4.5 m^3) for rural households where as 1.4 cu-ton (2.5 m^3) for urban residents (National Forest Master Plan-NFMP, 2001-02 to 2030-31). Among the intangible benefits, its contribution makes a number of forms including protection of slope, water catchments, soil erosion and siltation control thereby protecting downstream agriculture, as also the streams, rivers and lakes.

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Like other developing countries, deforestation and forest degradation resulting from agricultural expansion, encroachment, over-exploitation, conversion of forest land into other use etc., are major issues that hinder sustainable forest management of the country. The annual deforestation rate between 2005 and 2010, accounts 0.95% of the total forest cover (FRA 2010, FAO). Although limited information on forest degradation is available, according to the satellite imageries it is more significant than deforestation in Bago Yoma area where natural teak-bearing forests grows very well. Plantation forestry has always been the supplement to the natural forest management. It is asserted in the 1995 Myanmar Forest Policy that existing natural forests will not be substituted with forest plantations. Plantation forestry has a complementary role to natural forest in order to control deforestation and forest degradation. Accordingly, the objectives of plantation establishment in Myanmar have been to rehabilitate degraded forest lands, restore deforested areas and supplement various timber yields from the natural forests. Historically, Myanmar initiated the formation of teak plantation as early as 1869 on a small scale using "taungya" method. Large-scale plantation forestry began in 1980 and about 30,000 ha of forest plantations have annually been formed by public sector since 1984. Decreasing timber supply from natural forests and inadequate resources from public sector to invest in forest plantations, call for Forest Department to encourage private sector investment in plantation forestry.

Since 2006-2007, along with the development of market-oriented economy in Myanmar, Forest Department has been encouraging private investment by national companies and entrepreneurs in commercial forest plantations with a view to supplying increasing demand of teak and other hardwoods of the country, contributing to the national economic development, and conserving environmental stability. As of February 2012, almost 44,000 hectares of private forest plantations has been established by over 100 private companies/entrepreneurs all over the country. For this purpose, the department grants forest land concessions to the private companies and entrepreneurs in the degraded forests in which some parts have been already encroached by the local people for their livelihoods.

According to Forest Law (1992), Forest Land includes Reserved Forest and Protected Public Forest, which are legally constituted for the production of sustained timber yield, environmental protection, and

as well as for supplying basic needs of the people from forestry sector. Although Forest Lands are designated with aforementioned objectives, it can be said that in reality legal enforcement is still inadequate for several reasons, including increased population with high poverty rate which accounts for 26% of country's population (IHLCA Report, 2011). Therefore, encroachment for agricultural activities inside Forest Land is a very common issue in Myanmar. Encroachment can be observed in two forms: one is shifting cultivation and another one is sedentary agricultural cultivation. Shifting cultivation is a major livelihood strategy for the indigenous people living in hill regions where population is relatively sparse. On the other hand, sedentary agriculture is common in the area where population is considerably dense with the shortage in land holding outside Forest Land. Moreover, grazing is another common form of use of Forest Land by rural people. Most of rural famers residing near forests used to pasture their cattle in the forest land. In addition, they can harvest fodders to feed their domesticated animals that are kept in their house. It encourages their livelihood with income diversification. Regardless of legal status, Forest Lands therefore play an important role in achieving goals of rural livelihood under current situation.

However, linkages between the developing forest plantations and livelihood of the people might be positive or negative. It can create job opportunities and income generation where forest resources are very scare and unemployed rate is high. At the same time, it can negatively effect on livelihood of local peoples, especially when they highly depend on the forests land and when these forest lands are confiscated by the companies / entrepreneurs under the concession right. In this context, it is important to know how local peoples cope or adjust with these conditions. So far, no research work has been conducted for this purpose. It is therefore essential to study on impacts (positive or negative) of private forest plantations on livelihood of local peoples.

In our study, we examine villager's perceptions of the impacts of plantations on the availability of natural resources (land, firewood and non-timber forest products). We examine how households have perceived the overall impact of the plantations on their livelihood. We further analyze whether any groups have been impacted more than others. We also analyze the link between different livelihood strategies and the impacts of private forest plantations. Our main hypotheses are as follows: (i) Local households perceive the impact of forest plantations on natural resources negatively. (ii)

Livelihood diversification for the livelihood strategies of the households has been affected positively by the introduction of forest plantations. (iii) The introduction of private forest plantations is perceived more negatively by poorer households and more positively by wealthier households.

