The Impact of Community Forestry schemes on rural livelihoods

Evidence from Gunung Kidul regency, Java, Indonesia

Master thesis
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Executive Summary

Community Forestry (CF) has received much attention from academic scholars and policy-makers as a method to tackle the widespread forest degradation and related poverty issues in forest villages. Worldwide, Community Forestry, which is defined as a situation where communities intensively manage forest resources, still has to meet its high expectations. Enhanced knowledge on the effectiveness of CF-schemes is vital for improved policy and implementation of the CF-schemes. This research focuses on two different types of CF-schemes in Gunung Kidul regency on Java, Indonesia. These are Hutan Rakyat (HR), which is Privately Owned Forests (POF) and Hutan Kemasyarakatan (HKm), which is a state-led Community Forestry Managment (CFM). Hutan Rakyat is tree cultivation on private farmland. Trees are planted and managed by the farmer or community and harvested when the farmer is in need of money. In HKm-programs, farmers are involved in the state forest management for a period of 35 years. The profit-sharing arrangements of the produced wood are 60% for the farmer, and 40% for the state. In addition to this, HKm-members are allowed to grow crops in between the tree stands for their own needs. The first research aim is to further investigate the impact of CF-programs on rural livelihoods, including both CF-members and non-members. The second aim is to understand the threats and opportunities that lie ahead in reaching poverty alleviation through CF-schemes. Special attention is paid to the impact of community forestry programs on the food production in the research area.

To serve the first research aim, the Sustainable Livelihoods Framework (SLF) has been applied in the form of a comparative livelihood analysis. This model implies that human well-being can be measured by means of 5 forms of capital, namely human, social, natural, physical and financial capital. All these forms of capital are defined by a set of indicators, as explained in this research. The comparative livelihood analysis is applied to indicate the differences in capital between CF-members and non-members. Data gathering has been conducted in 4 villages by means of a household survey comprising 80 households; 4 Focus Group Discussions; and 5 interviews with key informants. The second research aim has been attained by conducting a literature study and through a set of 8 interviews with experts in forestry or agriculture related topics.

The results of the comparative livelihood analysis showed that non-members have less access to livelihood capital than members. This particularly counts for HR-members and non-members. The difference in access to land, which is an element of natural capital, is the main contributor. In fact, more access to land results in higher agricultural revenues and, through this, higher access to financial capital. In turn, the higher financial capital explains that members are better represented in secondary schooling, which is an element of human capital, and have better access to agricultural equipment, which partly determines physical capital. As for HKm- members and non-members, the difference in access to land is less distinct. For these reasons, no significant differences are found with respect to financial capital. The only remarkable difference between HKm-members and non-members refers to social capital, determined by the access to social networks. HKm-members are better represented in social organizations thanks to their involvement in HKm.

On the contrary, non-members concentrate their livelihoods more carefully on off-farm activities and hence generate higher income from it. Furthermore, it is found that although non-members have less access to most types of livelihood capitals, non-members are not disadvantaged by the CF-schemes. Rather, it is seen that CF-schemes have enhanced the livelihood capital of members and that this mere fact explains the difference between members and non-members. Due to the high level of mutual respect between members and non-members, it is concluded that the introduction of CF-schemes does not disturb the social cohesion within the villages.

So far, forest rehabilitation objectives are largely achieved. However, the potential of both CF-schemes in alleviating poverty is far from being reached. Hutan Rakyat has led to socio-economic development into a certain extent, however, not to the extent in which it has reached its potential. The main problem in HR is the practice of immature cutting of trees that is applied by the local farmers in order to meet financial needs. This practice deteriorates the growth process of the tree and results in the production of low-quality timber. Although the smallholders of Gunung Kidul regency have the potential to provide for large supply good quality teak to meet the needs of large scale certified timber industries, there is a lack of organization and financial means to realize this. Therefore, HR-farmers need a financial support to produce sustainable and good quality timber to gain higher market prices. Effective measures would be to create joint management of smallholders and wood certification schemes. Next to that, the principal reason for immature cutting is the need for financial means and the lack of alternatives to acquire an income. Therefore, HR-farmers need financial support from other stakeholders to overcome the depletion of tree stocks for financial needs.

With respect to HKm, it appears difficult to conclude whether the poverty alleviation objective will be obtained before the end of the program. First, there is evidence of HKm-programs affecting the local farming opportunities. Crop cultivation alternatives and other forms of livelihood support are necessary in order to compensate for those negative effects. Other challenges involved in reaching the poverty alleviation objective are first, to create more security in profit-sharing arrangements. Farmers are uncertain whether profits will eventually be distributed. They fear that changes in political colour might change the state's aspirations to benefit the local population. Second, the lack of genuine transfer of power and rights for forest resources do not realize local empowerment, which is crucial in poverty alleviation.

Content

List of Abbreviations

CF	Community Forestry
CFM	Community Forest Management
DFM	Decentralized Forest Management
FGD	Focus Group Discussion
FUGs	Forest User Groups
HKm	Hutan kemasyarakatan
HR	Hutan Rakyat
KWML	Koperasi Wana Manunggal Lestari
LMDH	Lembaga Masyarakat Desa Hutan
LEI	Lembaga Ekolabel Indonesia
NGO	Non-Governmental Organization
POF	Privately Owned Forest
PFS	Provincial Forestry Service
PHBML	Pengelolaan Hutan Berbasis Masyarakat Lestari
PKTHR	Paguyuban Kelompok Tani Hutan Rakyat
PMDH	Pembangunan Masyarakat Desa Hutan
POFMU	Privately Owned Forest Management Units
RB-UMHRL	Rancang Bangun Unit Manajemen Hutan Rakyat Lestari
SFC	State Forest Company
SLF	Sustainable Livelihoods Framework
SLA	Sustainable Livelihoods Analysis
VOC	Verenigde Oostindische Compagnie

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Introduction

In the mid 1970s, Community Forestry (CF) became a widespread method to tackle forest degradation and related poverty issues in forest villages (Sunderlin et al., 2008). The term "Community Forestry" is defined as "any situation that intimately involves local people in forestry activity" (FAO, 1978). Throughout developing countries, social programs and events are initiated to replant trees and bushes in rural areas for the benefit of the local environment, the production of timber and agricultural crops and the well-being of the people. The current forest area managed by local forest users worldwide is about one tenth of total forest area, although the character and stage of the programs is somewhat different across countries. The origin of Community Forestry goes far back, in some countries even more than one century. However, as a formal state recognized program, worldwide Community Forestry gained ground only at the end of 1990 (Arnold, 2001b; Maryudi, 2011; Sunderlin et al., 2008). This was a result of slowly emerging policy shift towards a more participatory approach on forest management. Eventually, the decentralization of forest management started a further restructuring of forest management from central to local authorities (Maryudi, 2011; Larson et al., 2007). The devolution of forest property rights from central to local farmers or user groups is a complex process that often takes many years to accomplish (Zenteno Claros, 2013).

During the last decade, much research has been devoted to the effectiveness of decentralized forest management (DFM) and the related Community Forestry programs throughout developing countries. It appears that the realization of decentralized forest management, and with that the success of CF-programs, is limited. Efforts for DFM have often merely led to joint management of resources between the state and the forest user communities, instead of genuine transfer of power and land rights to the latter. This experience is related to several factors. On the one hand, it has become clear that user communities cannot bear the full responsibility of the management of common pool resources such as forests. Effective DFM has got to go hand in hand with community empowerment by means of education and support in human resources, skills and finances. Furthermore, poorer households often lack the support of and access to specific policies and intervention schemes for genuine poverty alleviation. On the other hand, there is a lack of willingness from the state to fully transfer responsibility to local communities. This is probably because joint forest management is financially more attractive for governments. In this way, they are still in charge of the forest resources and benefit from revenues, yet reduce the management expenses by outsourcing towards the local community. This practice runs the risk of the state exerting too much control over forest resources without reaching the intended empowerment of forest communities (Arnold, 2001a; Devkota et al., 2010; Larson et al., 2007; Maryudi, 2011).

Another element within this debate concerns the local inequalities in welfare. According to some academics, it is often the already privileged group or -the elite- that benefits most from involvement in CF-programs. Poorer households are usually excluded from the process, which enhances local income disparities (Devkota et al., 2010; Larson et al., 2007; Maryudi, 2011; Wollenberg et al., 2004). Naturally, not all CF-programs cope with these issues and the extent to which they do is strongly dependent on the context of the programme. This, in turn, is determined by the governance structure, the geographical location, and the livelihoods strategies of communities (Djamhuri, 2012; Maryudi, 2011). As we can see, the academic debate concerned with Community Forestry is in progress, yet requires new research input in order to keep up with new developments. Furthermore, enhanced knowledge on the effectiveness of CF-schemes is vital for improved policy and implementation (Zenteno Claros, 2013). This is the goal this thesis meets.

This research aims to further investigate the effectiveness of CF-programs by focusing on the Gunung Kidul regency on Java, Indonesia[1]. This region is famous for its successful afforestation efforts from the 1970s onwards and is one of the many locations in Indonesia where community forestry has been applied (Fujiwara et al., 2011). For the people of Java, community forestry is considered to be very suitable as a means of alleviating rural poverty. What is more, it is believed that community forestry could help to reforest the island, which has suffered under severe deforestation and forest degradation during the last century (Krott, 2012). Since the early 1900s, Java has experienced a series of community forestry types, which have been adjusted and improved over the years. Currently, Java knows more than ten different types of community forestry. Each of these programs has a different background and knows different kinds of structures and implementation methods. In Gunung Kidul regency, there are generally two types of community forestry schemes. The one with the longest history is Hutan Rakyat, which is in essence Privately Owned Forests (POF). Hutan Rakyat is tree production entirely based on the initiative of the farmer. Trees are planted and managed on private land and harvested when the farmer is in need of money (Fujiwara, 2012). The second CF-scheme that coexists in the region is Hutan kemasyarakatan (HKm), which is a state led initiative. In HKm-programs, forest farmer members are responsible for tree growth on state forest plot for a period of 35 years. The profit sharing arrangements of the produced wood are 60% for the farmer, and 40% for the state. In addition to this, HKm-members are allowed to grow crops in between the trees on the plot of which the yield is totally theirs (Ota, 2011).

Although both HR and HKm-programs have contributed to forest rehabilitation in the area and have increased the standard of living of forest farmers to some extent, many researchers have pointed out that both programs still have many challenges ahead. First of all, forest rehabilitation schemes have decreased farming opportunities of the local farmers in favour of tree cultivation. If no alternatives are provided, this can lead to a decrease in agricultural revenues for local farmers. Apart from that, it remains uncertain to what extent community forestry programs affect the livelihoods of forest villagers that are not involved in the program. It is very much possible that the introduction of CF-programs disturbs the social cohesion in the villages, as it provides additional income for the one farmer while excluding the other (Djamhuri, 2012; Ota, 2011).

The current drawbacks of the schemes need to be addressed in order to realize sustainability and equity in CF-implementation. Unsolved or increased poverty issues in forest villages risk to entail further forest encroachments, as households still need to meet their basic needs. More research is needed to comprehend the socio-economic effects of CF-programs on the entire farmer community in order to overcome prevailing poverty and unsustainable forest depletion (Devkota et al., 2010; Djamhuri, 2012; Krott, 2012; Maryudi, 2011). These and other issues are addressed in this thesis. More specifically, this study focuses on the socio-economic impact of community forestry programs on both members and non-members with special focus on the food production changes in the research area. This is done by means of the Sustainable Livelihoods Framework (SLF). The main aims are to explore the socio-economic impact of CF-schemes on the involved population and the way these schemes can be improved so that rehabilitation and development objectives are attained. The central research questions guiding this research are:

[1] For geographical location, see Figure 3.1. (Chapter 3).

Does the current implementation of community forestry schemes in Gunung Kidul regency affect rural livelihoods and if yes, in what way?

And:

What is the current role of community forestry schemes in reaching its poverty alleviation objective and what are the threats and opportunities in reaching sustainable implementation of these schemes?

The research is carried out by using a mix of qualitative and quantitative research methods, comprising interviews with experts and key informants, household surveys, focus group discussions and a Sustainable Livelihoods Analysis (SLA).
The structural outline of this research proposal is as follows. Chapter 1 outlines the theoretical underpinning of this research and defines the key concepts used in this study. Chapter 2 presents the methodological framework and this is thus where the research questions, research objectives and applied methodology are described. After that, chapter 3 offers a background of the research area, discussing the national and regional context of the country. This is followed by three chapters of research results. First, chapter 4 describes the former and present implementation of Community Forestry schemes in the research area. Then, chapter 5 presents the results of the comparative livelihood analysis where livelihood strategies and assets for CF-members and non-members are defined. Eventually, chapter 6 presents the effects of Community Forestry schemes on the local food production. The emphasis of this chapter is laid on the main threats and opportunities in realizing sustainable Community Forestry programs. To finalize this report, the last chapter is devoted to the Discussion and Conclusion of this research.

1. Theoretical Framework

1.1 Introduction

Worldwide, Community Forestry is receiving much attention from scholars and policy-makers as a method to combat forest degradation and poverty issues in forest villages. In Indonesia, Community Forest Management (CFM) is one of Indonesia's strategies to rehabilitate its forest reserves and simultaneously alleviate poverty for forest dependent people. The rationale of the Indonesian government to develop Community Forestry in the country is two-fold. One the one hand, there is a growing interest in creating opportunities to upscale small scale timber plantations in order to meet the large demand of timber processing industries in Indonesia. At the same time, this could create a pathway to reduce prevailing rural poverty in the country (Fujiwara et al., 2011; Rodahi et al., 2010; Safitri, 2010). On the other hand, more and more incentives are created to involve local communities into state forest management in order to reduce illegal forest encroachment and equally reduce rural poverty. As a result, two types of programs exist.

This thesis discusses Community Forestry in the region of Gunung Kidul. The motive for investigating Community Forestry here lies within the fact that both types of CF-programs are developed in this region. This creates an opportunity to compare these programs and their effectiveness. Moreover, the region is interesting due to its successful afforestation efforts from the 1970s onwards. Despite these efforts, it appeared that rural poverty is still prevailing in the region. More research is needed to understand why forest rehabilitation, with the involvement of local communities, has so far not led to genuine local poverty alleviation.. In Gunung Kidul regency, several researches have been carried out to understand the socio-economic impacts of CF-schemes (Fujiwara et al., 2011; Rodahi et al., 2010; Safitri, 2010; Ota, 2011; Nugroho et al., 2011; Maryudi, 2011; Maryudi and Krott, 2012; Suryanto et al., 2012). These researches have emphasized the challenges and opportunities that are involved in sustainable implementation of these schemes. Although these researches contribute considerably to our understanding of the defaults in current CF-management, an in-dept livelihood analysis, such as developed in the present study, has so far not been executed. This livelihood analysis contributes to our knowledge about what is important on the grass root level. As local households are held as the main actor to manage forest reserves, they are supposed to be most knowledgeable on how to improve the CF-systems. This people-centred view on Community Forestry might provide new insights in our knowledge about how to improve its effectiveness.

In order to investigate the impact of CF on the local population and the challenges and opportunities that lie ahead in sustainable CF-implementation, it is crucial to first define the key concepts that play a central role in this study. Specific attention is paid to the Sustainable Livelihood Analysis. What tools can this model offer when estimating the socio-economic impact of CF-schemes? What is meant by rural or forest based livelihoods? What are CF-schemes exactly and what role do they play in forest livelihoods? These and other theoretical elements are addressed in this chapter.

1.2 Forestry-poverty linkages

There is a strong relationship between forest issues and poverty. This is first explained by the strong linkage between poverty and forest users (those who are directly dependent on forest revenues) (Krott, 2012). This linkage between poverty and forestry livelihoods is regarded as being two sided. On the one hand, poorer people are more attracted to forest livelihoods. This is due to several reasons. Firstly, throughout history, forest areas have provided shelter for poor people during wars or conflicts. There is a large likelihood that these people stay in the area and that their offspring will adopt the same livelihoods. Secondly, until recently forestland and resources have always been easily accessible. Without having access to employment, markets for selling goods or financial means for personal employment, forest resources offer a last opportunity for poor people to survive (Angelsen & Wunder, 2004; Ogle, 1996; Sunderlin et al., 2005). Next to that, the access to forest products is relatively uncomplicated. This is due to the low thresholds of capital and skills for entry, and the easy access to the local market for selling these products (FAO, 1987). This is one part of the linkage. On the other hand, poverty and forestry livelihoods are linked by the limited possibilities that forest communities have to escape poverty. One reason for this is the remoteness of forest areas, providing limited access to infrastructure, markets, health services and education (Wollenberg et al., 2004). A second reason is the strong dependency of forest livelihoods on forest resources and limited opportunities for income diversification. Together with the lack of secure land or resource tenure, this dependency makes these livelihoods most vulnerable for external factors (Angelsen and Wunder, 2004; Krott, 2012; Ogle, 1996; Sunderlin et al., 2005).

Another linkage between forest issues and poverty is the causal relationship between poverty and deforestation or forest degradation. Strong livelihood dependence on forest resources, which most poor forest users have, engender unsustainable use of resources and result in forest resource depletion. In turn, unsustainable use of forest resources cannot sustain livelihoods on the long term, resulting in enhanced poverty issues. A downward spiral of environmental destruction and poverty is said to be the result (Arnold and Bird, 2001; David 2012).

Obviously, the described linkages are not straightforward. As a matter of fact, the importance of forest products in rural livelihoods is declining over the years. This is related to several factors. First, this is because of a declined dependency of rural livelihoods on forest products, where forest products are more and more used as an additional source of income next to agricultural or off-farm activities. They are most useful in bridging seasonal gaps in agricultural production, meeting specific household needs and add to the financial security of the household. Hence, the development of the agricultural sector and the development of off-farm activities in rural areas reduce the dependency of forest products for rural livelihoods (Arnold, 2001b; Ogle, 1996). Second, throughout the past century, forestland is increasingly used for agricultural purposes (as is further explained in Chapter 4). This is done either in a sustainable way, through agroforestry systems, or in an unsustainable way, through clear-cutting of forestland to acquire agricultural land for cash crop production. This implies that the use of forestland for agriculture is economically more interesting than making a living from forest products in a direct manner (Arnold, 2001b; Keenan and Van Dijk, 2010). Thirdly, increased claims on forestland and forest resources of other more powerful stakeholders have limited the access to forest products for local communities. These stakeholders can either be large scale (state-owned) companies concerned with timber or oil palm production, or (non-)governmental organizations striving for forest conservation (Arnold, 2001b).

The role that forests play in the livelihoods of forest users are very context-specific, as is the manner in which these forest resources are managed. The willingness and capability of forest users to

manage forest resources sustainably is determined by their dependence on and the access to these forest products. Therefore, analyzing the impact of CBFM on rural livelihoods requires an understanding of the role forests play in these livelihoods. To do so, it is key to take into account a broader array of livelihood assets (Arnold and Bird, 2001; David 2012). How this is done is demonstrated in the next paragraph.

1.3 Sustainable Livelihoods Framework

1.3.1 Sustainable livelihoods

The Sustainable Livelihoods Framework (SLF) of Chambers and Conway (1992) is used to comprehend the complexity of forest communities and the changes in livelihoods. Before the Sustainable Livelihoods Framework is discussed in more detail, it is imperative to define the concept of sustainable livelihoods. Livelihoods are described as the 'capabilities, assets and activities required for a means of living' (DFID, 1999). A sustainable livelihood is therefore defined as the ability of an individual or household to cope with external shocks and to guarantee or enhance its capabilities and resources, without compromising with the quality of natural resources (DFID, 1999). Livelihood assets, also expressed in terms of capital or resources, are explained as being what people may or may not have. These are not merely the use of resources as such, but also the assets that offer people the capability to act (Bebbington, 1999; Chambers and Conway, 1992)

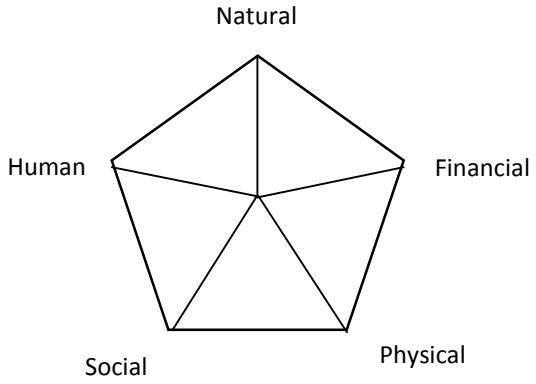
The concept of sustainable livelihoods was first used during the Brundtland Commission on Environment and Development in 1987. The central debate on Sustainable Development provided renewed insights in the link between poverty reduction and sustainable resource management (Solesbury, 2003). The sustainable livelihood approach further evolved in the early 1990s as a reaction on the neo-liberal and dependency approaches from the 1960s to 1980s. In this latter period, poverty issues were explained from macro-economic approaches where poverty was seen as a mere lack of income and as an insufficient level of Gross Domestic Product (GDP) per capita. Over time, new development theories started to evolve that changed the emphasis from material to non-material terms of development like human well-being, human basic needs, and present cultural and political values in society (Chambers and Conway 1992). A very influential academic in this new development paradigm is Amartya Sen, who developed the capability approach. This approach highlights the need for a positive approach on development issues. It focuses on people's capability (or freedom) to do something or be someone to provide the ability to climb out of poverty (Potter et al., 2008). These ideas have strongly influenced the development of the SLF (Kaag et al., 2004) which places the accent on people-centred, multilevel, participatory and sustainability approaches (Larson et al., 2007).

1.3.2 Sustainable Livelihood Framework

The sustainable livelihood framework offers a tool to determine the factors that influence livelihoods, and how these factors are interrelated. It focuses on the possibilities or constrains that people have in order to escape poverty. These are determined by the assets in material and non-material terms that give people the capability to act (Bebbington, 1999). The original set of assets are composed of five categories, expressed in natural, physical, human, financial, and social capital. It is believed that the balance between these sorts of capital is pivotal in reducing the vulnerability of livelihoods (DFID, 1999, Chambers and Conway 1992).

These livelihoods assets are presented in a pentagon, as is shown in Figure 1.1. The figure shows the many interrelations between different types of livelihood assets. The centre point of the figure, where all lines meet, is pictured as the point where livelihoods have no access to any of the assets, whereas the outer perimeter signifies the maximum access to assets. In this view, when measuring the assets of a livelihood, various pentagon shapes can be drawn (Bauman, 2000; DFID, 1999).

Figure 1.1: Model of livelihood



The different kinds of Capital are expressed as follows:

Human capital
Human capital is considered the ability of people to practice certain livelihood strategies. This ability is determined by skills, knowledge, ability to labour and good health.

Social capital
Social capital is defined as having access to social networks and connectedness, which gives people the ability to work together with other people. Human relationships of trust, reciprocity and exchanges, provide social informal safety nets and facilitate co-operation. Next to that, membership of more formalised groups, provide the ability to influence rules and sanctions.

Natural capital
Natural capital signifies the stock of natural resources that can be used by people. Especially for rural livelihoods the access to natural capital is extremely important to make a living. Natural resources vary from public goods such as clean air and biodiversity, up to private goods like access to land, access to natural resources like water, fertile soils, or access to livestock. The access to natural resources is particularly linked to land property.

Physical capital
Physical capital consists of the produced goods and services that are provided by human. Examples are access to infrastructure such as roads, railways and airplanes, but also access to shelter or public services like clean drinking water supply, sanitation and electricity. Access to these resources is crucial in reaching socio-economic development and prosperity.

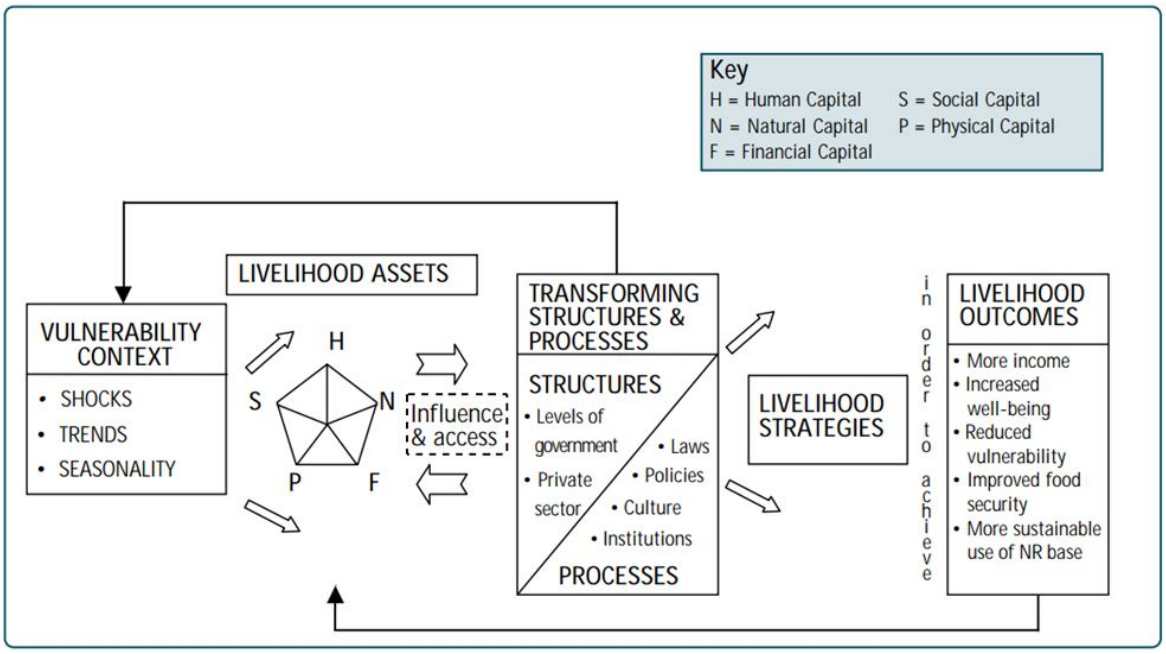
Financial Capital

Access to financial resources, such as an income or savings (both in terms of cash or liquid assets such as livestock or jewellery), is an important element in livelihood development. It provides people an exchangeable asset that is useful both when selling and purchasing resources or for investments in other activities (DFID, 1999).

1.3.3 Adopting the Sustainable Livelihood Framework

The accessibility of all types of assets is determined by the context in which the livelihood occurs. The Sustainable Livelihood Framework, as presented in Figure 1.2, acknowledges that human livelihoods are determined by the multifaceted web of enabling and constraining factors. Within the SFA, four elements influence the bundle of livelihood assets.

Figure 1.2 Sustainable Livelihood Framework



Source: DIFD, (1999).

Livelihood strategies

Livelihood strategies convey the range and blend of actions that people undertake in order to achieve to livelihoods outcomes. Examples of livelihood strategies are agricultural, manufacturing or street vending activities. The livelihood strategy that people (are forced to) choose determines the assets that he or she does or does not obtain (Chambers and Conway, 1992).

Livelihood outcomes

Livelihood outcomes refer to the results of livelihood strategies. The outcomes can in turn affect other livelihood assets. For example, the access to use fertilizer (physical capital) enlarges the agricultural yield (natural or financial capital).

Vulnerability context

The vulnerability context can be interpreted as being the external environment that affects the livelihood over which one has limited to no control. Factors that determine the vulnerability context are shocks like floods, bad weather or conflicts, that might destroy people´s home or yield; trends, such as in economic or political spheres; or seasonal shifts, in food availability, market prices or employment. Although these factors are not always negative, they strongly determine the deprivation in which poor people find themselves (DFID, 1999; FAO, 2003).

