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社会经济的影响分析-基于农户的视角**

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**ANALYSIS OF THE IMPACTS OF PRIVATE FOREST  
PLANTATIONS ON SOCIOECONOMIC OF LOCAL  
COMMUNITIES IN PHYU TOWNSHIP, TAUNGOO  
DISTRICT, BAGO REGION - BASED ON LOCAL PEOPLE'S  
PERSPECTIVE**

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## 骠国乡、Taungoo 区、勃固地区私有人工林建设对当地社区 社会经济的影响分析-基于农户的视角

### 摘要

缅甸林业部门要求私人投资人工林, 因为2006-07 年的土地特许权授予私人有投资造林的权利。换句话说, 缅甸主要依靠森林资源和林地为生的农村人口占总人口的 70%。本文探讨了骠国乡、Taungoo 区、勃固地区的私有人工林对农村社区的社会经济的影响。根据研究结果, 如果充分重视人工林负面影响的话, 私有人工林有可能对当地人民的财富和福祉产生积极影响。本研究利用二元和多项式逻辑回归分析, 分析了两个村庄213观测资料的住户调查数据。研究表明, 私有人工林通过减少自然资源的供应, 威胁到了传统农村生计的基础。然而, 投资也支持社区的生计战略多样化, 并提供正规就业和增加商业及贸易活动。研究也显示, 随着人口增加, 传统农业的一些做法导致自然资源的过度开采, 多样化的生计战略增加了家庭的就业和商业活动。大多数受访者反映说, 人工林对其家庭的福祉没有任何总体或积极的影响。我们的研究表明, 社会经济的家庭特征仅仅解释了受访者对人工林影响的不同认知, 但不同村庄之间对人工林影响的认知的差异很大。

**关键词:** 社会经济影响, 私人投资, 私有人工林, 土地特许权



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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 Phyu 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 given to minimizing the negative impacts. The household survey data of 213 observations from two villages were analyzed using binary and multinomial logistic regression analyses. The study shows that forest plantations have threatened 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 growing, population and traditional agricultural practices have led to the overexploitation of natural resources, non-natural resource-based livelihood strategies increase the resilience of a household. The majority of respondents reported 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 explain respondents' perceptions of the impacts of forest plantations but perceptions differ significantly between individual villages.

**Key words:** Socio-economic impacts, Private investment, Private Forest Plantations, Land concession right





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## ABBREVIATIONS

CSO	Central Statistical Organization
DZGD	Dry Zone Greening Department
ECD	Environmental Conservation Department
EPP	East Pegu Yoma Project
FAO	Food and Agriculture Organization
FD	Forest Department
FRA	Forest Resource Assessment
IHLCA	Integrated Household Living Conditions Assessment
INBAR	International Network for Bamboo and Rattan
MOECAF	Ministry of Environmental Conservation and Forestry
MTE	Myanmar Timber Enterprise
NFMP	National Forest Management Plan
NGO	Non-Government Organization
NTFPs	Non Timber Forest Products
PAS	Protected Area System
PCA	Principal Component Analysis
PFE	Permanent Forest Estate
PPFs	Protected Public Forests
PSD	Planning and Statistics Department
RFs	Reserved Forests
RRA	Rapid Rural Appraisal
SD	Survey Department
SLA	Sustainable Livelihood Approach
UNCED	United Nations Conference on Environment and Development
WCED	World Commission on Environment and Development



# 1 INTRODUCTION

## 1.1 Background

Myanmar is still one of the countries in South-East Asia Region possessing rich forest resources. Forest Resource Assessment- FRA (2010) showed that 46.96% of the total country area (31.77 million hectares) is covered with different types of forest in 2010. Up to December 2011, the status of Permanent Forest Estate (PFE) which was legally constituted as Reserved Forest (RF) and Protected Public Forest (PPF) has reached to 163,550 km<sup>2</sup>, 24.17% of the total land area. In addition, a total area covering 37, 895 km<sup>2</sup>, 5.60 % of total land area of the country has been constituted as Protected Area Systems (PAS) for conserving biodiversity and protecting environment in the country. The main purpose of constituting Reserved Forests and Protected Public Forests is to conserve the forest resources so as to ensure contributing to country economy and fulfilling basic needs of the people from the forestry sector. The 1995 Myanmar Forest Policy stipulates to keep 30% of the total land area of the country under RF and PPF, and 5% under PAS.

In Myanmar, 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. Forestry sector stands at the one of the largest earnings in the country through export of logs and processed timber. 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. About 70% of total population are residing in rural areas and mainly use the wood fuel for cooking. The annual consumption of wood fuel per household is estimated to be 2.5 cu-tons (4.5 m<sup>3</sup>) for rural households where as 1.4 cu-ton (2.5 m<sup>3</sup>) 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, control of soil erosion and siltation thereby protecting downstream agriculture, as also the streams, rivers and lakes.

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 stated in the 1995 Myanmar Forest Policy that existing natural forests will not be replaced with forest plantations. Plantation forestry has a complementary role to natural forest in order to control deforestation and forest degradation. Consequently, the

objectives of plantation establishment in Myanmar have been to restore deforested areas, rehabilitate degraded forest lands and supply 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.

## **1.2 Problem Statement**

In Myanmar, rural population accounts for about 70% of the country population. The livelihoods of the rural people, more or less, used to depend on natural forests and forest lands. The shifting cultivation in natural forests is a major livelihood strategy for most indigenous peoples in hilly region of the country. In addition, timber, non-timber forest products (NTFPs) and bush meat are also significantly contributing to their livelihood. Similarly, encroachment for agricultural expansion in relatively low land forest area is very common in Myanmar. Thus, the livelihood of local peoples still much relies on the forest land and forest resources. According to the statistics, agricultural encroachment inside forest land reached to 1.62 million acres or 0.65 million hectares by the end of December 2011 (Planning and Statistics Division, Forest Department).

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.

Therefore, land concession for developing private commercial forest plantation usually takes away the land and forest resources used by the local peoples. This situation is challenging livelihood of local people. 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 scarce 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.

### 1.3 Objectives of the study

The aim of this study is to analyze the perceptions of local people who live near private forest plantations on how the establishment of private forest plantations has impacted their livelihood and wealth. Natural assets, alternative livelihood strategies, and wealth as a livelihood outcome are the central aspects of livelihood which are examined in this study. Three main objectives of this study are as follow:

- (1) To analyze the perceived impact of private forest plantations on natural resources.
- (2) To identify which livelihood strategies affect the wealth of a household and how private forest investments contribute to the wealth.
- (3) To examine how households have perceived the overall impact of forest plantations on their livelihood in order to analyze if there are groups that have been affected more than others.

The purpose of this study is to evaluate how local communities have perceived the establishment of forest plantations. Both positive and negative impacts are to be classified and bring about a foundation for recommendations for future private forest investments. The results of the study could provide information for forest companies to avoid or reduce conflict with local communities. From the aspect of the local communities, the study target to identify how households benefit from the private forest plantation and improve their livelihood.

### 1.4 Operational definition of the study

**Livelihood:** Livelihood contained in the capabilities, assets and activities required for a means of living (Chambers, R and G. Conway, 1991).

**Livelihood assets:** Livelihood assets refer to natural capital, human capital, physical capital, financial capital and social capital (DFID, 2001).

**Livelihood Strategies:** Livelihood strategies mean different activities and choices of the people for the achievement of their livelihood goals (DFID, 2001).

**Livelihood outcome:** Livelihood outcome in this study means increased income (DFID, 2001).

**Impact:** Impact refers to any positive or negative changes in livelihoods of local community, particularly change in livelihood assets, livelihood strategies and livelihood outcomes as a result of development of private forest plantation.

**Private forest plantation:** A private forest plantation is defined as forest crop or stand which is established by private companies or individual entrepreneurs, with a

primary objective of producing timber for commercial purpose, on forest land under forest land concession granted by Forest Department by means of planting teak and/or other hardwood species regardless of age of planted trees and their canopy cover.

**Forest land:** Forest land means land including Reserved Forests and Protected Public Forests (Forest Law, 1992).

**Income:** Income refers to farm income, off-farm income and non-farm income. It encompasses both income in-cash and in-kind (Ellis, F., 2000).

**Land holding:** Land holding in this study refers to area of land to which farmer accesses for agricultural purpose regardless of legal identities.

## 1.5 Research Hypothesis

Based on the reviewed literature following hypotheses are made and tested in the course of this study.

- (1) Local households perceive the impact of forest plantations on natural resources negatively.
- (2) Livelihood diversification for the livelihood strategies of the households has been affected positively by the introduction of forest plantations.
- (3) The introduction of forest plantations is perceived more negatively by poorer households and more positively by wealthier households.

With regard to natural resources, almost entirely negative impacts have been reported in previous literature, which is reflected in hypothesis (1). On the other hand, increasing job opportunities has been discussed often as a positive argument for private forest plantations, especially in rural areas, thus it is here asserted (2) that the impacts on livelihood strategies are positive. Poorer households depend more on natural resources, thus, poorer households have a more negative attitude. Employment is usually endeavored to people with more education and richer households can be able to more education, thus, richer households gain more easily from positive impacts on livelihood strategies. Hypothesis (3) is based upon those two mentioned facts.

## 1.6 Limitations of the study

The research was carried out in the Bago region of Myanmar which is one of the most forested areas in Myanmar. The questionnaire survey was carried out in the period of July and August 2016. The questionnaire survey was carried out with the assistance of one forestry graduate who has been studying Master degree in Beijing Forestry University. It may also be some bias of the surveyor with the misunderstanding of the answers by the respondents. Due to the time and financial limitations, the sample is not so much to better represent the whole region. Therefore this study could not be generalized for other location.

## **2 LITERATURE REVIEW**

### **2.1 Introduction to the sustainable livelihood approach**

The sustainable livelihood approach (SLA) is based on the concepts of livelihood, wellbeing and sustainable development. Even though the concept of livelihood was not new, the inclusion of sustainable livelihood in the report “Our common Future”, also known as the Brundtland report, by the World Commission on Environment and Development (WCED) (1987) raised the concept to new awareness. Chambers and Conway (1992, p.6) took up the concept of sustainable livelihood in their discussion paper, and as a result the following definition for a sustainable livelihood was suggested:

A livelihood comprises the capabilities, assets (stores, resources, claims and access) and activities required for a means of living: a livelihood is sustainable which can cope with and recover from stress and shocks, maintain or enhance its capabilities and assets, and provide sustainable livelihood at the local and global levels and in short and long term.

The concept of livelihood is usually closely connected with the idea of sustainable development. In the Brundtland report of the WCED (1987) sustainable development was defined as: “Development that meets the needs of the present without compromising the ability of future generations to meet their own needs.” Thus, sustainable development affects a fair allocation and distribution of resources not only between present interest groups, but also in consideration of future generations.

In the context of sustainable livelihood Chambers and Conway (1992) distinguished external and internal sustainability and with this, respected the fact that, on the one hand, a livelihood system affects its surroundings and on the other hand is affected itself by its environment, shocks and pressures. Moreover, they clarified that a sustainable livelihood is self-sufficient, able to cope with shocks, and has high resilience. In general sustainability comprises of three dimensions: economic, social and environmental sustainability. In order to figure sustainable livelihood, sustainability in all three dimensions need to be achieved. Especially in developing countries, many rural livelihoods depend heavily on natural resources and are threatened if resources are not used in sustainable manner.

The review of livelihood often comprises concepts like well-being and quality of life. In contrast to poverty, this appears to be more a physical lack of assets or resources, well-being and quality of life are experiences and subjective constructs (Chambers 1995). Hence, it change into evident that livelihood cannot simply be interpreted with a household’s wealth, but instead the well-being and the households own perception of his personal state (Sen 1993).

The concept of sustainable livelihoods by Chambers and Conway (1992) was taken up by others (Ellis 1998, Scoones 1998, Ellis 2000) and further developed, modified and refined into the sustainable livelihood approach as a framework for analysis (Bennett and

Dearden 2014). Most of the attitude from the definition of Chambers and Conway can be found in the SLA, despite the status of capability is discussed and included to different extents. Ellis (2000) omits capabilities in his definition of livelihood, because in his opinion capabilities overlap with the concepts of assets and activities. It reveals that Chambers and Conway (1992, p. 4) pointed out that livelihood capabilities represent the ability to cope with shocks and stress, as well as to utilize new livelihood opportunities. They derived the concept from the work of Sen (1993), which defined capability as “a feature of a person in relation to goods”. This could for example be the status of being in good health or having a proper nutrition.

An important attitude of capabilities is the freedom of the thing to make use of an alternative. This attitude of capabilities cannot be captured by assets or livelihood strategies, since they only proxy what the household possesses and which activities are carried out, but not what is actually possible for the household. As Chambers and Conway (1992, p. 5) showed that the capabilities are the basis on what the household can gain its living as well as the result, opening up new possibilities and allow an enhancement of the well-being. The SLA gives a tool to analyze the complex interactions among asset ownership, institutions, shocks and how these lead to livelihood outcomes. The framework of the SLA is traditionally divided into six sections, which are explained in the following section and a conceptualization of the approach can be seen in Figure 2.1.

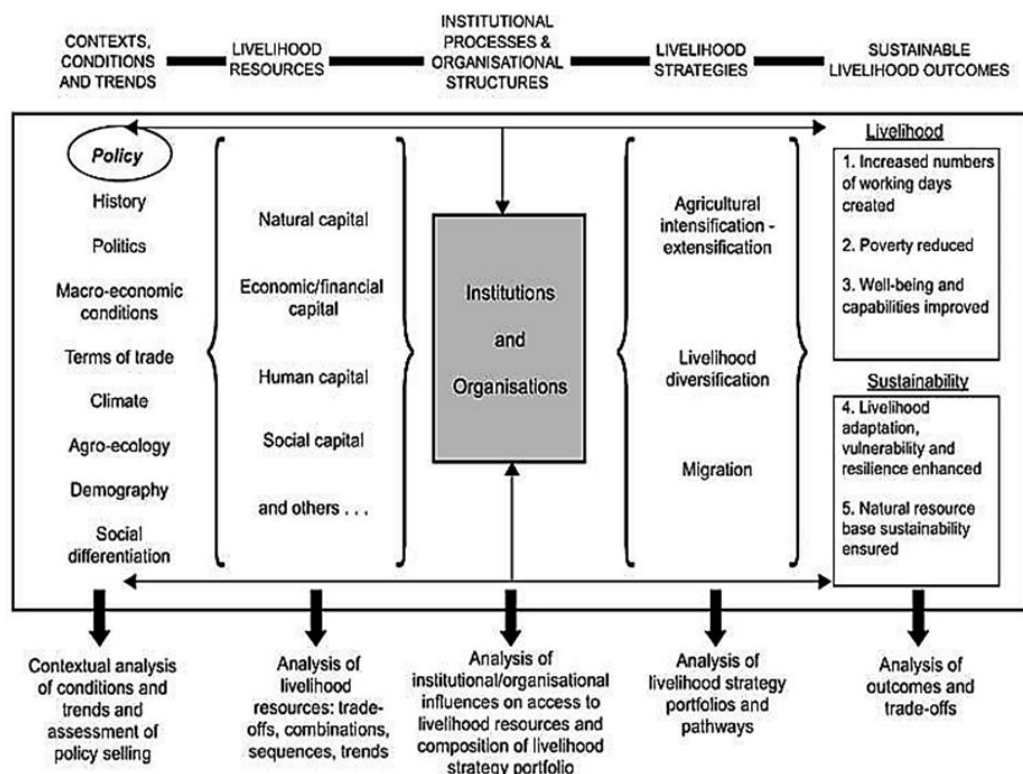


图 2.1 可持续生计框架的概念及其组成部分和它们之间的联系（资料来源：Scoones 1998）

Figure 2.1 Conceptualization of the sustainable livelihood framework its components and connections between them (Source: Scoones 1998).

An analysis of the contextual setting around the investigated livelihood is a essential part of the SLA (Scoones 1998). It comprises the circumstances of the livelihood which the households cannot influence. Crucial determinants for the contextual setting are, among others, local history, economic and political situation, ecological and climatic conditions and social differentiation of the region (Scoones 1998). The capital assets display the foundation of the livelihood; they are the means that a household can use to build up its livelihood and well-being (Ellis 2000). In line with the SLA framework, the number of different capital assets which can be found in the literature varies (Ellis 2000). While Scoones (1998) focus that his list of capitals is not exhaustive, he only distinguishes four forms of capitals. Other studies have classified up to seven different capitals, which includes political and cultural capital (Bennett and Dearden 2014). The most commonly used version is the one with the five capitals natural, human, social, physical and financial capital (Table2.1).