2. Data and Methods

2.1 Study area

The study was conducted in the Taungoo District, East Bago Region of Myanmar. Bago Region is situated in the southern central part of Myanmar between the latitudes of 19˚20' N and 46 ˚ 45' N and longitudes of 94 ˚ 35'E and 97 ˚ 10'E. The region occupies an area of about 15212 sq miles and consists of four districts, Bago, Taungoo, Pyay and Tharawady. It divides the western part (Pyay and Tharawady) and eastern part (Bago and Taungoo) of the Bago Region. Bago Yoma sometimes refers to as "Home of Teak" because teak which grows on the Yoma is of highest quality. The specific areas of the study was the Pyu township of Taungoo District which is located between the latitudes of 18˚48' N and 18 ˚ 13' N and longitudes of 95 ˚ 50'E and 96 ˚ 34'E. It comprises of 10 wards and 62 village tracts. A total population of township was 257,273 of which 63,880 are residing in the Township. Average temperature is about 29.˚C and average rainfall is about 85 inches. There are three reserved forests with an area of 100,679.31 ha and two protective public forests with an area of 61937.05 ha. (Forest Department, Taungoo District). Although Forest Department has launched private forest programme starting from 2006-07, it was found that private forest plantation companies and entrepreneurs started to invest in 2009-2010. As of July 2016, 11 private investors(4 Companies and 7 Entrepreneurs) have been allowed for establishing private teak plantation and the total permitted area reaches to 3,583 ha in the Township, of which 2,240 ha to be developed by 6 investors are inside the Myayarbinkyaw Reserved Forest. (Forest Department, Pyu Township)
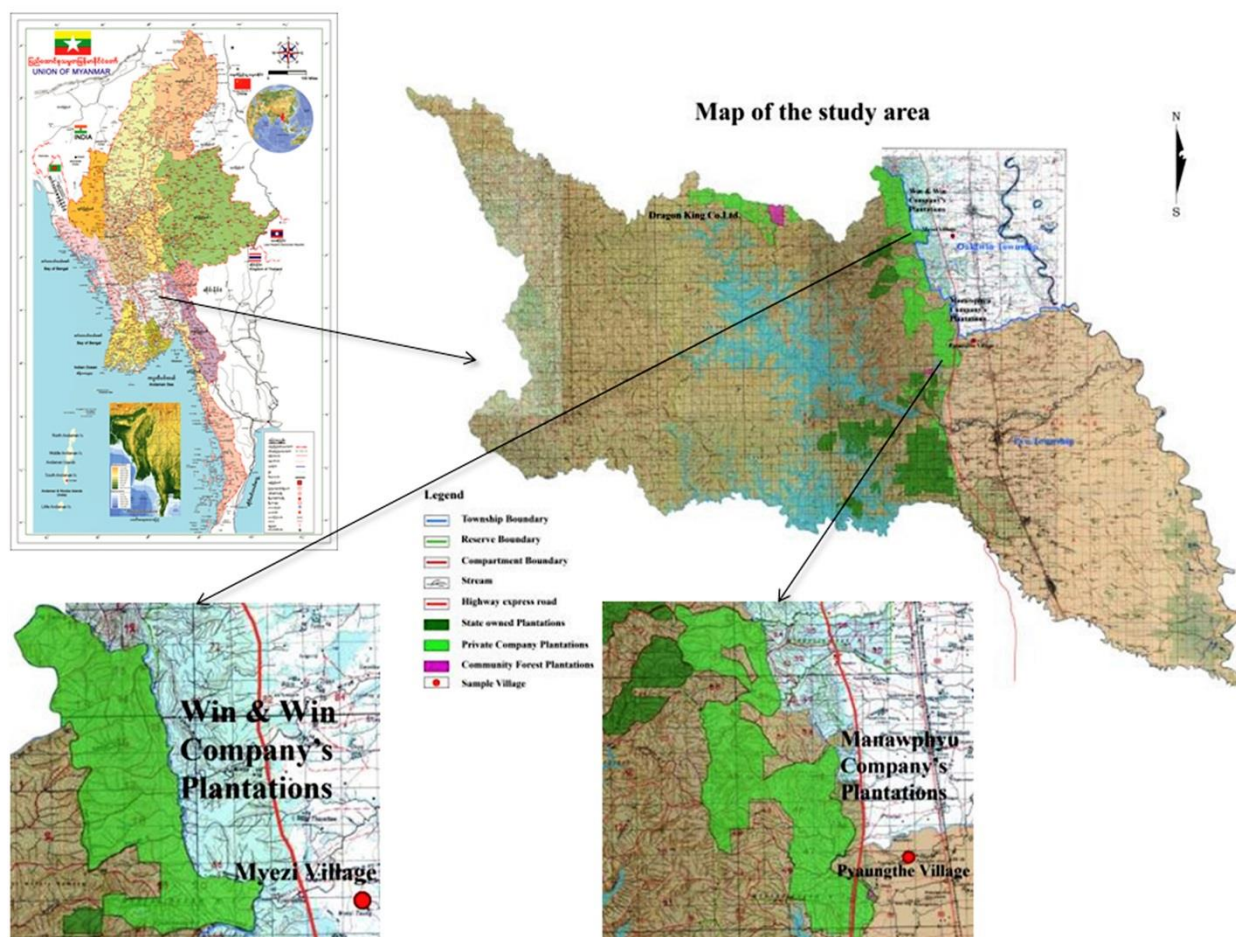