Transforming structures and processes

Structures and processes like institutions, organisations, policies and legislation shape livelihoods strategies and assets. Structures refer to the actors and institutions in society that create processes, such as policy, legislation and public services. Structures and processes are strongly interlinked and are operational at all levels, from international to the household level and from public to private sectors. Structures and processes hence determine the "rules of game" in society and decide on the livelihood strategies that can be opted for. They too decide the access to the different kinds of capital and the substitutability of capitals (the possibility to transform one asset into another). For example, the ways in which markets are organized are strongly dependent on the policy and legislation at hand. In turn, markets form a mean for households to trade agricultural crops (natural capital) for money (financial capital). Hence, the state influences the organization of markets, and the organization of markets determines the eventual accessibility of markets for sellers (DFID, 1999; FAO, 2003).

1.4 Forest livelihoods

The concept of forest livelihoods is a very broad one. In essence, forest livelihoods are livelihoods that depend on forest resources either as a dominant source of income or as a supplementary income. Accordingly, uses of forest resources are different in type and purpose (Arnold, 2001a; David, 2012). The characteristics of different types of forest users and uses (purposes) are described below.

1.4.1 Forest Users

According to Byron and Arnold (1999) three categories of forest users can be distinguished. First, the group of "forest dwellers" represents those who live in forests and for subsistence depend on hunting-gathering or swidden cultivation. This group is most dependent on forest resources yet represents the smallest group of forest users worldwide. Second, the "farmers living adjacent to forests" are people that depend predominantly on agricultural, yet use products from the nearby forests as a supplementary source of income. This group comprises the largest group of forest users and includes smallholders and landless people. The third group is the "commercial forest users" who make a living from forest products industry without necessarily living near the forests (Sunderlin et al., 2003; Arnold, 2001a). In this research, the focus is entirely on "farmers living adjacent to forests".

1.4.2 Forest products and services

Forest livelihoods derive an income from a variety of forest products like timber or non-timber products. Next to the subsistence income that forest products provide, they also function as a safety net when people are in urgent need of money (Arnold, 2001a; Zenteno Carlos, 2013). On the other hand, too much reliance on forests products and services can limit the household's potential to escape poverty and might result in a poverty trap. For instance, strong reliance on only a few forest

products makes people vulnerable for unpredictable market changes (Ongle, 1996; Zenteno Carlos, 2013). In addition, it limits the possibilities to invest into other economic sectors. For this reason, a plausible development strategy would be to generate higher incomes from forest products and services and to enhance differentiation of forest use. This would enhance the possibilities of the household to combat poverty (Wunder, 2001).
There are 5 types of forest products and services to be distinguished:

Agricultural land
For centuries now, forestland is used for agricultural production, especially when the soil is fertile. The use of forestland for agricultural purposes can either be done through agroforestry practices where crops are cultivated without damaging the forests or through forest conversion, where plots are cleared from trees and scrubs and replaced by crops. In agroforestry systems, shade-tolerant crops, such as coffee or cacao trees, are grown between the tree stands. This method can offer a more sustainable solution for crop cultivation, as the damage of tree stands is kept to a minimum and the forest soil conditions (water and nutrients) remain more or less unchanged (Pokorny et al., 2010; Suryanto et al., 2012). In a larger extent, forestland is converted to agricultural land. This method is rather unsustainable, as the time the forest plots need to recover is too long relative to the scale and frequency on which this method is carried out. Hence, more forestland is damaged than can be recovered. Although this practice causes deforestation involving a decline in biodiversity, in soil quality, and in water availability, forestland conversion is in most cases the most profitable option (De Groot and Van der Meer, 2010; Keenan and Van Dijk, 2010; Sunderlin et al., 2005).

Timber extraction
Of all forest products, timber is the most commercially valuable resource. Favourable timber prices are therefore crucial in reaching local economic development (Dhakal and Masuda, 2009). Poor forest communities often gain little from these high value resources due to three reasons. Firstly, poor communities have limited bargaining power and have insufficient access to markets. National forest laws and regulations enhance this exclusion of the poor from high timber profits by assuring timber wealth for privileged groups such as national industries and powerful companies (Arnold, 2001b; Angelsen & Wunder, 2003; Sunderlin et al., 2005). Secondly, timber cultivation requires access to a set of assets and resources that the poor often do not possess. For instance, profitable timber production demands secure access to land, personal skills in managing and harvesting trees, high financial investments and access to consumer markets. Next to that, timber production is only profitable in the long run, whereas poor people rather invest in livelihood activities that generate short term gains. Thirdly, the conversion of forest capital has caused rather limited trickle-down effects to the local forest users. Although forest resources have contributed considerably to the regional or national economic growth, the commercial timber sector does not provide many opportunities for local people to enjoy profits. Related causes are the limited backward and forward linkages that the timber sector provides; the fact that profits are send to stakeholders of foreign countries; and the limited taxes paid by the forest companies and industries (Wunder, 2001; Sunderlin et al., 2005).

Collection of Non-Timber Forest Products (NTFPs)
Forest users largely benefit from non-timber forest products (NTFPs) such as medicinal plants, bamboo, firewood, fruits and nuts. The larger part of the NTFPs is used for household consumption,

though part is sold to local markets. Especially for poorer households, NTFPs are important sources in meeting the household's nutrition needs or for cash income to pay for fundamental household needs. NTFPs can provide extra livelihood security in times of seasonal shortfalls or natural or personal disasters (Angelsen & Wunder, 2003; Arnold and Ruiz Pérez, 1996; Sunderlin et al., 2005).
Next to that, NTFP are becoming increasingly competitive resources as they have high industrial values. Particularly resins, pharmaceutical extracts and oils have important economic value due to their rich and diverse genetic values. These industries have therefore invested in the strengthening of forest conservation programs in order to protect these forest products. Restricting NTFP extraction by local communities will endanger their perspectives to improve their economic standard (Arnold and Ruiz Pérez, 1996).

Payments for environmental services

Additional benefits can be provided by sustainable use of the forest resource base. In direct terms, sustainable use of forest stocks guarantees sustained forest profits. In indirect terms, local populations can receive financial compensation from external actors (governments, NGOs and private companies) in the form of Payment for Environmental Services (PES) for preserving the natural resource base in forests. This includes the conservation of quality and quantity of water and soil nutrients, and the maintenance of biodiversity. Other examples of PES are carbon storage and forest-based tourism (Sunderlin et al., 2005). The regulation of PES is still in its infancy. It remains uncertain how PES should be distributed among participants. Nevertheless, PES is considered by many to become an important solution for forestry-poverty issues (Wunder, 2001).

Employment

The forest sector employs many people all over the world. Employment opportunities in the production and processing of forest products can considerably contribute to the economic development (Sunderlin et al., 2005). However, enhanced competition for forest resources by commercial industries is conflicting with employment opportunities for forest users (Arnold and Ruiz Pérez, 1996). Creating employment opportunities for the local population can significantly contribute to local poverty alleviation. However, the extent to which this occurs is limited, as powerful industries do not often provide local employment opportunities and instead hire people from outside the area, as these are better skilled or educated (Arnold 2001; Hyman, 1996). Next to that, employment opportunities are to a large extent determined by local market forces (Arnold and Ruiz Pérez, 1996).

Indirect effects

The indirect effects of the forest sector include all types of economic development. This can vary from the local demand for goods and services to improve the forest industry, for example road construction, provision of health services and improved local skills and knowledge concerning forestry practices. However, indirect effects also include natural forest degradation, social conflicts for forest resources, and the economic downfall when logging practices have finished (Arnold, 2001b; Sunderlin et al., 2005).

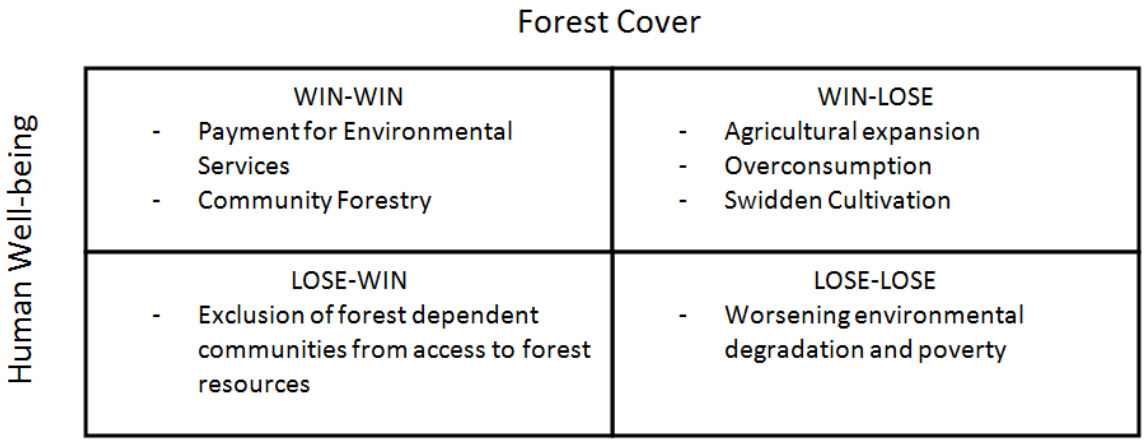
1.5 Poverty alleviation through forest management

During the recent decades, there have been several attempts to reconcile poverty reduction and forest conservation objectives. Thus far, large-scale success of such programs is not forthcoming (Wunder, 2001). According to Sunderlin (2005), there are generally two potential options to reach the goals of sustainable forest management and poverty alleviation. One is state or company-led Community Forest Management (CFM) and the other is smallholder tree production or the so-called Privately Owned Forest (POF) management. When generalizing both programs they are commonly referred to as Community Forestry (CF) schemes. Although the programs have a rather different character, this generalization is made for convenience sake.

1.5.1 Win-win situation or Poverty trap

Before going into detail about both of these options, it is best to conceptualize and understand the possible positive and negative outcomes by using a simple fourfold typology. This conceptualization is visualized in Figure 1.3 and explains how cases can be evaluated in order to come to the most sustainable solution for both poverty reduction and forest conservation. The upper left corner depicts the win-win situation, which is attained when reaching the two-fold goal of poverty alleviation and forest conservation. The reconciliation of both goals can theoretically be attained through the earlier mentioned PES and CF-schemes. However, practice proves otherwise. The upper right corner presents the win-lose situation, which occurs when forest cover are damaged due to human activities for either subsistence living or economic development purposes. These human activities can occur in the form of (unsustainable) agricultural expansion, hunting gathering, swidden cultivation or livestock activities. The lose-win situation occurs when communities are being excluded from resources for forest conservation purposes. For forest-dependent people, this entails a reduction in household income, which damages human well-being. Lose-lose situations take place when environmental damage occurs for the livelihood activities of poor households. As it is these same people who suffer from their environmentally destructive behavior, this situation can also be described as “the downward spiral of poverty and environmental degradation” leading to the so-called poverty trap. It is observed that these four situations evolve into one another. For example, a win-lose situation might develop into a lose-lose situation when the extraction of natural resources becomes economically unsustainable (Sunderlin et al., 2005).

Figure 1.3: Fourfold typology for human well-being and forest cover.



Source: Sunderlin et al. (2005)

Livelihood diversification offers households the opportunity to stay out of poverty. Especially the diversification towards off-farming activities avoids households to become too dependent on natural capital. However, climbing out of the poverty trap is a more difficult task. Poorer farmer households that are limited in social or human capital are likely to have difficulties finding a job off-farm. Firstly, off-farm activities are easier to acquire when having access to social networks. Secondly, most off-farm activities require some specialized skills and knowledge that poorer individuals often do not posses. Hence, livelihood diversification requires taking entry barriers that the poorest of the poor are unable to take. This leads to structural poverty. In this view, using forest resources as a safety net is a risky undertaking. When forest resources fall short, little other sources are in reach that can fill the gap in subsistence needs. Without having sufficient other forms of financial safety nets, such as livestock or off-farm activities, forest dependent household risk of getting inside the poverty trap (Barret et al., 2001).

1.5.2 Community Forestry

Community Forestry is the management of (natural and production) forests by forest villagers. It covers a variety of linkages between people and forest outputs. People involved in CF can be forest dwellers, farmers living adjacent to forests and smallholders of forest products (Arnold, 2001). The main objective of CF-schemes is to involve local communities in forest management in exchange for profit-sharing from timber production, extra farming opportunities or a salary. These objectives are in line with the general sustainable development aim, namely to reach development that benefits social, economic and environmental conditions. Officially, the implementation of CF implies power devolution from central governments to local governments or communities. Private as well as public organizations might be the main stakeholder in these schemes (Nugroho et al., 2011). However, the implementation of CF-schemes is determined by the national and local policy, which highly varies between locations. Therefore, there is a large variety of CF-schemes and hence their potentials to reach the aforementioned win-win situation.

In order to understand the effectiveness of CF-schemes, different factors need to be identified that influence the implementation of such schemes. Comparable data concerning the effectiveness of CF are rare, due to the complexity of the situation in which the many CF-schemes occur. The following section presents a small grasp of literature concerning the current flaws within CF (Zenteno Claros, 2013).

Power devolution

Community Forest Management can only be fully accomplished when genuine power devolution over forest resources has taken place. For effective CF-implementation it is important to give local forest users a role in decision-making procedures and the responsibility of forest management activities for which they can receive profits. There is world-wide evidence that genuine power devolution to local communities has hardly ever occurred. This hampers the successful implementation of Community Forestry programs (Larson 2005; Devkota et al., 2010; Maryudi, 2011; Sunderlin 2005).

Instead, powerful actors like NGOs or state forest administrations still largely influence the procedure and outcomes of Community Forestry programs. They use their influence by defining policy in such a way that they can make use of the local population in managing the forest resources. For example, forest management costs are considerably reduced by outsourcing activities to local

communities. Elite farmers within the CF-group are coerced to accept the imposed regulation, while forest administrations regain power over the forest resource. Some authors designate this phenomenon as the exploitation of the local communities (Devkota et al., 2010; Maryudi, 2011).

Land ownership

It is widely recognized that the access to land ownership is crucial in the alleviation of poverty. Property rights offer strong incentives for farmers to make clever investments and use careful management as they are more confident that benefits are for personal gain (Djamhuri, 2012). CF has experienced significant improvement and owes its success to the transfer, albeit partially and incomplete, of property rights from the state to local forest users. Tenure offers farmers a legal claim over the forest resources, providing incentive for farmers to participate in community forestry (Djamhuri, 2008; Zenteno Claros, 2013).

The failure of CF-schemes is often owing to the lack of land tenure rights of the local populations. The genuine provision of land ownership is lacking due to the slow procedure of decentralization of power and devolution of forest rights. More efforts from governmental actors are required in order to secure land and resource ownership in CF-programs, which is so fiercely related to farmers´ socio-economic well-being (Nugroho et al., 2011; Sunderlin et al., 2005).

Access to decision-making

It is important that CF-participants understand what kind of regulations are involved in CF as these indicate what farmers are allowed to do and what not. If participants do not comply with the rules, they might lose their membership of CF. However, there are some factors hampering the knowledge of rulers and regulations. For instance, access to decision-making for CF-members habitually occurs through a village-based forest farmers group. In most developing countries, only the head of the household can represent the participating household, which is in almost all cases a man. As a result, women are much less knowledgeable concerning CF-management although their role in farming is essential for household revenues. Next to that, the ability to participate of both men and women is strongly related to their skills in literacy and level of education. Consequently, poorer farmers that are illiterate or have difficulties reading and writing are less involved in meetings, especially when it comes to more difficult matters as government regulations. Hence, women and less educated man are not apt enough to understand the CF-regulation, and run the risk to be excluded from CF-schemes (Pokharel and Nurse, 2004; Siscawati and Mahaningtyas, 2012).

Shares of timber harvest

Within CF-programs, the benefit sharing arrangements are seen as a major incentive for CF-participation and encouragement for farmers to manage trees properly. Equally, it is held an important strategy for local poverty alleviation. The benefits mainly regard revenues of the main forest products such as timber or firewood. Nonetheless, many authors state that the promising benefits of the arrangements still need to be proved. This is related to several case-specific factors. First, the timber harvest shares in some CF-programs are negotiated in a later stage. This causes an insecurity of revenues which might entail eventual forest encroachment by the local population (Maryudi, 2011). Second, the benefits of timber harvest can only be reached in a late stage, as farmers have to plant the tree on bare land and need to wait until the trees are mature enough to be harvested. This implies that the investment activities, like clearing shrubs, planting and nursing the trees, are not paying off on a short term base. Even revenues from non-timber forest products, such

as fodder and fuel-wood are not in abundance, since the production forests often involve mono-cultures and young forests that have relatively little dead material. Together with revenues gained from other sources, like home gardens, the gains are merely sufficient for the subsistent economy of the members (Krott, 2012; Maryudi, 2011).

Food Security

Food production in rural areas is the one basic economic activity for rural households. In most cases, CF-participants are permitted to cultivate crops in the forest between the production trees. Up till now, the revenues from these agroforestry activities are lower than expected and considered as a mere mean to contribute to subsistence farming. The limited yields relate to several factors like the restricted periods in which crops may be cultivated, the access to and distance from the villages, and the poor soil fertility of forestland (which is even worse in pine forests) (Maryudi, 2011). Other examples show that reforestation takes place on areas which were previously used for crop cultivation. Even though crop farming is allowed on the forest plot, the growing canopy increases the competition for light for other species. As soon as the canopies of the (re)planted trees close, production of common (food) crops becomes nearly impossible. Decreased farming opportunities enhance the vulnerability of especially the poorest of households (Ota, 2012). A solution for this latter problem is thinning or pruning, which would offer a small cash of timber harvest, and would increase the crop yield. Nonetheless, thinning activities need approval of the forest authority and involve a complicated procedure (Krott, 2012; Maryudi, 2011).

Nature Conservation

Despite the fact that community forestry is promoted as being a solution for environmental degradation in the area, this aspect is often critiqued. The interests in the commercial production of monoculture forest outweigh the interest for biologically diverse forests that stimulate biodiversity, and offer habitats and corridors for indigenous species. For this reason, community forestry is criticized by some authors (Krott, 2012; Maryudi, 2011) as being a mere tool to regenerate forests for economic benefits (timber production) instead of genuinely recovering the damage done to forests areas.

Other examples in literature show that the objective of forest conservation is sometimes carried out at the expense of the poverty alleviation objective. The restricted use of forest products by local communities can have harmful effects on their well-being. This is even more the case for the poorest and vulnerable of the population. As a result, the willingness of the local communities to get involved in CF-programs might be reduced; having adverse effects on the forest conservation activities (Arnold, 2001b; Krott, 2012).

Exclusion from Community Forestry

Beside the issues concerned with the socio-economic implications for CF-participants, little is known about the effects of CF-schemes on people that do not participate in the area, yet live in the same forest village. The exclusion of forest community members from CF-schemes could stimulate poverty and forest encroachment in the village, instead of decreasing it (Djamhuri, 2008 and 2012). Poverty alleviation does not mean benefitting one part of the population at the expense of others. Rather, development thinking has brought some authors to believe that poverty alleviation should be seen as the enhancement of human well-being in general, and as a goal that can only be reached while serving the entire population (Angelsen and Wunder, 2003).

1.5.2 Privately Owned Forest management

A second way of achieving poverty reduction through forest conservation is by means of smallholder tree production. This small-scale production, from here on referred to as Privately Owned Forest management (POF) or Farm Forests, refer to forest parcel privately owned and managed by one or several households. Next to the profits smallholders can make form timber production, the forest plantations considerably contribute to the environmental quality, e.g. in protecting the quality of water and soil resources and preventing erosion to occur. Worldwide, 32% of the total forest area is managed by smallholders, whereas forest ownership by public organizations and corporations make up 50% and 18% of the total forest plantation cover, respectively. Within 15 years, the size of POF areas has tripled as a result of the increasing economic interests of farmers to invest in wood production for domestic or local usage. The wood production serves many purposes such as the production of firewood, charcoal, house construction, furniture production or for selling to local markets (Evans, 2009; Kanninen, 2010).

In most cases, POF has no basis in a professional private or public organization and is merely managed by local owners and communal farmer organizations. Hence, it has no formal management and planning systems and the harvest of trees is planned according to personal needs and occurs without taking into account the increment of the plant. Even though the POF can substantially increase household income, farmers miss out a substantial share of the potential profits that can be made. This is due to several factors (Fujiwara, 2012). First, lucrative implementation of this activity requires land tenure security and high investment costs, which poorer households often do not have (Sunderlin et al., 2005). Second, the quality and scale of the harvested trees are often not sufficient for formal and certified traders and industry. This is due to the small scale on which farmers realize tree production, and because of the low wood quality owing to immature cutting practices. As a result, farmers have a low bargaining position and are obliged to sell their tree logs to the informal (local) market, where prices are relatively low and unstable (Fujiwara, 2012). A third factor that influences the profitability of POF management is the fact that tree cultivation is sometimes allocated to former agricultural land, as is also the case in Community Forestry. Hence, POF might threaten the local food production and deprive household subsistence output (Arnold, 2001a).

During the recent decade there have been several efforts to enhance the profitability of POF management in order to increase the well-being of smallholders. These efforts, also referred to as outgrower schemes, include the financial and technical support from companies, governments or NGOs in order to enhance local production of wood material. The problem is that this support is only considered in areas that have a high probability of success, for example areas with good infrastructure, security of tenure, and good environmental conditions. Hence, the poorest areas, where these conditions are less outspoken, miss out on these opportunities (Arnold, 2001a; Pokorny et al., 2010).

1.6 Conclusion

People living close to or within forest are often partly or entirely dependent on forest products. These so-called forest users extract forest products like timber, firewood, medicinal plants, fruits and nuts, which contribute to short and long term income generation. During the recent decades, forest users are experiencing more and more pressure from local authorities to limit their activities in order to prevent further deforestation and forest degradation. Community Forestry Management (CFM) can both improve environmental quality while generating forest revenues for the local population. Worldwide, there are generally two types of CFM, namely Privately Owned Forest (POF) management and state or company-led Community Forestry (CF). State or company-led CF intends to improve forest livelihoods by providing access for local communities to forest resources, while contributing to the rehabilitation of the forest.

Worldwide, Community Forestry schemes have not yet met their high expectations. The genuine devolution of power and forest rights from central governments to local communities is the biggest issue in this matter. As for POF management, smallholders lack the financial assets to exploit the potential use of their forest plantations. The main problem is that timber production involves a long term investment where profits are generated only after 20 years. This investment is difficult to make, especially for poor farmers. As a result, forest plantation smallholders practice immature cutting of trees which affects sustainable wood production.

In order to estimate the impact of community forestry programs on the livelihoods of the local communities, the Sustainable Livelihood Analysis is carried out. This method provides the opportunity to assess the well-being of the forest farmers by taking into account five types of capital, namely human, social, natural, physical and financial capital. Each of these types of capital are defined by a set of indicators, which is explained in more detail in Chapter 2.6.

2. Methodological framework

2.1 Introduction

This research is conducted in Gunung Kidul regency, a rural area on Java, Indonesia. The research methodology comprises both qualitative and qualitative research methods, such as a literature review, a set of interviews, a household survey, focus group discussions and statistical analyses. This chapter elaborates on the principal elements of the conducted research methodology. Reference is given to the research objectives and questions, the conceptual model, and each of the aforementioned applied research methods. Finally, the operationalization of concepts and the limitations of the research are discussed.

2.2 Research objectives and questions

This research aims for a comparative livelihood analysis for CF-members and non-members in Gunung Kidul regency with special focus food production in the area. The research objectives are formulated as follows:

1. To understand the effects of community forestry on the livelihoods of rural community at large;
2. To find out the livelihood strategies that farmer communities apply to combat poverty;
3. To explore the relation between food production and community forestry schemes;
4. To find out what opportunities community forestry can offer to increase land use opportunities for farmers and to guarantee food security;

These research objectives are associated with the following central research questions and sub-questions:

Central research question 1*:*
Does the current implementation of community forestry schemes in Gunung Kidul regency affect rural livelihoods and if yes, in what way?

Central research question 2:
What is the current role of community forestry schemes in reaching its poverty alleviation objective and what are the threats and opportunities in reaching sustainable implementation of these schemes?

Sub-questions

1. *What type of community based forestry schemes can be found in the research area and how are they build up?*
2. *Do participants and non-participants of community forestry schemes diversify their income and if so, in what way?*
3. *Are there differences between the livelihood assets of participants and non-participants of community forestry schemes and if yes, what kind of differences?*
4. *Do community forestry schemes influence the food production in the area and if yes, how does this affect the livelihoods of the local farmers?*

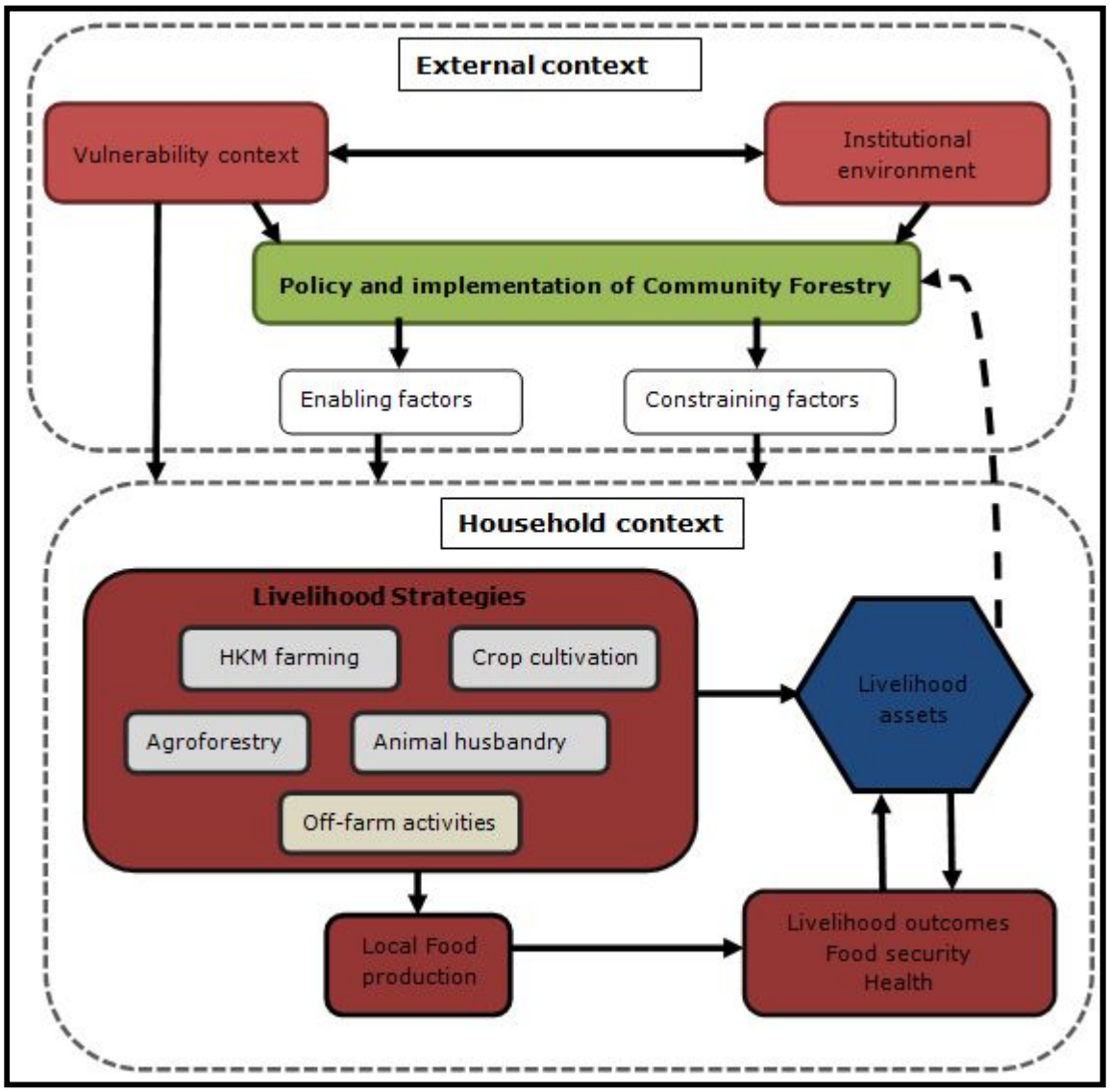
5. *Can community forestry play a role in securing or improving (if needed) the rural livelihoods, and if so, in what way?*

These sub-questions are treated in different chapters of this thesis. The first sub-question is answered in chapter 4, sub-questions 2 and 3 are treated in chapter 5, and answers to sub-questions 4 and 5 are provided in chapter 6.