#### *Human capital*

DFID (2001) described human capital that represents the skills, knowledge, ability to labour and good health that together enable people to pursue different livelihood strategies and achieve their livelihood objectives. Human capital influences on the amount and quality of labour available at a household level. This varies according to household size, skill levels, leadership potential, health status, etc. Many people regard ill-health or lack of education as core dimensions of poverty and thus overcoming these conditions may be one of their primary livelihood objectives.

According to Ellis, F., 2000, human capital refers to education level, health status of individuals and populations. Thorpe, A. & Van Anrooy, R., (2009) define human capital as the skills and knowledge (not just acquired through formal education processes and training opportunities, but also acquired informally though social contacts) allied to the physical ability to labour productively.

Investment in human capital is often characterized by public sector because education and health service are usually supplied by the state although benefits have both private and public dimensions (Ellis, F. 2000).

#### *Social capital*

Social capital is relatively new concept that departs from the narrow definition of economic assets and it is also a subject of continuing debate over its definition (Ellis, F. 2000). Although the notion that social relations, networks, norms, and values matter in the functioning and development of society has long been present in the economics, sociology, anthropology, and political science literature, the concept of social capital embodying multidisciplinary views has been put forth only in the past 10 years (Grootaert, C. & Van Bastelaer, T. 2001).

According to DFID (2001), social capital means the social resources upon which people draw in pursuit of their livelihood objectives. These are developed through

networks and connectedness, either vertical (patron/client) or horizontal (between individuals with shared interests). They increase people's trust and ability to work together and expand their access to wider institutions, such as political or civic bodies; membership of more formalized groups which are formed based on mutually-agreed or commonly accepted rules, norms and sanctions; and relationships of trust, reciprocity and exchanges that facilitate co-operation, reduce transaction costs and may provide the basis for informal safety nets amongst the poor.

Ellis, F. (2000) also provided the definition of social capital that refers to social network and associations in which peoples participate and from which they can derive support that contributes to their livelihood. Thorpe, A. & Van Anrooy, R., (2009) defined social capital as "social resources" that households are able to call upon in pursuit of livelihood objectives and these resources range from kinship networks and informal connections, to membership in more formal organizations. Grootaert, C & Van Bastelaer, T. (2001) mentioned that the social capital of a society includes the institutions, the relationships, the attitudes and values that govern interactions among people and contribute to economic and social development.

#### *Natural capital*

The natural resource base or environment has relatively recently come to be thought of as a capital stock in the pure economic sense (Ellis, F. 2000). Natural capital is the term used for the natural resource stocks from which resource flows and services useful for livelihoods are derived. There is a wide variation in the resources that make up natural capital, from intangible public goods such as the atmosphere and biodiversity to divisible assets used directly for production (trees, land, etc.). Clearly, natural capital is very important to those who derive all or part of their livelihoods from resource-based activities such as farming, fishing, gathering in forests, mineral extraction, etc.(DFID, 2001).

Moreover, Ellis, F. (2000) briefly describes natural capital as natural resource base (land, water, trees) that yields products utilized by human populations for their survival, and Thorpe, A. & Van Anrooy, R. (2009) as the natural resource stocks, from which income and/or consumption opportunities are derived.

#### *Physical capital*

Physical capital comprises the basic infrastructure and producer goods needed to support livelihoods. Infrastructure can help people to meet their basic needs and to be more productive. Affordable transport; secure shelter and buildings; adequate water supply and sanitation; clean, affordable energy; and access to information (communications) are essential components of infrastructure for sustainable livelihoods: Infrastructure is commonly a public good that is used without direct payment. Producer goods are the tools and equipments that people use to function more productively (DFID, 2001). Ellis, F. (2000) expressed that physical capital refers to assets brought into existence by economic

production processes, for example tools, machines, land improvements like terraces or irrigation canals.

*Financial capital*

Financial capital refers to the financial resources that people use to achieve their livelihood objectives. There are two main sources of financial capital as mentioned below:

*Available stocks:* Savings can be held in several forms: cash, bank deposits or liquid assets such as livestock and jewellery. They are the preferred type of financial capital because they do not have liabilities attached and reliance on others. Financial resources can also be obtained through credit-providing institutions.

*Regular inflows of money:* Excluding earned income, the most common types of inflows are pensions, or other transfers from the state, and remittances (DFID, 2001). According to Ellis, F (2000), financial capital refers to stocks of cash that can be accessed in order to purchase either production or consumer goods, and access to credit. Similarly, Thorpe, A. & Van Anrooy, R., (2009) stated financial capital as the financial resources, including cash and credit opportunities, available to the household. In addition, Ellis, F. (2000) stressed that access status of individual or household with respect to savings, loans or other forms of finance or credit clearly make a big difference to the livelihood choices that are open to them, and therefore financial capital is recognized as an important component of individual or family assets.

Other important aspects when analyzing capital assets in the SLA are access and control. Households have different access to resources. Access to capital assets is linked to control over the resources. If an asset is restrained by third parties, a part of the households might not be able to access this resource. On the other side, if there is insufficient or no control over a resource, especially in the case of natural resources, the resource in question might be overexploited. Institutions balance the interactions and relations of social communities, as well as the production and endowment of capitals over the households (Dasgupta 2001).

Organizations, in this context, are governmental, non-governmental, private companies or community based associations. The analysis of institutions and organisations considers which influence institutions and organizations have on capital assets and consequently the livelihood strategies of a household. Firstly, the access and control of resources is mostly determined or regulated by organizations and institutions, for example through legislations. Secondly, organizations might provide additional opportunities for livelihood strategies, for example by providing new jobs for the region. The rural livelihood strategies constitute the activities and actions undertaken by a household to create income aiming to sustain its living or satisfy human needs (Chambers and Conway 1992, Ellis 2000). As reported by Ellis (2000), capital assets and the contextual setting are the main factors determining which livelihood strategies are adopted by a household.

Scoones (1998) imported three main types of changes in livelihood strategies; namely, agricultural intensification or extensification, livelihood diversification, and migration. Livelihood diversification means the adaptation of additional strategies by the household providing it with additional income options and capabilities. A diversified strategy portfolio with several activities independent of natural resources is preferable (Ellis 2000). In consideration of climate change, natural resource based livelihoods are often examined as less resilient and more vulnerable than livelihoods that have additional non-natural resource based strategies. The important point in the diversification of strategies is when the household becomes less conditional on just one income source and thus less prone to shocks (Scoones 1998). The sustainable livelihood outcomes are the part of the SLA which differs most in different studies depending on the purpose of the analysis. Scoones (1998) classified five key issues for the analysis of the sustainable livelihood outcomes. The five issues commenced different ways to analyze the livelihood outcome with emphasis on different aspects of the livelihood.

*Creation of working days* describes how much income can be built by the livelihood strategies performed by the household through employment (Scoones 1998, p.5). The analysis target is an increased amount of days on which the members of the household are able to carry out income producing work. This means to different attitudes in the livelihood framework. For example, an improved health of the household could gain the effective working days. On the other side, increased employment opportunities might be unsuccessful to create working days when simultaneously the population is growing (Scoones 1998).

*Poverty reduction* is naturally one of the main goals when carrying out a livelihood analysis and implement development projects. The approaches to analyze this outcome vary from absolute poverty lines to relative poverty indicators or equity measurements (Scoones 1998, p.6). However, poverty measures usually concentrate on income levels, consumption or capital asset endowment and thus they alone might not capture changes in livelihood exhaustively.

*Well-being and capabilities* refer as livelihood outcomes catch the quality of life that a household can accomplish with its capital endowment and livelihood strategies (Chambers 1995). Possible livelihood outcomes could consist of the construction of a house with improved materials, like a tin roof instead of a grass thatched roof. The analysis of capabilities constitute the question of what a households is actually able to do with its assets in the given context and how it commits to the functioning of a person (Sen 1984). Functioning in this context is linked to the doing and being of a person which in combination should enable the household to build up their livelihood (Sen 1993). Ensuing Chambers and Conway (1992) the possibility to select between different alternatives and bring them out is a part of the quality of life.



*Livelihood adaptation, vulnerability and resilience* concern how the household responds and adapts to shocks and trends. A household that declines to adapt to new circumstances is likely to be affected from poverty in the future. This becomes especially evident in the context of climate change, where households need to adjust their livelihood strategies. If a household succeeds to diversify his livelihood strategies, the outcome would be a reduced vulnerability and an improved resilience towards shocks.

*Natural resource based sustainability* is especially important considering that rural poor households depend on natural resources as alternative income sources beside farming (Dasgupta 1993). As we can see, a countries economic growth and related increased wealth has been accomplished through exploitation of natural resources (Dasgupta 2001). Since equal distribution of benefits often fails, the poorest households which depend on natural resources are deprived of an important income source (Dasgupta 2001).

The sustainable livelihood approach has been adopted in various previous studies and contexts. One of the main applicants of the method is Frank Ellis, who has done livelihood studies in several African countries (Ellis and Mdoe 2003, Ellis and Bahiigwa 2003, Ellis et al. 2003). Ellis studies focus mainly on the process and efficiency of poverty reduction strategy papers. In the situation of rural livelihoods in developing countries property rights show an important role, because land and forest are often owned by the public sector. Lambini and Nguyen (2014) discuss in their work the linkage of the sustainable livelihood framework and property rights. Well defined property rights and related regulation for the access and use of resources by communities would enhance the sustainable livelihoods (Lambini and Nguyen 2014). Some other studies focus only on specific sections of the livelihood framework. In the work of Mogaka et al. (2014), only the capital assets are theoretical.

The sustainable livelihood framework is looked under the aspect of forest investments in form of private forest plantations, which represent a change in the section of institutions and organizations. This study identifies how the change in institutions and organizations impacts other sections of the sustainable livelihood framework, with primary focus on impacts on natural capital assets and livelihood strategy diversification. Moreover, the sustainable livelihood approach is accounted to classify how the forest investments and their impacts on natural capital and livelihood strategies bring to the households' overall livelihood and wealth. Natural capital is taken into account the basis for rural livelihoods. If access and control are denied by the introduction of private forest plantations, households would have to accept alternative livelihood strategies to offset the loss. In order to emphasize and analyze the trade-off between those, the mentioned sections were chosen for the analysis in the scope of this study.

For this study the evaluation of perception of households is applied to assess the impacts of forest plantations on livelihoods. The livelihood is considered to be decreasing if negative impacts are found and the quality of the living in the local communities is

considered to be improved if positive impacts are found. Even though the perception of locals might not follow the actual situation, it is important to analyze how households experience negative impacts or benefits.

## **2.2 Private forest investment**

### **2.2.1 Private forest investments and overview**

The human population is constantly growing the demand for forest based products is increasing simultaneously. Moreover, the forest cover is decreasing (FAO 2010a) and natural forests are under pressure. In addition to timber production and fuel wood collection, land use changes in favour of agricultural uses have been identified as main drivers of deforestation. Fast growing forest plantations are seen as a possible solution to satisfy the increasing demand of forest products and in addition transform fallow into productive land.

Public institutions often lack the financial means to ensure sustainable forest practices, thus private investments into the forestry sector are one of the main financing sources for sustainable forest management in the developing countries (World Bank 2008). According to the World Bank (2008), approximately US\$15 billion are yearly invested into forestry in the developing countries by private investors. The private sector includes investments by the domestic and foreign forest industry, as well as by local communities and individuals. Investments from the private sector mainly aim for commercial or productive use of forest resources.

In this study the focus lies on forestry investments in form of forest plantations for industrial purposes. Forest plantations are commonly defined as “those forest stands established by planting or/and seeding in the process of afforestation or reforestation” following the definition of the FAO and their Forest Resource Assessment (2001). Plantations can consist of either indigenous or introduced species and need to cover at least an area of 0.5 hectares with a tree crown over of at least 10% of the land cover; total height of adult trees is required to be above 5 meters (FAO 2001). Industrial forest plantations are usually even-aged managed, monocultures, which fast growing exotic genera like various species of Eucalyptus and Pinus, have a high yield and are managed intensively managed (Indufor 2012).

In 2010 the planted forest area in the world was about 264 million hectares, accounting for about 6.6% of the total forest area (FAO 2010a). Over the past 20 years the area of planted forests has increased rapidly (Figure 2.2). In the Forest Resources Assessment conducted in 2010 the planted forest area composed of more than only forest plantations for productive purposes, but it is estimated that about 76% of the planted forest areas have production as their main purpose (FRA 2010). According to a report by Indufor (2012) industrial forest plantations covered an area of 54.3 million hectares in 2012.

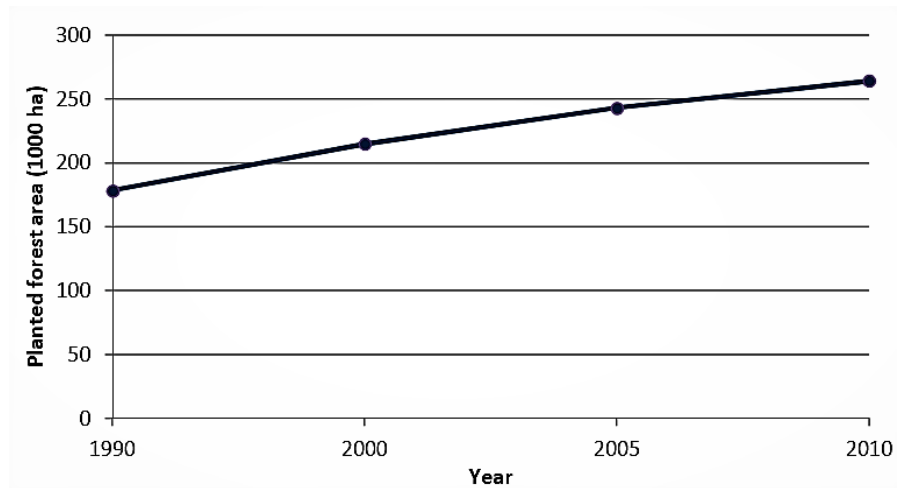


图 2.2 1990 年至 2010 世界人工林区的发展 (粮农组织 2010a)

Figure 2.2 Development of planted forest area in the world from 1990 till 2010(FAO 2010a)

For private investors forest plantations seem to be a lucrative investment because the managing costs of forest plantations are often lower than for natural forest. In most cases plantations consist of only one tree species, and if a suitable species is chosen a high volume per unit can be yield, which reduces the harvesting costs (Evans 2004). Still, the profitability of a forest plantation depends on various factors, including chosen species, land characteristics, labour costs and local as well as global wood prices (Niskanen et al. 1993).

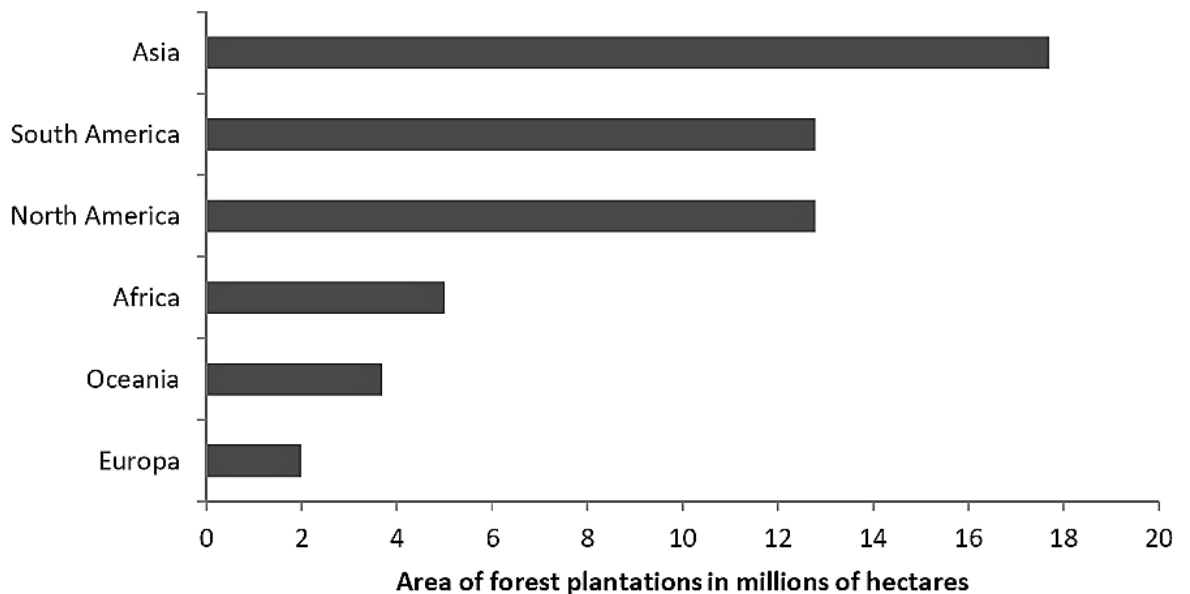


图 2.3 2012 年按区域计算的工业林面积 (Indufor 2012)

Figure 2.3 Area of industrial forest plantations by region in 2012 (Indufor 2012)

Figure 2.3 shows that especially Asia and America have large areas of industrial forest plantations. Africa, however, has relatively small area compared to the potential due to land availability. For investors in developing countries, forest plantations seem to be attractive, because the land can often be acquired cheaply and labour costs are low. Hence, successful investments in developing countries can achieve high rate of returns. On the other hand, the level of uncertainty for foreign investors is relatively high, and investments involve higher risks in many African countries. Risks can be due to political insecurity, instable political systems or economic insecurity in the country. Additionally, some governments in developing countries expect the investment projects to be socially acceptable and beneficial for the local communities and investments have been established in connection with poverty mitigation programs.