Fig.1 Research villages and their location

2.2 Data Collection

Selection of study villages was carried out using the criteria of "nearest to the largest private forest plantations". Among others, private forest plantation established by Manawphyu Company in Myayabinkyaw reserved forest (RF) is 1,092 ha and the one developed by Win & Win Company in this RF is 750 ha respectively. They are the largest ones in Pyu Township during 2009-2014. Only two target villages, i.e. each village nearest to each plantation, were selected as representative communities in this study. According to the preliminary investigation carried out on 29-30 July, 2016, the following two villages were selected as target villages: Pyaungthe village which is nearest to Manawphyu's plantations and Myezi village which is nearest to Win & Win's plantations.

There are altogether 309 households in two target villages:

194 households in Pyaungthe village and

105 households in Myezi village.

Sample size was calculated at 5% precision level by using Taro Yamane formula (Yamane, 1967):

$$n = \frac{N}{1 + N\,e^2}$$

Where; n = sample size

N= total population of household

e = precision level

Thus, the result of sample size calculation is 213. Then, it was proportionately allotted for the each target village: 130 households for Pyaungthe village and 83 households for Myezi village. After that sample households were randomly selected. Secondary data related to private forest plantation were mainly collected from Headquarters of Forest Department before conducting field data collection. Some additional secondary data related to the study was also obtained from Local Forest Department of Pyu Township while collecting primary data. For conducting household survey, questionnaires were prepared to ensure that its scope covers livelihood assets, livelihood strategies and livelihood outcomes for assessing impact of private forest plantation. Also they were pretested among 10 households in Pyaungthe village in order to know their validity and workability. Then, they were improved based on the findings during the pretest phase. Data were collected from the sample households by using questionnaires along with personal interviews to household head or his spouse. Before interviewing, they were briefly explained about research work and got their prior informed consents. Then, interview was conducted.

2.3 Data Analysis

Data analysis was carried out using binomial and multinomial logistic regression analyses as well as principal component analysis. The logistic regression model is based on a logistic distribution with a s-shaped curve because the conditional mean of the output variable for dichotomous data needs to be equal or bigger than zero and equal or smaller than one (Hosmer et al. 2013). In contrast to linear regression, in logistic regression, the outcome variable (Y) is transformed into logits, which is the natural logarithm of the odds of Y. The odds equal the ratio of the probability to belong to one category (p_i) relative to the probability not to belong to the category ($1-p_i$). For dependent variables with more than two categories, the multinomial logistic regression model is applied. In this case the odds are the ratio of the probability to belong to one category (p_i) relative to the odds to belong to a reference category (p_0). The logistic regression takes the form

$$Logit\,(Y) = Ln\left(\frac{pi}{p0}\right) = a + \sum bi \, * \, X_i$$

Where X_i being the predictors or independent variables,

a   the constant,

b_i the estimates for the predictors,

in the binomial case p_0 can be replaced with $(1- p_i)$ where the non-occurrence is the reference category.

The coefficients of the predictors in logistic regression express the changes of the odds to be in one category in comparison to a reference category of the dependent variable, under the assumption that the other predictors are held constant. In logistic regression odds are usually compared in form of odd ratios (OR).

Binary logistic regression analysis was also used to describe factors interpreting respondents' perceptions of the impacts of private forest plantations on the availability of different natural resources (land, fire wood and non-timber forest products). Logistic regression analysis was carried out separately for each of the resources. The dependent variables in each model had a value of 1 if the respondent

answered negative impacts of private forest plantations on the specific resource availability, 0 otherwise. Independent variables used in each model were socio-economic or livelihood related characteristics that were assumed, based on theory or practical observations, to explain the impact.

Multinomial logistic regression analysis was used to examine the relationship between wealth and different livelihood strategies (including forest company employment and business activities). Wealth was the dependent variable in the model. Households were divided into three wealth groups using principle component analysis. Dividing respondents into different wealth groups based on income levels was not applicable, since most households sustain their living with their yield from the farm plots and NTFPs collection. Household wealth was assessed, following Filmer and Pritchett (2001), on the basis of their ownership of different assets (bike, motorbike, Television, mobile phone, house with fire brick, house with tin roof, other valuables). The principle component analysis provided weights for each of the assets based on the asset combination with the maximum explained variance. An asset index for each household was set up with the gained weights, according to which the households were subsequently divided into three wealth groups. While 20% of respondents were in the richest wealth group, each contained 40% of the sample in the two lower wealth groups. The "richest wealth group" was the reference category in the multinomial logistic model, which compared to the "lowest wealth group" and "middle wealth group". Different livelihood strategies, apart from agriculture, were regarded as independent variables.