2.3 Conceptual model

The relation between community forestry schemes and rural livelihoods cannot be studied without understanding the context in which it occurs. The conceptual model presented in Figure 2.1 provides insight in this context by presenting the many linkages between external factors and the livelihoods of rural households in Gunung Kidul regency. The livelihoods are studied by adopting the Sustainable Livelihood Approach (SLA), as presented in Chapter 1. The SLA forms the basis to compare and analyze the assets that CF participants and non-participants have and use to reach economic development. The arrows between the concepts represent the influences from one to another, which can be either one or two-sided.

Figure 2.1: Conceptual Framework



2.4 Q-squared Methods

This study makes use of a combination of both qualitative and quantitative research techniques is applied, also referred to as Q-squared research methods (or Q^2-methods). The choice for this combination lies within the idea that the different types of research methods are complementary. On the one hand, qualitative data have an explanatory character and are most useful when analyzing political and regulatory structures and processes and human behaviour. The weakness of qualitative data however is that it lacks the possibility to compare or generalized data across population groups. On the other hand, quantitative data enable these generalizations and comparisons between population groups, though in socio-economic studies it risks to lose too much relevant information. The Q^2-method offers the benefits of reliable data gathering without losing the understanding of the social context (Desai & Potter, 2006; Hulme, 2007).

The qualitative research methods used in this study are a literature study, interviews, Focus Group Discussions, and household survey. The quantitative research methods comprise the statistical analyses and other types of calculations made to conduct a comparative livelihood analysis.

2.5 Research Methods

2.5.1 Literature study

Literature research is used to place this study into its scientific context. Literature has provided background information on the CF-programs, its strengths and weaknesses, and future risks and challenges. Next to the extensive use of internet and books, literature was gathered via the interviews with experts and stakeholders. The literature research was an indispensable instrument to supplement the other field research methods.

2.5.2 Household Survey

The household survey is the most important component of this research. It provides core information on the households' livelihoods and strategies and the relevance of CF to rural livelihoods in Gunung Kidul. The comparison between members and non-members and between the two social forestry programs is entirely based on this survey. Next to that, it provides insight in the changes in food production in relation to social forestry programs.

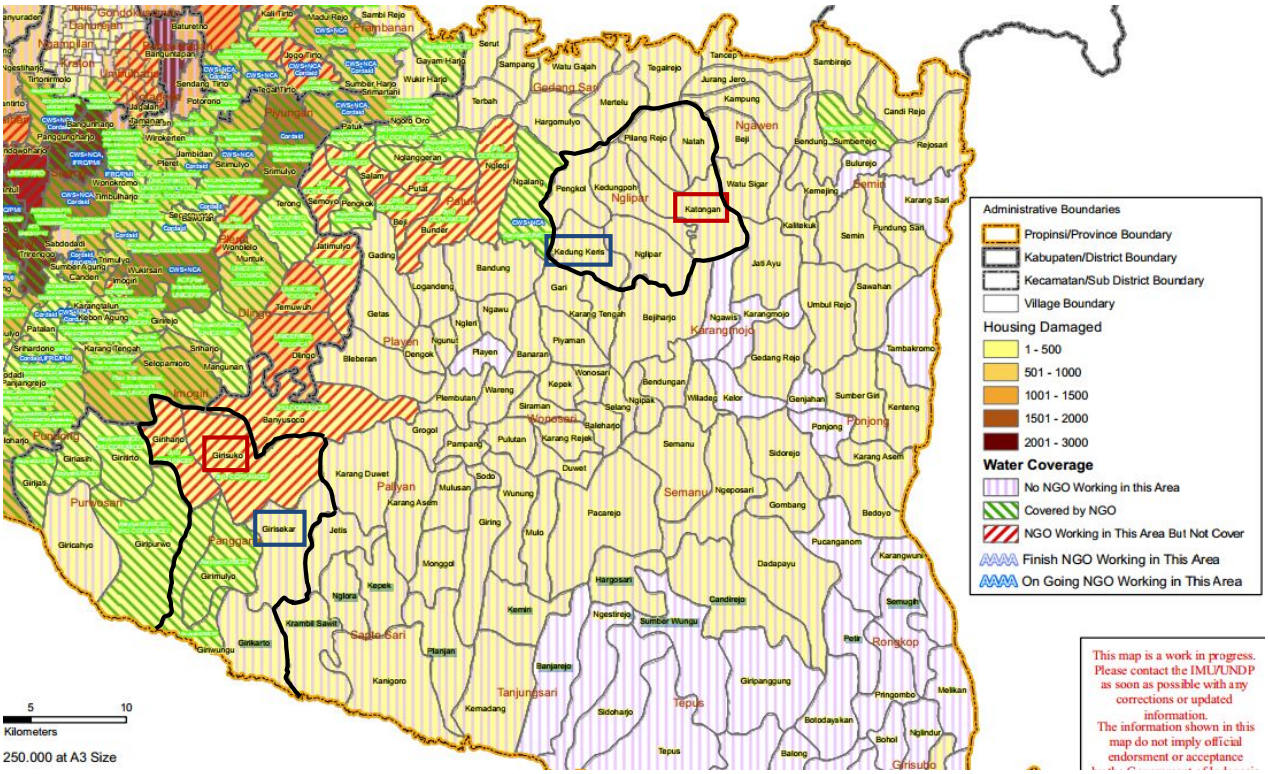
The questionnaire used for the survey includes both open ended and closed format questions. The closed questions relate to livelihood strategies (main sources of income and respective earnings) and livelihoods assets (as operationalized in chapter 2.6). The open questions regard the changes in living standard and household food production, and perceptions of participants and non-participants concerning the effectiveness of HR and HKm. The complete questionnaire can be found in appendix C.

2.5.3 Research site selection

The survey was conducted in four villages in Gunung Kidul regency. The villages Kedung Keris and Katongan are located in the sub-district of Nglipar, and the villages Girisekar and Girisuko can be found in the sub-district of Panggang. Figure 2.2 shows a map where these research locations are situated. The selection of these four villages is related to the located CF-programs, considering HR

and HKm. Kedung Keris (Nglipar) and Girisekar (Panggang) are selected for its long history in HR-management (Fujiwara, 2012). Katongan (Nglipar) and Girisuko (Panggang) are selected for their well-performing HKm-programs (Interview Himmah, 2013). The environmental characteristics of the two sub district Nglipar and Panggang are somewhat different, linking directly to the difference in food crop production. Conducting the analyses in these different socio-environmental conditions would allow identifying context specific deteriorations that would otherwise go unnoticed.

Figure 2.2: Map of research areas in Gunung Kidul regency showing the two sub-districts and four research villages



Source: http://reliefweb.int

Additional legend

- Sub-district
- HR-village
- HKm-village

In each of the four villages, 20 questionnaires were carried out, giving a total of 80 questionnaires. Table 2.1 demonstrates how many members and non-members were selected in each of the research areas. It equally shows the sub-villages in which the questioned households were situated. In Katongan, three sub-villages are included in the sampling because the HKm-farmers lived quite dispersed over the village. All households were randomly selected. This means that all households in the research village had an equal chance to be selected. This method reduces bias to a minimum and provides a representative sample of the population (Desai and Potter, 2006). Naturally, during the selection of households, involvement in CF was taken into account, in order to make sure that the

balance of members and non-members was more or less equal. However, this could not be done in HR-villages since the share of non-members was very small.

Table 2.1: Number and location of households selected for the survey

Sub-district	Village	Sub-village	CF-type	Nr of members	Nr of non-members	Total households
Nglipar	Kedung Keris	Pringsurat	HR	15	5	20
Nglipar	Katongan	Ngunut Kepok Sari Jeruk Legi	HKm	8	12	20
Panggang	Girisekar	Blimbing	HR	16	4	20
Panggang	Girisuko	Temu Ireng 2	HKm	10	10	20

2.5.4 Focus group discussions

Focus Group Discussions (FGD) are used to understand communal perceptions, norms and values. The discussed topics related to the benefits and constraints, and the short and long term effects of CF-programs. The purpose of conducting the FGDs was to acquire additional information about the CF-type the farmers are involved in. The questions of the FGDs were little structured and mainly included open ended questions. This way of questioning was selected in order to trigger a discussion between the participants. The total size of the groups varied from five to eight household members.

2.5.5 Interviews

A set of interviews were carried out to acquire additional information to the household survey. The target persons of the interviews were either experts or key informants, further explained in the sub-paragraphs below. All interviews had a semi-structured character which offered a certain structure and focus in conversation while allowing new questions to be brought up. Appendix A offers an overview of the time and place of the conducted interviews including the occupation of the respective interviewee.

Interviews with experts

Interviews with experts were conducted for several purposes. The first interviews had as a main objective to gain better orientations of the research areas. These interviews provided knowledge about suitable research areas and about the structure and implementation of CF and main issues there present. The character of the interview questions transformed from general into detailed as the results of the household survey gained shape. The purpose of the latter interviews was to verify the survey results. Therefore, questions were more critical and directed towards issues concerning farmers land acquirements and land rights, the status of wood certification, and the future of CF in Gunung Kidul.

Interviews with key informants

During the field research in Gunung Kidul, interviews with key informants, such as head of farmer group, head of HKm-groups, and head of HR-groups were conducted. These interviews were held

with the main purpose to gain a more elaborate idea of the history of HR- or HKm-programs in the village, the status of wood and land certification, and the main issues related to social forestry or other socio-economic subjects relevant in the village.

2.5.6 Statistical Analyses

The survey outcomes have been coded and recoded, according to the range of data gathered. A small part of these data has been analyzed in SPSS using the linear regression analysis. This analysis is used to test whether one set of variables have a causal relationship with one or more others. The results of the regression analyses are valid with a significance level (P-value) of 0,05. Within the regression analysis, the option backward regression is used. This method indicates the contribution of each independent variable to the dependent variable. With each step, the variable with the most insignificant value is removed from the model. After that, the test is reperformed until only significant variables remain. The strength of the correlation of the independent variable to the dependent variable is indicated with the B-value. Additionally, the R^2 refers to the measure in which the dependent variable is determined by the independent variable (De Vocht, 2007).

2.6 Operationalization of Concepts

As is mentioned in chapter 1.3.3, the sustainable livelihoods framework forms the basis of this research. To determine the livelihood strategies and assets of CF (non-)participants, these concepts are operationalized in measurable variables. The operationalization of livelihood assets is based on FAO (2009) and DFID (1999).

Livelihood Strategies

Livelihood strategies are ways in which people make a living. The livelihoods of people are defined by assessing the household's activities, the number of hours per week spend per activity and the average wage earned for this activity (see Table 2.2).

Table 2.2: Operationalization of livelihood strategies

Type of Livelihood strategy	Working Load	Average wage/profits
E.g. forestry, agriculture, livestock, fishery, manufacturing or service provision	Hours per week	In money values

Human Capital

Human capital is determined by the household's level of education of adults and children (see Table 2.3). Adults are here defined as the household members that are 16 years and older who do not attend school but contribute to the household income or workload (including housekeeping). Household skills have not been taken into account in the survey since it was considered to be too difficult to make a valuable and comparable indication of this concept.

Table 2.3: Operationalization of Human Capital

Type of capital	Concept	Measurement variable
Human capital	Education	Share of adults achieved primary school
		Share of adults achieved secondary school
		Share of adults achieved higher education or university
		Share of children enrolled in school

Source: based on FAO, 2009

Social Capital

Social capital is defined as the household's access to networks, the relations of trust and the access to loan systems (see Table 2.4). Access to networks is determined by memberships of social organizations and the frequency of attendance in meetings. Relations of trust are determined by the involvement in mutual assistance (Gotong Royong), the rural voluntary work in which farmer households participate.

Informal loan systems can be in the form of Arisen (a communal lottery system) or Pinjaman. The Pinjaman system is a loan system that is established by small communal groups, e.g. farmer groups, HKm-groups or women groups.

Table 2.4: Operationalization of Social Capital

Type of Capital	Concept	Measurement variable
Social capital	Access to networks	Membership of social organization
		Frequency of attendance in meetings
	Relations of trust	Involvement in Gotong Royong (social voluntary work)
	Access to (informal) loan systems	Arisen or Pinjaman

Natural capital

Natural Capital is firstly defined by the quality of the farmland in terms of soil fertility and water availability. This is assessed by asking the respondent for the appreciation of the soil quality and water availability on a scale from 1 to 4 (see Appendix C). Secondly, it is determined by the household's access to land, expressed in security of tenure and plot size. Thirdly, it relates to the household´s access to natural resources, such as timber and Non-Timber Forest Products (NTFP), fishery and animal husbandry (see Table 2.5).

Table 2.5: Operationalization of Natural Capital

Type of Capital	Concept	Measurement variable	Categorization
Natural capital	Quality of farmland	Soil fertility	assessment respondent scale 1 to 4
		Availability of water sources	assessment respondent scale 1 to 4
	Access to land	Size of land used for farming/ forestry	Number of hectares
		Security of tenure	Yes/no
	Access to natural resources	Fodder	Yes/no
		NTFP	Yes/no
		Fishery	Yes/no
		Animal Husbandry	Number of animals

Physical Capital

Physical Capital is determined by several concepts, as is depicted in Table 2.6. First, it is defined by the access to equipment for agricultural activities, such as crop fertilizer and pesticides, and land manipulation equipment like diesel machine or tractor. Secondly, physical capital is derived from the quality of housing. Quality of housing indicates the wealth of the family and demonstrates the measure in which households have used financial assets to improve their housing quality. It is defined by the construction material, access to sanitation and drinking water, and access to household appliances and vehicles. The quality of construction material is quantified on a scale from 1 (excellent quality) to 4 (bad quality). Only the quality of floors and walls are taken into account, as the quality of roofs was more or less the same for all houses.

In SLA, the access to public services is often considered as an important physical asset. Although the questionnaire used for this study did include some questions related to access to public services, the answers were not taken into account in the quantification of physical capital. As a matter of fact,

households in the village lived quite dense so the distances to schooling and health care facilities per household showed no interesting varieties.
Fourthly access to infrastructure is considered an essential physical asset and is measured by taking into account the availability of vehicles. Initially, the distance to the main road was asked for. However, the little variety among respondents made that the concept is left out of the analysis.

Table 2.6: Operationalization of Physical Capital

Type of Capital	Concept	Measurement variable	Categorization
Physical capital	Equipment for agricultural activities	Use of fertilizer	Yes/no
		Use of pesticides	Yes/no
		Use of land preparation equipment	No, Diesel machine and/or tractor
	Quality of Housing	Construction material (walls and floor)	(scale 1 to 4)
		Access to sanitation	Yes/no
		Access to drinking water	Yes/no
		Access to electricity	Yes/no
		Access to household appliances and vehicles	Absolute number

Financial Capital
Financial capital is determined by the financial security and the household's income and savings. Table 2.7 summarizes how financial capital is defined.

Household income
The household income is estimated by calculating the households´ agricultural production and the yearly income generated from off-farm activities. The annual agricultural production is considered to be an important indicator for the basic income of the household, as this does not change as much over the years as other practices, like livestock activities or tree cultivation (Rohadi et al., 2010). The agricultural production in kilogram is multiplied by the average market prices. The price indication is derived from the survey.
Earnings from off-farm activities are more difficult to estimate as many farmers do not know precisely what they earn. Therefore, the off-farm activities are based on rough estimations.

Financial security
Financial security is an indication for the measure in which households can secure their current and future financial situation. The financial security is measured by taking into account the *type of savings* and the *access to extra income* from remittances or subsidies.
Savings serve as a safety net for households. Many farmers have savings in trees or livestock stocks. Whenever farmers are in need of money, these resources are used to generate income. The size and type of this stock is different per household. In the research villages, farmers have three types of savings, which are categorized according to the measure in which it can function as a safety net for farmers. When farmers either use their livestock or tree stocks as savings (so either one of the two), farmers are considered to have the least financial security, apart from farmers that have no savings

at all. If farmers have access to both trees and livestock as saving resources, the financial security is considered as more stable than the former group. Farmers that have access to bank accounts often have stable off-farm jobs and have the highest security of income.
Extra household income can be generated through retirements, subsidies and remittances. Not all households have access to these extra sources of income and the exact amount of money received is often uncertain. For this reason, the categorization of extra household income is based on whether a household has access to extra income or not.

Table 2.7: Operationalization of Financial Capital

Type of capital	Concept	Measurement variable	Categorization
Financial capital	Income	Income from agricultural production	Yearly earnings from crop yield
		Income from off-farm activities	Yearly earnings from e.g. construction, manufacturing or charcoal production
	Financial security	Type of saving	Bank account
			Livestock and Tree plantation
			Livestock or Tree plantation
			None
		Access to extra income	Retirement, subsidies or remittances
			No

Changes in food production
The assessment of changes in food production is based on several variables as indicated in table 2.8.

Table 2.8: Conceptualization of Changes in Food Production

Concept	Measurement variable
Changes in food production	Changes in food production for household itself
	Changes in food production in and around the village
	Reason for changes (if the case)
	Coping strategies for changes (if the case)

Value of CF-Programs
The last part of the questionnaire was devoted to the value of HR- or HKm-programs of both participants and non-participants. For participants this value is determined by the economic importance of the program to the household and the satisfaction with the program (Table 2.9). The value of non-participants is determined by the desire to participate and feelings of jealousy and competition. Both participants and non-participants were asked for an explanation of the values, and whether and what they would like to change about the program.

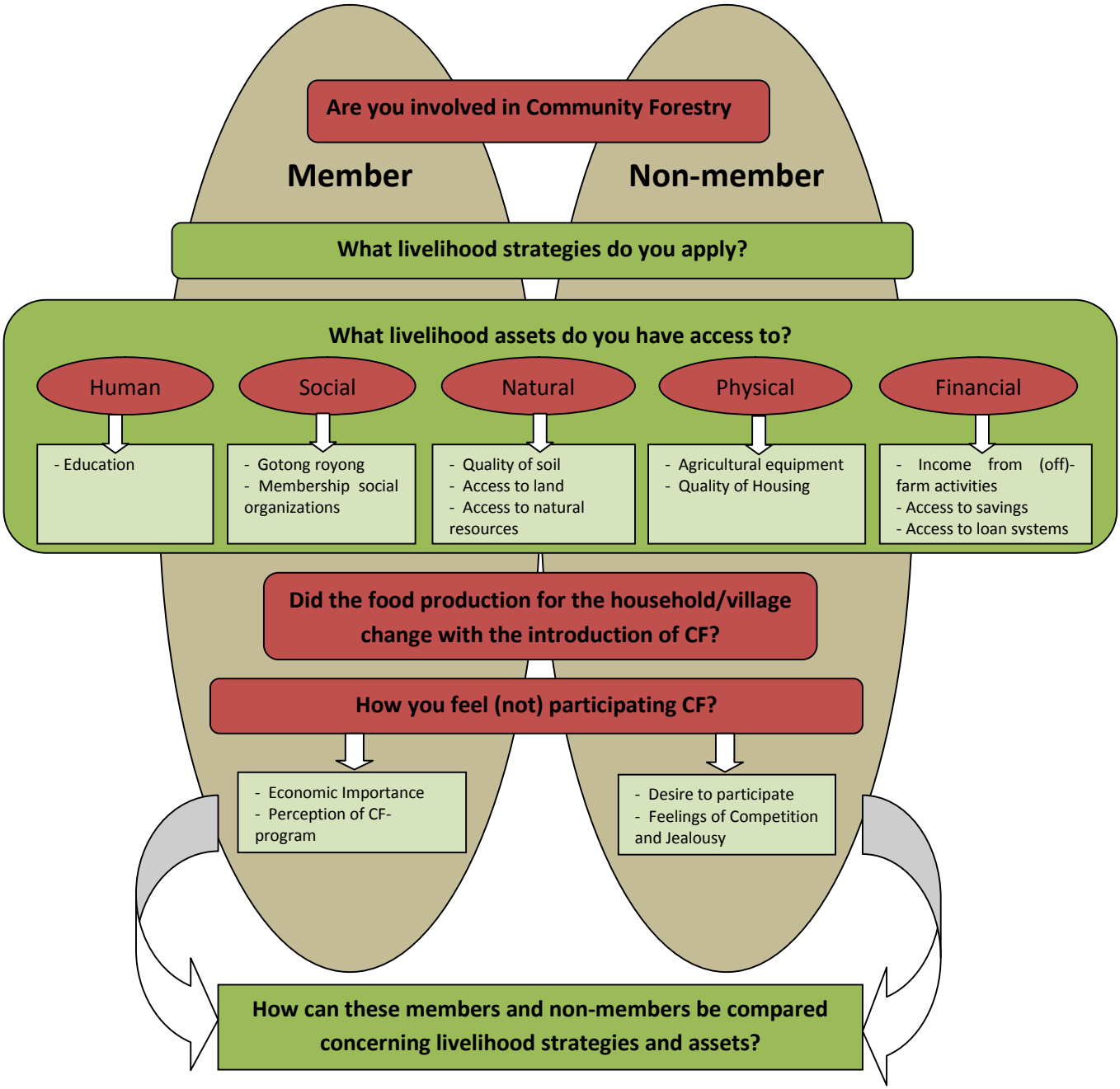
Table 2.9: Conceptualization of values

Concept	Measurement variable	Categorization
Value of participants	Economic importance to the household	Assessment respondent scale 1 to 3
	Satisfaction with the program	Assessment respondent scale 1 to 3
Value of non-participants	Desire to participate	Assessment respondent scale 1 to 3
	Feelings of competition and jealousy	Assessment respondent scale 1 to 3

Livelihoods Assessments

A livelihood assessment is carried out on the basis of the entire range of livelihood assets. Figure 2.3 provides a systematic representation of the research design. It shows which steps are taken in order to make a valuable comparison between HR- and HKm-members.

Figure 2.3: A systematic representation of the research design



2.7 Research Limitations

2.7.1 Focus Group Discussions

One aspect that has probably influenced the research outcomes of FGDs was the presence of more dominant participants such as the head of HKm- or HR-group during the meeting. It was apparent that some FGD-participants were withholding to share critical thoughts and ideas. In some cases critical participants were silenced by the head of HKm-group. A plausible explanation relates to the fact that heads of HKm-groups are working in the service of the government. They can get disadvantaged when they express critical thought about the program. In any case, this has had some bearing on the research result. More reliable research data would have been gathered without this social pressure. Nevertheless, this kind of situations are almost impossible when conducting qualitative research and especially where the opinion of people is the main focus point.

2.7.2 Translation

As the larger part of the data gathering was executed with the aid of a translator, this might have had bearing on the eventual research outcomes. The spoken language of the translator and the respondent was either Indonesian or Javanese, depending on the respondent's language skills. When gathering of data through oral communication in a strange language, some misinterpretation or subjectivity might slip in. Misinterpretations are particularly risky if the translator lacks knowledge on the subject. For this reason it was attempted to inform the interpreter about the respective subject of interview at all times. Limiting subjectivity is more difficult, as this is culturally determined. To limit loss of data, the researcher intentionally briefed every translation in her own words. This provided the opportunity for the translator to see whether the data were well interpreted by the researcher. Despite these efforts, perfect transfer of data in translated oral communication remains unfortunately impossible.

2.7.3 Credibility of Data

Another limitation of this research lies within the credibility of the gathered data. It specifically relates to the estimations of financial capital of CF-members. The revenues from tree cultivation was intended to be measured by inquiring after the plot sizes, the price for the sold timber, and the frequency and amount of timber sellings. Unfortunately, farmers were only aware of the first and second inquiries, namely the plot size and the timber price and did not have an idea about the two latter. This is because farmers sell timber on a rather irregular basis and therefore could only give very vague estimations.

A more adequate research method could have provided better specifications on the matter. For instance, plot and tree size measurements at breast-height could have given a better indication of the productivity of the forest plot. Moreover, more precise inquiries regarding cutting practices (for example, when, where, how often, at what age) would have contributed to a better knowledge about the potential of HR-revenues. Since research time, money and the knowledge of the researcher concerning tree measurements were limited, these additional measurement were not possible. The use of secondary data has compensated these missing data to some extent.

3. Contextual framework

3.1 National context: Java, Indonesia

Geography

Indonesia is the world's largest archipelagic state, which consists of about 17,500 islands spread around the equator, of which 6000 are inhabited. With its total surface of 1,919,440 km2 (length of 4,800 km and a width of 2,000 km), Indonesia is ranked as the 16th largest country in the world. Indonesia is situated in South East Asia, bordering the countries Malaysia, Papua New Guinea, and East Timor. The coasts border the Indian Ocean in the South, the Pacific Ocean in the North East, and the South China Sea up North. The largest islands are Sumatra, Java, Kalimantan (Indonesian Borneo), Sulawesi (Celebes) and Papua (the Indonesian half of New Guinea). Indonesia consists of 33 provinces with the capital city Jakarta situated on Java (Demaine, 2008).

The study area is situated on the island of Java, which has a land area size of 132,007 km^2. The Gunung Kidul regency is situated within the Province of Yogyakarta Special Region, which is enclosed by the province Central Java (see Figure 3.1.) (Demaine, 2008).

Figure 3.1: Geographical position of Yogyakarta Special Region.

Source: tript.com

Climate

The geographical location of Indonesia, around the equator, explains its maritime equatorial or tropical climate. This climate is known for its heavy rainfall and considerably high temperatures throughout the year. However, details of climate variables vary according to specific locations. This is notably the case for rainfall, which is strongly determined by the monsoons. In general, the northern and western parts of Indonesia are characterized by distinct peak periods in which precipitation is predominant. In this region the average annual precipitation varies between 2000 and 3000 millimetres. The southern and eastern parts deal with much less precipitation, around 1,000 millimetres a year. Here, rainfall is strongest within the wet season, which lasts from December to March, and less in the dry season, which takes place between June to September. The average monthly temperatures are not much different throughout the country, namely around 26,5 °C. However, the average does range in geographical altitude, from 23°C in high mountainous areas to 33°C on coastal plains (Demaine, 2008).

The climate on Java alters gradually from west to east. The western parts are relatively more humid compared to the eastern parts. In Central Java, precipitation averages around 2,000 mm a year and temperature ranges between 21°C and 32°C. As Gunung Kidul regency is situated in the south, this area deals with more frequent droughts then the northern parts of Central Java (Demaine, 2008).

Population

The Population of Indonesia is nowadays around 241 million (measured in 2012) (Kuncoro, 2013) and has experienced an annual growth rate of 1.4% between 1995 and 2005 (Demaine, 2008). The island Java is the most populous, housing 58% of the total Indonesian population on only 6% of Indonesia's entire land surface (Djamhuri, 2012). Indonesia is home to around 350 ethnicities, who most of them have their own language, customary laws and norms. The two predominant ethnicities are the Javanese (45% of the total population) and the Sundanese (14 % of the population) (Resosudarmo, 2005). The population of Indonesia master over 350 languages, yet only 13 of them have each at least one million speakers. The national language is Malay, which is also referred to as Bahasa Indonesia. The Islam is the predominant religion is Indonesia which is practiced by 88,2% of the population. Nevertheless, some parts of Indonesia are home to Hindus, Christians, Buddhist and animists (Demaine, 2008).