### 2.2.2 Impacts of private forest investments / Plantations

This section will give an overview of discussed economic, social and environmental impacts of forest plantation for local communities in earlier studies with emphasis on developing countries. In many developing countries the growing conditions for trees are favorable, thus countries could benefit economically in form of increased exports of forest products or substitution of previously imported products (Evans and Turnbull 2004). In addition to overall contribution to the country's economy, introduction of forest plantations are contributing to the development of the local communities. Forest investments usually involve an improvement of the infrastructure of a region, for example in form of bridges, roads and power supply.

The development of the community is directly, as well as, indirectly affected by the forest company. Direct effects are partly due to the need of the forest plantations for example to have proper roads for the transportation of their machines, or as part of social responsibility programs. Positive changes in infrastructure are often seen only several years after the initial investment, which might lead to dissatisfaction in the community. In case of plantations in Ghana, households believed that infrastructure would improve once the company makes enough profit (Schoneveld et al. 2011), hence communities were content with the introduction of plantations. Indirectly, the investment can raise the government's interest in the region, causing increased public actions. Additionally, improved cash flow through employment might lead community initiatives for more development.

One of the main arguments for forest plantations are the potential positive impacts on the employment situation for the region. Especially in rural areas where people depend on farming and natural resources alternative employment in the forest plantations is expected to improve people's livelihoods. The majority of households with employees in the plantations in Ghana reported increased income security and were able to increase their capabilities to sustain food supply, provide education for their children and cover medical expenses (Schoneveld et al. 2011). However, the needed labour for the work on a forest

plantation varies strongly over the rotation period. While initially much labour is needed for clearing the area and planting the seedlings, the demand for labour decreases after this initial phase and only increases again when the trees are to be harvested. In a case of industrial forest plantations in Indonesia it was shown that even though the majority of households were involved with the plantation, there was not enough work for representatives from all households to be employed, especially after the initial planting phase (Tyynel äet al. 2002).

Charnley (2005) brought up that even though industrial forest plantations are established in rural areas, the facilities for the further processing of the raw material are often not implemented in the same area. This limits the social and economic development potential and reduction of employment possibilities in the region. On the other hand, Evens and Turnbull (2004) argue that in this case less financial means are required and negative impacts on the environment like pollution from the factories are avoided. In Ghana the establishment of biofuel feedstock plantations reduced the land availability and the resulting reduced farm incomes forced local households to expand their livelihood strategies (Schoneveld et al. 2011). Besides formal employment, some households managed to take up small-scale trading of common goods, livestock keeping, or other off farm activities (Schoneveld et al. 2011). The study by Schoneveld et al. (2011) stresses that lack of skills or financial means often limit the expansion of livelihood strategies for many households. Furthermore, Schoneveld et al. (2011) point out that formal employment should be adapted by households complement to farming and not as a substitute for the farming completely.

A study conducted in Zanzibar, analysing the impact of tree planting on livelihoods, showed that not the whole community, but only individual households can benefit from planting activities (Sitari 2005). According to Sitari (2005), especially women have fewer chances to benefit from the investments. People report positive impacts and increased wealth from the plantation activities if they are involved themselves (Charnley 2005). This stresses that the investments done with respect to the communities are viewed more positively and provides improvement for the region. In the study by Tyynel ä et al. (2002) it was shown that the impacts of industrial forest plantations varied between households from different wealth groups. Wealthier households had fewer problems sustaining their livelihood due to larger land areas and access to fertilizers to yield sufficient harvest. In addition wealthy households had access to higher education leading to better positions in negotiations for land as well as providing skills for formal employment (Tyynel äet al. 2002).

While the positive impacts on the economy are mentioned in arguments in favor of private forestry investments, negative impacts of forest plantations are mostly reported on natural resources and most of the disputes and conflicts are held over the issue of land Gerber (2011). Investments in forestry, especially large-scale operations, need a rather

large area of land, but at the same time farm land represents the basis of rural livelihoods. The two main issues connect to this are the property, land use rights and land use changes.

Generally, the land that a forest company needs to acquire for the establishment of its plantations is either under public or private ownership and could be for example abandoned farm land or deforested areas. In many countries where the land and the forests are owned by the state the resources are used by local communities under customary norms (Charnley 2005). Forest companies gain access to the land with concessions given out by the government and hence have the right to occupy the land even if it is used by locals. In rural areas many locals depend heavily on customary land rights, thus the establishment of forest plantations is limiting their access to areas and decrease the availability of land (Indufor 2012). In a case where palm oil plantations were established in Indonesia, the increased scarce of natural resources, especially land, affected mainly former land owners or customary users (Obidzinski et al. 2012). In the study by Obidzinski et al. (2012) every second customary land user reported negative impacts on their livelihood due to the palm oil plantations. Many households in the study had to abandon forest product based livelihood strategies and thus, give up additional income sources. Furthermore, the study pointed out that the shifting cultivation practices became more complicated, since farmers had to walk further distances to open new farm plots (Obidzinski et al. 2012).

The crucial issue in the conflicts over land is that in several cases the establishment of forest plantations has entailed the displacement of households, their farms or both. This is probably one of the most serious impacts for an individual household. Displaced families often migrate to urban or peri-urban areas, which entails noticeable changes to the household's livelihood. Displacements occur in case land is acquire through concessions by the state as well as bought from private land owners. One of the most extreme cases of displacement due to the establishment of forest plantations has occurred in South Africa in the late 1950ies, when about 400 households had to resettle (Tropp 2003). In the case of South Africa the displacement was initiated by the government and its intensive afforestation program, where additionally apartheid issues played a crucial role (Tropp 2003).

In many cases households are promised compensation in form of new land, formal employment or financial means. In Ecuador smallholders sold their land to a large-scale plantation company being promised among others monetary compensation as well as employment opportunities in return (Gerber and Veuthey 2010). However, the study by Gerber and Veuthey (2010) revealed that in many cases the promises were not kept, less compensation paid and only short-term employment offered, which resulted in a resistance campaign. In the case of Indonesia (Obidzinski et al. 2012) it was shown that communities with prior experience with plantations had advantages and were able to receive compensation for given up land as well as improve their livelihoods through new opportunities.

In addition to farm land as important natural capital, forests are essential in the context of rural livelihoods as they provide firewood, non-wood forest products (NWFP), like mushrooms, berries and medical plants and cultural sites. However, deforestation and forest degradation are problems that especially developing countries have to face. The ability of plantations to decrease the pressure of natural forests is often mentioned as a positive argument in favour of forest plantations. However, Friedman (2005) argued that plantations can only partly fulfil this expectation, because there are various other reasons for pressure on natural forests. One of the main drivers of deforestation and forest degradation is land use change, often from natural forest to agricultural crop lands and pastures. Growing population and resulting increased pressure on food security as well as shifting cultivation practices contribute significantly to the process in poor countries. However, also land use conversion of natural forest to forest plantations is seen as a degradation of the forest area, as biodiversity and certain ecosystem services are decreased.

The change of natural habitats towards monocultures can limit the access to forest resources important for rural livelihoods. In a study by Obidzinski and others (2012) a majority in local communities in Indonesia reported displacement of natural resources like timber and non-wood forest products with medical plants being the most serious. The reduction of natural forests in favour of industrial plantations forced households to walk further distances to collect products from the forest (Obidzinski et al. 2012). The form of the conversion and the initial land use determine if a land use change is viewed positively and which groups benefit from the conversion. If abandoned land with little agricultural value is afforested it is usually seen as beneficial in terms of all aspects (Evans and Turnbull 2004). In contrary, the conversion of potential agricultural land is viewed negatively in social terms, especially in areas with high rates of malnutrition.

Djanibekov proved in his study that the conversion of marginal irrigated agricultural land to forest plantations under the Clean Development Mechanism (CDM) can improve the rural livelihoods. This result is especially focused on long term impacts, because a decrease in income and food production was observed for the first years, but eventually an increased income was reported. The interactions between forests or plantations and the water systems are complex and the impacts on the water system depend on the circumstances. In areas with problems of flooding plantations can carry a protective function, whereas on the other side in dry areas negative impacts have been reported. Some scientists have found negative impact on the watershed by fast growing tree plantations, while others have found positive impacts (Bowyer 2001). Following Bowyer (2001), the extent to which the hydrology of a site is affected depends on several factors like for example the chosen species, the initial land use and management practices. Some of the tree species used in plantations, especially eucalyptus, are known to require a lot of water (Friedman 2005, Gerber 2011). For the local communities negative impacts on watersheds can lead to harvest failure due to droughts as well as drying out of water sources.

Another issue is the use of chemicals and pesticides which besides the effect for the ecosystem, the chemicals and pesticides can cause negative effects on the health of local communities if residues of the chemicals get into the water sources. In Indonesia some communities have identified serious environmental problems in water as well as air pollution due to the established palm oil plantations and heavy use of herbicides and pesticides (Obidzinski et al. 2012). Even the company recommended their workers not to use water from the rivers close to the plantation sites (Obidzinski et al. 2012).

In summary negative issues in connection with forest plantations are usually dealing with a decline in natural capitals for the locals. Positive effects are usually observed for employment and economic development in the areas. This emphasises the complexity of the problem, where positive effects are desired, but are closely connected to concessions in natural resources.



## **3 PLANTATION FORESTRY IN MYANMAR**

### **3.1 Policy stipulations related to plantation forestry**

In 1995, Myanmar Forest Policy was promulgated in accordance with sustainable development principles adopted in UNCED. The policy explicitly highlights its objectives and measures in paragraph 3. Among them, “Forest Regeneration and Afforestation” is one of the key areas on which the policy emphasized. The policy clearly indentified and mentioned the two objectives of forest regeneration and afforestation as follows:

- 1) To pursue sound programme of forest development through regeneration and rehabilitation operations to optimize productivity from natural forest;
- 2) To encourage planting of fast growing multipurpose tree species in degraded forest lands, rebuilding forest and farm lands to meet industrial and domestic demand, as well as restore ecological balance.

In order to achieve the above-mentioned objectives, the policy also stipulates its measures such as establishing plantation cooperatives and providing institution finance for establishment of man-made forests on degraded/denuded lands; and reforestation to restore degraded land and meet rural needs. However, it highlights that only a combination of plantation forestry and natural forest management is the most efficient use of forest resource base in the country.

### **3.2 Historical background and status of plantation forestry**

Historically, in order to create teak plantations in conjunction with cultivation of agricultural crops on hill slopes, the so-called “taungya” system was adopted in Myanmar in 1869. The term “taung” in Myanmar language actually means hill and “ya” means a plot of agricultural land on a slope (Wint, S. M.).

Referring to (Blanford, 1958), P.K. Ramachandran Nair (1993) confirmed that “taungya” was originally local term in Myanmar for shifting cultivation, and it was subsequently used to describe the afforestation method. He mentioned “taungya” system as a forerunner to agroforestry, and development of the system dated back over 150 years ago when Dietrich Brandis, German Forester, arrived in Burma in 1856. By that time, shifting cultivation was widespread in the country and there were several court cases against the villagers for encroaching on the forest reserves. After realizing the detrimental effect of shifting cultivation on the management of timber resources, Brandis encouraged the practice of "regeneration of teak (*Tectona grandis*) with the assistance of “taungya”. The villagers were got the right to cultivate food crops in the early stages of forest plantation establishment, and at the same time they have to do afforestation on the cleared land by sowing teak seeds.

Generally, Myanmar foresters agreed that forest plantation using “taungya” system was an efficient and successful method to establish forest plantation in the form of compensatory plantations on a small scale at low cost. During the 45 year-period (1896-1941) before the Second World War, the average area planted per year was only about

1000 ha (Wint, S. M.). However, the large-scale plantation had initiated by 1980s, along with development of East Pegu Yoma Project (EPP) which was a large-scale teak plantation project implemented from 1979-80 to 1984-85. The project was co-financed by the Myanmar Forest Department and World Bank loan. The main expectations of the project were: to earn more foreign exchange by producing more teak and hardwood; to remove about 20,000 ha of shifting cultivation land from reserved forests; to distribute more timber for local use; to develop plantation techniques for fast growing species so as to provide fuel wood, charcoal and local use timber in short-term; to have more teak dominant forests in the future and to develop wood base industry in the future. Totally 16,914 ha of teak plantations were established during the project as shown in Table 3.1 and 1720 households of land-less families were organized as basic “taungya” workers (Forest Department, 1989).

表3.1 EPP期间每年建立的柚木种植园面积

Table 3.1 Area of teak plantations annually established during EPP

Year	1979-80	1980-81	1981-82	1982-83	1983-84	1984-85	Total
Area (ha)	708	1,725	2,769	3,829	3,963	3,920	16,914

Source: Ministry of Forestry, Forest Department, 1989 (adopted from Kaung, B. & Cho, K. M, 2003).

Apart from teak plantation, the project also established 2,879 ha of non-teak hard wood plantations on a research level to establish nursery technique for those species and to study development of those species. The next milestone development in plantation forestry of Myanmar is launching teak special plantation project in 1998-99. The main objectives are: to increase area of quality teak forests while maintaining the country's natural habitat of teak; and to increase annual timber yield while contributing to environmental stability. The project was implemented with public financing (Forest Department's budget) in seven divisions, namely Sagaing, Bago (East), Bago (West), Magway, Mandalay, Yangon and Ayeyawady. Initially, the project period was set up for 40 years from 1998-99 to 2037-38, together with annual planting target of 20,000 acre (approximately 8,000 ha). However, the project was able to run up to 2005-06, later on it was dissolved under normal plantation programme of Forest Department. The status of region-wise teak special plantation establishment during the period of 1998-99 to 2005-06 is presented in Table 3.2.

Along with changes in political, social and economic situation, there has been increasing high demand in timber and firewood. In addition, protecting watershed areas of newly constructed dam and reservoirs became important task for Forest Department. Currently, Forest Department has been developing four types of forest plantations, namely Commercial Plantation, Village Supply Plantation, Industrial Plantation and Watershed Plantation. Between 1981 and 2012, the total area of different types of plantation established by Forest Department reaches 0.87 million ha (2.14 million acres) all over the

### 3 PLANTATION FORESTRY IN MYANMAR

表3.2柚木专用种植园（1998-99~2005-06）

Table 3.2 Teak special plantation establishment (1998-99 to 2005-06)

Region	Sagaing	Bago (East)	Bago (West)	Magway	Mandalay	Yangon	Ayeyawady	Total
Area (ha)	5,261	9,713	10,927	13,355	15,783	3,237	6,475	64,751

Source: Planning & Statistics Division, Forest Department

country. Table 3.3 shows area of forest plantation with respect to different types established by Forest Department for the said period.

Up to 2005-06, forest plantations were developed by the public sector, and therefore Forest Department is the only organization in the country which is responsible and has mandate for establishment of all types of plantation mentioned above (Forest Law, 1992, Section 13) where as Dry Zone Greening Department has been establishing village supply plantation and watershed plantation, except commercial and industrial ones, since its establishment in 1997. However, budget and manpower are major constraints to successful implementation and maintenance of such a large extent of forest plantation from public sector. On the other hand, Myanmar has reformed its economic policy and it encourages the market- oriented economy. In line with newly reformed policy, Forest Department invited private investments in plantation forestry in 2006-2007.

表3.3森林部门1981 - 2012年度（3月）建立的森林种植面积

Table 3.3 Area of forest plantation established by Forest Department during the period of 1981- 2012

(March)			
Sr.	Types of Plantation	Area (ha.)	Percent
1	Commercial plantation	475,059	54.92
2	Village supply plantation	135,951	15.71
3	Industrial Plantation	72,489	8.38
4	Watershed Plantation	181,540	20.99
	<b>Total</b>	<b>865,039</b>	<b>100.00</b>

Sources: Natural Forest and Plantation Division, Forest Department, 2011

Up to 2011-12, over 100 national entrepreneurs/companies invested in this area and total area of nearly 44,000 ha of private forest plantation has been established all over the country. Of which, 65% of total area stands for private teak plantations and the remaining 35 % non-teak other hardwood plantations. Generally, private forest plantations fall under the categories of commercial and industrial plantations. Table 3.4 shows the status of State and Region-wise private forest plantations development in the country.