Multinomial logistic regression was also used to analyze household perceptions concerning the impact of the private forest plantations in their overall well-being and to identify groups vulnerable to changes caused by private forest plantations. The dependent variable in the model was a value of 1 if the respondent responses forest plantations to have a negative overall impact on his or her households' welfare. Negative reported impacts were compared to the category for respondents reporting no impacts with a value of 0 and positive reported impacts with a value of 2. Similarly, independent variables were used as in the binomial regression models.

McFadden pseudo R^2, Hosmer-Lemenshow test, maximum likelihood ratio test and -2log likelihood was used in the regression analysis to assess the goodness of fit and eligibility of predictors. A 5% risk level was applied for all tests of statistical significance. Stata (version 13.0) software was used for all statistical analysis.

3. Results
3.1 Perceived impacts on natural resources, infrastructure and overall well-being
NTFPs collection was the main livelihood strategy for nearly all households (72%) in the study area. The second one is plantation company workers. 21% of the households carry out farming and sold a minor part of their harvest to generate additional income for the household. Other income-generating livelihood strategies included small scale trader, charcoal production, service provider and formal employment as civil servant or elsewhere (Fig.2). Forest plantations are perceived to impact the main livelihood, NTFPs collections that the distance to travel for collecting NTFPs was farther after plantation companies entered. Nearly all of the household survey respondents assessed the plantations to have negative impacts on land availability (Table1).

For their livelihoods, the respondents perceived private forest plantations to also negatively impact the availability of resources from natural forests. Most households collect firewood and various types of NTFPs from the natural forest areas. Local people have also experienced positive impacts. Possibilities for pursuing alternative livelihood strategies have increased and infrastructure has developed (Table 2). Most of the respondents thought employment opportunities to have increased because of private forest plantations (Table 2). The forest plantation companies have additionally implemented social activities in the villages, e.g. roads and education and health care facilities have been improved with the support of the companies.

The majority of households have perceived positive impacts at all on the overall well-being of their household (Table 3). Households from Pyaungthe village have more commonly reported positive than Myezi village (Table 3).
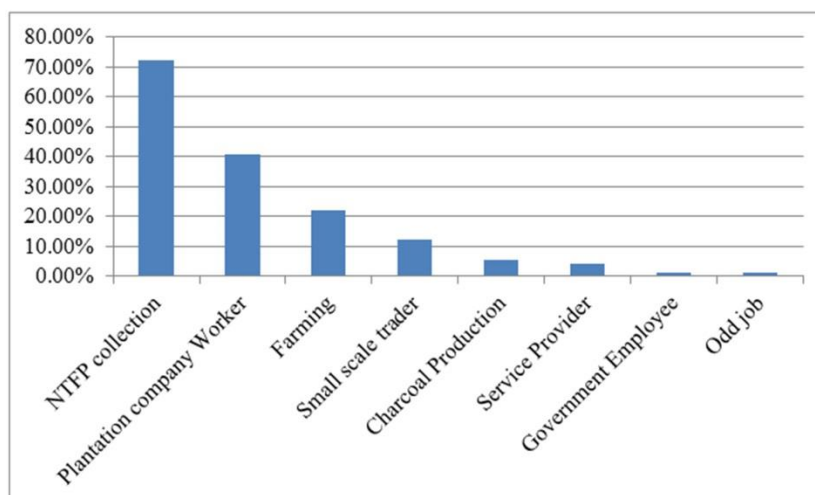
Fig.2 Proportion of households participating in different livelihood activities N=213

Table.1 Perception on the impacts of plantations on natural resource and land availability (% of respondents), N=213

	Negative impact	No impact	Positive impact	I do not know
Firewood	92.96	0.94	-	6.10
NTFP	74.18	12.68	-	13.14
Land availability	92.02	0.47	-	7.51

Table.2 Perceptions on the impacts of plantations on employment, trading and infrastructure (% of respondents), N=213

	Negative impact	No impact	Positive impact	I do not know
Employment	-	1.88	98.12	-
Roads	-	38.97	46.95	14.08
Health care	-	28.64	65.26	6.10
Education	-	30.05	64.79	5.16

Table.3 Perceptions on overall impacts of plantations (% of respondents), N=213

	Negative impact	No impact	Positive impact	I do not know
Pyaung The	1.87	3.75	55.40	0
Myeze	2.35	12.68	23.95	0

3.2 Factors influencing perception concerning natural resource availability

The binary logistic regression model on the perceived impact of private forest plantations on farmland availability is shown in Table 4. The dependent variable of the model has a value of 1 if the respondent reported negative impacts of private forest plantations on the farmland availability, 0 if otherwise. The variable "Number of household members" is the total number of people living in the household; "Household owns livestock" is regarded as a value of 1 if the household owns at least one type of livestock (e.g. ducks, chickens).