Java currently houses around 120 million people. Both the Javanese and the Sundanese are two of the three principle ethnicities of Java. The former is best represented in Central and East Java, whereas the latter is more dominant in West Java. A third main ethnic group is represented by the Marudese, which originally come from the island Pulau Madura, situated north east from Java. The religion of Javanese is predominantly Muslim, though some Hindu groups can be found in East Java (Resosudarmo, 2005).

The island of Java has known the most intensive land use changes throughout Indonesia, which is notably a result of dry and wet agriculture. Although Java is one of the most developed islands of Indonesia, it still copes with striking rural poverty issues. The main problem in rural areas is the poor soil fertility and the low access to land and resources, which at present comprises 0,6 ha of land average per household. These households concern those that live in villages situated in state forestland, at the moment around 6,000 villages consisting of a total population of 30 million people (Adi et al., 2004; Budidarsono and Burgers, 2006).

Environment

Indonesia is very rich in biodiversity, thanks to its pristine rainforests, rich coastal and marine areas. The country accommodates as far as known, 3,305 species of amphibians, birds, mammals, and reptiles, of which 31.1 percent are endemic and 9.9 percent are threatened. Indonesia houses at least 29,375 species of vascular plants, of which 59.6 percent are endemic (Resosudarmo, 2005).

Next to that, Indonesia is rich in natural resources, ranging from petroleum and natural gas, coal and minerals like bauxite, copper, gold, iron, manganese, nickel, sulfur, silver, and tin. Indonesia is world largest exporter of liquefied natural gas. Non-mineral resources used for export are timber, rubber and coffee, extracted from the vast forestlands that the country holds (Demaine, 2008).

The geography of Indonesia makes the country prone to natural disasters like severe flooding, severe and unpredictable droughts, volcanic activities, earthquakes and tsunamis. Environmental damage caused by human activities relate to air and water pollution and deforestation, intensive forms of agriculture, forestry, industries, fisheries and manufacturing. These intensive practices led to tremendous changes in land use, mostly at the expense of forestland, and have affected the Indonesian landscape and environment considerably (Demaine, 2008).

Political History of second half of the 20th century

After the Dutch colonial rule, Indonesia gained officially recognized independence in 1949 with the exception of West-Papua (at the time called West-Irian), which persisted until 1963 before coming under Indonesian authority. The new leader of the Indonesian post-independence government was Sukarno, who changed the established parliamentary democracy into the so-called 'guided democracy'. Retrospectively, his regime is considered a rather authoritarian one, balancing the forces of the military and the Communist Party of Indonesia (PKI). The growing opposition against this regime created a separate parliament named the Revolutionary Government of the Republic of Indonesia (PRRC). However, Sukarno stayed in power, thanks to the powerful army that remained loyal to him. During the early 1960s, Indonesia experienced a rapid economic decline that resulted in an attempted coup by the communists, which got violently suppressed by the army. This led to another coup by the communists which in turn got violently suppressed by the army and led to around 500.000 deathly victims (mainly communists) (Resosudarmo, 2005).

In 1966, the head of the military called General Suharto took power over the Sukarno regime. The authoritarian regime of Suharto brought back stability in the Indonesian economy, a development due to the so-called New Order Administration. This New Order rehabilitated foreign and domestic policies and was advised by Western economic experts, which made acknowledgement by the US government possible. This led to an increase in economic stability. In 1997, the Indonesian economy was struck by the Asian crisis, leading to tremendous inflation. The authoritarian "New Order" regime, renowned for its corruption and suppression of political opposition, was forced to resign in 1998 after continuous outbreaks of violence (Demaine, 2008; Frederick and Worden, 1993).

The following period was marked by the development of new laws and regulations, the establishment of new political parties and their right to assign for upcoming elections. This has led to democratic elections in 1999 and 2004. The elections of 1999 resulted in the presidency of Abdurrahman Wahid, also referred to as "Gus Dur", and Megawati Sukarnoputri as Vice President. After repeated governance failure, mainly related to scandals of corruption, Wahid was pressured to resign and give control to Megawati. The 2004 elections resulted in a new president, Susilo Bambang Yudhoyono, and vice-president, Jusuf Kalla. The latter was an old army officer, who got re-elected in 2009 (Demaine, 2008; Resosudarmo, 2005).

During the past decade, the Indonesian government has developed a decentralization of authority from central to district and municipal levels concerning agriculture, trade and investment, industry, health care and education, and natural resource management. On the face of it, these changes in the governance system should have created the opportunity to enhance economic efficiency in realizing both resource sustainability and equity. Yet, the Indonesian organization of decentralized governments still has many drawbacks (Resosudarmo, 2005). More information on this topic related to natural resource management is provided in chapter 4.2.2.

Forest Management

After Brazil and the Democratic Republic of Congo, the Republic of Indonesia contains the world's third largest tropical rain forest area worldwide. An estimated 137 million ha of the national territory is covered by forests, including all three categories of forest area, namely production forest (for timber production), protection forest (serves as life support system, for example to prevent erosion and protect the watershed), and conservation forest (for the conservation of biodiversity). Currently, Java counts 3,022,476 ha of state forestland which covers 23% of the land surface. The larger part of these forests is production forest, mostly located in Central and East Java. These territories are used

to produce teak trees for timber, and pine trees for pine resin and timber. Java has one of the largest tree production areas in the world, together with Thailand and Myanmar. Currently, Java owns around 35% of the worldwide teak forest area. Teak is a valuable timber species, owing to the high quality of wood and the many purposes it serves. Worldwide teak is used for the production of furniture (29%), moldings (20%), housing (18%), flooring and paneling (8%), and for decoration (8%) (Fujiwara, 2012; Resosudarmo, 2004).

3.2 Regional Context: Gunung Kidul Regency

3.2.1 Geographical and environmental characteristics

Topography and Rainfall

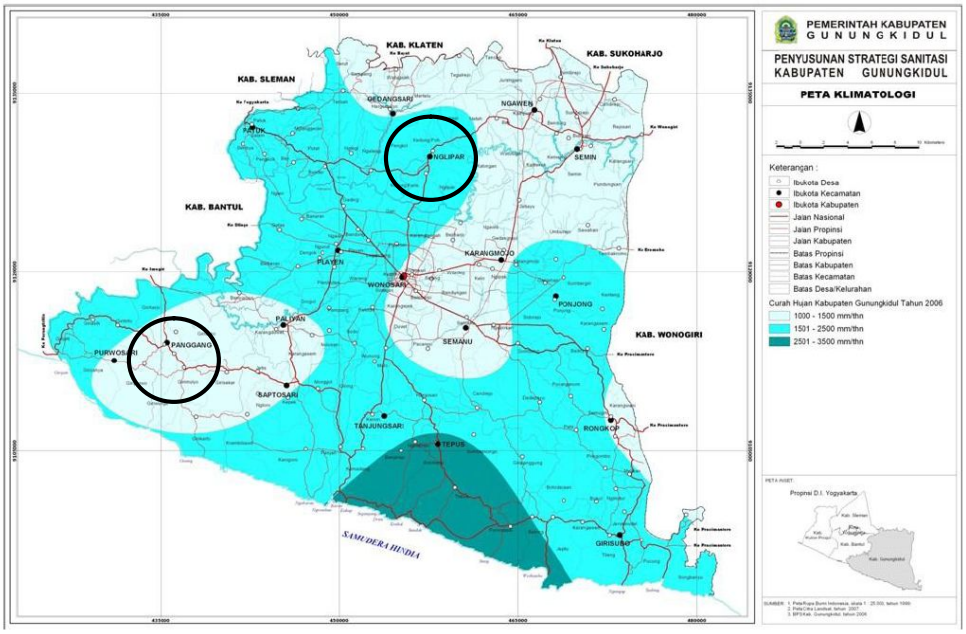
Gunung Kidul regency is one of the four districts situated in Yogyakarta Special Province. The district is located in a mountainous region where altitudes vary from sea level to up to 700 metres. Due to its mountainous character, the population density is relatively low compared to the Java average. In Gunung Kidul regency, the population density is 461 people per km^2 compared to 997 people per km^2 for Java as a whole. The total land surface of Gunung Kidul regency comprises 1485.36 km^2, divided over 18 sub-districts and 144 villages (Ota, 2011).

As is mentioned in the methodology, the selected research villages have different geo-physical characteristics which are strongly related to the different topographical areas and the varying annual rainfall throughout the region. Gunung Kidul regency can be divided in three topographical areas. Up north, we find the Batur upland area, a bit more to the south the Wonosari Lowland area is located, and most south we find the Pegunungan Sewu (translated as the thousand hills). The latter area is well-known for its karst landscape, characterized by limestone rocks and mountains. The villages Kedung Keris and Katongan are located in the Batur upland area and the village Girisekar and Girisuko are situated in Sewu mountainous area (Fujiwara et al., 2011).

The yearly rainfall is around 1,741 mm (average from 2001 to 2007) yet varies throughout the district, as is visible in Figure 3.2. The villages Kedung Keris and Katongan, both situated in the sub-district Nglipar, experience an annual rainfall of 1500-2000mm. The villages Girisekar and Girisuko, located in sub-district Panggang, deal with an annual precipitation of 1000-1500mm (Ota, 2011; Wardhana et al., 2012).

Most areas cope with water shortages during the dry season. For this reason, irrigated agriculture is not so widespread in the area; only 7.09% of the agricultural field is irrigated relative to 25.52% in the entire Yogyakarta Province (Ota, 2011). The variations in annual precipitation explain the local differences in agricultural production. In Panggang, the lower amounts of annual precipitation allow only a single harvest a year, whereas in Nglipar, two harvests a year are possible (FGD, 2013).

Figure 3.2: Map of Gunung Kidul regency showing differences in annual rainfall. The black circle indicate the location of the research villages.



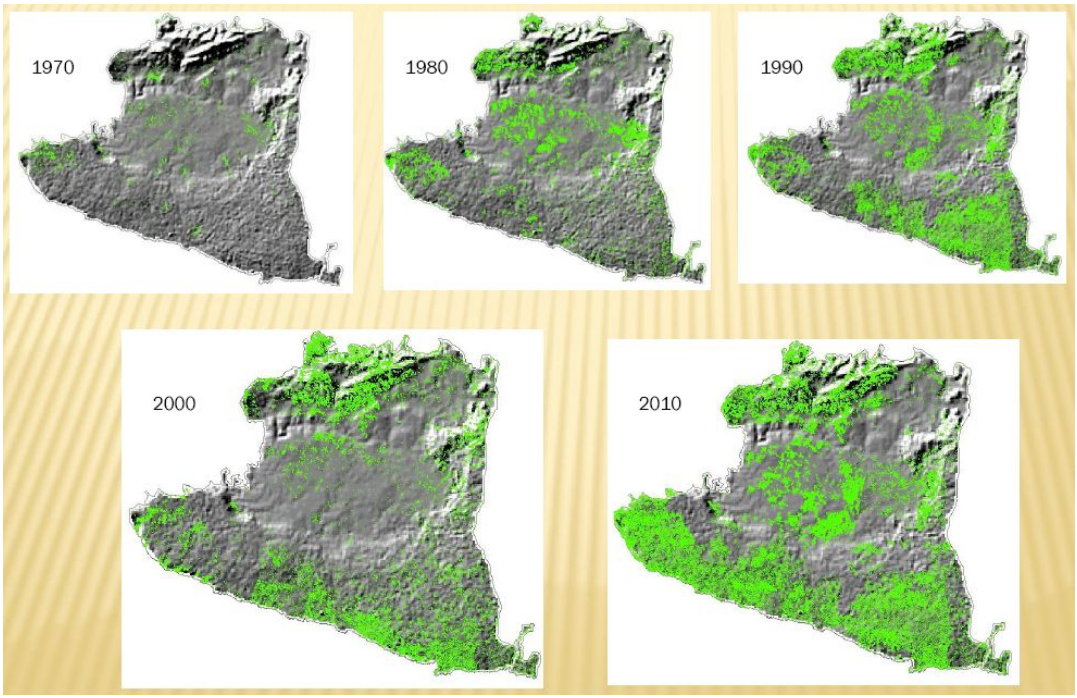
Source: PFS (2013)

Forest Cover and Management

Besides agriculture, the area of Gunung Kidul regency is for more than 50% covered by private or state forest (Wardhana et al., 2012). Though the larger part of production forests on Java are authorized by the Ministry of Forestry (MoF), 99.6% is managed by the State Forest Company Perhutani (present on Java island only) who operates rather autonomously with regard to logging, marketing and protection (Fujiwara et al., 2012; Resosudarmo, 2004). The forest areas situated in the Yogyakarta Special Region (including those of Gunung Kidul regency) belongs entirely to the Provincial Forest Service (PFS). In this area, 18,000 ha are covered by state forestland (Nugroho et al., 2011; Maryudi, 2011). The production forests owned by the PFS of Yogyakarta Province are used for teak timber production (69.8%) and kayu putih (Melaleuca cajuputi) for oil production (30.2%) (Djamhuri, 2008; Nugroho et al., 2011; Ota, 2011)).

Gunung Kidul regency is known for its relatively large share of private forest land. Here, almost half of the forestland is managed of local farmers, owing to at least 12,615 ha, compared to 13,221.5 ha of state forestland (Fujiwara, 2012). Private forest cover has tremendously expanded during the last decades as a result of smallholder timber plantations (see Figure 3.3). Where Gunung Kidul regency was almost treeless in the 1970s, private forest cover has reached approximately 21,500 ha in 2010 (Wardhana et al., 2012). Private forest plantations mainly comprise (Acacia mangium), mahogany (Swietenia mahagoni) and predominantly teak (Ota, 2011). The increased forest cover has stimulated the environmental quality, which has resulted in transformation of uncultivatable land into agricultural land (Fujiwara et al., 2011; Wardhana et al., 2012).

Figure 3.3: Historical expansion of smallholder forest plantations in Gunung Kidul regency



Source: Wardhana et al. (2012)

3.2.2 Socio-economic development

In 1843, Gunung Kidul regency housed around 12,310 people. Nowadays, this has increased to up to 675,382 people. The population growth in Gunung Kidul regency has accelerated during the second half of the 19th century, both related to immigration and natural growth. People living in the surrounding lowlands migrated to Gunung Kidul in search for new agricultural land and to avoid the feudal burdens of taxation. After 1950s, the population growth decreased as a result of birth control, changed roles for women, enhanced school enrolment and migration (PFS, 2013; Nibbering, 1999; Sunkar, 2008). During the 1950s and the 1960s, the population of Gunung Kidul suffered from a severe social and economic crisis, which was worsened by poor environmental conditions. Vegetation had almost disappeared causing severe erosion and poor agricultural production. The local diet consisted predominantly of cassava, which led to malnutrition and famine. As a result, people moved to other parts of Indonesia hoping for a better future. The crisis situation did not improve until the 1980s, when farmland was better managed. Farmers were learned to use several agricultural techniques to prevent erosion and to enhance crop productivity. For instance, people started building terraces for crop cultivation on hillsides or applying intercropping techniques. Besides, farmland was more and more used for tree cultivation. Next to the positive effect of tree growth on farming conditions, the practice also became important strategy in local livelihoods to provide in needs for construction material, fuel and fodder and to generate an income. Next to that, tree cultivation provides a social insurance for farmers in order to reduce exposure to risks, such as crop failures and unstable revenues (Nibbering, 1999; Sunkar, 2008).

Although the situation with reference to the crisis period considerably increased, the economic growth in the region of Gunung Kidul is quite low. This is first of all because the local households strongly rely on agriculture for subsistence. Next, the low farming land availability, the quality of farming land, and the lack of industrial growth provide little opportunities to enhance economic productivity (Filius, 1997; Sunkar, 2008).

4 Forest Management on Java and in Gunung Kidul

4.1 Introduction

This chapter deals with the historical development and current situation of forest management in Java and Gunung Kidul regency. The main purpose is to understand the different types of Community Forestry schemes that are implemented in Gunung Kidul regency and how they are characterized. The chapter will start with a description of the history and development of (community) forest management in the research area, including an analysis of the decentralization process in Indonesia and its impact of forest management. Subsequently, the two principal types of CF-schemes that are present in Gunung Kidul regency are elaborately described.

4.2 History of forest management

4.2.1 Colonial period

Before the Dutch occupation, the forest stocks of Java were largely sufficient to meet the needs of the relatively small population. During the Dutch colonial rule, from 1600 to 1949, forest stocks, especially teak trees, were intensively used for the shipping industry of the Dutch East Indies Company (VOC) and export. As the Dutch occupier did not manage the forests by replanting what was felled, it did not take long before considerable damage was done to the forest stocks. Around 1750, large parts of the forests along the north coast were severely damaged. As a result, the Dutch administration realized the need to develop a more careful forest management by creating forestry regulations such as deforestation bans, selective logging and reductions in the log quota. However, this led to an increased state control over forest resources, while the local population got less and less access to the use of the forest. Towards the end of Dutch rule, in 1943, the Dutch administration had more than 3 million ha of forestland under its command (Budidarsono and Burgers, 2006; Fujiwara, 2012; Safitri, 2010).

During the independence war of 1942 to 1945, the Japanese army was called upon to stand by the Indonesian population. This period is marked by large scale devastations of former state forests for the production of food and material for the Japanese army. The lack of forestry management during this episode led to a doubling of reforestation rated from 1,241,424 ha (registered in 1939) to 2,162,812 ha a year during Japanese occupation (Budidarsono and Burgers, 2006; Safitri, 2010).

4.2.2 From centralized to decentralized forest management

After Indonesia gained official independence in 1949, the Indonesian Forest Service (*Jawatan Kehutanan, Kementrian Kemakmuran*) adopted the forest management formulated by the Dutch. This centralized form of forest management had a repressive and militaristic shape under Suharto's rule (1965-1998). During Suharto's regime, the state strictly limited the use of forest products by the local population. Nonetheless, forestland was clandestinely destructed as a result of the increased demand for agricultural land of the local communities (Budidarsono and Burgers, 2006; Fujiwara, 2012; Sunderlin et al., 2001).

In 1997, Indonesia was hard hit by the Asian crisis leading to the downfall of Suharto in 1998. During the crisis, illegal logging and illegal forest resource depletion accelerated due to a lack of control of the national forestry authority. This stimulated the local population to voice their demand for land rights and increase their household income (Bullinger and Haug, 2012; Fujiwara, 2012). Although the resistance against the Ministry of Forestry was quelled, the strengthened voice of the national media highlighted the severity of forest destruction on Java. It disclosed that illegal deforestation was

largely perpetrated by companies and the State Forest Company (SFC) itself, though implemented by local communities working in their favour. In addition, it demonstrated that the prevailing poverty and inaccessibility of forest resources had led to severe deforestation (Peluso, 1992, in Fujiwara 2012; Budidarsono and Burgers, 2006).

In this same period, new hope was created to reform the highly centralized political control towards more autonomous governments at the province and district level, and to reform the extremely corrupted forestry sector. Regional governments as well as local communities demanded more autonomy, including a greater control on natural resources. The following period was marked by a socio-political transition (*Reformasi)*, which called for democratization, freedom of speech, and decentralization (Bullinger & Haug, 2012; Larson, 2005). Official decentralization was introduced in 1999, under the laws no. 22/1999 and no. 25/1999. However, it took until 2001 before these laws have constituted into decentralized policy and implementation. The power vacuum that was left behind after the fall of the New Order regime caused some conflicting views among stakeholders about the right implementation of decentralized forest management. The blur of responsibilities, undetermined utilization rights for industries and local forest users and unclear agreements about tax collections gave local decision makers the incentive to make their own decisions. This led to regulatory disparities among regions (McCarthy, 2004; Yasmi et al., 2005)

Nowadays, it is thought that decentralization has, to some extent, led to the recognition and development of community forestry schemes throughout Indonesia. However, many local government actors believe that central governments are still too much in control in these schemes thereby making them too bureaucratic and cumbersome (Maryudi, 2011; Nugroho et al., 2011).

4.2.3 Development of Community Forestry programs

In Indonesia, the idea of community forestry was already carried out more than one century ago. In fact, the history of community forestry on Java dates back to the 19th century, when forestry management was under Dutch rule. In that period, the Dutch recognized the need of local communities to have access to cultivated land and forest resources for subsistence living. As a result, the first state-initiated community forestry program was introduced in 1873 under the name of *Taungya* system (or *Tumpang Sari*), which literally means “intercropping timber and agricultural crops. In this program, forest parcels were allocated to local farmers for a two-year period in which they were allowed to cultivate crops in exchange for tree planting and maintenance (notably teak trees (Tectona grandis L.)). In return for land preparation and the planting and tending of trees, farmers could get a small loan and use the parcels for crop cultivation between the tree stands. After two years, when the trees needed less nursing, farmers could get a new parcel if desired. This program was considered as a strategy to alleviate poverty, reduce illegal deforestation for agricultural practices and as a means to apply cheap reforestation (Budidarsono and Burgers, 2006; Djamhuri, 2012; Safitri, 2010).

After independence, the Indonesian government adopted several community forestry programs. Many studies have demonstrated that community forestry programs (before 2001) fell short in expectations. There was too little incentive for farmers for long-term implementation, due to the lack in land and resource tenure security. The plots were too small (0.10 ha - 0.25 ha) and the two-year cultivation period appeared to be too short to provide for sustainable revenues. In addition, some of the programs did not involve poor households; the program implementers preferred farmers with leadership skills or who had received higher education. The problems around Tumpang Sari increased

tremendously from the 1960s onwards, as population growth caused increased demand for forest parcels. This caused a too high competition for forest land which sequentially led to rent-seeking behaviour by local forest managers. For example, farmers suddenly had to pay to acquire a parcel and the cash payments for farming were reduced. The result was a failure in reforestation, due to increased forest encroachment by the local population (to meet their needs for forest resources) and the intensified production of teak and other timber products for quick profit-making (Djamhuri, 2012; Rosyadi et al., 2005).

To combat increased forest encroachment, the SFC introduced several community forestry programs, such as the Prosperity Approach (1972-1982) and the Forest Village Development Program (in Indonesian *Pembangunan Masyarakat Desa Hutan* (PMDH)) (1982-1986). Both programs aimed to improve the generated income from Tumpang Sari activities as well as other activities, such as beekeeping, silk farming or animal husbandry (Djamhuri, 2012; Fujiwara, 2012; Safitri, 2010). The idea was that forest encroachment could be reduced when poverty among the community was eradicated. The main difference between the Prosperity Approach and the PMDH is that PMDH participants were organised in collectives such as the Forest User Groups (FUGs) or Forest Village Community Organization (Lembaga Masyarakat Desa Hutan (LMDH)), with whom farmers had to share their income. Both programs did not succeed in reducing forest encroachments as they failed to alleviate poverty. Instead, the programs only benefitted the already privileged groups and the richer landowners. Next to that, the programs did not contribute to land allocation as they were supposed to. Rather, the lack of both tree and land tenure remained, which gave the farmers no incentive to manage forests in a sustainable manner (Djamhuri, 2012). The subsequent programs, namely the community forestry program (1986-1995) and the integrated village development program (1995-1999), failed as well. In these cases this was due to a corrupted SFC staff and the Asian crisis (1997) which even enhanced the prevailing poverty (Djamhuri, 2012; Fujiwara, 2012).

In 2001, the State Forest Company Perhutani initiated a well-known type of community forestry called Pengelolaan Hutan Bersama Masyarakat (PHBM), meaning 'joint forest management with communities'. This program offers profit-sharing of forest products which are allocated to the community forestry group as a whole. For example, PHBM implementation for pine forests on Java involves profit-sharing arrangements of 25% and 5% of timber and pine resin sales, respectively. Within PHBM, participants acquire access to land and resources for a two-year period during which the land rights still owe to the state. This means that the benefits for the participants coming from both timber harvest and crops are temporal (Fujiwara, 2012; Safitri, 2010). This program still has some challenges to cope with, such as raising satisfaction with program-participants, and in creating stable and adequate benefit-sharing schemes (Fujiwara et al., 2012).

The manner in which community forestry on Java is managed depends on the government institution that prevails in the region. Currently, government of Indonesia has designed and implemented at least nine types of community forestry schemes, aiming to meet wood demands, create better and decentralized forest management and realize increased living standards for forest communities. Next to state initiatives, there a limited set of private initiatives (Verchot et al., 2010, Rohadi et al., 2010; Fujiwara et al., 2012). Appendix A gives an impression of the CF-schemes present in Indonesia.

4.3 Hutan Rakyat in Gunung Kidul

4.3.1 Size and Characteristics

Hutan Rakyat, or Privately Owned Forest (POF), is a forest parcel privately owned and managed by one or several households. An example of HR-land is depicted in Figure 4.1. As mentioned before, POF is also referred to as smallholder tree production. According to the Ministry of Forestry (MoF), Hutan Rakyat is defined forest as owned and managed by local farmers comprising a minimum of 0.25 with a canopy closure of more than 50% of wood plants or a minimum of 500 trees per hectare during the first years after planting (Fujiwara et al., 2011). During the 32 year long reign of Suharto, the growth of teak for commercial purposes was prohibited (FGD 3, 2013). However, the growth of teak on smallholder farms was tolerated. From the 70s onwards, HR-area has tremendously increased. This is partly owing to the agrarian reform that occurred in Indonesia after the fall of Suharto which aimed to revitalize land allocation and to redistribute land equally. Currently, about 9% of the total 94 million hectares of forest area is covered by POFs (Kanninen, 2010).

Figure 4.1: HR-plantation on rocky grounds

Source: Author

Hutan Rakyat has increased the financial status of the farmers and functions as a safety net in times of hardship. Trees like Mahogany, Acacia and most importantly teak, have relatively high economic values and provide economic security to the household and its future generations. Originally, Hutan Rakyat consists of several types of tree and crop farming each having different characteristics. These different plantations are referred to as the home garden (Pekarangan), dry land (Tegalan), and forestland (Alas or Wono). However, in most cases (like in this study) the term of Hutan Rakyat is generally used when referring to Alas (Forestland) specifically. The other types of farming systems known in the research area are:

- Dryland (Tegalan): non-irrigated farmland principally used for the cultivation of agricultural crops both sometimes also for trees. Trees are either planted in the border of the plot or in rows between the crops (see Figure 4.2).
- Irrigated rice fields (Sawah): next to rice production, farmers sometimes plant teak (not intensively) along the borders (see Figure 4.3).
- Home-garden (Pekarangan): land surrounding the farmers' house often used for the cultivation of agricultural crops or other tree species. Trees are planted for either fruit or timber production.
- Forestland (Alas), tree (mainly teak) plantation mainly situated on rocky infertile land, unsuitable for crop production (Rohadi et al., 2012).

Figure 4.2: Dryland Agriculture. Intercropping of Corn and Cassava

Figure 4.3: Irrigated Rice field. Intercropping of Rice and Banana trees

Source: Author

As mentioned in Chapter 1.5.2, Privately Owned Forests have no basis in a professional private or public organization and is merely managed by local owners and communal farmer organizations. Hence, it has no formal management and planning systems and the harvest of trees is planned according to personal needs (*tebang butuh*). Consequently, the harvest of trees occurs even in immature states, without taking into consideration the increment of the lodge. As a result, the quality of the harvested teak is not sufficient for formal large scale and certified traders and industry. This is why these farmers have a low bargaining position and are obliged to sell their tree logs to the informal (local) market, where the offered prices are low and unstable (Kanninen, 2010; Fujiwara, 2012).