### **3.3 Forest resources and rural livelihood**

The majority of the poor people in the world are concentrated in the rural areas and they depend on forest resources for their livelihood. It is estimated that 60 million people of indigenous people are totally dependent on forest resources, 350 million people are highly forest-dependents World Bank (2008). Forests can provide rural people a wide variety of goods such as fuel, food, medicines, housing materials, composts fertilizer, fodders, and as well as cash. Especially, dependency on forest resources increases during economic and social hardship times to the rural people. Related to rural income from developing countries, World Bank (2008) reported that the wild food, fodders for animals and fuel are the most important products and accounts for 70 percent of forest income and household forest income increased with the increased distance from markets. Smallholders living in forest margin in different parts of the world earn 10-25 percent of their household incomes from non-timber forest products.

However, household forest income is likely to decline with the changes in quantity and quality of forest due to various causes, or when sedentary agricultural activities from hunting and gathering forest products are introduced. Such shift to agricultural land use indicates decreased availability in forest resources due to forest degradation. Although agricultural expansion increases income opportunity, this activity in turn causes deforestation and forest degradation which decreases forest income for the rural household.

Therefore, forest resources known as natural assets are of importance for the rural people especially for the poor who are inaccessible to financial, physical and human capital. The use of forest as natural insurance or safety net is important because livelihoods are characterized by unusually high levels of environmental, agricultural, epidemiological and market uncertainty (World Bank, 2008).

### **3.4 Roles of NTFPs and forest land in rural livelihood in Myanmar**

#### **3.4.1 Use of NTFPs**

Like other developing countries in the world, rural people representing 70 % of total population in Myanmar remains dependent on forest resources for their livelihood. Recorded or unrecorded extraction and utilization of timber and NTFPs significantly contributes to their livelihood. Among them, firewood and charcoal are important forest products for their day-to-day life. Similarly, bamboo is also essential housing materials for grass-root rural people in Myanmar.

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表3.4缅甸的国家和地区私营森林种植园发展情况

Table 3.4 State and region-wise private forest plantations development in Myanmar

Sr.	State/Region	Teak plantation (ha.) <sup>1</sup> (as of 24-2 2012)	Non-teak other hardwood plantation (ha.) <sup>2</sup> (as of 24-2 2012)	Total (ha.)
1	Kachin	659.65	558.88	1,218.53
2	Kayah	20.23	105.22	125.45
3	Kayin	598.95	614.51	1,213.46
4	Chin	121.41	242.01	363.42
5	Sagaing	3,345.61	1,750.30	5,095.91
6	Taninthayi	-	289.88	289.88
7	Bago (East)	12,838.93	3,047.96	15,886.89
8	Bago(West)	2,448.40	512.75	2,961.15
9	Magway	1,521.65	1,266.45	2,788.10
10	Mandalay	1,522.87	3,139.31	4,662.18
11	Mon	161.88	397.41	559.29
12	Rakhine	-	427.60	427.60
13	Yangon	1,679.48	733.65	2,413.13
14	Shan(south)	101.17	324.45	425.62
15	Shan(North)	839.74	388.75	1,228.49
16	Shan(East)	-	69.61	69.61
17	Ayeyawady	2,509.11	1,431.09	3,940.20
	<b>Total</b>	<b>28,369.08</b>	<b>15,299.83</b>	<b>43,668.91</b>

Sources: 1/ Planning and Statistics Division, Forest Department

2/ Natural Forests and Plantation Division, Forest Department

#### *Firewood*

Although Myanmar is a gas exporting country, domestic provision of natural gas and electricity is so far limited and inadequate. This leads to continued use of firewood and charcoal as main sources of energy. According to NFMP, the annual consumption of wood fuel per household between 1990 and 2000 is estimated at 2.5 cu-ton (4.5 m<sup>3</sup>) for rural households where as 1.4 cu-ton (2.5 m<sup>3</sup>) for urban residents. Myanmar Forestry Outlook Study (2009) reported that estimated consumption of fuel wood in Myanmar for 1990, 2000 and 2005 was 35.20, 40.56 and 44.59 million m<sup>3</sup> respectively, as shown in Table 3.5.

表3.5缅甸薪炭林的估计消费量

Table 3.5 Estimated consumption of fuelwood in Myanmar

<b>Fuelwood consumption</b>	<b>unit</b>	<b>1990</b>	<b>2000</b>	<b>2005</b>
Total consumptions	(m <sup>3</sup> )	35.20	40.56	44.59
Total population	million	40.78	50.13	55.40
Per capita consumption	(m <sup>3</sup> )	0.86	0.81	0.80

Source: Kyaw Tint and CSO (various issues) / adopted from Myanmar Forestry Outlook Study (2009)

### *Charcoal*

Next to firewood, charcoal is still at the stage of second most important energy source for cooking both at urban and rural residents. Usually, all urban people purchase charcoal from the local markets. However, some rural people are involved in charcoal burning for their own consumption or for trade purposes. Thus, charcoal burning is also one of the livelihood options for the rural forest dependent peoples. So far, data of charcoal production for personal consumption is not available in Myanmar. The official records of Forest Department shows that annual charcoal production for trade purpose is between 210,000 and 300,000 cubic ton during the period of 2005-06 to 2010-11 as shown in Table 3.6.

表3.6 2005 - 06年度至2010-11年期间木炭年产量

Table 3.6 Annual production of charcoal during the period of 2005-06 to 2010-11

<b>Year</b>	<b>2005-06</b>	<b>2006-07</b>	<b>2007-08</b>	<b>2008-09</b>	<b>2009-10</b>	<b>2010-11</b>
Charcoal production	232,583	296,877	268,561	265,906	210,334	211,744

(Cubic ton)

Source: Forest Department

### *Bamboo*

Bamboo is a multipurpose forest product which can be utilized not only for housing purpose but also for food and income generation by producing value-added products. FAO & INBAR (2006) reported that bamboo production and its value in 2004-05 was estimated at 9,550 thousand metric tons, which is worth about 229,210 million Kyats. About 30 percent of production of bamboo stems accounts for raw materials needed for production of utensils, handicrafts, and for construction. Apart from bamboo stems, collecting and selling of bamboo shoots also contribute to rural livelihood: not only ensuring food security of household but also enhancing household income by selling them in the local markets. However, production data of non-wood bamboo product such as sheaths and branches which are used for making hats and utensil etc. are so far unreported for the whole country.

Table 3.7 provides the production and its value of bamboo stems and bamboo shoots during the period of 2000-01 to 2004-05.

表3.7 缅甸笋生产及其价值 (2000-01- 2004-05)

Table 3.7 Production and its value of bamboo stems and bamboo shoots in Myanmar (2000-01 to 2004-05)

Sr.	Particulars	2000-01	2001-02	2002-03	2003-04	2004-05
1	Production	8,480.832	8,809.955	9,116.737	9,371.410	9,550.440
	(000, metric tonne)					
	Value	60,796.57	179,723.09	213,331.64	224,913.84	229,210.56
2	(million Kyats)					
	Production	0.819	0.865	0.913	0.964	0.973
	(000, metric tonne)					
2	Bamboo shoot	44.638	54.208	65.831	79.945	87.591
	Value					
	(million Kyats)					

Source: Global Forest Resources Assessment 2005, Myanmar Country Report on Bamboo Resources (FAO/INBAR, 2006)

#### *Wild food and other products*

In addition to above-mentioned NTFPs, thatch, rattan, resin, varieties of medicinal plants, wild food such as mushroom, yam, honey as well as bush meat are also indispensable resources for the livelihood of forest dependent people. However, many of NTFPs are undervalued or unreported.

#### 3.4.2 Role of forest land in rural livelihood in Myanmar

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. According to the statistics of Forest Department, encroachment figure all over the country as of December 2011 reaches 6,548 km<sup>2</sup>, representing 4% of the total Forest Land as shown in Table 3.8. Moreover, grazing is

another common form of use of Forest Land by rural people. Most of rural farmers 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.

### **3.5 Linkage between forest land concession, afforestation and local people's livelihoods**

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 prevents forest plantation investments in the land and property, they take 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) figured out that through granting land concessions, hundreds of thousands of hectares have been allocated 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



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表 3.8 林地内的侵蚀面积（截至 2012 年 12 月）  
Table 3.8 Encroachment area inside forest land (As of December, 2012)

Sr.	State/Region	Forest Land Area	Encroachment	Percentage to Forest Land
1	Kachin	16,291.47	340.56	2.09
2	Kayah	6,344.60	143.33	2.26
3	Kayin	9,045.40	197.76	2.19
4	Chin	5,168.74	110.34	2.13
5	Sagaing	29,198.17	1,719.85	5.89
6	Taninthayi	12,794.35	283.26	2.21
7	Bago (East)	10,898.92	257.76	2.36
8	Bago(West)	5,177.15	91.39	1.77
9	Magway	10,515.58	598.25	5.69
10	Mandalay	9,600.35	444.58	4.63
11	Mon	2,155.71	261.61	12.14
12	Rakhine	6,865.01	160.64	2.34
13	Yangon	1,075.06	1.24	0.11
14	Shan(south)	19,126.93	201.77	1.05
15	Shan(North)	6,393.97	154.17	2.41
16	Shan(East)	5,697.29	61.71	1.08
17	Ayeyawady	7,201.03	1,520.17	21.11
<b>Total</b>		<b>163,549.72</b>	<b>6,548.37</b>	<b>4.00</b>

Source: Planning & Statistics Division, Forest Department (2012)

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) highlighted 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.

## 4 METHODOLOGY

### 4.1 Selection of 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 takes up 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, 11private 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, Phyu Township)

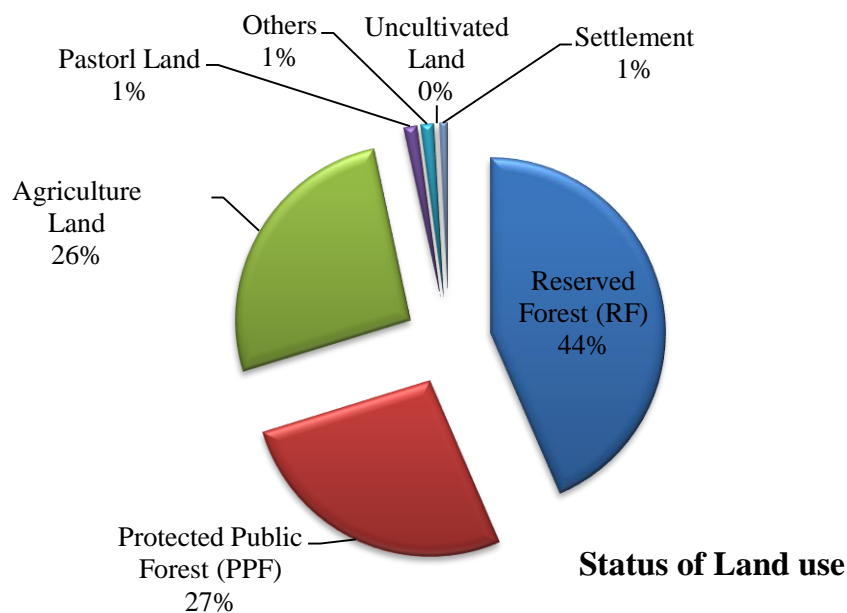


图 4.1 研究区土地利用情况  
Fig.4.1 Status of Land use in study area

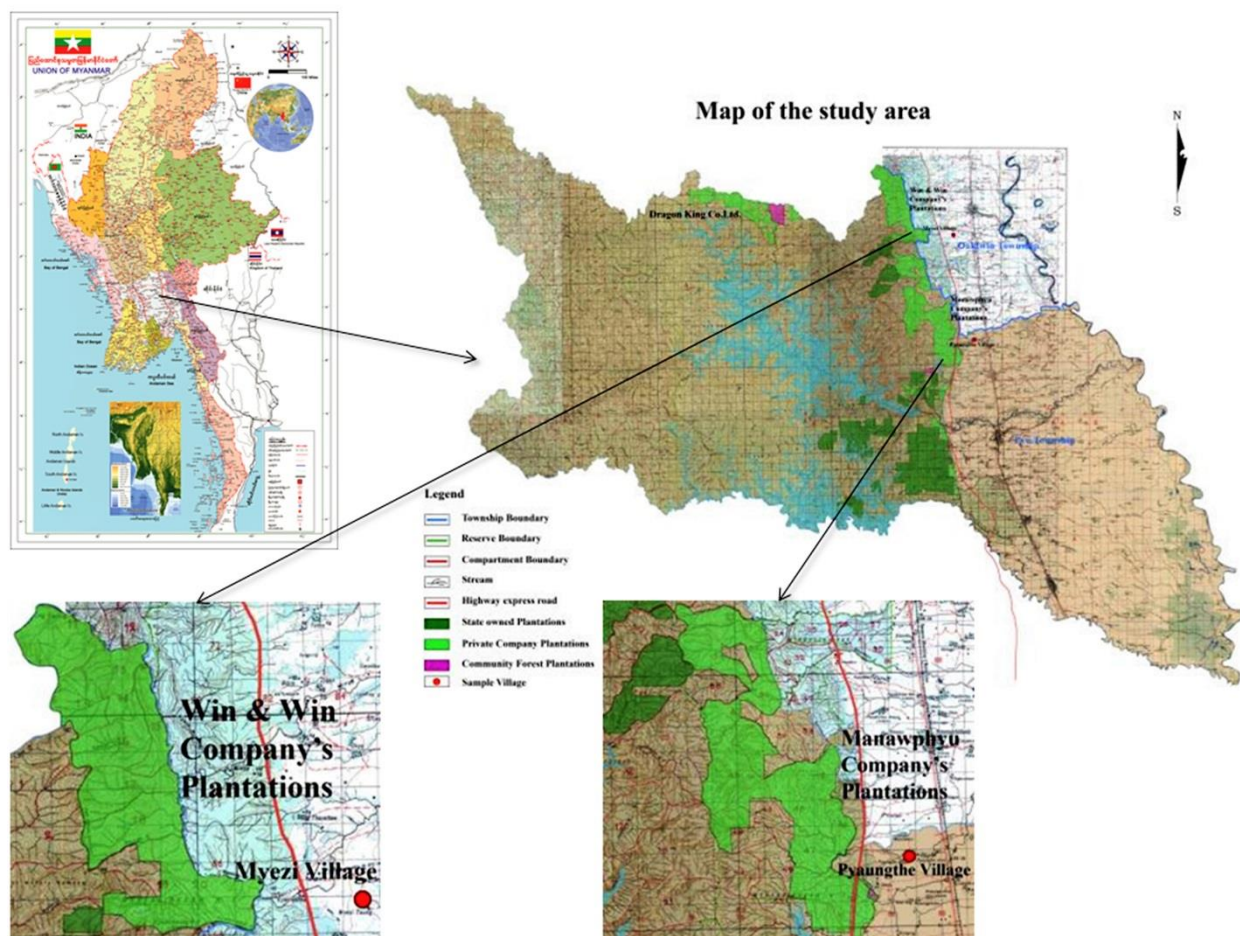


图 4.2 研究村及其位置

Fig.4.2 Research villages and their location

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.

## 4.2 Sampling and sample size

There are altogether 309 households in two target villages: 194 in Pyaungthe village and 105 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.

## 4.3 Data Collection

The data for this study was mainly collected in a household survey, focus group meetings and key informant interviews. For the collection of household data a structured questionnaire with closed ended questions was used which can be separated into three main parts. In the first part, general household characteristics were reviewed and recorded like number of children or number of members In the second part the respondents were asked about their livelihood strategies and if members of the household are formally employed either in general or specifically in one of the forest companies. The last part is questions related other livelihood capitals, especially natural resources, and how the establishment of

private forest plantations has affected those capitals from the point of view of the interviewed person.

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. A total of 213 Households were interviewed in the two villages. Of these, 108 interviews were answered by a female and 105 by male respondents (Table 3.1). About 79.81% of the households were male headed. Households had an average of 5 household members (Table 3.1).

表4.1村庄样本的家庭信息

Table 4.1 General household information of the sample by village

	Gender of the respondents in %		Gender of head of the household in %		Average household size
	Male	Female	Male	Female	
Pyaungthe	35.38	64.62	80.77	19.23	4
Myezi	71.08	28.92	78.31	21.69	5
Total	49.30	50.70	79.81	20.19	4

Assuming that the leading person of a household would have the good knowledge on the situation and livelihood of a household, it was desired to do the interviews with the leading person of the household. If the leading person of the household was not present another adult person who was present and answer was chosen as respondent. However, as the majority of household is led by men, who are responsible for the work on the farm plot or other activities outside the house, often a women present at the house was interviewed instead.