According to the results, negative impacts on land availability were mainly perceived by people who were from households with a larger family size. Furthermore, households whose livelihood activities were more dependent on farmland and NTFPs collections were more likely to report negative impacts on land availability by private forest plantations. Households that depend heavily on land are ones that sell many crops and where farming is the main income source, have a higher amount of livestock for which they need more land as pastures or for fodder production and households which food

needs to be provided. Binary logistic regression models were also used to analyze which factors explained respondent's likelihood to report negative changes in the availability of firewood and NTFPs. However, as the whole population in the study area is highly dependent on natural resources and thus homogenous in this case, only some significant explanatory factors were found. In all two models (NTFPs, firewood) the village of respondents was found to be the most important variable explaining negative responses. During the focus group discussion, respondents in Myeze pointed out that a growing population and charcoal production had caused deforestation already prior to the establishment of private forest plantations.

Table.4 Logistic regression model on the perceived impacts on farmland

Reporting a negative on farmland				[95% C.I. for Exp(B)]	
	B	Sig.	Exp (*B*)	Lower	Upper
Number of household members	.407	0.020	1.503	1.066	2.120
Household sells crops	-.685	0.353	.503	.118	2.140
Household owns livestock	.303	0.201	1.354	.850	2.157
Constant	.630	0.380	1.878	.460	7.668

N=213; reference category for dependent variable: non-reporting of negative impacts; -2Log-likelihood:-52.087; Hosmer-Lemeshow test 0.083; C.I.-confidence interval.

3.3 Forest plantations, wealth and livelihood diversification

Table 5 represents the results of multinomial logistic regression model examining the relationship between different livelihood strategies and wealth. The dependent variable in the model is the wealth category of the household. The variable "Number of livestock" illustrates the number of different types of livestock that a household possesses; "Number of livestock for sale" is the number of different types of livestock that a household owns with the purpose to sell them. The variable "Educated" is regarded as a value of 1 if the education of the household exceeds the sample average. "Business activity" has a value of 1 if the household owns a business or is engaged in trading activities other than selling crops, livestock or charcoal.

Differences can be observed especially between the lowest and highest wealth groups. According to results, households are more likely to be in the highest wealth group if they carry out different business activities. Poorer households comparatively are more often forced to sell livestock to generate income and cannot keep the livestock for themselves as a saving account. Higher education also increases the odds of being in the highest instead of the poorest wealth group.

As we cannot provide time series data, it is not possible to certainly say how the private forest plantations affect resident wealth, i.e. whether the establishment of forest plantations directly impacted the wealth groups of individual respondents or whether people employed or carrying out business activities were already in their current wealth groups before the establishment of the private forest plantations. A wealth regression analysis indicated, however, that short-term work did not improve the wealth status of the household in long-term, as previous employment in a private forest plantation did not significantly increase the odds of a households to be in the highest wealth group. One thirds of the people that were employed when the study was carried out had been in their companies for at least three years. According to the study many of the households with long-term employment will able to require assets as a consequence of their employment. According to our results there is a connection between wealth and the diversification of livelihoods, especially the commencement of non-natural resource-based strategies. As private forest plantations create possibilities for the diversification of livelihoods, they also increase residents' possibilities to gain wealth and increase their standards of living.

Table.5 Multinomial logistic regression model on the relevance of livelihood strategies on the wealth status of a household, with the wealth categories as dependent variables and the highest wealth group as a reference group

		B	Sig.	Exp (B)	[95% C.I. for Exp(B)] Lower	Upper
Lowest wealth group	Intercept	-.719	0.023	.154	.261	.906
	Number of livestock	.056	0.481	1.057	.904	1.236
	Number of livestock for sale	-.170	0.158	.843	.665	1.068
	Educated	.330	0.301	1.392	.743	2.605
	Forest Company Employment	.567	0.065	1.762	.964	3.221
	Business activity	-1.709	0.008	.181	.051	.637
Middle wealth group	Intercept	-.406	0.171	.666	.372	1.191
	Number of livestock	.102	0.185	1.107	.952	1.288
	Number of livestock for sale	-.194	0.092	.823	.656	1.032
	Educated	.070	0.816	1.073	.593	1.939
	Forest Company Employment	.021	0.943	1.021	.568	1.837
	Business activity	1.003	0.024	2.727	1.137	6.538

N=213; -2Log-likelihood:-86.241; McFadden: 0.195; highest wealth group is reference.