4.3.2 Recent developments

During the 1990s, the pressure on teak production started to increase. As state forests could not produce sufficient teak to meet the demand of wood processing industries, these started to focus on non-state wood production. The industries have come directly to the teak farmers villages to acquire teak from HR-plantations. The increased pressures on HR teak production have exacerbated immature cutting practices by local farmers. This results in higher pressures on the tree production, which reduces the quality of the produced timber and hence the price that farmers can get from it. Though the price of teak from HR has increased to some extent, the recent inflation makes genuine profit increases undone. The lack of official planning and management in HR-implementation makes HR-farmers more vulnerable to external shocks such as price fluctuations (Kanninen, 2010; Fujiwara, 2012).

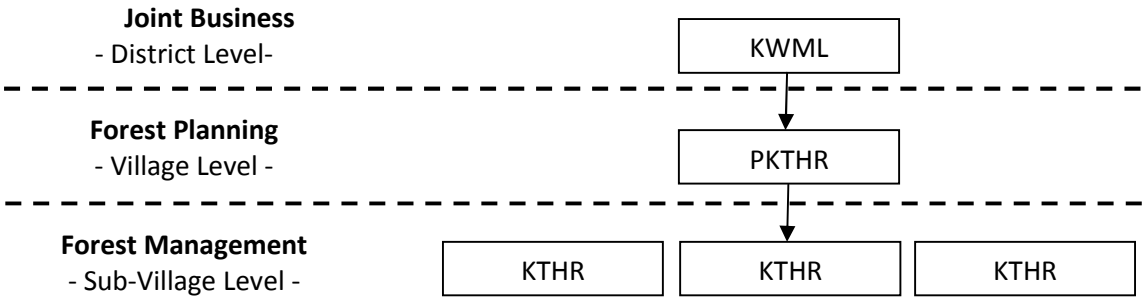
Several efforts have been carried out in order to improve the stability of wood supply and the (vulnerable) economic position of teak farmers. In 2004, a collaboration between the Centre of Community Forestry Studies (Pusat Kaijan Hutan Rakyat or PKHR) and the NGOs Shorea and Arupa resulted in a supporting project called Sustainable Privately Owned Forest Management Units (POFMU) or in Indonesian Rancang Bangun Unit Manajemen Hutan Rakyat Lestari (RB-UMHRL). The main focus point of this initiative was to strengthen HR-farmers through teak quality improvements, create sustainable HR-areas and mainstream the POFMU model. At the same time, a multi-stakeholder initiative named POKJA-HRL working group was established which researched the teak production potential of HR-farmers and designed a program for forest certification and establish a business plan for tree products. The stakeholders involved in this initiative are Forestry service at the district level, university scholars, local NGOs, and HR-farmer representatives (Fujiwara, 2012; Fujiwara et al., 2011; Interview Arupa, 2013).

The objectives of RB-UMHRL and POKJA-HRL groups are to reform HR-management and to create forest certification in order to create better access to markets and a premium and stable price for local farmers. To realize this, a cooperative association named Koperasi Wana Manunggal Lestari (KWML) was created in 2006. The KWML is the cooperative association operating at the district level. The village level and sub-village level are represented by the HR-farmer group association (Paguyuban Kelompok Tani Hutan Rakyat-PKTHR) and (Kelompok Tani Hutan Rakyat-KTHR) respectively. Figure 4.3 provides an overview of the current organization of HR-management (Rohadi et al., 2012; Fujiwara et al., 2011).

The aim of the KWML was to create a certified cooperate body to which HR-farmers can sell their teak logs. By means of a pilot project, the KWML manages the forest certification of three villages Kedung Keris, Dengok, and Girisekar within Gunung Kidul. This forest certification, exclusively designed for smallholder timber producers is also known as the Pengelolaan Hutan Berbasis

Masyarakat Lestari (PHBML) which is attached to the Indonesian Ecolabel Institute (Lembaga Ekolabel Indonesia or LEI). Next to that, the KWML has implemented several activities to improve farming revenues. First, the KWML has improved access to teak fertilizer, which would improve the teak growth. Second, a chainsaw lending program was set up, where farmers can borrow the saw when needed for harvest instead of using hand saws or axes. Third, workshops were provided for villagers in woodcarving activities (Fujiwara et al., 2011). More information concerned with the activities of the KWML and the threats and opportunities to genuinely improve HR-practices can be found in chapter 6.4.

Figure 4.4: Organization Structure of HR-



Source: Fujiwara et al., 2011

4.4 Hutan Kemasyarakatan management in Gunung Kidul

4.4.1 Size and characteristics

The Hutan Kemasyarakatan (HKm) program has the longest history among the state-led Community Forestry initiatives in Indonesia. The HKm-scheme is set up with two broad aims. The first is to rehabilitate state forests that had been so severely neglected and destructed before and during the economic crisis in 1998. The second aim is to empower the local rural populations by providing secured rights to forest resources and involving them in forest management through participatory action. In practice, farmer members participate in state forest management through planting, managing and helping government employees with pruning and thinning practices. In return, farmers get a 60% share of the eventual income from tree harvest. In addition, farmers are allowed to grow crops between the tree stands of which the revenues entirely belong to the farmer (Devkota, 2010; Nugroho et al., 2011; Djamhuri, 2008). Gunung Kidul was one of several districts in Indonesia where the implementation of HKm started (Nugroho et al., 2011). Though the establishment of HKm-forest programs was already in 1995, only under pressure of the university forestry experts and local NGO did the state manage to complete the program in 2007 (Interview Shorea, 2013; Djamhuri, 2008). HKm was implemented within three provinces across Indonesia, namely in Lampung (Sumatra), West Nusa Tenggara (Lesser Sunda) and Yogyakarta Province (Java), covering a total surface of 8,873.89 ha in total (Ota, 2011; Djamhuri, 2008). In 2007, HKm-forest in Gunung Kidul regency covered 1,087.65 ha of land and reaches an annual timber production of approximately 90,000 m^3. This HKm-forestland is managed by approximately 3420 households registered in 35 HKm-farmer committees. The land availability per HKm-household comes down to 0,32 ha per household (Interview PFS, 2013).

In HKm-programs the participating community has several regulations they are asked to live by. Primarily, the status of forestland must remain in good condition. HKm-members have secured rights for non-timber forest products (NTFP) like wild fodder (used as animal feed); fallen or dead branches (used for fuelwood); teak leaf cocoons and wild medicine crops. Also, farmers have access to plant and harvest food or medicinal crops, but only in the early stage of the program. Next to that, there is limited access to harvest fuelwood and use of forest areas for animal grazing (FGD 4, 2013; Ota, 2011; Krott, 2012; Maryudi, 2011). Rights for timber production are defined in the profit sharing arrangements. For a long time, the profit sharing arrangements between the farmer groups and the government remained vague. Not before May 2009, both stakeholders agreed upon a profit-sharing arrangement of 40% for the state, and 60% to the farmer group. These arrangements are taken care of after the state has gained 10% of the total wood profits under the name of Forest Resource Commission Tax (Provisi Sumber Daya Hutan: PSDH) (Interview PFS, 2013; Ota, 2011). Additional incomes in HKm can be made through planned forest activities, like reforestation programs which include tree planting and nursing, but also thinning (selective logging) and logging. The forest users are prohibited to sell agro-forest parcels, to hunt in the forests or to cut trees or branches (FGD 4, 2013; Krott, 2012; Maryudi, 2011).

4.4.2 Planning and structure

Though the implementation of HKm is a bit different among farmer groups and villages, a general idea of the planning is as follows. Since 2001, the concrete administrative bases were settled. After several meetings of HKm-farmers groups, internal regulations and the operation plan were established and it was decided which farmers would participate in the program. In 2003 and 2004, tree seedlings were provided to the farmers. Only in 2007, the official regulations and objectives of

HKm community forestry were accepted and the HKm-farmer committees were legally established by the government under the status of IUPHKm (Interview Shorea, 2013; Ota, 2011). Though some HKm-committees planted Acacia (Acacia mangium) and Mahogany (Swietenia mahagoni), the predominant tree species is teak (Ota, 2011). Planting requirements were not fixed and largely depend on the suitability of the soil. Some areas of Gunung Kidul are rather mountainous and therefore less predictable when it comes to tree planting. The tree planting intervals ranges from 4*2 m to 6*2 m or 6*4 m grids (Interview PFS, 2013; Ota, 2011). Though some of the interviewed HKm-members have indicated that the farmers themselves had to pay for fertilizer and tree seeds, several authors point out that these products have always been provided by the government (though probably not always in time) (Ota, 2011; Interview PFS, 2013; Interview Himmah, 2013).

Figure 4.5: HKm-forest plot. Some remainders of cassava crops are visible.

Source: Author

4.5 Crop production and State forests

In addition to Community Forestry schemes, the reasonable share of the interviewed farmers has access to state forests for crop production. This practice, in Indonesian is referred to as *Baon*, is similar to Tumpang Sari. The main difference is that in Baon, crop production is allowed for an undetermined amount of time. There is no fixed government regulation provided for this practice, so secure rights for forest resources are not provided. For governments this serves as a method to combat forest encroachment by the local population. Instead of forbidding the access to forest resources, which stimulates illegal forest uses, crop production of the forest is tolerated under the precondition that the tree stands are not damaged. For farmers, the access to farmland next to their private land provides, although in most cases only temporarily, additional income to the household (Interview PFS, 2013; interviews heads of farmer groups).

The type of tree species on the state forest plot determines the extent to which crop cultivation is possible. State forests with Kayu Putih (Melaleuca cajuputi), a species used for medicinal production (see Figure 4.2), have good farming opportunities. The tree stands of Kayu Putih are planted with a considerable space in between which leaves enough space left for crop growth. Besides, the leaves of the Kayu Putih trees are harvested every year for medicinal purposes. For this reason, the tree stands stay relatively small and cause little competition for light, leaving good opportunities for crop cultivation. Teak, Mahogany or Acacia plantations on the other hand only allow crop production for

Figure 4.6: State forest Kayu Putih Plantations where crop local farmers are allowed to cultivate crops

Source: Author

4.6 Conclusion

This chapter dealt with the development and current status of Community Forestry schemes in Gunung Kidul regency. In Gunung Kidul regency, generally two types of CF-schemes can be identified. First, Privately Owned Forest (POF) management or in Indonesian Hutan Rakyat (HR), is the cultivation of trees by smallholders on private land. This initiative started already in the 1970s by local farmers who sought to diversify their agricultural activities by cultivating trees. Additionally, it was seen as the solution to improve the environmental conditions (soil quality and water availability) in order to stimulate crop productivity. The second CF-scheme in Gunung Kidul regency is Hutan Kemasyarakatan (HKm), which is a state-led initiative aiming for state forest rehabilitation while involving local communities in order to reduce poverty in the region. The program was introduced in 1995 and got officially implemented in 2007. Farmer members participate in state forest management through planting, managing and helping government employees with pruning and thinning practices. Profit sharing arrangements amount a 60% for the local population against 40% for the state.

The following chapter (5) will go into detail about the impact of these CF-schemes on the livelihoods of the local community. After that, chapter 6 provides more insight in the threats and opportunities that are concerned with the current implementation of CF-schemes.

5. Rural Livelihoods in Gunung Kidul regency

5.1 Introduction

The previous chapter dealt with the development of forest management in Indonesia and Java, with a special focus on Community Forestry in Gunung Kidul regency. This chapter elaborates on the effects of Community Forestry programs, named Hutan Rakyat and Hutan Kemasyarakatan, on livelihood strategies and capitals of rural households in Gunung Kidul regency. It shows whether there is a difference in livelihood strategies and capital between Community Forestry members and non-members and how these differences can be explained. This livelihood analysis is conducted with the aid of both qualitative (FGDs and interviews with key informants) and quantitative (household survey SPSS results) research methods.

5.2 Livelihood strategies

As is obvious for rural areas, livelihood strategies in Gunung Kidul regency mainly convey a range of agricultural activities. The principal livelihood strategy is food crop cultivation the most common food crops are rice, cassava, corn, peanut and soy bean. In a lesser extent, vegetables like long bean, spinach and eggplant and fruits like banana, mango, papaya and coconut are grown, but this is rather on a small scale and often solely produced in the home garden. The larger part of the agricultural production is sold to the market, though this depends on the exact production and needs for household food consumption. Depending on the rainfall amounts per year, agricultural production in Gunung Kidul regency is either practices on dryland (*ladang*) or irrigated riceland (*sawah*). As mentioned in chapter 3.2 the sub-districts Nglipar and Panggang have large differences in amounts of rainfall per year. The more abundant rainfall in Nglipar creates possibilities for (ricefield) irrigation and for two harvests a year. Panggang sub-district however lacks this abundant rainfall. This explains the fact that harvesting of all crops except for peanut can only be done once a year, and farmland irrigation is infeasible.

In some villages across Gunung Kidul regency, for example in Kedung Keris or Girisekar, farmers can acquire access to state forestland for crop cultivation. This provides farmers an additional income from crop growth, albeit in some cases only for a limited number of years. As mentioned in the previous chapter (4), the period in which crop growth on forest parcels is possible strongly relates to the type of trees grown.

Besides crop production on agricultural or forestland, farmers tend to diversify their sources of income through livestock activities. However, the capacity of the household determines if and in what measure livestock activities take place. The most common farm animals are principally chicken, goats, cows and occasionally ducks. The reason for keeping livestock is either for breeding (keeping female animals and selling their juvenile offspring) or raising practices (raise juvenile animals until they are older and more valuable). In only a few cases the animals were used for own consumption.

If potential labour capacity in the household is large, or access to land is limited, some of the household members tend to find jobs off-farm. Common off-farm activities for men often involve house construction, furniture making, or charcoal production. For women, the food production activities through so-called home-industries are more common. The main products that are produced in these home-industries are crackers (*Kroepoek* or *Kripik*), made from a variety of crops, like cassava, rice or banana or tempe.

Other ways in which respondents generate income is through loan systems, subsidies or remittances. This is further explain in the next paragraph (5.3).

5.2.1 Livelihood strategies of HR-members

Chapter 4 already provided an overview of the main activities involved in privately owned forest management. In the HR-villages Girisekar and Kedung Keris, almost all farmers were involved in HR-management. The people that did not have HR were either old farmers, women headed households, or people working off-farm. Private forest management can also be found in the HKm-villages Katongan and Girisuko, though these villages do not have organized HR-groups like in Kedung Keris and Girisekar. In these villages, both HKm-members and non-members invested in tree growth on their own land. All HR-respondents throughout the four villages owned a POF-land varying from 0,1 ha (and less) to 2,5 ha. Each of the HR-respondents had planted teak as the predominant tree species (not less than 70% of the total tree stands) and Mahogany and Acacia trees as additional species. HR-farmers could only give a rough estimation of the number of trees as they did not regularly count them. As is demonstrated in Table 5.1 the number of trees per hectare is highly variable. Especially average tree growth in Kedung Keris and Katongan show a high average number of tree per hectare. In these cases, the respondents had predominantly juvenile tree stands that can grow much denser than older trees. The size of the POF-land therefore gives a better indication of the potential capital of timber resources.

Table 5.1: Characteristics of POF land in the research villages.

Village	Kedung Keris	Girisekar	Katongan	Girisuko
CF-type	HR	HR	HKm	HKm
Nr of HR-respondents	14	16	7	11
Average plot size	0,45	0,66	0,63	0,43
Nr of trees per plot	680	658	464	305
Nr of trees per ha	1597	759	2458	694

Advantages and Disadvantages of HR-management

Smallholder teak production involves some advantages and disadvantages for rural households. Most farmers grow teak for trading purposes (56%), which provides additional income and financial security, or grow it for the production of construction material (24%) (see Figure 5.1). Mahogany and Acacia species are grown for making animal cages on the farmland or for timber production. Only sporadically, HR-farmers grow crops between the tree stands. The cultivation of crops for fodder is more common.

Only a minority of the respondents mentioned some drawbacks of HR-management. 20% of the respondents were bothered with a crop production decrease due to tree growth. Another 8% argues that the revenues from tree production can only be acquired on the long term, so one has to be patient.

Figure 5.1: Advantages in HR-management

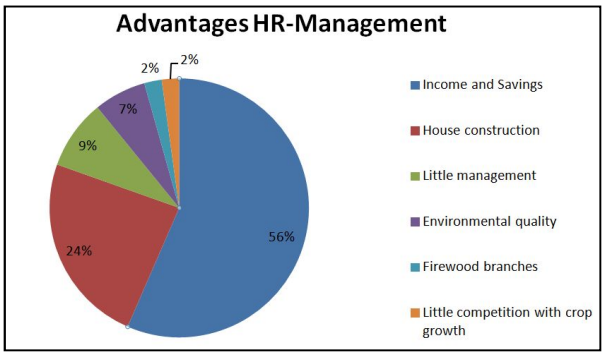
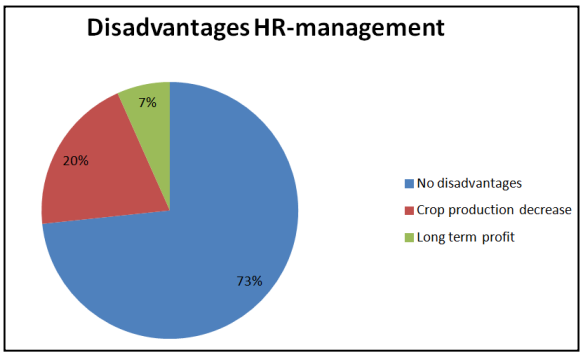


Figure 5.2: Disadvantages in HR-management



Livelihood Strategies

The livelihood strategies of all respondents were partly or entirely based on agricultural activities. Livelihood diversification contributes to the financial security of the household. Table 5.2 demonstrates the extent to which livelihood diversification takes place outside farming activities in the HR-villages Kedung Keris and Girisekar. Farming activities include crop and tree cultivation and livestock activities. Hence, all households that have only one livelihood strategy are entirely focused on agricultural practices. The results show that the number of off-farm activities in which households are involved is not that much different between HR-members and non-members. However, the income generated from these activities is much higher for non-members, as is further elaborated upon in chapter 5. This is due to the fact that non-members miss out on the revenues gained from HR-practices and hence need to compensate through other activities.

Table 5.2: Number of Livelihood strategies for HR-member and non-members in Kedung Keris and Girisekar

Nr of Livelihood Strategies	HR				Total farmers
	HR-Members		Non-members		
	N	%	N	%	N
1	13	42,0%	4	44,4%	17
2	12	38,7%	4	44,4%	16
3	6	19,4%	1	11,1%	7
Total	31	100%	9	100%	40

5.2.2 Livelihood strategies of Hkm-members

HKm-members and non-members were interviewed in Katongan and Girisuko. Table 5.3 gives an impression of the average size of the forest plots owned by HKm-members. The HKm-plantations always involve teak plantations and the total HKm-forest size is varying per region. No explanation can be found for the larger average plot size in Katongan compared to Girisuko.

Table 5.3: Average plot size of HKm per village

Village	Katongan	Girisuko
Number of HKm-repondents	12	10
Plot size (ha)	0,425	0,298
Total HKm-plot size (ha)	100	35

Source: Primary data and PFS (2013)

Advantages and Disadvantages of HR-management

There is little disagreement among HKm-farmers about the advantages and disadvantages of being involved in HKm Community Forestry. HKm-farmers mention the short term extra income from crop growth and the long term timber profit as the main advantages. Other representative quotes made by HKm-farmers with reference to the advantages of being involved in the program are:

"HKm provides me an extra plot of land next my own parcels. It generates an additional income, for which I am thankful".

"I am happy to help the government to make this region greener"

Nevertheless, farmers can be critical about the program. First, all HKm-farmers in Katongan and Girisuko dealt with decreasing crop production on the forestland. The competition for light becomes critical for crop growth when the canopy of the trees closes. The principal crops cultivated on the forest plots were peanut, corn and cassava, and fodder for animal feed. In general, after 3 to 5 years after tree planting, crop growth decreases to a mere 10%. The exact number of years in this depends on the type and growing rate of the trees and the location of the plot. If planted on a hilly area, crops receive more light than if they are planted on a flat area. Chapter 6 discusses in more detail how HKm affects the local food production.

Another point of critique is that becoming an HKm-member in both of these villages is practically impossible. Due to limited government control on state forest, forestland was extensively and informally used by local farmers for agricultural purposes (Ota, 2011). The majority of the farmers that already had access to the forestland are the ones who are now involved in HKm. Hence, the chance to become HKm-member without having earlier access to state forest in the first place is hardly possible. The only way to acquire land is through inheritance or buying it from other farmers. The latter is unlikely to happen as HKm-farmers are in most cases reluctant to sell their land (FGDs Katongan and Girisuko).

Another disadvantage that farmers mention is that they are uncertain whether the state will genuinely share the promised profits, namely according to the 60/40 percent arrangements. They fear that the political leaders will easily change the profit sharing arrangements by the time the timber profits should be paid off. This topic is further discussed in Chapter 6.4.2.

Livelihood Strategies

Table 5.4 provides insight in the degree into which HKm-members and non-members diversify their income through off-farm activities. The results demonstrate that non-member households invest more workforces in off-farm activities than HKm-members. It is apparent that HKm-farmers feel less urge to invest in off-farm activities as they generate higher income from agricultural and forest farming. More data on the financial contribution of off-farm activities are presented in chapter 5.3.5.

Table 5.4: Number of Livelihood strategies for HKm-member and non-members in Katongan and Girisuko

Nr of Livelihood Strategies	HKm				Total
	Members		Non-members		
	N	%	N	%	N
1	12	54,5%	7	38,9%	19
2	6	27,3%	9	50,0%	15
3	4	18,2%	2	11,1%	6
Total	22	100%	18	100%	40

5.3 Livelihood assets

5.3.1 Human Capital

Human Capital is generated through household labour capacity, education and skills. None of these variables seem to be determined by CF-participation.

Labour capacity

The engagement of a household in HR is strongly determined by the household labour capacity, relating to the age and health situation of the household members. As appeared from the interviews and FGDs, women-headed households or elderly couples are seldom engaged in HR because they cannot bare the intensive work involving POF-management (cutting branches and tree stands). In this respect, the household labour capacity is an important determinant for HR-involvement.

The involvement of HKm-members is not so much determined by the labour capacity. Older people still aim to participate in such schemes as they only have to do the planting and managing of the trees, and the tree harvesting will be for next generations.

Education in the research villages

Table 5.5 presents the households level of education among the four research villages. The villages show no exceptional differences concerning access to education. In all villages, primary and secondary schooling was located within 2 and 7 km from the households, respectively. The household respondents made clear that the villages´ access to education has experienced considerable improvement during the last 20 years. Where the larger part of people older than 50 years old only attended primary school (men as well as women), almost all members of the youngest generations went through secondary schooling.

Table 5.5: Household education level in the 4 research villages.

Level of education	HR-villages						HKm-Villages						Total	
	Kedung Keris		Girisekar		Sub-Total		Katongan		Girisuko		Sub-Total			
	N	%	N	%	N	%	N	%	N	%	N	%	N	%
No education	-	-	1	5%	1	2,5%	-	-	1	5%	1	2,5%	2	2,5%
Primary School	3	15%	5	25%	8	20%	6	30%	8	40%	14	35%	22	27,5%
Junior High School	8	40%	2	10%	10	25%	3	15%	6	30%	9	22,5%	19	23,75%
Senior High School	8	40%	9	45%	17	42,5%	10	50%	5	25%	15	37,5%	32	40%
University	0	0%	1	5%	1	2,5%	1	5%	0	-	1	2,5%	2	2,5%
Unknown	1	5%	2	10%	3	7,5%	0	-	0	-	0	-	3	3,75%
Total	20	100%	20	100%	40	100%	20	100%	20	100%	40	100%	80	100%

Education CF-members and non-members

The regression analyses that were carried out to measure the relation between the level of education and CF-involvement showed no significant results. Tables 5.6 and 5.7 demonstrate the highest level of education within HR-villages and HKm-villages. These data show that HR- and HKm-members have a slightly higher participation in junior and senior high school. It is probable that the additional income that is provided by CF-membership offer households the opportunity to pay for secondary schooling fees.

Table 5.6: Highest level of Achieved education for HR-villages

Highest Achieved Education	HR-members		Non-members		Total	
	N	%	N	%	N	%
No education	1	3,2%	0	0	1	2,5%
Primary School	8	25,8%	3	33,3%	11	27,5%
Junior High School	4	12,9%	1	11,1%	5	12,5%
Senior High School	16	51,6%	4	44,4%	20	50%
University	1	3,2%	0	0%	1	2,5%
Unknown	1	3,2%	1	11,1%	1	2,5%
Total	31	100%	9	100%	40	100%

Table 5.7: Highest level of Achieved education for HKm-villages

Highest Achieved Education	HKm-members		Non-members		Total	
	N	%	N	%	N	%
No education	0	0	0	0	0	0
Primary School	8	36,4%	7	38,9%	15	37,5%
Junior High School	7	31,8%	2	11,1%	9	22,5%
Senior High School	7	31,8%	8	44,4%	15	37,5%
University	0	0	1	5,5%	1	2,5%
Unknown	0	0	0	0	0	
Total	22	100%	18	100%	40	100%

Skills

To increase the skills of the population in Gunung Kidul, villages have received several forms of support from local NGOs, University of Gadjah Mada, and the local government. The NGO's Arupa and Shorea have conducted several programs aiming to increase the standard of living farmers in the area. For example, it has provided the local communities with sowing equipment, furniture machines, micro-credits and workshops. This was thought to both enhance the value added of the wood sold and increase knowledge about how wood production and selling can become more economically viable. The workshops were used to train the farmers in furniture making, managing home industries, and to improve knowledge about rearing livestock. Though most of the farmers did indicate that the workshops were of great importance to their current knowledge about wood production management, complaints about the furniture equipment are nevertheless existent. First of all, they complained that the furniture equipment is provided as a loan, and farmers have to pay it back with the revenues gained from the furniture businesses. However, the profits of the furniture production were merely gained, due to insufficient access to markets. As a result, farmers get a debt,

although this will eventually be extinguished. In addition, the furniture equipment will no longer work due to the little maintenance of the machinery (Interview key informant 1, 2013).

5.3.2 Social Capital

Social capital involves the access to social networks and the social cohesion in the village. The estimation of household social capital takes into account the involvement in Gotong Royong and Social Organizations.

Gotong Royong

In Gunung Kidul regency, Mutual Assistance (Gotong Royong) is commonly practiced. Gotong Royong is a form of community based labour exchange, where people are socially obliged to help each other out in busy or difficult times. It is mostly applied throughout busy times on the farmland, such as during land preparation, planting, weeding and harvesting. Next to that, Gotong Royong is also used for ceremonies like weddings or funerals, where people need help for cooking, cleaning or construction activities. In most cases, Gotong Royong substantially adds to the social capital in the villages, as people can ask for help whenever needed. However, some respondents have indicated that Gotong Royong can be a burden to the financial situation of households. In all research villages it became clear that agricultural workers (who make a living by working on other farms) are disadvantaged by this practice. People are less willing to hire workers when they can demand the community for help though Gotong Royong. Another disadvantage of Gotong Royong is that it costs a lot of financial capital. The villagers of Girisekar indicate that villagers are obliged to offer relatively large amounts of gifts (often a part of their yield) to other households who organize the ceremonies. Respondents indicated that if they have to attend several ceremonies in one month, they have difficulties making ends meet. These same respondents suggested changing the communal based agreement concerning gifts, so their financial security remains more stable.

Though the set-up of Gotong Royong is somewhat different among villages, CF-members and non-members show the same type of involvement. Therefore CF-involvement does not influence Gotong Royong.

Social organizations and memberships

Next to Gotong Royong practices, villagers are involved in different kinds of local groups and networks. Both HR-members and HKm-members are organized in special HR- or HKm-groups. HR-groups are set up with the aim to exchange skills and knowledge on how to plant, manage and harvest the tree stands. During these meetings people can indicate whether they are in need of help for tree farming through Gotong Royong. In Kedung Keris, HR-members still gather every month, yet in Girisekar people hardly gather anymore, as they feel no need to. Chapter 4.4 already provided the necessary information on how HKm-groups are organized.