## 4.4 Data Analysis

### 4.4.1 Wealth categorization

In order to get an overview of the economic status of the interviewed households within the dataset the households were classified in three wealth groups. The categorization on the

basis of monetary values was not applicable because income and expenditure data are of poor quality in the study villages. An asset based approach for wealth ranking was applied instead. This work employed the principal component analysis (PCA) following Filmer and Pritchett (2001) in assessing household wealth in absence of expenditure or income data.

In the first step eleven indicator assets were identified based on literature review. In this study the wealth ranking was based on observed housing characteristics, fire brick house and tin roof, and durable asset endowment, including, motorbikes, television, bicycles, mobile phones and ownership of at least one other valuable asset. These assets were recognized as status symbols and proxy what kind of amenities the household could afford. It was supposed that an increased wealth rank increases the quality of live and thus, the livelihood of a household. Land or livestock owned by the household were not counted for the wealth ranking, because they represent investments that the household makes into livelihood strategies, not to improve the standard of living. In contrary, the primary purpose of amenities is not to create an income for the household.

Principal component analysis is applied to lessen the number of variables and their correlation in an analysis by means for the orthogonal linear combinations that contain similar information (Filmer and Pritchett 2001). When applying PCA in wealth ranking, the assumption needs to be made that “the long-run wealth of a household explains the maximum variance (and covariance) in the assets variables” (Filmer and Pritchett 2001). With other words, assets with a smaller variance don't separate the households significantly, while assets with high variance point to differences in the wealth of a population.

All variables were converted to the binary form of “1” indicating the possession of an asset by a household and “0” indicating the absence. In the case of the variable for the main material of the house, which consists of the three categories post, timber and fire brick, only fire brick was considered as an amenity and coded with the value “1”. Both other categories were coded with the value “0”. Then the first principle component of the PCA was used to evaluate the weights of the different household assets (Table 4.2). The solution explained 28.5% of the variance between the households. The higher the variance of an asset between the households the higher is also the absolute weight of the variable (McKenzie 2005). The weights for the material of the house, cart, solar plate and battery, television and tined roof, had the greatest weight, while owning a radio had the lowest weight of the included variables (Table 4.2).

Subsequently, the households were categorized into three wealth groups on the basis of their factor scores. For the separation of the groups percentiles were set to 40% and 80% forming the poorest wealth group for the lowest 40% of scores, medium wealth following from there to 80% of the lowest scores and highest wealth group for the 20% with the highest scores. The decisions for the percentiles at 40 and 80 was based firstly on the example of Filmer and Pritchett (2001), who suggested this separation due to the fact

that in developing countries the share of people with the lowest wealth is much higher than the share of people with higher wealth. All cases and the assigned wealth categories were reviewed to ensure sensibility in the categorization results. In all cases the categorization appeared suitable, for example no household with a firebrick and tin roofed house got classified in the poorest wealth group and likewise no household with only a bike and a mobile phone as amenities got classified in the highest group.

表 4.2 主成分分析组成矩阵

Table 4.2 Principle component analysis component matrix

	<b>Amenity weights</b>
Radio	0.0586
Bike	0.3109
EVD portable player	0.0963
Solar Plate & Battery	0.3905
Television	0.3600
Motorbike	0.3368
Mobile phone	0.3062
Cart	0.4060
Other valuables assets	0.1859
Fire brick house	0.2995
Tin roof	0.3351

Extraction Method: Principle Component Analysis

One needs to keep in mind that the outcome of this wealth ranking is only applicable for this study and situation. It allows the relative wealth of the households in this context and due to the application of PCA the weights are set for this data set. Additionally, this wealth ranking only accounts for one point in time, when the interviews were carried out. Curiously households which invested into livestock and land are able to do more amenities in the future.

#### 4.4.2 Logistic regression analysis

The central objective of this study is to analyze the perceptions of local households on the impacts of forest plantations on natural resources, livelihood strategies and overall livelihood including wealth status of the households. In order to assess those relationships logistic regression was chosen for analysis of the data, because all dependent and most of the independent variables are categorical. Logistic regression grants evaluating the effect of different factors on the perception of an impact or the membership to one of the wealth categories. The logistic regression model is based on a logistic distribution with a s-shaped curve as 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). The main difference 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 ( $1-p_i$ ). The multinomial logistic regression model is applied for dependent variables with more than two categories. 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

$$\text{Logit}(Y) = \ln\left(\frac{p_i}{p_0}\right) = a + \sum b_i * X_i$$

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 used in form of odd ratios (OR).

#### 4.4.2.1 Model specifications

For the assessment of the desired objectives and the stated hypotheses different models were built like shown in Table 4.3.

表 4.3 研究中使用的不同模型的描述，目的和参考类别

Table 4.3 Description of different models used in this study, their purpose and reference category

Purpose	Model	Form of model (BN/MN*)	Contrast(first mentioned is reference category)
Analysis of perceived impacts of plantations on natural resources	Farm model	BN	No negative impact reported vs. negative impact reported
	Firewood model	BN	No negative impact reported vs negative impact reported
	NTFPs model	BN	No negative impact reported vs negative impact reported
Analysis of impact of livelihood of strategies on wealth	Wealth model	MN	Highest wealth group vs lowest wealth group; middle wealth group
Analysis of perceived overall impact on households' livelihood	Overall benefit	MN	Negative reported impact vs no reported impact; positive reported impact

\*BN= binomial logistic regression; MN= multinomial logistic regression model



The models to evaluate the perceived impacts of plantations on natural resources were figured out with binomial models and the dependent variables were converted into dichotomous variables. As the main aim of this part of the analysis was the question what caused respondents to report negative impacts on natural resources, the dependent variables in the models contrasted the reporting of negative impacts (1) with the nonreporting of negative impacts (0) (Table 4.3). The Non-reporting of negative impacts thus included the responses “no impact”, “positive impact” and “I don’t know”.

The wealth model for the analysis of livelihood strategies and their contribution to the households’ wealth was assessed with a multinomial model, because the dependent variable had three categories. In contrast to the other presented logistic regression models, the wealth model analysis didn’t have a dependent variable that was derived directly from the respondents, but instead, was computed and externally assigned like described in the previous section (4.4.1). The reference category for the dependent variable was the highest wealth group, because the main purpose of the analysis was to identify which livelihood strategies enable households to reach higher wealth standards.

An ordinal logit model would have been used for the wealth analysis because the outcome categories are series. An ordinal logistic regression model in this case the proportional odds model would allow a simpler interpretation of the results, because it contrasts a higher class to a less than or equal to in contrast to a higher class (Hosmer et al. 2013). When using the ordinal model, the assumption of proportional odds needs to be done and approved with the parallel lines test. For this model the test of parallel lines produced a significant ( $p \leq 0.05$ ) result, hence the assumption of proportional odds is violated. Like suggested in Hosmer et al. (2013), the multinomial logistic regression was used as the alternative. For the purpose of this study the analysis with a multinomial logistic regression model is sufficient, since the contrast between the wealthiest and the other two groups should be emphasized. The perception of the overall impact is assessed with a multinomial regression model, as there are more than two response categories (Table 4.3). Twelve respondents were not able to evaluate the overall impact on their household and are omitted in the analysis, since no significant explanation could be found. The main focus of the analysis is the impact of wealth on the perception of overall benefit from private forest plantations. Furthermore, the negative reported impact was chosen as reference category (Table 4.3),

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

## 5 RESULTS

### 5.1 General household information

Most of the households in the study live in house made out of post with grass thatched roof. Only few households can afford a house made out of fire bricks and timber with tin roofed as presented in Figure 5.1. The share of houses with out of fire bricks in Myezi village is higher than that of Pyaungthe village, (Figure 5.1).

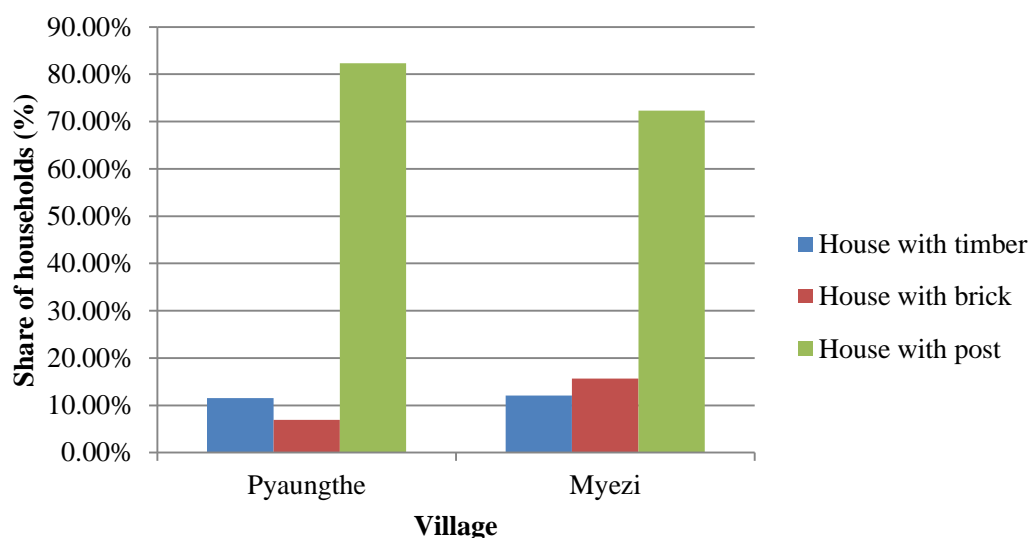


图 5.1 村庄的主要材料

Figure 5.1 Main material of the house by village

The analysis of the created wealth groups showed that some households with certain characteristics are more often in the poorer wealth groups than others. About 42.50% and 40.00% of the female headed households were categorized in the poorest wealth group and middle wealth group, but 17.5% in the highest wealth group. A similar differentiation can be observed between different age groups of the respondents. Of all the people categorized into three group: youngest, middle and the oldest age group. The respondents in the youngest and middle classified age groups were distributed more equally than the older respondents.

表 5.1 村庄财富类别分布情况

Table 5.1 Distribution of wealth categories in the villages

Village	Lowest wealth group (share in wealth group)	Middle wealth group (share in wealth group)	Highest wealth group (share in wealth group)
Pyaungthe	41.54% (25.35%)	41.54% (25.35%)	16.92% (10.33%)
Myezi	30.12% (11.74%)	44.58% (17.37%)	25.30% (9.86%)
<b>Total</b>	<b>37.09%</b>	<b>42.72%</b>	<b>20.19%</b>

The differences were also found between the wealth groups in the villages (Table 5.1). Pyaungthe village has the highest share of people in the lowest wealth group and slightly higher than Myezi village in the lowest share of people in the highest wealth group (Table 5.1). The share of people in the lowest group in Pyaungthe is almost as high as in Myezi, (Table 5.1). Most of the households categorized in the highest wealth group live in Pyaungthe (Table 5.1). The most common cultivated crops are rice and beans which are produced by almost all households and simultaneously are also used as cash crops more often than other crops (Figure 5.2). Households from higher wealth groups cultivate a higher variety of crops than households from the poorest wealth group.

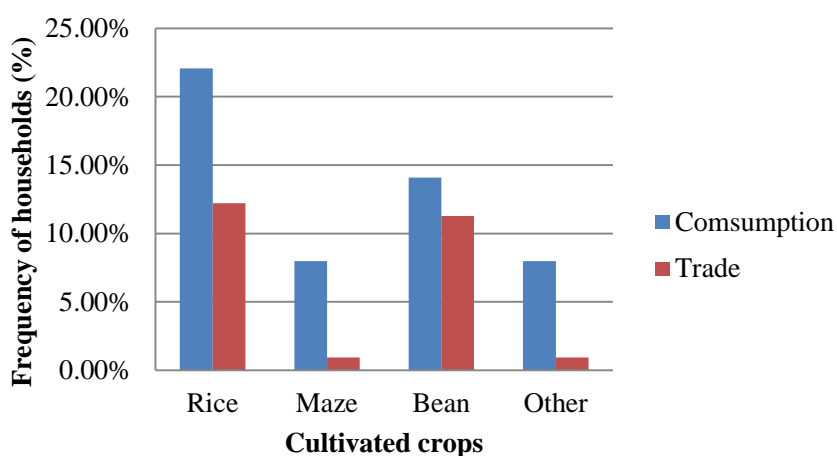


图5.2家庭为自己消费和贸易种植的作物的频率

Figures 5.2 Frequency of crops cultivated by the households for own consumption and trade

## 5.2 Perceived impacts on natural capitals

This section will mainly present the results testing the hypothesis (1), whether the establishment of forest plantations has impacted negatively on natural capital of local households. Firstly, an overview over the natural resource in question and its use by the households is given. The later, the perceived impact on the forest resource by the private plantations is evaluated.

*Farm land* is one of the most important livelihood capitals for rural households because it provides the basis for farming activities. There are 18 households is owned small farm plot and 8 households is owned medium farm plot in Pyaungthe village and 18 households in small farm plot and 3 households in median farm plot in Myezi. All of the households manage one plot (Table 5.2). Most of the Respondents in this study had occupied their current plots in average for about more than 10 years. Shifting cultivation is the common practice for few of respondents in this study area.

表 5.2 村庄所有农户

Table 5.2 Farm land owned by households by village

Village	No Farm Land	Small(1 acre to 4 acre)	Medium (5 acre to 9 acre)	Big (10 acre and above)
Pyaungthe	78.46%	17.69%	3.85%	0.00%
Myezi	77.11%	15.66%	7.23%	0.00%
<b>Total</b>	<b>77.94%</b>	<b>16.90%</b>	<b>5.16%</b>	<b>0.00%</b>

The establishment of forest plantations has impacted the land availability negatively in the opinion of more than 90% of the respondents in all villages (Table 5.3). During the Focus group meetings the impact on farm land availability was identified and perceived in two main forms. Firstly, greater land areas were occupied by plantations and thus no longer available for potential establishment of new farm land in context of shifting cultivation. Secondly, people of poorer households, their livelihoods mostly depend on NTFPs collections had to go further distance because of the forest plantations. With the establishment of the plantations, the households in the communities lost access as well as control over the occupied area. The issues impacting on the likelihood to report negative impacts on land availability were examined using logistic regression analysis and the results are presented in Table 5.4.

表 5.3 村庄对土地供应量的影响

Table 5.3 Perceived impacts on land availability by village

Village	No impact	Negative impact	I don't know
Pyaungthe	0.77%	92.31%	6.92%
Myezi	0.00%	91.57%	8.43%
<b>Total</b>	<b>0.47%</b>	<b>92.02%</b>	<b>7.51%</b>

表 5.4 对农田影响的逻辑回归模型

Table 5.4 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.

The binary logistic regression model on the perceived impact of private forest plantations on farmland availability is shown in Table 5.4. 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.

表 5.5 村庄木柴供应情况影响的认知

Table 5.5 Perception of impacts on firewood availability by village

Village	Negative impact	No impact	Positive impact
Pyaungthe	90.00%	2.31%	7.69%
Myezi	97.59%	0.00%	2.41%
<b>Total</b>	<b>92.96%</b>	<b>1.41%</b>	<b>5.63%</b>

Firewood is the most important fuel for the households and most of the respondents use only firewood for cooking and only about 6 % reported to use charcoal in addition to firewood. There is no household uses charcoal as their main fuel.

The majority of the interviewed households in the villages close to the plantations think that the forest plantations have impacted negatively on the firewood availability (Table 5.5). The perception of impact on firewood varies between the villages (Table 5.5). Statistical cross tabulation analysis, as well as logistic regression analysis has shown that the village of the respondents is the main factor determining the perception of impacts. More than half of the respondents in both villages express concern about impacts on firewood. In connection with this stands the origin of firewood, which includes the information whether the household uses a different source for their firewood than the natural forest.

表 5.6 村庄对非营利组织的影响

Table 5.6 Perceived impacts on NTFP by village

Village	Negative impact	No impact	Positive impact
Pyaungthe	69.24%	15.38%	15.38%
Myezi	81.93%	8.43%	9.64%
<b>Total</b>	<b>74.18%</b>	<b>12.68%</b>	<b>13.15%</b>

On one hand the impact was described as decreasing natural forest area during focus group meetings as well as individual interviews and, on the other hand, restricting the access to natural forest area. As a consequence, households had to walk longer distances to reach the border of the decreasing natural forest as the direct way to the plantation was occupied by the plantation. In many cases, the villagers were not allowed to enter the plantation area and had to walk around.

Firewood collection, charcoal production and greater need for farmland were mentioned as main drivers for deforestation around the villages. Whenever the case, the communities feedback in the focus group meetings that for the implementation of private forest plantations, natural forest area is decreased or degraded woodlands are changed into plantation land. The collection of non-timber-forest products varies between households and villages. The extent of people collecting NTFP depends on the occurrence of this product close to the village and traditions and need for the product.