Table.6 Multinomial logistic regression model for the perceived impact on household's livelihood and overall well-being, with negative reported impact as the reference category

		B	Sig.	Exp (B)	[95% C.I. for Exp(B)] Lower	Upper
No impact	Intercept	-1.902	0.000	.149	.059	.371
	Number of men	.428	0.085	1.534	.943	2.495
	Household sells crops	-.289	0.551	.748	.289	1.938
	Forest Company Employment	-1.367	0.006	.254	.096	.670
	HoH male*not poorest group**	.228	0.618	1.257	.510	3.094
	HoH male* poorest group**	.223	0.707	1.249	.391	3.991
	HoH female*not poorest group**	.485	0.426	1.624	.491	5.369
Positive impact	Intercept	-1.334	0.001	.263	.117	.591
	Number of men	.592	0.012	1.809	1.136	2.878
	Household sells crops	-.300	0.508	.740	.304	1.801
	Forest Company Employment	-1.867	0.000	.154	.059	.404
	HoH male*not poorest group**	-.522	0.230	.593	.252	1.390
	HoH male* poorest group**	-.408	0.476	.664	.216	2.043
	HoH female*not poorest group**	.053	0.925	1.055	.344	3.232

N=213; reference category for dependent variable: negative impact; **reference group= female-headed households from poorest wealth group; C.I.-confidence interval;-2Loglikelihood:-129.734; Mc Fadden: 0.076.

3.4 Perceived changes in the overall welfare of the household due to plantations

As shown in the former sections, private forest plantations have had positive as well as negative effects on livelihoods of local communities. To assess the impact on local livelihoods, household perceptions on the impact of forest plantations on their overall well-being was analyzed. Factors explaining changes in the overall welfare of households were examined using multinomial logistic regression (Table 6).

The variable "Number of men" represents the number of men living in the household in study area. The variable "Household sells crops" has a value of 1 if the household sells part of their harvest on the market, variable "Forest company employment" is regarded as a value of 1 if the household has at least one member employed in a forest plantation company. The combinations of "Household head male/female *(not) poorest group" explore an interaction effect between the gender of the head of the household and the wealth status of the household, where female-headed households from the poorest households are referred to the group with a value of 0 (the other combinations as a value of 1).

The main characteristics contributing to a positive perception of the impacts of private forest plantations has been the employment of a family member in the plantation. Households with employment provided by plantation companies had higher odds to report positive instead of negative impacts on the overall well-being of their household. On the other hand, living in a village where many households had to depend on natural resources that collect from natural forest because of plantations has been a major cause leading to a negative overall perception of the impacts on the households.

Socio-economic characteristics of households, e.g., the number of household members or education, generally played a minor role in the perception of the overall impacts of private forest plantations on the household. Female-headed households from the lowest wealth group give feedback negative on their households more often than female-headed households from other wealth groups, but otherwise wealth did not influence a significant impact on the perception of the overall impacts on the household and is thus not included in the model.

However, the influence that the wealth status of a household has on the overall perception of the impacts can be indirectly seen though the correlation of wealth with other factors that is significant in the model. There are significantly more households in the highest and middle wealth groups engaged in business activities than in the lowest wealth group.

4. Discussion

The aim of the study was to examine the impacts of forest plantations on local people and their livelihoods. As expected, the households considered plantations to cause a decrease of many natural resources that are important for all households. My study suggests that household livelihood strategies were diversified as employment and business activities increased due to the plantations. In general, most of the households felt that private forest plantations had either a positive impact or no impact on the household's overall welfare. Otherwise, the feeling of respondents showing negative impacts was not insignificant and employment effects influenced only a small proportion of households.

The employment of household members in private forest plantation companies significantly impacted respondent perceptions of the impacts of plantations. However, contrary to the third hypothesis, general socio-economic characteristics like education or the size and wealth of the household had no major importance as explanatory variables. The poorest households were still found to get low benefit from the existence of private forest plantations compared to other groups.

Cromwell, E. (2002) stated that a majority of people in the developing world live on or use land over they have insecure tenure. Tenure security protects people's investments in the land and property they occupy against political or commercial exploitation. Rights to land can be an important source of asset-based security for the poor.

Concerning land concession in Lao PDR, Cor. H. Hanssen (2007) pointed out that through granting land concessions, hundreds of thousands of hectares have been alienated from local communities; they have lost the land, or access to the land, or the right to use it. This has had a negative impact on the livelihoods of especially the poorest communities and the poorest within communities.

Similarly, Prachvuthy, M. (2011) conducted a study on Impacts of Economic Land Concessions on the Livelihoods of Indigenous Communities in Northeast Provinces of Cambodia and it has been reported that economic land concessions are not

providing great benefits for local communities and that they had in fact harmed their traditional livelihoods. Only one-third of company jobs have gone to indigenous peoples, with the other two-thirds going to in-migrant workers, who are challenging the indigenous way of life.

Dahal.G.R et al (2011) also suggested that decisions to allow large-scale commercial intervention in forests forest lands - such as the establishment of industrial plantations, large-scale commercial industrial, mining and logging- should not be guided by interests seeking to raise government revenue and profit for investors. Rather, decision makers need to consider longer term, socioeconomic and environmental benefits, and whether such interventions will provide any benefits to local residents while seeking the rights and traditional practices of local people.