Next to CF-groups, farmers are involved in women groups (PKK), farmer groups, youth groups and Wisma Desa. The latter is a local based working group in which participants share and communally manage an agricultural plot and share a loan system (see next section). The number of memberships within a household depends on the household size and the household's involvement in CF. In Table 5.8 is visible that Hkm-members are better represented in social groups than non-members. HR-members and non-members are evenly involved in memberships, since non-members often choose

additional groups to be involved in, like the PKK or Wisma Desa. Hence, the number of memberships of HR-members and non-members are quite the same.

Table 5.8: Organized group memberships of CF-members and non members

Nr. of Group memberships	HR-villages				HKm-villages				Total
	HR		Non-HR		HKm		Non-HKm		
	N	%	N	%	N	%	N	%	N
0	1	3,2%	1	11,1%	0	-	1	5,6%	3
1	17	54,8%	5	55,5%	5	22,7%	10	55,6%	37
2	8	25,8%	1	11,1%	4	18,2%	4	22,2%	17
3	3	9,6%	2	22,2%	10	45,4%	2	11,1%	17
4	2	6,5%	0	-	2	9,0%	1	5,6%	5
5	0	-	0	-	1	4,5%	0	0%	1
Total	31	100%	9	100%	22	100%	18	100%	80

Access to Loan systems

Access to loan systems provide households financial security as they can borrow money when in special need. These loan systems are mainly provided in an informal form (Pinjaman) within communal groups. Next to that, people often make use of Arisan, which is a lottery provided for all who are interested in participating. The idea is that all participants stake a certain amount of money and every two months 1 or 2 participants win a price such as a motorcycle or a television. When farmers are not member of a certain communal group they lack the access to informal loan systems and Arisan. However, households like this are rare. Only households with considerably elderly people are sometimes not participating in a group, as they lack the energy to participate. As both CF-members and non-members are well represented in social organizations no difference in access to loan systems can be indicated.

5.3.3 Natural Capital

Natural capital is of crucial importance to rural livelihoods. To make farming financially viable, soil and water resources must be in workable condition and there must be sufficient access to land to make crop productions profitable. As a matter of fact, an important cause of rural poverty is the lack of access to land and crop failures (FAO, 2009). The latter is related to insufficient protection measures against unpredictable or extreme weather events, which is strongly linked to Physical Capital.

The analysis shows that the access to land in particular is smaller for non-members relative to HR- and HKm- members. Hence, CF-programs have a positive influence on natural capital.

Access to land

Access to land is an important factor in staying out of extreme poverty. The majority of respondents possessed their own agricultural plot for crop or tree cultivation. The few interviewed landless farmers either had access to the land of their parents or relatives working with profit sharing arrangements, or worked as agricultural workers elsewhere. In Gunung Kidul, new land is difficult to acquire and households mainly gain access to land through inheritance or by buying land from their neighbours.

The security of land tenure for the local households is not straightforward, although farmers do not risk land eviction or land grabbing (Interview key informants 1;2;3;5, 2013). Most of the land is certified as “model-D” land (Nglipar) or “Model-E” land (Panggang). Both of these models have been established about 2 generations ago, when land measurements were done by the farmer itself. The certificate is only valid at the village level. National land registration is possible, but due to the high cost involved (requires work of government officials), farmers often stick to the Model-D or E certificate (Interviews heads of farmer group, 2013).

Table 5.9 presents the access to land per allocation for HR-, HKm- and non-members. Clearly, HR-members have more access to land than non-members. In both Kedung Keris and Girisekar, the difference in total access to land is more than 1 hectare. Non-members not only seem to run short in HR-land (excluding HR-land, the difference is 0,6 ha). The access to agricultural land used for *sawah* or *ladang* is also smaller compared to HR-members.

As for HKm-members and non-members, the difference in access to land is considerably smaller. This is related to the fact that non-members compensate for their HKm-exclusion by investing in POF and agriculture.

Table 5.9 Average size of land per land use type per household in hectares (ha)

	Kedung Keris		**Katongan**		**Girisekar**		**Girisuko**	
CF-involvement	HR	Non-HR	HKm	Non-HKm	HR	Non-HR	Hkm	Non-Hkm
HKm-land (ha)	0	0	0,43	0	0	0	0,28	0
HR-land (ha)	0,42	0	0,18	0,18	0,68	0	0,20	0,28
State forestland (ha)	0,52	0,53	0,1	0,08	0,28	0	0,39	0,20
Homegarden (ha)	0,15	0,11	0,07	0,21	0,02	0,04	0,08	0,17
Agriculture (ha)	0,22	0,04	0,33	0,30	0,45	0,29	0,27	0,25
Total land (ha)	1,37	0,34	1,09	0,74	1,44	0,32	0,94	0,89
Difference Members and Non-members (ha)	**1,03**		**0,35**		**1,12**		**0,05**	

Ownership of Fish ponds

Raising fish in private fish pond, as depicted in Figure 5.3 is a very common practice in Kedung Keris, yet farmers in Katongan, Girisekar and Girisuko are hardly familiar with this practice. The reason for this difference is that villagers in Kedung Keris have been motivated to invest in fish ponds through workshops provided by the government and the PKHR. In Girisekar and Girisuko, respondents pointed out that managing a fish pond all year through is difficult; this due to the limited water availability in the dry season. In Katongan, where the climate does allow for raising fish, farmers found the investment costs for fish ponds to high. The main purpose of having a fish pond was for own consumption, yet some farmers raised the fish for selling purposes. No distinction is made between CF-members and non-members, due to a limited number of farmers raising fish.

Figure 5.3: Private fish pond in Kedung Keris

Figure 5.4: Animal cages in Girisuko

Source: Author

Ownership of livestock

The ownership of livestock (see Figure 5.4) contributes largely to the financial security of the farmers, as it a. As mentioned before, livestock is primarily kept for selling purposes and to a lesser extent used for own consumption. The local government stimulates livestock activities by providing female cows for primarily four farmers in the village. These farmers are supposed to raise the female cow until it had reproduced. While keeping the offspring, farmers were obliged to bring the female cow to the next farmer in the village in order to provide them the same opportunity for profit. The extents to which these programs yield result appear to be bound to the location. As is visible in Tables 5.10 and 5.11, the households in Girisekar and Girisuko, situated in the relatively dry area Panggang, have less access to livestock activities when compared to those households in the other two villages (in sub-district Nglipar). The failure of livestock programs is related to the fact that villagers in Girisuko and Giriseker generate fewer revenues from agricultural practices as a consequence of the limited rainfall. For this reason, farmers in these villages are more likely to sell the livestock they posses when they are in need of money. The crux is that no reproduction can be realized when all livestock is sold, and hence no additional income can be provided anymore (FGD Girisekar, 2013).

Beforehand, it was presumed that CF non-members are likely to invest more in livestock as a substitute for CF-exclusion. Nevertheless, the tables below show that livestock ownership is in almost all cases higher for CF-members than for non-members. No explanations can be found for the few exceptions where non-members own more livestock (indicated in bold).

Table 5.10: Average number of animals owned by households in HR-villages

Village	**Kedung Keris**			**Girisekar**		
CF-involvement	HR	Non-HR	Village average	HR	Non-HR	Village average
Cows	1,53	1	1,4	1,06	0,5	0,95
Goats	2,73	1,4	2,4	1,44	0	1,15
Chickens	16,7	**24**	18,6	7,56	2	6,45

Table 5.11: Average number of animals owned by households in HKm-villages

Village	Katongan			Girisuko		
CF-involvement	HKm	Non-Hkm	Village average	HKm	Non-Hkm	Village average
Cows	1,8	1,3	1,6	1,6	1	1,3
Goats	1,7	**2,8**	2,2	4,1	2,3	3,2
Chickens	10,8	7,1	9,4	5,7	5,1	5,4

Quality of soil

Households were asked to give an indication of the soil fertility of their farmland, whether this fertility had changed over the years and why. Naturally, the experienced changes in soil fertility were entirely dependent on the amount of fertilizer used. All farmers revealed that without the use of fertilizer, crop growth was not economically viable. They mostly use organic fertilizer provided by the village cows. If farmers could afford it they used artificial fertilizer, which resulted in a much higher crop yields than organic fertilizer. The demand for fertilizer in Gunung Kidul is high and many farmers have asked for government support for fertilizer in the general remarks section of the questionnaire. More information on the access to fertilizer is described in the next sub-paragraph (5.3.4).

5.3.4 Physical Capital

Physical capital in this research is determined by the availability of infrastructure, the quality of housing and the access to agricultural equipment. These assets are extremely important in rural areas as they (literally) pave the way for economic development. The regression and correlation analysis demonstrated no significant correlations between the quality of housing and the HKm- or HR-membership. However, there is a slight difference in access to agricultural equipment, as presented in the following section.

Quality of housing

Quality of housing is related to the quality of building materials of the walls and floor. The Regression analysis and the results presented in Table 5.12 show no significant or interesting differences between the CF-members and non-members.

Table 5.12: Quality of housing for HKm- and HR-members and non-members

Quality of housing	excellent		good		average		bad	
	N	%	N	%	N	%	N	%
HR	6	19,4%	13	41,9%	11	35,5%	1	3,2%
Non-HR	2	22,2%	2	22,2%	5	55,6%	0	0%
HKm	4	18,2%	6	27,3%	11	50%	1	5,5%
Non-Hkm	3	16,7%	9	50%	6	33,3%	0	0%

Access to electricity

The electricity provision in the research area was considerably good. All household respondents had access to electricity, though in some cases the current was not strong enough to supply more than a few electrical devices.

Access to main road

Main roads were in good condition. Smaller roads towards more remote areas often consisted of only 2 small pathways made of cement and were often in a bad condition (see Figure 5.5). Distance to the main road was initially taken as an important element to determine physical capital. However, this variable was left out of the analysis as all respondents had access to the small roads which led to the main road within 2 kilometres.

Access to drinking water

Households in Gunung Kidul use different sources of water such as shared or private water wells (see Figure 5.6), piped water, river water and sometimes rainwater. All households have access to drinking water either through private or shared water provisions. The water availability is determined by the local climate. As is indicated in chapter 3.2 the sub-district Panggang copes with more widespread water shortages than sub-district Nglipar. Besides, the drinking water service is little developed in the village Girisuko (Panggang). In this village, households are obliged to use rainwater for cooking and washing purposes and poorer households even use rain water for consumption. This is because although the piping system along the main road is already constructed, the water current will not run until December 2014 at the earliest (FGD, Girisuko). Households situated more than 50 meters from the main road still do not have access to the pipes. Whenever these will be provided remains unclear. Water provisions are therefore region specific and not dependent on whether or not a household is involved in CF or not.

Figure 5.5: Village road in Kedung Keris

Figure 5.6: Water well in Kedung Keris

Source: Author

Access to household goods

The household appliances presented in Table 5.13 were beforehand considered as important indicators for physical wealth. The motor cycle is an important means to transport people or goods to markets for agricultural purposes (transport of fodder or crops) or personal reasons. Important communication devices are the cell phone for personal communication and the television for information and education. Only a small part of the respondents did not have these devices in their possession. The gas stove is more expensive compared to the woodstove but causes a less damaging effect on human respiratory health. A fridge is very useful for food conservation, though it makes up for a relatively high investment and electricity costs. Hence, the gas stove and the fridge are appliances that only the wealthiest households can afford.

The linear regression analysis conducted to measure the relationship between the physical wealth, expressed in possession of household appliances, and the CF-involvement show no significant results. As is presented in Table 5.13, all CF-members and non-members have a similar distribution of household goods.

Table 5.13: Ownership of household appliances of CF-members and non-members

Household appliances	HKm (22)		Non-HKm (18)		HR (31)		Non-HR (9)	
	Yes	No	Yes	No	Yes	No	Yes	No
Gas stove	9	13	8	10	12	19	3	6
TV	22	0	18	0	29	2	7	2
Telephone	20	2	18	0	29	2	7	2
Fridge	8	14	5	13	5	26	0	9
Motorbike	16	6	15	3	24	7	6	3

Equipment for Agricultural practices

The use of pesticides is quite equal for HR-, HKm-members and non-members (see Table 5.14). The access to land preparation methods like a diesel machine for irrigation or a tractor for ploughing is different for members and non-members (Table 5.15). HR- and HKm-members more often possess land preparation equipment than non-members. The fact that CF-members possess more agricultural land would explain they are more in need for this equipment. The use of this equipment for smaller plots of land is expensive, as the investment costs hardly outweigh the yield profits.

Table 5.14: Use of fertilizer and pesticides of HR- and HKm-members and non-members

Fertilizer and pesticides	HR		Non-HR		HKm		Non-Hkm	
	N	%	N	%	N	%	N	%
Both fertilizer and pesticides	12	39%	3	33%	11	50%	9	50%
Only fertilizer	19	61%	6	67%	11	50%	9	50%
Total	31	100%	9	100%	22	100%	18	100%

Table 5.15: Use of land preparation methods of HR- and HKm-members and non-members

Land preparation methods	HR		Non-HR		HKm		Non-Hkm	
	N	%	N	%	N	%	N	%
Diesel machine or tractor	18	58%	2	22%	7	32%	3	17%
Only manual	13	42%	7	78%	15	68%	15	83%
Total	31	100%	9	100%	22	100%	18	100%

5.3.5 Financial Capital

As defined in the Methodological Framework, financial capital of households is estimated by the household income and the financial security.

Household cash Income

The household cash income is derived from the households´ agricultural production plus the yearly income generated from off-farm activities. The results of the average annual agricultural capital and off-farm income per household are presented in Table 5.16. The table shows a clear distinction in income diversification between CF-members and non-members. Non-members seem to generate a considerably higher income from off-farm activities, yet a smaller income from agriculture than CF-members.

Next to that, there is an apparent distinction between CF-members and non-members regarding the total household income. However, this distinction should be neglected by considering that there is an underdetermined estimate of earnings made from tree farming by both HR- and HKm-farmers. The income from HR is not calculated in this study because it required numerous additional measurements (see Chapter 2.7.3). Next to that, the earnings made over the years in HR-management depend on the farmers needs, the size of the plot and the number and age of the trees. Farmers are little aware of when and how much trees they harvest on a yearly basis. Moreover, fluctuations and uncertainties in future timber prices make reliable cost-benefit calculations unfeasible. This topic is discussed in further detail in Chapter 6.4.2.

Nevertheless, it is assumed that the average revenues acquired from HR-activities compensate for the smaller off-farm revenues. For this reason, the household income is considered to be equal among HR-members and non-members.

Table 5.16: Annual household earnings from agricultural production and off-farm activities in 1000Rp.

Average income per household in 1000Rp.	Total agricultural income	Off-farm activities	Total income
HR-member	7,342.10	3,122.22	10,464.32
Non HR-member	5,977.78	6,122.20	12,100.07
Hkm-member	6,697.27	2,413.18	9,110.45
Non HKm-member	6,509.72	7,139.41	13,635.00

Financial security

Financial security proves whether a household can secure its current and future income. Financial security is assessed by the extra income from remittances or subsidies and type of saving. The regression analysis demonstrated that the variable *extra income* is not of significant influence to CF-membership. The only significant result that was found is the relation between the variables *Access to savings* and *HR-membership* (see below).

Extra Household Income

Next to the income generated through livelihood activities, households in Gunung Kidul receive subsidies, remittances or make use of (informal) loan systems (see social capital). Government subsidies are offered in the form of small rice supplies (5kg a month per households) or some educational support (300.000Rp per education level, in which primary schooling, junior high or senior high equals one level). Remittances are offered by family members working abroad or in the city of which the exact amount of money is highly uncertain. Respondents could not give a precise indication. As already mentioned, no significant relation is indicated between CF-membership and the access to extra household income.

Access to savings

The correlation and regression analyses demonstrated a significant relation between the type of savings and the involvement in HR, with a B-coefficient of 1,190 and an R^2 of 0,289 (sig=0) (see Appendix D). HR-involvement forms a direct source of savings, as all HR-members have a saving stock in trees, next to savings in livestock or bank account. Although savings can also be stocked in other types of capital, such as livestock or fish farms, tree management seems to have more important contribution to the financial security of people.

The difference between HKm-members and non-members is less distinct when it comes to savings. No significant relation is found between the HKm-membership and type of savings. This is because HKm non-members also invest in trees in the form of POF. Thus, both HKm-members and non-members have a tree saving stocks, albeit not in a different form of community forestry.

5.4 Conclusion

The first aim of this chapter was to find out whether Community Forestry participants and non-participants diversify their income and in what way. The second aim was to estimate whether and to what extent the access to livelihood assets is different between the Community Forestry participants and non-participants. This comparative livelihood analysis provides a means to estimate the effects of CF-programs on the livelihoods of the local population. This will be discussed in the final conclusion of this thesis. For now, what follows is an overview of the different livelihood assets of both population groups.

5.4.1 Livelihood diversification

The household survey conducted in four villages in Gunung Kidul regency showed that there is a strong diversification of livelihood activities. The way this is divided strongly relates to the involvement of the household in CF-schemes. The clearest difference between these two population groups is that non-members concentrate their livelihoods more carefully on off-farm activities, like construction work, furniture making and food production. These differences are mirrored in the proportional annual income per household. Excluding income derived from CF-activities, CF-farmers generate more financial capital from agricultural production and much less from off-farm activities.

5.4.2 Livelihood Assets

Human Capital

HR and HKm-members have a slightly better access to secondary schooling than non-members. Therefore, the access to human capital is higher for CF-members than for non-members.

Social Capital

The access to social capital is differently represented among CF-member and non-member groups. Especially HKm-members have a higher social capital as they are better represented in social organizations. Hence, being involved in HKm enlarges the household's access to social networks. For HR-members and non-members this difference is less distinct.

Financial Capital

As described in the former subparagraph, HR- and HKm-members generate less financial capital from off-farm activities relative to non-members. In addition, HR-farmers often have a higher financial security thanks to the tree stocks. For HKm-members, the financial security is more or less the same.

Natural Capital

The fact that HR-members earn more from agricultural production than non-members is also mirrored in higher access to land. The average HR-member owns approximately 1 ha of land more than non-members. Excluding HR-land, the difference is about 0,6 ha. For HKm-members and non-members, the access to land is almost similar. Where HKm-members have access to HKm-land, non-members have invested more in POF and agriculture relative to HKm-members.

Ownership of livestock is another element of natural capital. In general, CF-members have better access to livestock than non-members. In conclusion, the access to natural capital is higher for HR-members and HKm-members, relative to non-members.

Physical Capital

CF-members have better access to land preparation equipment such as diesel machinery or tractors. This is the only element of physical capital which differs between members and non-members. Hence, the access to physical capital is slightly higher for members relative to non-members.

6. Unraveling the current and future role of Community Forestry in rural livelihoods

6.1 Introduction

The previous chapter presented the different livelihood strategies and assets of CF-members and non-members in four villages in Gunung Kidul regency. The first part of this chapter elaborates on the effects of CF-programs on the food production in the area and whether this has affected the socio-economic situation of the local community. Additionally, it focuses on the economic importance of CF-involvement for farmers. This analysis is based on the household survey, Focus Group Discussions and interviews with key informants.

The second part of this chapter addresses the threats and opportunities of Community Based Forestry programs with respect to the food production and socio-economic situation in Gunung Kidul. It describes the role that CF can play in securing and improving the economic standard of the communities and with that the food production in the area. This part of the chapter is purely based on qualitative data gathered through Focus Group Discussions, the household survey, interviews with experts and existing literature.

6.2 Contribution of Hutan Rakyat on Economic standard and Food production

6.2.1 Food production in HR-Villages

The impact of Hutan Rakyat on the socio-economic situation is studied in the villages Kedung Keris (Nglipar) and Girisekar (Panggang). The implementation of HR-programs and the geographical environment in both villages are quite different. This explains the differences in socio-economic effects.

Kedung Keris (Nglipar)

Since the introduction of Hutan Rakyat, the majority of HR-farmers of Kedung Keris have experienced an increase in household food production. However, the increase in food production cannot be attributed to the introduction of HR. In contrast, a small share of the agricultural land had to make way for POF allocation. However, this small decrease in crop cultivation is largely compensated by the increase in crop production elsewhere. The reasons for increased crop production are related to the improved farming conditions in the area. Firstly, the HR-introduction has improved the quality of the soil and the water availability, thanks to the more abundant tree growth in the area. Improved environmental conditions benefit crop growth. Secondly, HR-participants agreed that the workshops provided by PKHR and Arupa (as described in chapter 4.3.2) have contributed to the local knowledge of farming practices. These workshops informed farmers that trees can grow on areas where crops cannot, for example on rocky or steep parcels of land. As a result, more and more farmers have been growing trees on poorly arable land, while concentrating crop growth on fertile land. This improved knowledge has enhanced the food production in and around the village. Thirdly, tree management has improved the financial situation of the farmers by providing better access to agricultural equipments such as a diesel machine or a tractor and the better access to fertilizer and pesticides. In turn, these agricultural aids and devices enhance agricultural yield (FGD 1, 2013; Interview key informant 1, 2013).

Food production in the village has also increased because the majority of the farmers have access to state forest for crop cultivation. In Kedung Keris, the forest plantations are allocated to Kayu Putih trees, a tree species that stays relatively small and thus leave ample space for crop growth (see Chapter 4.6). The access to state forest plantations has enhanced local farming opportunities and contributed to the well-being of the involved farmers.

Girisekar (Panggang)

In Girisekar, the food situation is somewhat different than in Kedung Keris. Just like in Kedung Keris, HR-management has caused small decreases in food production private land. However, farming alternatives in Girisekar are less developed than in Kedung Keris.

In Girisekar, teak is grown on uncultivable land or on the border of agricultural land. The latter causes a small decrease in crop production. However, most farmers have succeeded to overcome this problem through crop growth intensification or increase in access to land elsewhere. As crop production is a farmer´s primary concern, it will always be a substantial livelihood strategy. For this reason, farmers expect that POF-management will always coexist with crop cultivation and that the first would never mean a real threat to the second (FGD 3, 2013; Interview key informant 3 and 4, 2013).

In this village, crop production on state forest is also possible, but the productivity of forest soil is much lower than in Kedung Keris. This is principally due to the fact that tree plantation are grown with teak trees. Teak rapidly grows to a height which causes too much light competition for common food crops to grow. Like mentioned in chapter 5.2.2 crop production on teak plantations is limited to 3 to 5 years from planting onwards. For this reason, state forest plantation in Girisekar cannot offer the same farming opportunities as in Kedung Keris.

As is visible in Table 6.1, farmers in Kedung Keris earn Rp. 7 million more from annual crop production than farmers in Girisekar. This is closely related to the dryer climate conditions in Girisekar (see chapter 3.2). In conclusion, in Girisekar the decrease in crop production is in most cases compensated by other farming opportunities. However, the measure in which this is compensated is smaller compared to Kedung Keris.

Table 6.1: Crop production in weight and economic value in Kedung Keris and Girisekar

	Average Production	Rice	Cassava	Peanut	Corn	Soybean	Total Crops in 1000 Rp.
Kedung Keris	kg	562.50	279.44	305.75	334.21	394.00	
	1000 Rp.	4,500.00	377.25	2140.25	793.75	2,758.00	**10,569.25**
Girisekar	kg	289.50	172.50	67.75	136.00	16.00	
	1000 Rp.	2,316.00	258.75	474.25	340.00	112.00	**3,501.00**
Difference villages (K-G)	kg	273.00	106.94	238.00	198.21	378.00	
	1000 Rp	2,184.00	118.50	1,666.00	453.75	2,646.00	**7,068,25**

6.2.2 Economic importance of HR in rural livelihoods

The economic importance of HR-management for farmers is estimated by taking the change that has occurred in standard of living due to HR-involvement. The value that HR-farmers attribute to the program is assessed by the level of satisfaction with the program and suggestions for further improvement. All HR-farmers were asked to give a measure of satisfaction with respect to the HR-program, ranging from very satisfied, quite satisfied, not so satisfied, or not satisfied at all. Of all 31 HR-farmers in Kedung Keris and Girisekar, 4 farmers were very satisfied, 22 farmers were quite satisfied, and 3 farmers were not so satisfied with HR-involvement. Farmers that were not so satisfied with HR-management complained about the small plot of land or the juvenile age of the trees.

The economic importance of HR depends on the size of the plot and the age of the tree stands. The majority of HR-farmers experienced an increase in economic standard since HR-introduction (as presented in Table 6.2). Households that experienced no change in economic standard, attributed this to the low productivity of the HR-land, owing to a small plot size or the fact that the tree stands were too young to be productive. Non-members were also asked to indicate whether they had experienced a change in standard of living, by taking the last decade as a period of reference (see Table 6.2). If the living standard did increase, this was mostly due to increased revenues from off-farm activities or reduced household expenditures, like educational fees.

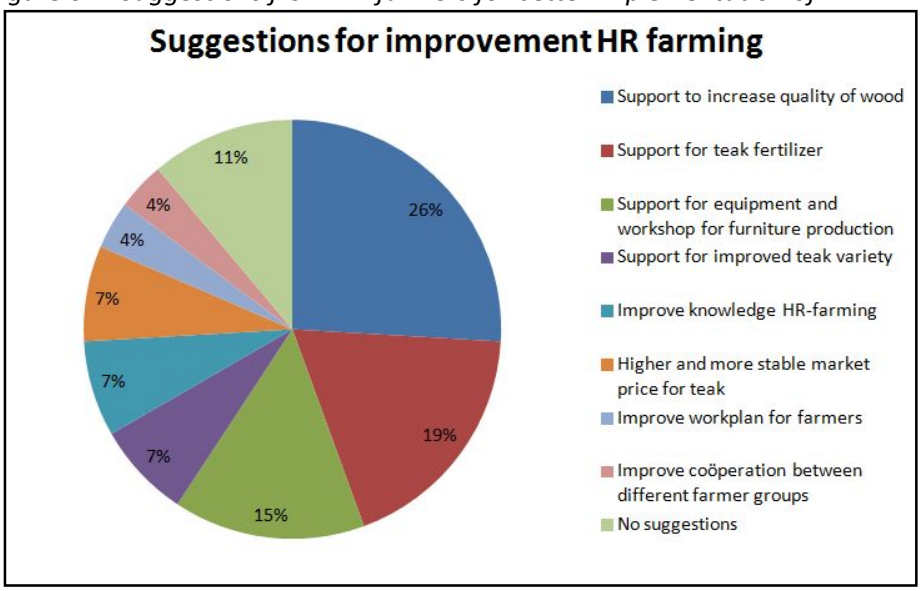
Table 6.2: Change in Economic standard with introduction HR

		Increase	No change	Decrease
Kedung Keris	HR	10	5	0
	Non-HR	2	1	2
Girisekar	HR	11	5	0
	Non-HR	0	3	1

All HR-farmers of Kedung Keris and Girisekar gave suggestions for the improvement of HR-management, as presented in Figure 6.1. It appears that the most important obstacle in increasing the profitability of HR-management is the low quality of the harvested teak. The primary obstruction is the practice of immature cutting that is applied by all farmers. The household's constant need for money is impeding long term tree management and hence hampers the improvement of the teak quality. Although farmers are well aware of that a reduction in immature cutting practices would considerably increase the market price for teak, a lack of financial means hampers them to do so. Another reason for low teak quality is that HR-farmers have too little access to fertilizer needed for solid teak growth. Therefore, a considerable number of HR-farmers suggests to provide support for fertilizer for enhanced teak production. A third suggestion made by HR-farmers is to increase the added value of teak production. This can be done by transforming the locally produced wood logs into secondary goods like furniture. Since farmers lack the knowledge and financial means to make such an investment, this sort of local furniture production would never be realized without external support. In the next paragraph 4 of the same chapter, these opportunities and challenges are more elaborately described.