In summary, many households perceived negative changes in the availability of the resources, especially concerning farm land and forest. All households look like to depend on natural resources regardless of their socio-economic background, hence wealth status, education or gender of the head of the household play no important role in the perception of impacts. The perception varies greatly between the villages. The initial natural resource endowment of a village looks like to mark the main differences between the villages. Regardless, the forest plantations look like to have compounded the situation. At the same time, individual as well as contextual affect the attitude of the villagers towards the companies.

### **5.3 Livelihood strategy diversification and its impact on the wealth of a household**

In the following the second hypothesis, whether livelihood diversification for the livelihood strategies of the households has been affected positively by the introduction of forest plantations, is tested. Firstly, different livelihood strategies found in the villages are presented and the impact of plantations on them is analyzed shortly. Afterwards, the logistic regression of wealth categories is presented which provides an insight on the importance of various strategies for wealth of a household.

## 5 RESULTS

*Farming* is seen as the second important livelihood strategy. According to the analysis of this study, 22% of households cultivate crops as their main livelihood strategy. While about a quarter of the households cultivate crops only for their own consumption, the rest regularly sell part of their harvest in order to increase the income for their household.

表 5.7 村庄木材收获的人口构成比例

Table 5.7 Share of people selling part of their harvests by village

Village	Not sell crops	Sell crops
Pyaunthe	7.14%	92.86%
Myezi	31.58%	68.42%
<b>Total</b>	<b>17.02%</b>	<b>82.98%</b>

As presented in the previous section 5.2, the availability of farm land has been perceived to be impacted negatively by the forest plantation establishment; hence also the farming activities are impacted negatively.

*Livestock keeping* as a livelihood strategy is carried out by less than half of the households in the villages. Of all households 29% owned at least one different kind of livestock and about 12% owned more than one different kind of livestock. The highest share of households without any kind of livestock was found in Myezi with 39%. Livestock is classified as a financial asset because it can be converted into cash. Households sell part of the animals mostly when they need money or food shortage, for example after crop failure or death of family members. The differences between the owned livestock and the one that is farmed for sale are presented in Figure 5.3. The share of pigs and cattle that is sold is higher than the shares for other animals.

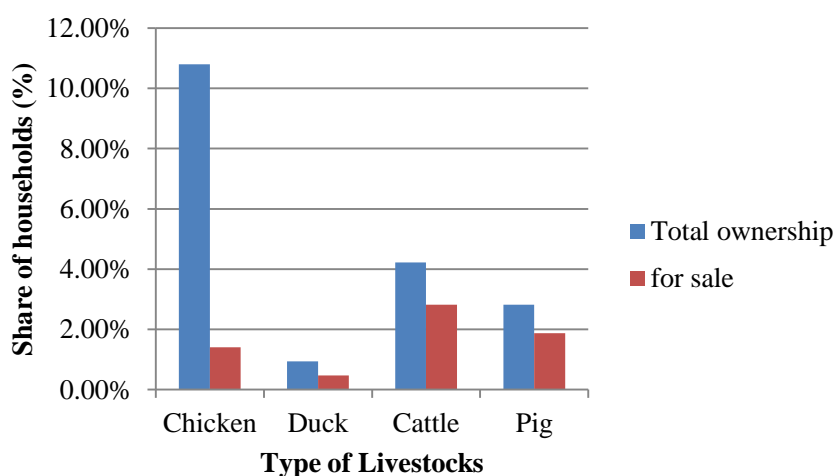


图 5.3 拥有牲畜和按家畜种类出售牲畜的户数份额

Figure 5.3 Share of households that own livestock and share of households which sell livestock by type of livestock

*Charcoal production* has been enlarged over the past few years in the region and put additional pressure on the natural forests. In the study area, charcoal can provide additional income for households, but unsustainable use will limit the possibilities for this livelihood activity in the future. Of all households in the survey only 5% produces charcoal; the highest share is produces in Myezi, there is no produce in Pyaungthe (Table 5.8). In contrast to the results for the production of charcoal, Pyaungthe has the highest share of people purchasing charcoal, while in Myezi there is no share of people purchasing charcoal (Table 5.8). Overall, the number of people using charcoal compared to people producing charcoal is much higher. This is due to the fact, that produced charcoal is not used by the household itself, but sold, usually in the capital Yangon where the price is up to three times higher than in the villages.

表 5.8 村庄生产和采购木炭百分比

Table 5.8 Production and purchase of charcoal by village in percent

Village	Produce charcoal	Purchase charcoal
Pyaungthe	0.00%	0.47%
Myezi	5.16%	0.00%

Some households have family members which have skills that can earn an additional income for the family. Most common skills are sewing, brick making and carpenter (Figure 5.4). Some of the skills are not evenly scattered over the villages. Of the 5 households that have a brick maker live in Pyaungthe and the other one in Myezi. People who work in the forest companies do the operation like planting or guarding. Although possessing a skill favor the household alternative income, some of the skills are depending on natural resources, mainly from the forest.

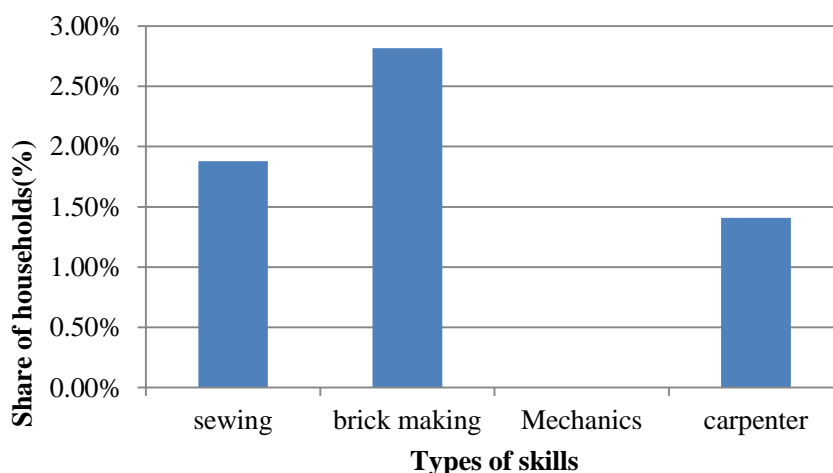


图 5.4 拥有技能的家庭的份额

Fig 5.4 Share of households which possess skills by type of skills



*Formal employment*

Some people in the villages have a formal job and get a regular salary. Formal employment includes the engagement in a forest company as well as jobs like teachers or police officers. Piece work or independent jobs, like house construction, are not counted here, but considered in other categories. Overall 7.98% of all respondents have a member in their household with formal employment (Table 5.9). Currently 5.16% have members employed in a forest company, 87 households have members who work for a forest company previously (Table 5.9). Comparing the share of people who are currently employed in a forest company to the share of people who used to be employed previously, it becomes evident that the figures for previous employment are higher in all plantation villages. The greatest difference between current and former employment can be found in Myezi where previously about 54.22% of the households had a job in the forest company but in 2016, there is no households in Myezi were employed. The possible reason is that, in general, work on the plantations only requires a high workload in the initial phase when cleaning the area and actually planting the seedlings. Thus, when fewer work forces in the plantation were required. Many lost their employment after a few years. Overall, in the villages with a forest plantation, 64.32% of the respondents believe that the introduction of forest plantations has improved the employment situation for their community (Figure 5.5). The highest rate of positively perceived impact was found in Myezi with almost 86.75% and the lowest in Pyaunthe where only every second out of three respondents reported positive impacts on employment. Unlike in the case of natural resources the positive impact on employment is more easily accountable, since the created job opportunities would not have been there without the forest companies.

表 5.9 村庄就业情况

Table 5.9 Employment situation in the villages

<b>Village</b>	<b>Formal employment (in %)</b>	<b>Employment in a forest company (in %)</b>	<b>Previous employment in a forest company (in %)</b>
Pyaunthe	9.23%	8.46%	32.31%
Myezi	6.02%	0.00%	54.22%
<b>Total</b>	<b>7.98%</b>	<b>5.16%</b>	<b>40.85%</b>

*Trading and business activities* comprise an important form of livelihood strategies, because they enable a household to be self-employed and in some cases be less dependent on their farming activities. However, the main trading activity in the villages is selling of harvested crops, the selling of crops is not included at this point because most households only sell crops if they have produced a surplus. In the context of this study the trading and business activities consider the trades of common goods like for example soap, clothing or salt and additionally business activity like the ownership of a rice mill or doing piece work.

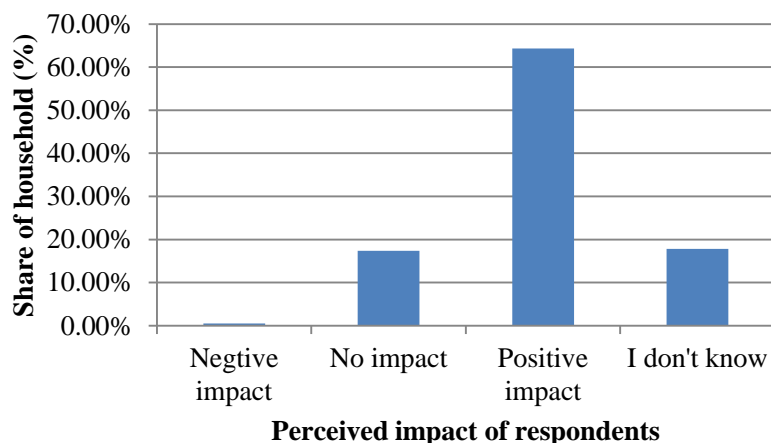


图 5.5 对种植园附近村庄的就业情况的影响

Figure 5.5 Perceived impact on the employment situation in the villages close to a plantation

Overall 12.21% of the respondents reported that their households are engaged in some kind of business activity (Table 5.9). A comparison of villages regarding the share of people engaged in business activities (Table 5.10) showed that there is less business activity in the Pyaungthe village. Households that have members employed in the forest company purchased more farm goods and other products like soap and clothing Overall the respondents from the villages close to a forest plantation perceived positive impacts on the trading possibilities by the forest plantations (Table 5.11). According to the perceived impacts, households in Myezi village have benefited more than households in the Pyaungthe village from improved trading possibilities.

表 5.10 农村从事商业活动或贸易活动的户数比例

Table 5.10 Share of households engaged in business or trading activities by village

Village	Engaged in Business activities
Pyaungthe	10.00%
Myezi	15.66%
<b>Total</b>	<b>12.21%</b>

表 5.11 对交易和市场可能性的影响

Table 5.11 Perceived impact on trading and market possibilities

Village	Negative impact	No impact	Positive impact	I don't know
Pyaungthe	5.38%	47.69%	22.31%	24.62%
Myezi	6.02%	26.51%	48.19%	19.28%
<b>Total</b>	<b>5.63%</b>	<b>39.44%</b>	<b>32.39%</b>	<b>22.54%</b>

The wealth model demonstrates which livelihood strategies account households to belong to the highest wealth group and not to a lower wealth group. The emphasis is here on the predictors related to livelihood strategies impacted by forest plantations. The result of the multinomial logistic regression analysis is presented in Table 5.12. 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

表 5.12 以最高财富组为参考类别确定的群体成员资格因素的逻辑回归模型

Table 5.12 Logistic regression model on factors determining membership to the highest wealth group with the highest wealth group as the reference category

			[95% C.I. for Exp(B)]				
			<i>B</i>	<i>Sig.</i>	<i>Exp (B)</i>	<i>Lower</i>	<i>Upper</i>
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	

$N=213$ ;  $-2\text{Log-likelihood}=-86.241$ ;  $\text{McFadden} = 0.195$ ; highest wealth group is reference.

companies for at least three years. According to the study many of the households with long-term employment will be 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.

#### 5.4 Perceived overall impact on households livelihood and impact of wealth

For the assessment of hypothesis (3), if the introduction of forest plantations is perceived more negatively by poorer households and more positively by wealthier households, a logistic regression on the perceived overall impact on the households' livelihood was carried out. The main emphasis of the analysis is on the differences in the perception between different wealth groups. Furthermore, the results of the analysis of impact on natural resources were integrated to answer the hypothesis. With negative impacts on natural resources, the main reasons for reporting negative impacts on the overall livelihood of households are straightforward. Apart from the increased opportunities in the livelihood strategies, other positive impacts were not an issue of this study, however, Table 5.13 presents further reasons for people to report positive impacts. Especially impacts on infrastructure have been perceived positive by the respondents. In some places companies have improved roads and bridges, because they had to prepare them for their machines and cars.

表 5.13 对种植园对基础设施影响的看法

Table.5.13 Perceptions on the impacts of plantations on infrastructure (% of respondents), N=213

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

Overall over one third of the respondents perceived a positive impact on education by the forest plantations, while 5% of households didn't report any impact on education (Table 5.13). Overall about 29.58% of the respondents experienced a negative effect on their household, while about 8.45% reported either no or positive impacts of forestry investment (Figure 5.6). For the logistic regression analysis a multinomial model was built with negative impact being the reference category, to identify the factors for negative experienced impacts on the household. The results of this analysis are presented in Table (5.14). As the main target was the testing whether there are differences in the perception in the wealth groups, the model was tested with the variable for the wealth categories,

but no significant main-effect on the dependent variable was found. No impact was reported more often in the highest wealth group, while the positive impact was reported more often in the middle wealth group (Figure 5.7). This indicates that the wealth group is not the major factor, but that reported impacts depend on other factors closely connected to the wealth groups. Hence, the model is considered under the aspect of wealth as an indirect factor on the perceived impacts.

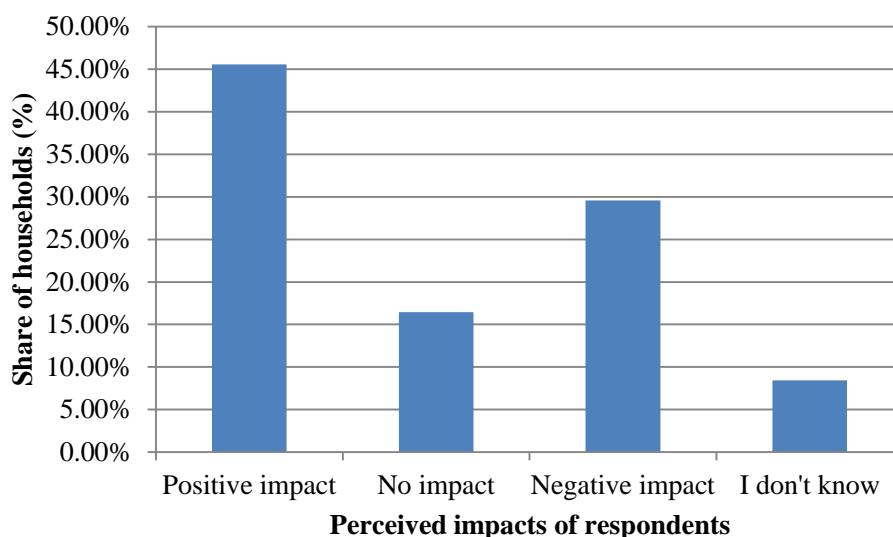


图 5.6 人工林对农民生活的整体影响

Figure 5.6 Perceived overall impact of forest plantations on the livelihood in villages close to plantation

According to the results of this analysis, forest company employment positively affects the perception of the households (Table 5.13). Households with at least one member employed in a forest plantation have 3.8 times higher odds to report positive rather than negative impacts on the overall livelihood. All the households in the highest wealth group and somebody employed in a forest company answered a positive impact on their livelihood. Due to the quasi-complete separation no interaction effect of wealth status and employment can be introduced to the model. The higher wealth status is not the basic fact for those households to report more positive impacts, but their households have got benefit from forest plantation companies because of the formal employment and increase its wealth. Thus, wealthier households report more positive impacts if they have personally benefitted or even increased their wealth due to the forest investments.

A dummy variable for the poorest wealth group with communication of female headed households is involved in the model. More than half of the female headed households perceived the impact of forest plantations on their household as negative. However, households which are led by a female are less likely to report negative impacts on their overall livelihood if they are not from the poorest wealth group. Female headed households from the poorest wealth group have increased odds to report negative

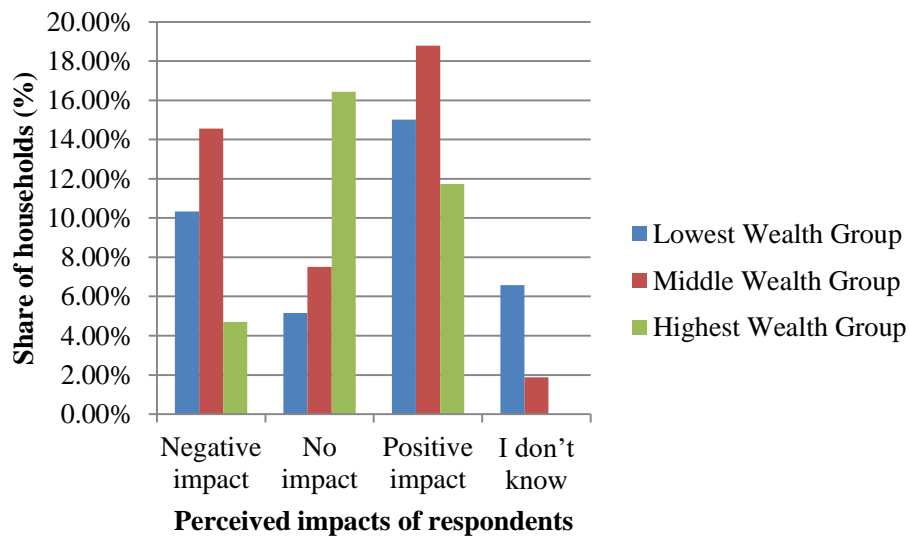


图 5.7 财富对家庭整体生活的影响

Figure 5.7 Perceived impact on overall livelihood on household by wealth groups

impacts over no impacts. This result demonstrates that the wealth of a household has an indirect impact on the experienced overall impact of forest plantations for specific groups. 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.