Moreover, Hobley, M. (2007) pointed out that according to evidence the privatization and enclosure of common pool resources are driving livelihood transformation in quite negative ways, increasing inequality, and generating conflict. Also she stressed that the challenge facing forestry is not just the restoration of trees or forest biodiversity but the growth of a political and social landscape that facilitates people's abilities to make choices to secure their livelihoods

On the other hand, Hoogenbosch, L. (2010) highlighted that the plantations in Ghana's High Forest Zone offer workers a stable livelihood with permanent wage labor and the ability to grow food crops between the trees and that plantations are managed in different ways and therefore represent different strategies to contribute to the workers' livelihood.

Schirmer (2006) revealed that commonly-reported perceptions of impacts of afforestation that afforestation provides increased quantity of employment in a region and can revitalize declining rural communities by providing new industry and employment opportunities. Consequently, it can improve local/regional service provision too. On the other hand, it has also been mentioned that afforestation takes up land needed for other uses such as agriculture, and reduces people's ability to live/subsist off the land by reducing their access for various agricultural/subsistence activities

Therefore, it is clear that developing private forest plantations under forest land concession might have both positive and negative impacts on the livelihoods of local communities. But, their magnitude and direction may vary with the extent of social and environmental safeguards that are incorporated into forest land concessions policy and practice of individual private company and entrepreneur.

Our study implies that competition over arable land is perceived to be higher than prior to the establishment of forest plantations. Similar to e.g., Gerber (2011); Nahuelhual et al. (2012); Obidizinksi et al. (2012), communities in my study were found to experience increasing difficulties in collecting firewood and NTFPs as a side effect of the established plantations due to growing population size and charcoal production.

Moreover, my study observed that previous employment and short-term contracts in private forest plantations had no impact on the wealth of a household, whereas most of those households with members currently employed on a long-term basis in the forest companies belong to the highest wealth group. In general, forest plantation activities are highly seasonal that lead to short-term contracts for local employees and new private forest investments are mainly labor intensive only in the initial phase of the project and many workers might be laid off after the planting phase (Tyynela et al., 2002; Charnley, 2005). According to the results of our study, most households remain highly dependent on their agricultural activities even if members of the household find employment or are engaged in trading or business activities which is in agreement to other findings Schoneveld et al. (2011); Lyons and Westoby (2014).

Dependence on natural resources and negative impacts of private forest plantations on those resources were observed in all wealth groups. The result is in line with the finding of Vihervaara et al. (2012), the majority of respondents in the study area perceived that forest plantations positively impacted their overall welfare or that no impact was observed. Our study identifies the respondents' home village as a major factor influencing how respondents view the impacts on overall welfare and natural resources while household characteristics and respondent gender had only a minor impact. But this result is opposite to the findings of Vihervaara et al. (2012), Tyynela et al. (2002). Similarly to Sitari (2005), the results of our study identified female-headed households from the poorest wealth group as especially vulnerable to negative impacts. Most of the private forest plantations in the study area were rather young (less than 8 years) during data collection. The trees were still small and not all the

areas for which land use rights had been acquired had been planted so far. This may have impacted respondent's perceptions and the negative impacts. Benefits experienced may also change as the plantation trees and the total plantation area are growing in size.

5. Conclusions

Since 2006-2007, along with the development of market-oriented economy in Myanmar, Forest Department has been encouraging private investment by national companies and entrepreneurs in commercial forest plantations with a view to supplying increasing demand of teak and other hardwoods of the country, contributing to the national economic development, and conserving environmental stability. The pressure on land and forest resources has increased due to investments. As rural households in the area are still predominantly dependent on land and ecosystem services, the relocation of farm plots and decreased availability of firewood and NTFPs have negatively impacted the majority of local people.

Access to farm plots and extractable forest products were already weakened to some extent prior to the establishment of plantations due to pressure caused by rapid growing populations. Potential for improvement exists with all stakeholders involved. Shifting cultivation practice and slash and burn culture cannot be sustainable under the prospect of a rapid growing population. As forest investors seek higher land availability, training programs for agricultural intensification could be provided to the communities, and thus improved productivity.

According to our results, private forest plantations have the potential to positively impact local people's wealth and well-being, if enough emphasis is given to minimizing the negative impacts. These negative impacts on natural resources can be avoided or at least mitigated by avoiding areas including important natural resources for the villages and by providing additional firewood and by supporting livelihood diversification. Furthermore, our results showed that the circumstances in the villages differed, which led to differences in the perceived impacts of private forest plantations between the villages. Consultations and land use planning should be adjusted to individual villages, even if certain factors are valid in all villages.

Non-natural resource-based livelihood strategies like employment in a forest company have a positive effect on the households. Forest companies should support the diversification of livelihood strategies by using a long-term basis local labor force as much as possible. Supporting the development of human capital in the form of education, practical training or agricultural knowledge increases local population's perceptions to adapt to change and increase wealth.