Like briefly mentioned in chapter 5.2.1, farmers that are not involved in Hutan Rakyat are often older people or female-headed households. Nevertheless, 3 of the 9 interviewed non-members felt the desire to get involved in HR-management, yet lacked sufficient access to land to do so.

Figure 6.1: Suggestions from HR-farmers for better implementation of HR



6.3 Contribution of HKm on Economic standard and Food production

6.3.1 Food production in HKm-villages

The effects of HKm on the food production and the socio-economic situation of the local population are analysed in the villages Katongan (Nglipar) and Girisuko (Panggang). The implementation of HKm-programs and the geographical environment are quite different in these villages. This explains the differences in socio-economic effects.

General remarks

Both in Katongan and Girisuko, the HKm-forest was already used by farmers for crop cultivation before the HKm-schemes started up (as described in chapter 4.6). In this period, the government forest control was limited, resulting in less dense tree growth and illegal cutting. As a result, farmers could grow more crops more extensively than is currently allowed. Hence, compared to this period, farmers in both villages have experienced a decrease in crop growth owing to the better management of state forests. The following section provides more village-specific details on food production.

Katongan (Nglipar)

Although the crop production in Katongan decreased to some extent, it is not threatening the farming opportunities of the villagers. The surrounding agricultural fields provide enough crop farming opportunities to compensate for this loss. This is principally because the climate in Katongan allows two harvests a year, which results in a much higher yield per hectare per year than in Girisuko (see Table 6.2).

Girisuko (Panggang)

The introduction of HKm in Girisuko has had a much higher impact on the local farming opportunities than in Katongan. The much dryer climate in Girisuko allows for only one harvest a year, which reduces the crop productivity considerably. As a result, farmers in Girisuko are more prone to changes as the average annual crop yield from other agricultural fields is lower. Like demonstrated in Table 6.3, an average household in Girisuko earns Rp. 1,934,660.- less from crop growth outside the HKm-yield than a household in Katongan. A reduction of farming opportunities on HKm-plots is therefore more threatening for farmers in Girisuko. The interviewed HKm-farmers see this yield reduction as a real threat to their financial situation.

Table 6.3: Crop production in kg and financial value (in 1000Rp.) in Katongan and Girisuko

		Rice	Cassava	Peanut	Corn	Soybean	Total
Katongan	Average production in kg	398.95	342.22	196.75	605,00	155.00	
	Total average yield in 1000 Rp.	3,191.58	513.33	1,377.25	1,512.50	1,085.00	**7,679.66**
Girisuko	Average production in kg	306.00	530.50	174.00	512.50	2.00	
	Total average yield in 1000 Rp.	2,448.00	795.75	1,218.00	1,281.25	14.00	**5,745.00**
Difference villages (K-G)	Average production	92.95	-188.28	196.58	92.50	153.00	
	Money values	743.58	-282.42	159.25	231.25	1,083.00	**1,934.66**

6.3.2 Economic importance of HKm in rural livelihoods

This paragraph deals with the economic importance of HKm and the perceptions that HKm-farmers have with respect to HKm-programs. In Katongan, HKm-members are reasonably positive about the current and future additional income they can acquire from the program. Firstly, involvement in HKm offers short term profits of crop cultivation for a period of three years. Secondly, long term profits are made through the profit sharing arrangements of timber harvest. Additional benefits involve the access to fodder and firewood. After the first three years of crop cultivation, farmers continue to grow grasses on the parcel which they either use for animal feed or for selling.

Compared to Katongan, farmers in Girisuko are less satisfied with the HKm-program. Like mentioned in the previous paragraph (chapter 6.3.1), the introduction of HKm in this village has considerably changed their farming opportunities and the local food production. Of all respondents, 1 respondent was very satisfied, 13 respondents were quite satisfied, and 7 respondents were not so satisfied. The respondents that were not so satisfied were mainly those struggling with the uncertain profit-sharing arrangements.

Table 6.4 presents the changes in economic standard since HKm-introduction. In Katongan, farmers have indicated more often that their involvement in the HKm-program has added to the financial situation of the household. A relatively smaller amount of two households said that they experienced a decrease in standard of living since the involvement of HKm. These farmers severely suffered under the crop production decrease on the forest plot, and did not have many other livelihood activities to deal with the decrease.

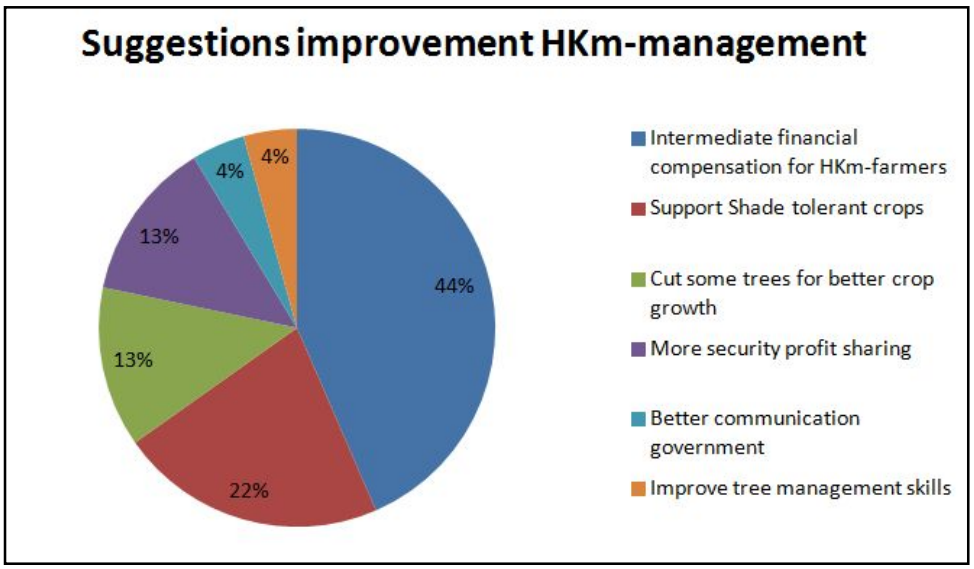
Table 6.4: Change in Economic standard with introduction HKm

		Increase	No change	decrease
Katongan	HKm	7	5	0
	Non-HKm	6	1	1
Girisuko	HKm	4	4	2
	Non-HKm	4	4	2

To improve the system of HKm-management, most farmers (44%) would design a system in which farmers could get intermediate compensation for their HKm-activities. Hence, they were attracted by the idea of getting a monthly or yearly salary for HKm-activities instead of getting the full payment after harvest time, so after 20 to 35 years. Another important share of the HKm-farmers (22%) wishes to get financial support to develop the growth of more shade-tolerant crops. This would allow farmers to continue crop farming on the HKm-farmers when tree growth makes the growth common food crops impossible. Another solution offered by the respondents (13%) is more thinning practices so that more light can reach the forest soil for crop growth. Other farmers (13%) suggest providing more transparency in the HKm-programs as they fear that applied profit sharing arrangements are sensitive to change.

As mentioned in chapter 4.4.1, new HKm-forestland is not available anymore. The share of non-members wanting to get involved in HKm-programs is 6 out of 18. Of these 6 non-members, 2 households often had feelings of competition or jealousy towards HKm-members. The others argue that there is too much mutual respect among the farmer community to have these feelings.

Figure 6.2: Suggestions from HKm-farmers for better implementation of HKm



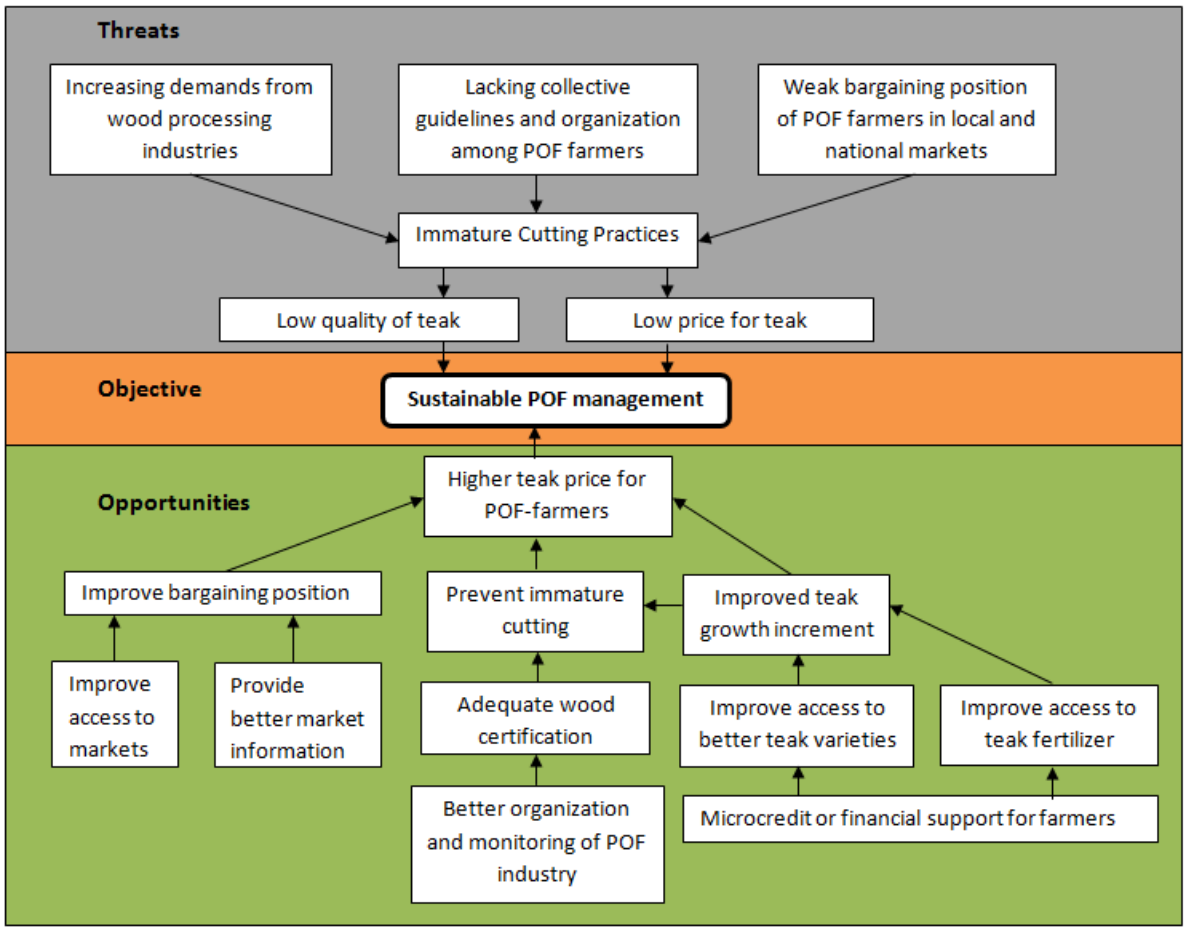
6.4 Threats and Opportunities of CF-schemes

The analysed CF-schemes still have some hurdles to take for sustainable implementation. This part of the thesis focuses on the most important threats these CF-schemes face and the opportunities that are offered for sustainable implementation. The information described in this part is derived from existing literature, FGDs and interviews with key informants and experts.

6.4.1 Hutan Rakyat

The most difficult challenge for HR-improvement is to make the program socially, economically and environmentally more sustainable. In this paragraph, an overview is made of the current and future threats and opportunities involved in sustainable HR-implementation. Figure 6.3 helps to comprehend the complex web of factors that influence the sustainable development of POF-management.

Figure 6.3: Threats and opportunities for Sustainable POF-management



Preventing immature cutting

The most obvious way to reach sustainable POF-management is to eliminate immature cutting practices by farmers. Harvesting immature trees deteriorates the growth process of the teak tree and hence affects the quality of the wood. Large diameter logs have better teak quality and hence involve a much higher market price (see Table 6.5). Besides, large scale wood processing industries have a high demand for large diameter logs. Therefore, the eradication of immature cutting practices would considerably contribute to the financial capital of the farmers. Different stakeholders have attempted to avoid immature cutting, yet without a sustainable result. For instance, the KTHR and the PKTHR (see chapter 4.4.2) have set up rules against immature harvesting and made farmers conscious about the economic downsides of this practice. However, these measures did not have the designed effect. As long as farmers are economically incapable to avoid it, they will use immature harvesting to make ends meet.

An obvious solution to solve this problem is to enhance the financial capital of HR-farmers. The NGO´s Shorea and Arupa have carried out some measures to do so, for example by providing microcredit or to give support through livestock programs. Unfortunately the scale on which it took place was too small. The following section describes what other initiatives can be or are already undertaken to avoid immature cutting (Fujiwara, 2012; Rohadi et al., 2010).

Table 6.5: Log price per diameter category in 2009

Log grade (Diameter)	Price (Indonesian Rupiah/m^3)
10-13 cm	700,000
15-19 cm	1,450,000
20-28 cm	2,450,000
30-40 cm	3,600,000

Source: Fujiwara et al. (2011)

Access to markets

Other elements that affect farmers' opportunities to generate higher gains from tree cultivation are the limited access to markets and their low bargaining position. HR-farmers are often unaware of the selling prices of their timber and the demanded standard of timber quality. Besides, most HR-farmers sell their timber to middlemen, who are the ones that determine timber prices. Both factors determine the weak bargaining position of the farmers (Fujiwara, 2012; Rohadi et al., 2010; FGD 1 and 3, 2013; Interview Arupa, 2013).

Several solutions can be thought of to improve farmers´ knowledge on markets and improve their bargaining positions. First, workshops are a viable solution to provide better market information for farmers. NGOs like Shorea and Arupa, and the PKHR have already contributed to this part. However, improved knowledge on market systems only has effect when farmers are offered other selling alternatives next to the middlemen they are used to sell their timber to. To improve their bargaining position, collective action on marketing can offer an adequate solution. However, this alternative requires external assistance from either private or public organizations (Fujiwara, 2012; Rohadi et al., 2010; Interviews Himmah, Maryudi and Arupa, 2013). More information on the possibilities for collective action is described in the following section (Wood certification).

Wood certification

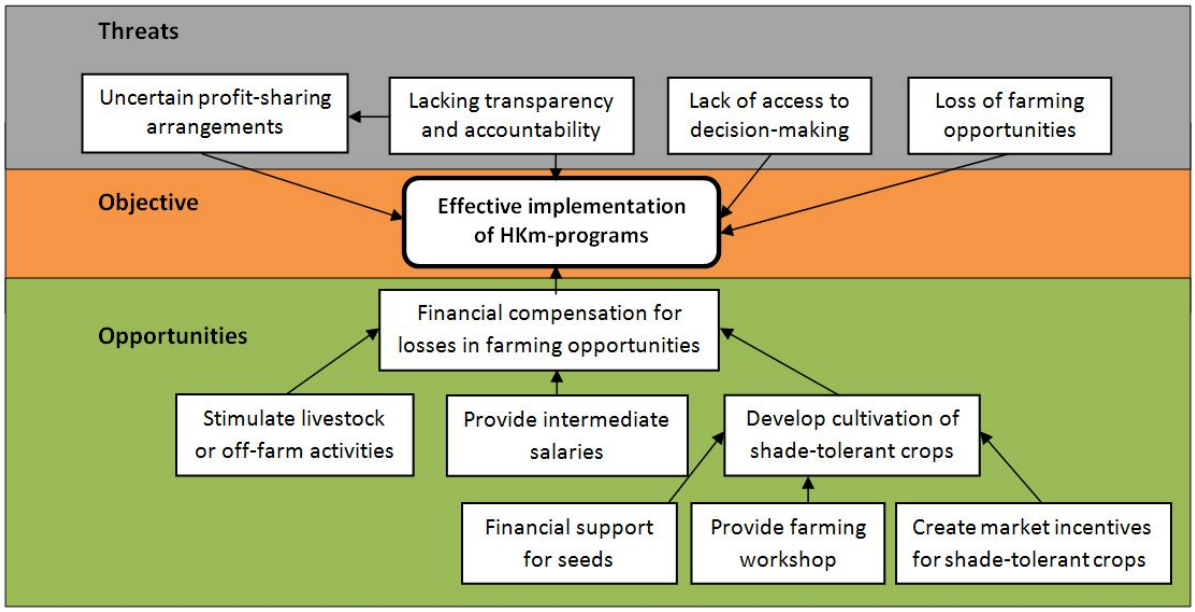
Wood certification schemes can offer a sustainable solution for immature cutting practices and the prevailing poverty among rural communities. In Gunung Kidul, wood certification schemes have been applied by the creation of the Koperasi Wana Manunggal Lestari (KWML). This is a local people's cooperative association that was established to manage POF with wood certification in GK district in 2006 (see Chapter 4.4.2). Unfortunately, the KWML certification scheme did not change the situation of the farmer as the economic scale on which it was carried out was too small to be effective. Certified industries are merely interested in large and stable supply of wood involving large diameter logs. Unfortunately, the limited capacity of the KWML group could not meet these needs. To illustrate, teak furniture industries in Jepara (a town situated north in Central Java) have a teak demand of 1.5 to 2.2 million m^3 per year, whereas the KWML can only supply 1626 m^3 a year at the maximum (Rohadi et al., 2010). As a result, the KWML could not provide for promised the premium prices (20-30% higher than normal) for teak logs to HR-farmers. Consequently, farmers remained more interested to sell their teak to the informal market, undermining the effects of the certification efforts (Interview Himmah and Maryudi, 2013; Fujiwara, 2012).

Learning from this, a more effective solution would be to upscale the cooperative association of the KWML to the province level, hence involving all villages in Gunung Kidul regency involved in HR-management. In fact, the district government of Gunung Kidul has plans to include an additional 96 villages in the certification scheme. All together, these villages produce approximately 40,000m^3 of teak timber on a surface of 15,000ha. Such a project would only succeed if farmers as well as the KWML-group would receive initial financial support. As for the farmer, financial support is needed to prevent immature cutting for financial reasons and to be able to produce high quality teak. As for the KWML, financial support provides the possibility to give HR-farmers a higher price for the teak supply and pay more instantly. For these reasons, a well-functioning KWML-group demands high financial investments from external actors (Fujiwara, 2012; Interview Himmah, 2013). To illustrate, the establishment of the KWML-group of 2006 involved 50,000 to 60,000 USD per village excluding the 10,000 USD certification costs. In conclusion, province-wide implementation of the KWML-group would be an effective though costly measure to support the economic development of POF farmers in Gunung Kidul regency (Fujiwara, 2012; Rodahi et al., 2010).

6.4.2 Hutan Kemasyarakatan

As for HKm, it remains a challenge to attain the two-fold target of forest rehabilitation and poverty reduction in Gungung Kidul. The forest rehabilitation objective of HKm is largely obtained. More than 35 thousand ha of state forest area in Gunung Kidul regency has been recovered thanks to this initiative (Interview PFS, 2013). However, for the moment, it seems like the poverty alleviation objective is unlikely to be achieved. Several threats and opportunities are involved that (might) affect sustainable implementation of HKm-programs (Ota, 2011). Figure 6.4 illustrates how these threats and opportunities cohere with the effective implementation of HKm-programs.

Figure 6.4: Threats and Opportunities to reach the adequate and effective implementation HKm-programs



Transparency and accountability in Profit-sharing arrangements

The effectiveness of HKm-programs is largely determined by its transparency and accountability towards participants. Without ensuring adequate profit-sharing arrangements, farmers will become reluctant to cooperate, which entails further forest encroachment (Krott, 2012; Nugroho et al., 2011). Although HKm-participants have received a contract for HKm-membership, many HKm-respondents complained about the many uncertainties that are concerned with the program. The main concern relates to the obscurity of profit-sharing arrangements. The term over which benefit-sharing will be distributed is too long for participants to be confident about genuine payments. Participants realize that political colour of governments can change any time, and with that the state's aspirations for improving rural livelihoods through benefit-sharing of timber production. Besides, the ignorance about market price development for teak timber enhances these uncertainties. Creating better transparency and accountability should become a serious concern in HKm-policy and implementation (FGD 2 and 4, 2013; Nugroho et al., 2011).

To secure the promised benefits from the HKm-scheme, participants opt for several intermediate solutions. For example, farmers suggest financial compensation on a yearly or monthly basis instead of receiving the payment after 20 to 35 years of tree management. Such intermediate salary would enhance payment security for farmers, contribute to the financial stability of the household and enhance the motivation for farmers to contribute to forest rehabilitation. Governments are probably

reluctant to provide such advanced payments, taking into account the uncertainty with respect to timber market price developments (Interview Himmah and Maryudi, 2013).

Reduced farming opportunities and crop production

As described in chapter 6.3.1, HKm-programs run the risk to reduce farming opportunities in the area. The measure in which this has socio-economic effects depends on the farmland alternatives at hand.

For genuine poverty reduction through HKm-implementation, HKm policy-makers should become aware of the impact of HKm on farming opportunities in the area. If this impact turns out negative, and hence farmers experience a loss in farming opportunities, policy-makers should come up with an alternative solution to compensate for these losses. This can be done through various pro-poor monitoring and facilitation alternatives. For instance, the cultivation of shade-tolerant crops such as Porang, Ginger or Kurkuma could partly alleviate the reductions in agricultural production. However, according to local farmers, the market opportunities for financially viable cultivation of these crops are limited. Therefore, market incentives should be created to provide profitable cultivation of these crops. Other forms of financial compensation can be given in the form of subsidies to stimulate livestock activities or different types of home-industries (Interview Budiadi and Himmah, 2013; FGD 2 and 4, 2013).

Access to decision-making

Up till now, the decentralization process in the Indonesian government structure has so far failed to genuinely transfer power to local communities. As for HKm, this failure is mirrored in the limited access to decision-making processes for HKm-members. The fact that HKm-schemes bring along some socio-economic disadvantages for the local population, such as uncertainties relating to the profit-sharing arrangements and losses in farming opportunities, point out that farmers have too little voice to stand up for their rights. Although there are monthly meetings with HKm-groups and forest officials, it appears that the heads of the HKm-committees are very much cooperative with and accountable to the forest officials. As the rest of the group has to cohere with the head of the committee, the imposed procedures within HKm-implementation cannot be refused (Maryudi, 2011; Interview Shorea, 2013). Maryudi (2011) additionally points out that through the HKm-scheme, governments have only enhanced their power over forest resources by involving the local population. Hence, farmer-members are employed to manage forest resources in return for very limited revenues, in order to regain power over forest resources.

6.5 Conclusion

6.5.1 Food production

The introduction of CF-schemes has considerably contributed to forest rehabilitation in Gunung Kidul regency. For a large part, this is attributed to local communities who have participated in forest management schemes. In this chapter it is seen that increasing forest cover brings along negative socio-economic consequences for the local communities. Gunung Kidul regency is relatively densely populated and land surface is intensively used for agricultural purposes. Considering the intensified agricultural land use in the area, it is feared by specialists and policy makers that increasing forest cover and stricter rules for forest uses limits the local population's farming opportunities. This chapter has demonstrated that in some cases the food production has decreased as a result of CF-implementation. The extent to which this happens strongly relates to the type of community forest management and the measure in which crop productions alternatives are at hand. This chapter has explained this as follows.

In HR-programs, tree cultivation is little competing with crop cultivation. In essence, most of the tree cultivation occurs on land that is unsuitable for crop cultivation, such as rocky or hilly areas. Only in a few cases, HR is implemented on former agricultural land. In these cases, farmers experience reduced crop production, yet these losses are largely compensated by intensified crop production on their own farmland or access to state forest for crop cultivation (called Baon).

In Hkm-programs, the situation is slightly different. Before HKm-implementation, the state forest was already used by the same farmers that are currently HKm-members. However, before HKm was created, the possibilities for crop cultivation were better, as a result of less intensive forest management. Hence, the space left between the tree stands was in that period much larger than in the current situation, which leaves better possibilities for crop cultivation. Evidence from the two analyzed HKm-villages has demonstrated that farming opportunities within the HKm-forest – without future adjustments - will eventually reduce to zero. The extent to which this loss of farming opportunities threatens the household's financial situation depends on the available crop cultivation alternatives.

An additional comment that needs to be made refers to the differences in climate conditions between the villages. In the villages situated within the sub-district Nglipar (Kedung Keris and Girisekar) experience a wetter climate than those in Pangggang (Katongan and Girisuko). This results in higher annual yields in Nglipar, where the climate allows for two yields a year, compared to Panggang, where the dryer climate allows only a single yield per year. For the villages in Panggang, the less favourable conditions limit the farmers' opportunities to compensate for losses in crop production. Hence, HR- and HKm-farmers in Panggang are more disadvantaged by CF-schemes than in Nglipar.

6.5.2 Other threats and opportunities in CF-management

This chapter also considered the different threats and opportunities in CF-management. Results show that the largest threat in HR-management is the practice of immature cutting that farmers apply in order to meet personal needs. This widespread practice deteriorates the growth process of the tree and results in the production of low-quality timber. HR-farmers need an external incentive to produce sustainable and good quality timber to gain high market prices. Wood certification schemes can help farmers to achieve this, yet in order to be effective these schemes need to be

applied on a larger scale than is currently the case. The high investment costs that are involved in such a large scale implementation form its main obstruction.

Other elements that affect farmers' opportunities to generate higher gains from tree cultivation are the limited access to markets and their low bargaining position. The unawareness of HR-farmers about timber selling prices and standard quality of timber reduces their changes to generate higher incomes from tree cultivation. To improve their bargaining position, collective action can offer an adequate solution, though this requires external assistance from either private or public organizations.

Hkm-programs have difficulties meeting the two-sided sustainability objective, namely forest rehabilitation while alleviating rural poverty. The first threat to this objective relates to uncertain profit-sharing arrangements. The suggestion of farmers to create intermediate salaries would be a good option to alleviate poverty and stimulate sustainable forest management. However, it is unlikely for the government to cooperate with such a measure as a result of unsecure timber price development. Next to that, HKm-programs fail to transfer decision-making power and land ownership to local communities. The result is that governments stay too much in control over forest resources, and leave the local forest farmers with little power to stand up for their rights. Both of these defaults in current HKm-implementation create a threat to sustainable forest management. Indeed, without creating certainty of payment and the transfer of power, farmers will become reluctant to cooperate in the scheme, which might entail further forest encroachment.

7. Discussion and Conclusion

7.1 Introduction

Community Forestry (CF) is receiving much attention from scholars and policy-makers as being a method to combat forest degradation and poverty issues in forest villages. From 1970s onwards, forest communities have become active players in managing forest resources. CF generally takes two forms. On the one side, CF is implemented by smallholders whose main interest is to produce timber for personal needs. On the other side, there are state- or company-initiated CF-schemes.

This research was carried out with the aim to estimate the impact of Community Forestry schemes on rural livelihoods in Gunung Kidul regency, situated on Java, Indonesia. A comparative livelihood analysis was conducted to indicate the differences in livelihoods strategies and livelihood assets between CF-members and non-members. The Sustainable Livelihood Framework (SLF) provides the opportunity to assess the well-being of the forest farmers by taking into account five types of capital, namely human, social, natural, physical and financial capital. Each of these types of capitals was defined by a set of indicators, as visible in the reports earlier in this thesis. Special attention was paid to the relation between CF-schemes and local food production. A last research aim was to find out what threats and opportunities are involved in CF-implementation in reaching the two-sided aim of forest rehabilitation versus poverty reduction. Data have been gathered by means of both qualitative and quantitative methods. Qualitative methods have comprised a literature review, a set of interviews, a household survey and focus group discussions. The quantitative methods include calculations in financial capital and statistical analyses conducted in SPSS statistics.