The same in previous analysis, the perception of the households of the impacts of forest plantations on their livelihood differs between the villages. Households in

5 RESULTS

表 5.14 对家庭生活和总体福祉认知影响的多项 Logistic 回归模型，负面报告影响作为参考类别  
 Table 5.14 Multinomial logistic regression model for the perceived impact on household's livelihood and overall well-being, with negative reported impact as the reference category

		<i>B</i>	<i>Sig.</i>	<i>Exp (B)</i>	<b>[95% C.I. for Exp(B)]</b>	
					<b>Lower</b>	<b>Upper</b>
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
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.

Pyangthe have a more negative perception of forest plantations than households from the Myezi. Three out of four respondents from the village have reported a negative overall impact (Table 5.15). The wealth status of a household had not affected the perception of impacts on any of the natural resources in the analysis of impacts on natural resources. It may be that it was assumed that poorer households depend more heavily on natural resources. Although differences between wealth groups can be classified, households from all wealth groups still lean on natural resources

The analysis does not approve the hypothesis that there are differences in the perception of different wealth groups. Other factors have been classified more

表 5.15 村民对民生的总体影响

Table 5.15 Perceived overall impact on households' livelihood by village

<b>Villages</b>	<b>Negative impact</b>	<b>No impact</b>	<b>Positive impact</b>	<b>I don't know</b>
Pyaungthe	28.17%	12.68%	11.74%	8.45%
Myezi	1.41%	3.76%	33.80%	0.00%
<b>Total</b>	<b>29.58%</b>	<b>16.43%</b>	<b>45.54%</b>	<b>8.45%</b>

important for the reporting of positive or negative impacts on the household. At rest, in relation with two of those predictors, an indirect correlation between different wealth groups and the perception of impacts of the households can be seemed. It seems that households that have directly got benefit from the forest company via employment and have been able to reach a higher wealth status are more assuring to report positive impacts. On the other hand, female headed households that are in the poorest group address more negative impacts. Thus, it cannot be concluded that the wealth of a household explains the perception of impacts of forest plantations. Alternatively, certain groups in those wealth categories demonstrate a common perception of the impacts of forest plantations on their livelihood

## 5.5 Differences between villages as main factor

The analysis identified the villages of the respondents or the context of the villages as a main factor for differences in responses and perception of impacts. Firstly, the basic characteristics of the villages and their resource endowment are a reason for the differences in responses between the villages. Secondly, all two villages have plantations from a different company and the circumstances of establishment vary between the companies.

The primary endowment of natural capitals differs between the villages. The population growth marked up the requirement of communities for goods from the forest, land for food production. Some villages had difficulties to collect firewood from before the forest investments and reported reducing natural forest cover over past few years. In those villages the introduction of forest plantations has complicated situation for the households. In general, the employment situation has improved in all villages because there were not many opportunities for formal employment in villages beforehand.

## 5.6 Summary of the Results

The analysis of results presented in this chapter gave an insight how households have perceived impacts on their livelihood caused by the establishment of forest plantations. Households have perceived the impacts on natural capital negatively, which was caused mainly by reduced availability and access to land and forest. Although forest investments have contributed to the livelihood diversification of households in the area, the



benefits have been got only by individual families. Forest employment and increased business activities contribute important alternatives to traditional natural resource based livelihood strategies. The family which has members with employment in the companies had a significantly more positive perception of the forest plantations.

While families with employment increase their wealth status and standard of living, female headed households from the poorest wealth group have not get benefit particularly from the forest investment. The results shows that wealth do not play a major role in the perception of forest plantations because all families depend highly on the forest resources.

In general, about two third of the respondents reported either no or positive impact on their livelihoods from the forest plantations. Increased employment and improved infrastructure has been specified positively during the interviews. However, differences between villages have been classified as major factor for differing perception of impacts. Households from villages with higher primary endowment of natural capital adapted more easily to the new circumstances and reported less negative impacts.

## **6 DISCUSSIONS**

The aim of this study was to analyze how local households perceive the impacts of forest plantations on different livelihood aspects. Better understanding of impacts and how they are experienced by locals could support the relationship between forestry investors and local communities. According to the primary hypothesis, households faced negative impacts of private forest plantations on their availability of farm land, firewood and non-timber-forest products. While forest companies have increased the livelihood strategy alternatives by providing formal employment and affecting positively the business activities in the villages, which is in accordance with the second hypothesis of this study. The impacts on forest resources and the livelihood diversification influence the overall livelihood of a household. The results of the overall perception of impacts of private forest plantations on the livelihood can be examine as an valuation how the declining natural resources has been set by increased livelihood diversification. As an overview, most of households faced either no or positive impacts. Concerning the third hypothesis, the results of the logistic regression analysis didn't show a significant effect of the wealth status on the perception of impacts; hence other factors determine which households benefit from the establishment of forest plantation and which not. It cannot be concluded that wealthier households report more positive impacts while poorer households report more negative impacts. Besides, there may exist another group (subgroups) within the wealth classes, which report impacts in the same way.

### **6.1 Discussion on the impacts of forest plantations on natural resources**

The analysis of the perception of impacts on various natural resources showed that many households have perceived impacts on land and natural forest negatively. Households expressed fear of incapability to sustain their livelihood if not sufficient farm land can be found and forest cover continues to decline. However, the fact that a majority reported negative impacts especially on farm land and forest resources, does not alone proof that the establishment of forest plantations has actually negatively impacted on those resources. Additional information from focus group meetings have revealed that growing population and applied agricultural practices in the area cause increasing scarce of resources. It is obvious that the introduction of forest plantations is one of the causes for reduced natural resources. However, Gerber (2011) showed in his study that communities in many countries have faced increasing deforestation caused by plantations beside other conflicts. Thus, it is supposed that for some villages in the study area the forest plantations have amplified the continuous decline of the forest cover, which complicates the collection of forest products for households.

Similar to the study by Obidzinski et al. (2012), land users under customary traditions dependent on farming are negatively affected and households have to walk longer distances to open new farm plots. Moreover, it was seen that the rates of households which had to leave off their farm land varied between the villages, but it is different in the case in Indonesia (Obidzinski et al. 2012), with few exceptions, individual households didn't receive compensation, but companies promised compensation on the community level. It is the same in the case of Indonesia (Obidzinski et al. 2012) where the communities with more experience with forest companies were able to negotiate more benefits, future encounters of companies and communities in the region might lead to fewer negative impacts on livelihoods. Communities in the region have gained more experience with forest companies and have received information from neighboring communities, thus might be more cautious in negotiations with the companies. On the other hand this seems to complicate the land acquisition process for the forest companies, which have troubles allocating sufficient land for their plantations.

## **6.2 Discussion on the impacts of forest plantations on livelihood strategies**

The analysis of impact of livelihood strategies on the wealth status of a household showed that households with a more diversified portfolio of livelihood strategies are more likely to be in the highest wealth group. This goes in line with a study by Ellis (1998), who explained that increased diversification of the livelihood portfolio help the household to improve the standard of living and make it less vulnerable. However, in literature of (Tyynel äet al. 2002, Charnley 2005) showed private forest investments are labor intensive in the initial phase of the project, but when the trees are planted, many employees become extravagant. The features of a private forest investment make the forest company fewer opportunities to provide long-term employment for a large population.

Moreover, as pointed out by Charnley (2005) in most cases, forest industry is not established in rural areas where forest investments have introduced plantations showing positive effects of investments on a low level. However, expanded forest industry would cause negative impacts on natural resources like pointed out by Evens and Turnbull (2004), therefore the net social benefit may not be sure. The variousness of livelihood strategies could be obvious as one possible answer to upgrade the abilities of the households. Ellis (1998) even stated that already simply the capability to adapt new strategies is a major improvement to a household's livelihood and livelihood security. The establishment of private forest plantations contributes little expansion of livelihood. Employees that were give up after a short period were not able to make significant difference in their livelihood and were in a similar situation than before the employment. Only long-term employment makes an effect upon wealth as well as on positive perception of the private forest investments. Similar observations were made in the study of Schoneveld et al. (2011).

Although many of the studies on the impacts of private forest plantations showed positive impacts on the economic development for the local communities, cash flow and business activities are not classified. In some of the communities, the observed effect on business activities is small because the forest companies are the only option for formal employment. Whenever the case, trading activities with common goods are a form of self-employment that makes the household less dependent of natural resources.

### **6.3 Discussion on the overall impact on livelihood and impact of wealth**

The analysis of the perceived overall impact of forest plantations assessed whether there are differences in the perception between different wealth groups. The results of the different regression models showed that the wealth status of a household is not a primary factor in its perception of impacts. Households from all wealth groups reported negative impacts on natural resources. In the study by Tyynelä et al. (2002) it was disagreed that wealthier households had better opportunities to deal with negative impacts and were less vulnerable due to higher income from off farm work, better access to education and health care. But, the results of this study show no significant changes in the impacts on natural resources among wealth groups. This is because the social disparity inside the communities is small and all wealth groups depend on natural resources. All households collect various kinds of non-timber forest products.

In the context of improved livelihood variuousness, the improved access to education enabled wealthier households to gain important skills increasing their chances for employment in Tyynelä et al. (2002). In this study, household has overall benefitted from the forest plantations is highest in the wealthiest group. Furthermore, families with employment in the forest companies report more positive impact and many families were able to access amenities, improving their livelihood and wealth status. It could be assumed that the wealth status of a household did not play an important role in the employment acquisition because households with former employees come from all wealth groups. The same can be noticed between the education and employment was found.

In considering the overall benefits for the household, it showed that similar to the case of Zanzibar expressed by Sitari (2005) only individual households were able to benefit visibly from the forestry investments. Households with employment in the company were able to get benefits from it, like described in the study by Charnley (2005). The same in the case of biofuel plantations in Ghana, households with employment were able improve their capabilities to sustain their food supply and to improve their livelihood (Schoneveld et al. 2011).

Female headed households seem to have been benefitted less from the forest plantations than others. Moreover, there is a few of the female headed households with forest company employment. Increased cash flow, special incentives to support

those households could have been implemented because for those households it is more difficult to benefit from employment opportunities. The villages vary in their characteristics, as well as, how companies have approached the village and engaged the village in the process of establishing the forest plantations. Negative experiences by some of the households in a village cause the bad the image to the forest company in the whole village. There are two essential points that we noticed are the importance of the village characteristics and the relationship of the company and the community. First, the results of a case study like this depend on the selection of villages to a great extent, the outcome of the study could be far more negative if we choose place with low initial natural resource endowment and establish forest plantations. Secondly, the results show that substantial knowledge about the village is important for potential investors. Negative impacts on natural capital for households would be reduced if forest companies are aware of resource scarce and take those into account during the implementation of forest plantations.

Most of the results of this study are in accordance with findings in previous literature and reported impacts in other studies. Because of forestry investments, negative problems are generally related to a scarce of forest resources, limited access and control for local communities. On the other side, alternative employment and community development create positive impacts.

#### **6.4 Evaluation of methods and materials**

The SLA provided a complex framework for analysis and a detailed clarification of all its parts will go far beyond the scope of this study. But, the approach let on an understanding of the relationships between livelihood resources and strategies and how the introduction of forest plantations affects these. Furthermore, the framework provides potential topics related to this study, to classify the role of the government and other institutions, other livelihood capitals or other livelihood strategy options. Baseline data seem to be desirable for the task of comparing the situation in the villages before and a few years after establishment of private forest plantations. Moreover, this study answers the objectives and research questions with the collected data and provides information how households faced the establishment of private forest plantations near their community.

The structure of the questionnaire might have biased the responses because respondents might tend to respond in the same way to similar questions following each other. For example the questions on the impact on firewood availability and availability of NTFP were directly successive. The local proximity of the two questions in the questionnaire might be influenced the results for non-timber forest products. The respondents had reported negative impact on firewood and it might be biased with their answer. On the other side, these two resources are closely connected. The samples show a good gender balance of respondents and also include households from different groups. Also the sample represents the population in the studied villages well. Generalizations

of the results and application to other villages or regions should be made with much caution, because the results are closely connected to the individual situation in the study sides. Still, the recommendation to take village characteristics into account and prevention of increasing resource scarce are universal in the context of developing countries and rural livelihoods.

In order to get a better insight into alternative livelihood strategies, it would have been interesting to collect more information on the business and trading activities of households and the increased cash flow in the villages. But since this indirect effect of forest plantations was mentioned only marginally in previous literature, the collected data on this is only of general nature. The construction of the logistic regression models was challenging in terms of finding underlying causes for the differences between the villages. Because of the dominant effect of the villages on the perception of the households. An analysis with designated sub populations might have provided better results, but since the sample is rather small, the goodness of such analysis is questionable. Additional interaction effects and more complex models could provide a deeper insight into the reasons for the household's perception and thus are possible targets for further research on this data set.

Principle component analysis was used in this study to determine wealth groups. It can also be used other statistical methods or data could have been collected already utilizing a participatory wealth ranking. Due to the limitations of this study, during the data collection process and the higher relevance of other issues like the impacts on natural resources, the principle component analysis was more applicable and provided sufficient results for the purpose of this study.

## 7 CONCLUSIONS AND RECOMMENDATIONS

The conclusions of this study are as follows. Firstly, negative perceived impacts concern mostly reduced access and availability to farm land and natural forest. It became evident that all households depend on natural capital, thus the fact that the introduction of forest plantations has increased the scarce of resources in the area is a serious problem in the area. However, growing population and agricultural practices have also contributed to the decrease in available farm land and forest resources and are not only due to forest investments.

The private forest investments secondly have positively afflicted the diversity of livelihood strategies of the local households. The villages with a forest plantation near their village had an increased employment rate because of the additional option to work for the plantation. Moreover, households which are engaged in trading activities enabled the increased cash flow to increase their trading.

Thirdly, the wealth status of a household is not an important factor influencing the perception of impacts of private forest plantations. On the other hand, while female headed households in the poorest wealth group experience negative impacts, households who benefit directly report positive impacts.

On fourth, the results of this study pointed out that the perception of impacts of private forest plantations can be vary village specific facts and depend on several factors linked to the characteristics of the village and experiences with the forest company. That is why; establishing forest plantations near villages with higher primary natural forest resources might cause fewer conflicts on land use rights and firewood availability.

The objective of this study was to classify positive and negative impacts of forest plantations so that reduced potential conflicts and improved the symbiosis between communities and forest companies. Thus, the results of this study are of interest for forest companies with active investments or investment plans in the region of Pyu Township as well as in other regions with similar context.

In overall, for forest companies, it is recommended that to preserve natural resources and enhance livelihood strategy diversification to ensure sustainable livelihoods. For investors and companies, it became obvious in this study, that negative perceptions from the villagers are mainly based on negative impacts on natural resources. As mentioned by Siteo (2009) the main reason of conflict are irregularities in the community consultation process, hence the consultation and the included participatory mapping should be carried out with care in future land acquisition processes. Moreover, companies should try to avoid areas which are important for the collection of firewood and NTFP. So, it need to do that if natural capital is reduced, companies offer alternative sources, for example compartments of fast growing tree species for firewood collection. Moreover,

improved agricultural practices by means of training could be attempted to the communities to reduce using shifting cultivation on land availability due to infertile soil. Although the improved employment situation is already a positive impact on the communities, companies should use local labor force as much as possible. Furthermore, villagers who work in forest company could be offered support in education and attainment of additional skills, which would provide them with increased job chances afterwards in case of job loss. Conflicts have always included at least two parties; communities can afford to the reduction of conflicts and increase the collaboration with the companies. Villages have answered that they allow forestry investments because it bring development for their region, especially employment opportunities. All households in a village should participate in community consultations and important sources for forest products should be pointed out in order to ease the process for investments to avoid decisions made only by local chiefs or a minority of the village. Furthermore, villagers should reconsider their agricultural practices like shifting cultivation as well as slash and burn culture; these practices are promoting the scarce of natural forest.