To avoid land conflicts, private forest companies need to improve their negotiation process with local communities and make certain that all population groups in the villages have the possibility to express their concerns. The risk of land conflicts could be decreased by the actions of national governments to improve the implementation of land use rights. Sufficient personal, technical and financial capacity is currently missing to fully implement land use right in all the regions. Necessary capacity on the national as well as the local level needs to be provided to assure that local livelihoods are not compromised.

References

1. Anon (1992). Forest Law, Union of Myanmar.
2. Anon (1995). Myanmar Forest Policy.
3. Anon (2000). National Forest Master Plan, 2001-02 to 2030-31, Ministry of Forestry, Myanmar.
4. Ashley, C. & Carney, D. (1999). Sustainable Livelihoods: Lessons from Early Experience, Overseas Development Institute, p6.
5. Baumann, P. (2002). Improving Access to Natural Resources for Rural Poor: A Critical Analysis of Central Concepts and Emerging Trends from a Sustainable Livelihoods Perspective, FAO, p2.
6. Chambers, R. & G. Conway (1991). Sustainable Rural Livelihoods: Practical Concepts for the 21st Century, IDS Discussion Paper296, Institute of Development Studies, p6
7. Cor.H. Hanssen (2007). Lao land concessions, development for the people?: Proceedings-International Conference on poverty reduction and forests, Bangkok, p1.
8. Cromwell, E. (2002). DFID's Key sheet series: Pro-poor Infrastructure Provision, Land Tenure, p1.
9. Dahal, G.R, Atkinson, J. & Bamton, J. (2011). Forest Tenure in Asia: Status and Trends, p 30.
10. DFID (2001). Sustainable Livelihoods Guidance Sheets.
11. Ellis, F. (2000). Rural Livelihoods and Diversity in Developing Countries, pp7,8,11

12. FAO / INBAR (2006). Global Forest Resources Assessment 2005: Myanmar Country Report on Bamboo Resources, Working Paper, 126, Rome, p18, 21, 24, 27

13. FAO, (2010). Global Forest Resources Assessment, 2010.

14. Grootaert, C. & Van Bastelaer, T., (2001). Understanding and Measuring Social Capital: A Synthesis of Findings and Recommendations from the Social Capital Initiative, World Bank, p4.

15. Hobley, M. (2007). Does Forestry Have a Role in Poverty Reduction? Proceedings: International Conference on Poverty Reduction and Forests, Bangkok, p2.

16. Hoogenbosch, L. (2010). Forest Plantation and Livelihoods in Ghana's High Forest Zone.

17. IHLCA Project Report (2011). Integrated Household Living Conditions Survey in Myanmar (2009-2010); MNPED, UNICEF, Sida, UNDP; p16.

18. J.Landry, P.Chirwa.(2011). Analysis of potential socio-economic impact of establishing plantation forestry on rural communities in Sanga district, Niassa province, Mozambique

19. Kaung, B. & Cho, K. M. (2003). Forest Plantation Management between Centralized and Participatory Planning — A Case Study of East Pegu Yoma Project (EPP), Myanmar, p2,3.

20. Ngwe Thee (2013). Report on assessing impacts of private forest plantations on livelihood of local communities in Kyauktaga Township, Bago District, Bago Region, Myanmar

21. P. K. Ramachandran Nair (1993). An Introduction to Agroforestry, Kluwer Academic Publishers in cooperation with International Centre for Research in Agroforestry, p75.

22. Prachvuthy, M. (2011). Impacts of Economic Land Concessions on the Livelihoods of Indigenous Communities in Northeast Provinces of Cambodia, p36.

23. Schirmer, J. (2006). Socio-Economic Impacts of Land Use Change to Plantation Forestry: A Review of Current Knowledge and Case Studies of Australian Experience.[http://www.ces.ncsu.edu/nreos/forest/feop/Agenda2006/iufro_plantations/proceedings/G01 m-Schirmer.pdf]

24. Soussan, J. & Blaikie, P. (Not Known). Understanding Livelihood Process and Dynamics: Livelihood-Policy Relationships in South Asia, Working Paper 1, Annex 1. [http://www.citeseerx.ist.psu.edu]

25. Thorpe, A. & Van Anrooy, R. (2009). Inland fisheries livelihoods in Central Asia – Policy interventions and opportunities, FAO, p27

26. William F. Elmendorf and A. E. Luloff (2001). Using Qualitative Data Collection Methods When Planning for Community Forest, Journal of Arboriculture 27(3), p142.

27. Wint, S. M. (Not Known). A Brief review of Forest Restoration Programmes in Myanmar.[http://www.forru.org/PDF_Files/frfwcpdf/part2/p 22%20Wint%20a%20brief%20review.pdf]

28. World Bank (2008), Forest Source Book: Practical Guidance for Sustaining Forests in Development Cooperation, pp15-17.

29. Yamane, T. (1967). Statistics, An introductory analysis, 2nd Ed., New York: Harper and Row, p886