The Myanmar government was not a major part in the context of this study; nevertheless, it holds great responsibility and possibilities to improve the process of private forest investments for its objective to promote development in the study area. This puts the locals into a weak position in the consultation process and negotiations with investors over land. From the point of view of the government it is recommended to increase the awareness of their rights in the area.

In accordance with this, in future research the role of property and land use rights could be identified and linked with the results of this study because many conflicts are caused by the ill-definition of rights. Moreover, future research could take measure long term impacts and consider alternative livelihood strategies. Different impacts between different groups in the communities could be identified with a household social survey focusing on the household structures. This may make companies to avoid impacting the poorest groups in the community negatively, but offer specific support. In this study has shown that private forestry investments in developing countries have significant changes to local livelihoods.



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## APPENDICES

### Appendix I: Independent variables used in the logistic regression models

Variable name	Explanation	Code
Household sells crops	Household sells part of its harvested crops	0=no; 1=yes
Household had to relocate farm plot	Individual Household had to relocate farm land	0=no; 1= yes
Household lives in village with high relocation rate	Village context relocation/ Village with high share of relocation of farm land	0=low relocation rate in the village; 1=high relocation rate in the village
Number of household members	Total number of members in the Household	
Household owns livestock	Household owns at least one kind of livestock	0=no; 1= yes
Male respondent	Male respondent was present (in case male and female were present, also considered here as male)	0= only female respondent; 1=male respondent
Number of collected NTFP	Number of different NTFP that the household collects	
Pyauung Thay	Household lives in the village Pyauung Thay	0=no; 1= yes
Myay Zee	Household lives in the village Myay Zee	0=no; 1= yes
Household member has been sick	At least one household member has been sick during the past year	0=no; 1= yes
Household collects medical plants	Household collects medical plants from the forest	0=no; 1= yes
Number of livestock	Number of different kind of livestock that the household possesses	
Number of livestock for sale	Number of different kind of livestock that the household keeps for trade	
Education	Household has over average education	0=no; 1= yes
Forest company employment	At least one household member is employed in the forest company	0=no; 1= yes
Business activities	Household has business or trading activities	0=no; 1= yes
Number of men	Number of men in the household	
Head of household	Gender of the head of the household	0=male; 1=female

## Appendix II: Questionnaire of household survey (plantation villages)

Household survey - Questionnaire

Survey number: \_\_\_\_\_

Date of survey: \_\_\_\_\_

Village: \_\_\_\_\_

Respondent:  male  female

\*\*\*\*\*only for  
researcher\*\*\*\*\*

Observations: House characteristics:

Main Material of the house:  timber  fire brick

Main Material of the roof:  grass (thatched)  tin roof

Windows:  no windows  bamboo  timber

Electricity:  Yes  No

Other remarks: \_\_\_\_\_

\*\*\*\*\*

### A. HOUSEHOLD CHARACTERISTICS

1. Are you the head of the household?  Yes  No

2. How many women (including you), older than 18, are living in your household?

Women: \_\_\_\_\_

3. How many men, older than 18, are living in your household? Men: \_\_\_\_\_

4. How many children younger than 18 years live in your household?

Number of children \_\_\_\_\_

6. Is there any member that is currently absent because of work or studies from the household and living somewhere else?  Yes, because of  work  studies  No

7. Were you born in this area?  Yes  No -> How many years have you lived here?

\_\_\_\_\_

8. Are you aware of any forest plantations near your community?

Yes -> do you know from which company?  No

Manawphyu  Win & Win

Other \_\_\_\_\_

9. Did you know about the plantation projects before the first trees were planted?

Yes about all  only about some, those were: \_\_\_\_\_  No

10. Who first told you about the plantations projects?

- Relatives/ neighbors /friends  local chief  somebody from the government  
 Company  other NGOs (which) \_\_\_\_\_

**B. LIVELIHOOD STRATEGIES**

1. Are you ..... (activity)? Are men, women or children responsible for this activity? Can these activities be carried out during wet and dry season?

Activity	check the ones that apply	Men	Women	Children	Season W/D/B
Farming					
Plantation Company Worker					
Small scale trading					
Service Provider (transportation, entertainment, etc.)					
Charcoal production					
NTFP Collection					
Odd job or casual labor					
Government employee					
Other_____					

2. Do you have livestock? What kind?

- Chicken  Ducks  Goats\_\_\_\_\_  Cattle\_\_\_\_\_  Others \_\_\_\_\_  None

3. Which of this livestock is creating an income for your household?

- Chicken  Ducks  Goats\_\_\_\_\_  Cattle\_\_\_\_\_  Others \_\_\_\_\_  None

4. Does any member of the household have an employment?

- Yes: What kind of work? \_\_\_\_\_ Where? \_\_\_\_\_  No

5. Do members of your Household possess other skills that generate an income for the household?

- Wood carving  Sewing  Brick making  Mechanics  Carpenters  
 Other\_\_\_\_\_

6. Are members of the Household currently employed in a plantation project?

Yes -> how many? \_\_\_\_  No (-> go to 5.))

If yes: a. what kind of job is they doing in the company

Plantation  Administration  Guard  other\_\_\_\_\_

b. Are you satisfied with the salary?  Yes  No

c. What is the longest period that one of the members has been employed in the plantation?

Less than 6 months  6-12 months  1-3 years  more than 3 years

d. Which goods have you acquired since members started to work in the plantation project?

Built a house  Repairs on the house  Bike  Motorcycle

other\_\_\_\_\_

7. Has any member of the household been previously employed in a plantation project?

Yes  No (> go to 5.)

a) For how long?

Less than 6 months  6-12 months  1-3 years  more than 3 years

b) Why did the employment stop?

Salary not high enough  Conflict with employer  Retirement

Labor needed  I didn't like it  Temporary contract  I don't know

Other\_\_\_\_\_

### C. RESOURCES AND ASSETS

1. Which are the 3 most important plants or crops that you cultivate for domestic use? Give also the order if possible.

Rice  Maize  Beans  Soy  Other\_\_\_\_\_

2. Which are the 3 most important crops that you cultivate for trade? Give also the order if possible.

Rice  Maize  Beans  Soy  Other\_\_\_\_\_



APPENDIX

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3. Describe your farm land. How big is it? How is the quality of the soil, how many hours does it take to get there? How long have you been using this plot? Is it close to a plantation? How many are currently cultivated, how many are resting?

Agriculture lands (main type of crop)	SIZE 1: Big; 2: medium; 3: small;	How many bag of your main crop does this plot produce per harvest?	How many hours does it take you to get there?	For how many years have you been using this plot?	Is this plot close to a plantation? No: 0/ Yes:1	Water source
Plot 1						
Plot 2						
Plot 3						

4. How did you acquire these plots?

- Inherited  
  purchased  
  occupied new land  
  was ceded, by whom? \_\_\_\_\_  
 Other

5. Has your Household been relocated or had to give up farm land, because of a plantation project?

- Yes  
  relocated  
  gave up farm land  
  No (go to 7.)

a. If yes, did you get compensation for the relocation or the land you gave up?

- Yes:  
  Monetary  
  new land  
  other \_\_\_\_\_  
  No

i. How did you deal with the situation?  search new farm land on its own

Share with family or friends

other \_\_\_\_\_

b. If you acquired new land (through compensation or other), how is the land compared to the land you had to give up in terms of:

Distance:  
  closer  
  same distance  
  further away

Size:  
  bigger  
  same size  
  smaller

Productivity:  
  better productivity  
  same quality  
  decreased productivity

6. Have the plantations affected the availability of farm land for your household?

Increased or decreased?  Yes, increased  Yes, decreased  No  I don't know

7. Do you have enough farm land to provide food for the household for the whole year? "

Yes  No

- For how many months is there usually a shortage?

\_\_\_\_\_months

- How do you sustain your food supply in those months?

Buy food	
Borrow food	
Gather food from forests	
Trade assets against food	
Hunt or Fish	
Other_____	

8. What source of water do you use for farming?

River/ lake  rainwater  well  borehole  other\_\_\_\_\_

9. Which is your most important source of fresh water for domestic use during the wet

season?  River/ stream  well  spring  Borehole

Rainwater  piped water  Other\_\_\_\_\_

10. Is this also your most important water source during the dry season?

Yes  No -> which is it then?

River/ stream  well  spring  Borehole  Rainwater

Piped water  Other\_\_\_\_\_

11. Do you think the forest plantations have affected the cleanness of the fresh water?

How?

Yes, improved  yes, degraded  No  I don't know

12. What do you use for cooking?

Firewood  charcoal  something else\_\_\_\_\_

13. Where do you get the firewood from?

Collect in natural forest  collect in plantation area  Purchase on market

Other\_\_\_\_\_

14. Where do you get the charcoal from?

- Produce ourselves  Purchase  Other \_\_\_\_\_

15. Have the forest plantations changed the availability of firewood?

- Yes improved  yes decreased  No  I don't know

-> Why

-> Why?

- Collection from plantation areas  longer distances to the forest  
 Improved roads/Bridge  reduced natural forest area  
 Other \_\_\_\_\_  Other \_\_\_\_\_

If it has been decreased: How do you cope with that?

- Use charcoal  use gas  use electricity  
 Purchase firewood  Other \_\_\_\_\_

16. If you have trees on your land, for what purpose(s)?

- Food (Fruits)  medical  Firewood  Other \_\_\_\_\_  we don't grow trees

trees

17. Which non-timber forest products do you collect?

- Wild fruits  Honey  Medical plants  Bamboo  Ropes  Grass for roof  
 Other \_\_\_\_\_  None

18. Have the forest plantations affected your access to non-wood forest products?

- Yes improved  yes decreased  No  I don't know

Why/how

why?

- Collection from plantation areas  longer distances to the forest  
 Improved roads or bridge  reduced natural forest area  
 Other \_\_\_\_\_

19. Do you own any other assets that are important for your livelihood?

- Hoe  Axe  Bike  Motorbike  Television  Mobile phone  
 Other 1 \_\_\_\_\_  Other 2 \_\_\_\_\_

20. During the past 12 months have you received any support or assistance from the outside your household? Have you received.....? from whom?

	Check the ones that apply	From whom? 0:Government; 1:NGO; 2:Plantation company; 3:friends/relatives; 4:other (please specify)
Financial support		
Natural resources (firewood, food, ...)		
training / education		
Farm supplies (seeds, fertilizers, tools)		
Medical assistance		
other support		

21. Does your household save money or participates in a Group saving and Credit Scheme

- |   |  |
|---|--|
| <input type="checkbox"/> Yes, how?                      | <input type="checkbox"/> No, why not?          |
| <input type="checkbox"/> Group saving and credit scheme | <input type="checkbox"/> not enough money      |
| <input type="checkbox"/> At a bank account              | <input type="checkbox"/> No facility available |
| <input type="checkbox"/> Other _____                    | <input type="checkbox"/> don't want to         |
|   | <input type="checkbox"/> Other reason_____     |

22. Has your household ever borrowed money?

- |   |  |
|---|--|
| <input type="checkbox"/> Yes, where from?               | <input type="checkbox"/> No, why not           |
| <input type="checkbox"/> Bank institution               | <input type="checkbox"/> No collateral         |
| <input type="checkbox"/> Group saving and credit scheme | <input type="checkbox"/> we don't want to      |
| <input type="checkbox"/> Family or friends              | <input type="checkbox"/> Process too difficult |
| <input type="checkbox"/> Other _____                    | <input type="checkbox"/> other _____           |

a. If yes, why did you borrow the money?

- |   |  |  |
|---|--|--|
| <input type="checkbox"/> To purchase food         | <input type="checkbox"/> to purchase seeds | <input type="checkbox"/> construction or reparation work |
| <input type="checkbox"/> To purchase asset: _____ |  | <input type="checkbox"/> other _____                     |

APPENDIX

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23. Have any of your Household members been sick during the past year so that he could not contribute to the livelihood activities?  Yes  No

If yes:

a. Did this illness decrease your income significantly? ..

Significantly       only little       not at all

b. Was a treatment applied to cure?

Use health care facilities     Traditional treatments     Other\_\_\_\_\_

No, not needed                       No, not enough money     Not possible

24. Do some or all of the children in your household attend a school? If not, check all the reasons that apply.

Yes all:                       Yes some of them,                       No, why not /why not all?

Not enough money  health reasons

religious reasons  gender reasons

Labor is needed                       don't want

School too far away  Other\_\_\_\_\_

25. How many of the household members have ..... level of education?

Education Level	Number of HH-members
Primary	
Secondary	
Higher Education	
None	
Other	

26. Have you observed the following impacts on the community caused by the forest plantation projects?

Impact	If Yes →* (0/1/2/3)	Explanation
Employment situation		
Condition of roads or bridges		
Number of Health care facilities		
Number of Educational facilities		
Number of shops/markets		
Changed prices for food		
Changed prices for firewood		
Others_____		

\* 0: no impacts /1: negative impact /2: positive impact /3: I don't know

27. Do you think the forest plantations have changed the traditions of the community? How do you think they have changed.....

Impacts	*(0/1/2/3)	How? additional information if given
Traditional land use/usage of other crops		
Religious customs		
Changes in labor division		
Family structure		
Other_____		

\* 0: no changes /1: negative changes /2: positive changes /3: I don't know

28. Do you feel that your household has been in general benefited from the forest plantations?

Strongly disagree  rather disagree  no effects  rather agree  strongly agree

Do you think the plantations will bring more changes to your community in the future?

How do you think the following things will change in the future?

What do you think will change?	*(0/1/2/3)
Water sources	
Land availability	
Infrastructure like Health care, Roads	
Community Traditions	
Others_____	

\* 0: no changes /1: negative changes /2: positive changes /3: I don't know

Do you know anything about more/other plantation projects that are planned close to your village or farm plots?  Yes  No

a. How do you think about that?

Positive  negative  I don't care  I don't know

29. Choose one of the following options that you would hope for your household to achieve in the future?

Enough good water  higher education  good health  food security

Bigger livestock  more farm land  formal employment  Nothing

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June 2015 to August 2015 Deputy Staff Officer, Dry Zone Greening  
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June 2013 to June 2015	Deputy Staff Officer, Dry Zone Greening Department, Tatkone Township, Nay Pyi Taw I am responsible for the establishment of forest plantation, for arresting the Desert like formation and for local supply ;protection of remaining natural forests; introducing and promotion of the utilization of wood fuel substitutes; and management and development of water resources
February 2012 to May 2013	Range Officer, Phyu Township, Taungoo District, Bago Region, Forest Department I am responsible for planning, monitoring and evaluation of forest plantation establishment, responsible for forest law enforcement control and supervision of forest products trade, responsible for the rehabilitation and conservation activities of natural forest.
July 2011 to January 2012 Duties and Responsibility	Range Officer, Sin Paung Wae Township, Thayet District, Magway Region,Forest Department I am responsible for the establishment of teak plantation, economic plantation.
16. Publications January ,2017	Assessment of Forest Resources Dependency for local livelihood around Protected Area: A Case Study in Popa Mountain Park, Central Myanmar
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He is a doctor, professor, doctoral tutor and the editorial board of Green Economics in the University of Oxford. He graduated his Ph.d degree in Forestry Economics and Management from Beijing Forestry University (BFU) in 1999. He finished his post-doctoral in Forest Economics from Korea University in 2000. He was visiting professor in Forest Economics of Taiwan University (2003) and also fulbright visiting professor in Forest Economics of School of Forestry and Environmental Studies from Yale University (2007-2008). In 2014-2015, he was a visiting professor in Giessen University, Germany. He is a member of Green Economics Institute of Oxford University, UK, affiliate professor, Colorado State University, USA, committee member of Chinese Environmental and Economic Society, China, Director of China's Ecological Economic Society, China and Secretary-general of the professional committee of forestry system Engineering of China, China.

His main research areas are forest resource accounting, evaluation of environmental resource value, regional economies. He had presided and participated in 19 provincial and ministerial level and international cooperation projects. He also received 5 outstanding achievements in science and technology awards at provincial and ministerial level in China, 3 international awards and 4 outstanding paper awards.



**DIRECTORY LISTING OF ACHIEVEMENTS**

1. Theint Theint Htun, Wen Yali, Aye Chan Ko Ko, 2017, Assessment of Forest Resources Dependency for local livelihood around Protected Area: A Case Study in Popa Mountain Park, Central Myanmar International Journal of Sciences, Volume 6-2017 (01) : 34-43. DOI: 10.18483/ijSci.1176
2. Aye Chan Ko Ko, Zhang Ying, Theint Theint Htun, 2017, Study on Socioeconomic Impacts of Private Forest Plantations on Local Livelihood in Pyu Township, Taungoo District, Bago Region, Myanmar, International Journal of Science, Volume 6-2017 (02): 43-54. DOI: 10.18483/ijSci.1193



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