7.2 CF-schemes, Livelihood strategies and Assets

7.2.1 CF-schemes in Gunung Kidul

Gunung Kidul regency is a mountainous rural area situated in the south of Central Java. In this regency, there are generally two types of CF-schemes, namely Hutan Rakyat (Privately Owned Forest) and Hutan Kemasyarakatan (State-initiated Community Forestry Scheme). Hutan Rakyat (HR) refers to smallholder tree cultivation practiced on private land. The HKm-scheme is a state-led initiative aiming for state forest rehabilitation with the help of local communities in order to improve local well-being. Farmer members participate in state forest management through planting and managing tree stands in return for profit sharing of timber production. The arrangement, which was set in 2009, amounts a 60% of total profit for participants against 40% for the state forestry directive.

7.2.2 Livelihood capital

Both of the analyzed community forestry schemes have contributed to the livelihood capital of CF-members. To concretize the differences in capital between members and non-members of both CF-schemes, it is useful to at first focus on natural capital.

Natural capital

Natural capital is most importantly determined by two elements, namely the access to land and the access to livestock. With reference to HR, large differences are present in access to land between HR-members and non-members. The fact that HR-members have higher access to land than non-members is mirrored in the revenues generated from crop and tree production which in turn

enhances the household's cash income and financial security (see financial capital). Besides, the reason that non-members are excluded in HR-practice is often due to the lack of sufficient land or the lack of labour capacity. It this view, it is clear that access to land is an extremely important factor in a household's economic development.

For HKm-members and non-members differences in access to land are minimal. Although non-members lack the access to HKm-land, they do have more access to land for dryland or irrigated agriculture. This equally explains the minimal differences in agricultural crop production.

As mentioned, ownership of livestock is another element of natural capital. Although it was presumed that CF non-members would invest more in livestock to compensate for CF-exclusion, practice shows the contrary. In general, CF-members have better access to livestock than non-members. Though it is not fully clear why there is such a difference, there are various explanations that can be thought of to explain this result. First, HR and HKm forest parcels offer good opportunities for the cultivation of fodder. Therefore, CF-members have better opportunities to provide fodder for animals. The limited access to fodder might explain the fact that non-members invest less in livestock activities. Second, non-members have invested more in off-farm activities such as construction work or furniture production, and therefore might have less time or interest in gearing livestock.

To conclude, as is visible in figures 7.1 and 7.2, HR-members have a higher access to natural capital than non-members. This is due to the fact that HR-members have better access to both livestock and land. As for HKm-members and non-members, the difference in natural capital is only determined by the access to livestock.

Financial Capital

As stated above, HR-members generate higher revenues from crop and tree cultivation than non-members. Between HKm-members and non-members, this difference in agricultural income is less distinct. However, additional cash income can be provided from off-farm activities. In general, non-members generate higher income from off-farm activities than members. When summing up agricultural income and off-farm income, total cash income appears higher for non-members (see Table 5.16). Nevertheless, this does not necessarily mean that they have better access to financial capital. First, the revenues that CF-members generate from tree cultivation remain uncalculated, due to circumstances described in chapter 2.7.3. Hence, CF-members do have a cash income from tree cultivation, yet the exact amount is unknown. It can nevertheless be assumed that the cash income from CF-membership compensates for the missing revenues from off-farm activities. Therefore, household cash income can be considered equal among CF-members and non-members.

Another important element that determines a household's financial capital involves financial security. This is predominantly provided by the access to savings. Savings can either be provided in the form of trees or livestock. Private tree plantations mainly involve the cultivation of teak. The cultivation of teak is quite profitable (depending on the land plot size) thanks to the high market value and the large demand for teak timber. HR-farmers have proved to have better financial security since they have access to tree resources that serve as a financial buffer in more difficult times. Besides, they have higher access to livestock activities. For these reasons, HR-members have higher access to financial security. In conclusion, higher access to financial security determines that HR-members have better access to financial capital than non-members.

As for HKm-members and non-members, there is no difference in financial security. Many HKm non-members have invested in private tree cultivation (HR) that acts as a financial safety net. Hence,

where HKm-members have financial security from HKm-program (future income from tree stocks) non-members generate this from private tree cultivation. Conversely, it is difficult to interpret the financial security that is provided from HKm-membership. In essence, HKm-tree stocks cannot be deliberately depleted due to government restrictions. Hence, whenever an HKm-member is in need of money, it cannot use tree stocks to generate an income as is the case in HR. In this view, although it is taken for granted that HKm-membership provides for future income, financial security is not provided before the trees are harvested. However, as HKm-farmers have higher access to livestock activities than non-members. This compensates for the limited financial security that HKm-members deal with before timber profits are distributed. As a result, the financial security between HKm-members and non-members is considered as equal. In conclusion, there is no difference in the access to financial capital between HKm-members and non-members.

Other forms of livelihood capital

As already stated, access to natural capital is the most important form of assets to provide in subsistence in rural livelihoods. Higher access to land generates higher agricultural revenues which can be converted into financial capital. Financial capital, in turn, contributes to fulfil other household needs. One such household need is the access to education which contributes to the household´s human capital. As is most remarkable, both HR and HKm-members are better represented in secondary schooling. For HR-members it is probable that the additional income that is provided by HR-involvement offers households the opportunity to pay for secondary schooling fees. However, for HKm-members, this same explanation cannot be used since HKm-members are said to have equal access to financial capital. For this finding, no other plausible explanation can be found.

Physical capital is also strongly related to natural and to financial capital. This particularly counts for the elements access to land (natural capital) and access to agricultural equipment such as diesel machinery or tractors (physical capital). Obviously, higher access to land enhances the need for land preparation equipment such as diesel machinery or tractors. Besides, using land preparation is more cost-effective when having good access to land. The link between physical and financial capital is two-sided. First, access to financial means provides the opportunity to pay for such equipment. Second, better access to agricultural equipment enhances the agricultural revenues, which add to the household's financial capital.

The access to social capital is differently represented among CF-member and non-member groups. HKm- members appear to have higher access to social capital as they are better involved in social organizations. This is related to the additional social organization that only HKm-members can have access to, namely the HKm farmer group. Hence, being involved in HKm improves the household's access to social networks. For HR-members and non-members this difference is less distinct. This is because non-members and members are equally represented in different kinds of groups. Higher social capital can in turn be beneficial for knowledge exchange on farming issues, which can in turn enhance agricultural revenues. Additionally, better access to social networks enhances the household's opportunities to find jobs on or off-farm, which would also contribute to the financial capital.

Livelihood diversification

This research has demonstrated that there is a large difference in livelihood diversification between CF-members and non-members. The fact that non-members are in general more involved in off-farm activities points out that the exclusion from CF-activities forces people to invest in off-farm activities

to make a living. At this point it might be interesting to ask whether the financial advantages of diversification in livelihoods outweigh the financial advantages of entering a CF-program. In other words; to what extent does livelihood diversification enhances financial security in terms of spreading risks? A precise answer to this question requires a large number of calculations which is beyond the scope of this research (see recommendations for further details). Nonetheless, it is obvious that livelihood diversification enhances the financial security of a farmer. When a farmer invests in different activities and one of these fails to provide income, the others still stand.

Comparative livelihood analysis

The comparative livelihood analysis demonstrates that being involved in either one of the two CF-programs considerably enhances livelihood capital. The differences in household capital are schematically presented in Figures 7.1 and 7.2. These differences should purely be interpreted as a relative difference from one factor with respect to the other. No absolute numbers are directly indicated in this design. What becomes clear from these figures is what is concluded above, namely that non-members have less access to livelihood capital compared to CF-members. In addition, it appears that access to land is an important asset in rural livelihoods. Higher access to land accelerates the socio-economic development of the household. It creates the opportunity to grow crops for subsistence, while on the other hand provides the chance to diversify agricultural activities towards tree cultivation or livestock activities. These activities bring along additional income and provide a financial buffer in times of hardship. The additional revenues can provide for agricultural equipment, such as fertilizer, pesticides or land preparation machinery, which in turn enhances the agricultural production. Next to that, membership of HKm positively influences the access to social networks which are most opportune when household members are looking for a job. In this view, access to CF-programs creates opportunities to escape poverty. However the extent to which these opportunities are created is obviously dependent on the scale on which farmers are involved.

It is concluded that although non-members have less access to most types of livelihood capitals, non-members are not disadvantaged by the schemes. Rather, it is seen that CF-schemes have enhanced the livelihood capital of members and that this mere fact explains the difference between members and non-members.

As is mentioned in the introduction, one might wonder whether CF-programs could disturb the social cohesion in the villages, as it excludes some farmers from participating. Answering this question demands a more elaborate analysis to understand social linkages and social cohesion. Therefore, no satisfying answer can be provided. Nevertheless, some of these research findings indicate that up till now, there was no question of a disrupted social cohesion in the villages. As a matter of fact, it was seen that the small part of non-members who desired to participate in the scheme, did not experience any feelings of jealousy or competition. According to the farmers, this is because of the mutual respect that prevails in the region.

Figure 7.1: Schematic illustration of livelihood assets for HR-members and non-members

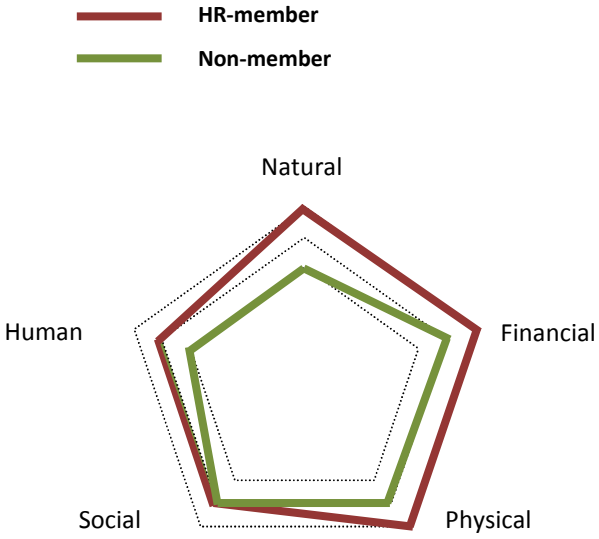
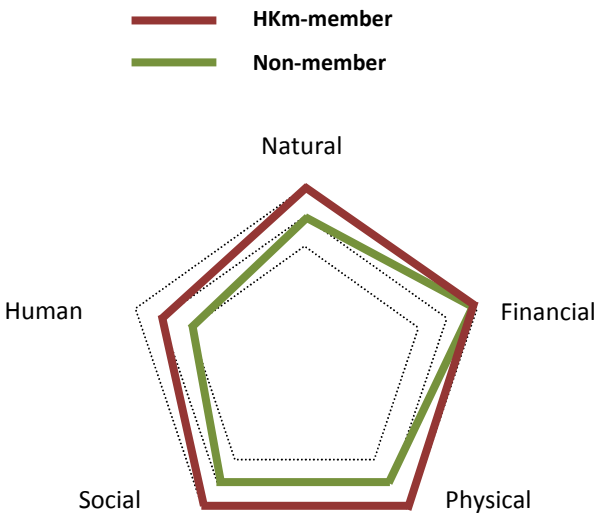


Figure 7.2: Schematic illustration of livelihood assets for HKm-members and non-members



7.3 Impact of Community Forestry Schemes

Both programs have the potential to reach the objective of poverty reduction through forest conservation. However, looking at the current state of CF-implementation, it is unlikely that CF-programs will meet this potential. The impact of CF-programs on food production and the socio-economic situation are largely determined by the type of CF-management and the location.

7.3.1 Hutan Rakyat

HR is financially attractive for several reasons. First, it provides the opportunity for livelihood diversification next to farming and livestock activities, which provides financial security. Second, the cultivation of teak is quite profitable and thanks to the large demand for teak timber involving a high market price. Therefore, the cultivation of timber provides additional income and acts as financial safety net for local farmers. Third, farmers have come to see that the environmental quality has considerably improved. This is mirrored in the better soil and water conditions and has, according to farmers, stimulated crop productivity.

The development of Hutan Rakyat in Gunung Kidul regency has for most farmers contributed to their financial capital. However, many challenges lie ahead to reach the potential of HR-implementation. This research has demonstrated that in some cases HR-farmers have noticed a reduction in food production on HR-land. However, this loss is largely compensated, for instance by the access to state forests for crop cultivation and intensified crop production on other farmlands. However, the crux is that the current access to state forest for crop cultivation is unregulated. This means that farmers risk to get evicted from this state forestland at any time. As alternative access to farmland is limited, the insecurity of future farming opportunities on state forestland might involve high risks for the well-being of the involved farmers. In conclusion, HR-management is not threatening food production, provided that farmers have better security of access to land.

For the moment, more essential threats in HR-management are the practices of immature cutting that farmers apply in order to meet personal needs. This widespread practice deteriorates the growth process of the tree and results in the production of low-quality timber. Although the smallholders of Gunung Kidul regency have ample opportunity to provide for large scale and good quality teak supply to meet the needs of large timber producing companies, the lack of organization and financial means among HR-farmer groups hamper this to occur. For this reason, HR-farmers need an external incentive to produce sustainable and good quality timber to gain high market prices. Wood certification schemes can help farmers to achieve this, yet in order to be effective, these schemes need to be applied on a larger scale than is currently the case. Moreover, the high investment costs that are involved in such a large scale implementation form its main obstruction.

Another suggestion for improved HR-management and reduced immature cutting is reducing farmers' needs for cash income. The principal reason for immature cutting is the need for financial means and the lack of alternatives to acquire an income. Therefore, HR-farmers need financial support from other stakeholders, such as industries or governments, in order to overcome the depletion of tree stock for financial needs. This can be reached by providing micro-credits or to support farmers through livestock programs.

7.3.2 Hutan Kemasyarakatan

The Hkm-programs were established in order to achieve a two-sided objective, namely alleviating rural poverty while rehabilitating forestland. Obtaining these two objectives was thought to create a win-win situation providing new opportunities for sustainable economic development in the area. Although the forest rehabilitation objectives are largely achieved, it appears difficult to conclude whether the poverty alleviation objective will be obtained before the end of the program. First, evidence from the two analyzed HKm-villages has demonstrated that HKm-programs have affected the local food production opportunities. Before HKm was implemented, people already had access to the state forest (Baon) for crop cultivation purposes. However, in this period, crop cultivation resulted in much higher yields due to inadequate tree management. In some of the analyzed cases, especially in Katongan, farming opportunities within the HKm-forest were already reduced to zero. The extent to which reduced farming opportunities on HKm-land threaten the household's financial situation depends entirely on the available crop cultivation alternatives. In other words, if HKm-members have sufficient access to other farmland or forestland where crop cultivation is allowed, the reduced crop yield from HKm-land can get compensated. In addition, other income generating activities such as livestock gearing or off-farm activities also provide means to compensate for losses in crop production. Unfortunately, these alternatives are not always available, at least not in the extent where they can compensate for losses in annual yields. This is not so much the case in Katongan, as it is in Girisuko.

There other challenges involved in reaching sustainable implementation in HKm-management. The first concerns the uncertain profit-sharing arrangements. Uncertain profit-sharing arrangements bring along uncertainties for HKm-farmers in whether they will gain their promised profits. This uncertainty of payment should be avoided, as farmers might lose their motivation for forest management and might illegally deplete forests for their own use. The second relates to the lack of genuine transfer of power and rights for forest resources. At the moment, HKm-participants have too little power in decision-making processes. Although there are monthly meetings with HKm-groups and forest officials, it appears that the heads of the HKm-committees stay very much accountable to the forest officials. Is this view, HKm-participants have little chance to stand up for their rights. Furthermore, HKm-participants get utilization rights instead of ownership rights. This means that although participants are allowed to use the land for 35 years, the state keeps the authority to grant and revoke the land rights. This way is the most profitable for the Indonesian government. On the one hand, the production costs are reduced as much as possible by outsourcing forest management to local farmers. On the other hand, governments still gain almost half of the timber production. As a result, governments remain the most powerful actors.

It is expected that if the current HKm-implementation sets forth, the poverty alleviation objective will not be achieved. For the moment, it seems that forests have been rehabilitated at the expense of the socio-economic well-being of the local population. The losses in farming opportunities, the uncertainties concerning the profit-distribution, and the lack of genuine transfer of power and rights to HKm-members demonstrate that without further improvement of the HKm-program, Hkm is failing to meet the poverty alleviation objective.

7.3.3 Final remarks

Although the introduction of Community Forestry schemes has led to some socio-economic development, it is still far from reaching its potential for sustainable alleviation of rural poverty. Successful implementation of CF requires more support for further development of the schemes. First, more efforts are required from external actors to enhance the financial capital of the farmers. Such can be attained by increasing revenues from timber production, create secure alternatives for crop cultivation as a substitute for losses in farming opportunities, stimulate livestock activities and facilitate small-scale industries in the region. Second, structural changes are required to make CF more effective. As for HR-management, this includes the creation of effective and large scale wood certification schemes and improving farmers' market access and knowledge. For HKm-programs, this involves an improvement of the transparency and accountability of the policy-makers towards the farmer-members, and to enhance their participation in decision-making processes.

Recommendations for further research

Community Forestry schemes

This research has demonstrated that CF-schemes have created economic development for poor farmers. However, it has also pointed out that the potential to realize poverty alleviation is not fully exploited. In order to meet the poverty alleviation objectives of CF-schemes, external support is necessary. In this research, some suggestions are made with reference to how this support can be offered. However, as it is beyond the scope of this research, no in-depth analysis with respect to these possibilities is provided. Therefore, it is recommended to investigate the type of and the measure in which this support could be provided.

As for Privately Owned Forest management, it is suggested that joint management and wood certification schemes would provide the chance for smallholders to generate higher income from tree cultivation. Little is known about the scale on which these initiatives would be effective. Besides, these efforts would only yield result if the farmers' needs to apply immature cutting practices are simultaneously eliminated. Adequate implementation of such schemes requires extra monitoring and financial assistance for farmers. More research on how to apply such an initiative is necessary in order to provide sustainable solutions.

HKm-schemes are still in a pilot-phase. As it is likely that HKm-schemes are not meeting their potential, it is suggested to investigate more thoroughly what solutions can be provided to strengthen the effectiveness of HKm. Specific attention should be paid to the degree of transparency and accountability of the program towards farmers. Otherwise, more research can be done to find solutions for the decreasing farming opportunities caused by HKm-schemes.

Financial capital

In this research, the calculation of financial capital could not entirely be executed due to some missing values. These values concern the profits gained from HR- or HKm-involvement. To make an indication of these profits, an additional set of calculations and measurements is necessary. These include tree growth calculations and the design of future timber price developments. A more adequate comparison of financial capital between members and non-members would contribute to our understanding about the effects of community forestry schemes on the local population.

Additionally, as mentioned in the conclusion, livelihood diversification offers opportunities for farmers to enhance their financial security. In other terms, the diversification of livelihoods provides the spreading of financial risks. The extent to which such initiatives contribute to the financial capital of local farmers is however unknown. Further research to this topic could enhance our understanding of the elements that contribute to financial capital.

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Map in Figure 3.1: Yogyakarta Special Region.
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Appendix A. Different Types of Community Forestry schemes implemented on Java, Indonesia.

NO	Types of CBFM	Main Idea	Land tenure		Main actors (land users) who use the rights	Management purposes	Examples	Challenges
			Ownership	Rights given to land users and managers				
1	Community forestry or Hutan Kemasyarakatan (HKm)	Participatory State forest rehabilitation programs Profit-sharing 40%-60% and crop cultivation allowed	State, (provincial or district level).	Access, use and manage	Provincial or District community offices and community groups	Production Conservation	Damar forest in Lampung Teak community forest in Java	
2	Community plantation forest or Hutan Tanaman Raykat (HTR)	Revitalise wood supply for pulp and other wood processing industries by investing in smallholder timber plantations	State (district level	Access, use and manage	Community groups, District forestry offices and possibly private companies (under contract agreement)	Production Conservation	HTR permits in North Sumatera, Jambi and South Sulawesi	Smallholders plantations often grow more slowly than industrial plantations and therefore demand more technical support from the state
3	Village Forest or Hutan Desa (HD)	Villages apply for a permit to manage surrounding forests	State (district to local village level)	Access, use and management of forest products including timber	Community groups, individuals and village government (under contract agreement)	Production Conservation	Village Forest in Java	Communities not able to compete with powerful companies, in which the government has higher stakes
4	Company-community partnership models	State forest rehabilitation programs while increasing the prosperity of local people	State owned company or Private companies	Access, use and manage	Community groups and state owned companies	Production Conservation	Perhutani partnerships models in Java (PHBM of MHBM) or PT. Musi Hutan Persada in South Sumatera	Genuine poverty alleviation
5	Privately Owned Forest (POF) or Hutan Raykat (HR)	Timber (mainly teak) plantations managed by farmer individuals or communities alone	Private	Access, use, manage and transfer	Individuals	Production	Smallholder teak farm forest in Java	Environmental, social and economical sustainability relating to failures in supported wood certification

Source: Adopted from Rodahi (2010) and Fujiwara (2012), additional information from Van Noordwijk et al. 2007, ASB, 2010; Verchot et al., 2010

Appendix B. List of interviews and Focus Group discussions

Table 1. Interviews with Experts

Date	Interviewee	Organization
20-03-2013	Mrs. Titik,	Expert social forestry UGM
25-03-2013	Mr. Budiadi	Expert Agroforestry UGM
01-04-2013	Mr. Wardhana	Expert Geospatial science UGM
08-05-2013	Mrs. Suwarti	Forest Service Gunung Kidul
13-05-2013	Mr. Perhim	NGO Shorea
14-05-2013	Mrs. Himmah	Expert Community forestry UGM
15-05-2013	Mr. Surya	NGO Arupa
17-05-2013	Mr. Maryudi	Expert Community forestry UGM

Table 2. Interviews with Key Informants

Date	Village	Name	Head of farmer group
08-04-2013	Kedung Keris	Pak Surada	HR
14-04-2013	Katongan	Pak Suparman	HKm
28-04-2013	Girisekar	Pak Siswo	HR
29-04-2013	Girisekar	Pak Harjo	Baon
04-05-2013	Girisuko	Pak Hadi	HKm

Table 3. Focus Group Discussions

Focus Group Discussions	Date	Village	Nr of participants
1	06-04-2013	Kedung Keris	5
2	14-04-2013	Katongan	5
3	29-04-2013	Girisekar	7
4	05-05-2013	Girisuko	5

Appendix C. Household Questionnaire

A. General information

No. ☐

Approximate age of respondent:

Sex of respondent:

B. Identification Household members

Nr.	B1. Age	B2. Sex	B3. Achieved level of education	B5. Occupation(s)
1.				
2.				
3.				
4.				
5.				
6.				
7.				
8.				
9.				

C. Livelihood Activities

	C1. Indicate the occupations	C2. What are the hours spend a week for each activity?	C3. What share of the total annual household income does each activity provide (in percentage)?
1.			
2.			
3.			
4.			

D. Livelihood activities and characteristics

Community Forestry

D1. Do you participate in Community Forestry? If not, go to question D4.		
What type of CF?	Since when?	How large is the parcel?
Do you own (punya) (X), rent or only manage (mengelola) (Y) this land?		

If X	Do you have security of tenure?	Do you hire workers? If yes, how many and for what purpose?
If Y	Do you have security of access?	
Why are you involved in CF?		
What are the advantages/disadvan-tages of being involved in CF?		

D2. Do you grow trees on this parcel? If not, go to question D3.		
What kind of trees do you grow?	What is the share and total number?	
What is the average production per day/week/month/year of the forest parcel that you own? What is the selling price?	**Timber**	
	NTFP	
	Fodder	
Did the production change over the years? 1: increase, 2:no change, 3: decrease	**Timber**	
	NTFP	
	Fodder	
Why did this change?		

D3. Do you grow crops on the forest parcel? Or do you have access to state forest outside HR or HKm? If not, go to question D4.		
What is the size of the parcel?	What kind of crops do you grow on the parcel?	What is the average crop production?
How many times a year do you harvest?	Do you consume or sell the yield? If selling, for what price?	Why these crops?
Do you use intercropping? Is yes, how?	Did the crop production on the forest parcel change in quantity over the years? If yes, how and why?	Did the type of cultivated crops change over the years? If yes how and why?

Home Garden

D4. Do you have a Home Garden? If not, go to question D5		
How large is the parcel used for gardening (in ha/m^2)?	Do you have security of tenure?	Do you hire workers on your land? If yes, how many and what profit sharing arrangement do you have (bagi dua/tiga.. etc)?
What kind of crops do you grow around the house?	What is the average production per crop type per year approximately?	
Why these crops?	Do you grow them for own consumption or for selling? If selling, what is the selling price?	
Did the production of the crops change in quantity over the years? If yes, how and why?	Did the type of cultivated crops change over the years? If yes, how and why?	

Agriculture

D5. Do you cultivate crops outside the home garden and the forest parcel? If not, go to question D6.					
What is the size of the parcel?		Do you own (punya) (X), rent or manage (mengelola) (Y) this land?			
If X	Do you have security of tenure?	Do you hire workers? If yes, how many and what are the profit sharing arrangements?	If Y	Do you have security of access? Profit sharing arrangements?	
What kind of crops do you grow on the parcel? Is it Sawah, or ladang?		What is the average crop production?		Do you consume or sell the yield? If selling, for what price?	
How many times a year do you harvest?		Why these crops?		Do you use intercropping? How?	
Did the crop production on the parcel change in quantity over the years? If yes how and why?		Did the type of cultivated crops change over the years? If yes how and why?			

Animal Husbandry

D6. Are you involved in animal husbandry? If not, go to question D7.		
Are the animals officially yours (X) or do they own to another farmer(Y)?	If Y	What are the profit sharing arrangements?
What animals do you keep?	How many?	What benefits does this livestock provide you (Consumption, selling)? If selling, for what price?
Did these benefits (in type and amount) change over the years? If yes, how and why?		

Off Farm Activities

D7. Are you and your household and family members involved in off farm activities? If not, go to questions E.	
What kind of off farm activities do you/they have and is it stable?	
How many days a week/month/ year do you spend on this job?	
What profits/benefits does it provide the household/family?	
Is the income shared with the rest of the household?	

E. Food production

E1. Does your household produce enough food all year through to meet the household's daily needs? If not, what products are you in need of, how much and when?	**E2. How do you acquire them (buying or getting from neighbours, friends or family members)?**
E3. Have you experienced a change in food production within the village and surrounding parcels the recent two decades? If not, go to question F1. If yes, how and why?	

Access to livelihood assets

F. Access to Social Capital

F1. Are you or your household members a member of a social or political organization? If not, go to question F5.	F2. What are the name(s) and type(s) of organisation(s)? E.g. Farmers association, community committee, women's association, youth association, credit group?	F3. What is the frequency of attendance in meetings? 1=every day; 2=twice a week; 3=once a week; 4=every two weeks; 5=once a month; 6=every other month; 7= other, nl:
	1.	
	2.	
	3.	

F4. Are decision-making processes organized in a participatory or a top down structure?	F5. Are you involved in gotong royong? If yes, how is this organised?

G. Access to Natural Capital

G1. How would you consider the soil fertility? 1: Very fertile; 2: Reasonably fertile; 3: Not so fertile; 4: Not fertile at all	G2. Did the soil fertility change over the years? If yes, give an indication
G3. How would you consider availability of water sources? 1: mainly good; 2: sometimes good sometimes bad; 3: mainly bad	G4. Did this change over the years? If yes, give an indication
G5. Did your access to land recently change over the years? If yes, how?	G6. Do you have access to fish ponds? If yes, how much fish do you catch a week or a month?

H. Access to Financial Capital

H1. Would you consider your job(s) as being stable?	**H2. Do you have an income from retirement/remittances? If yes, how much?**
H3. Do you have Savings? If yes, what type of stock and how much?	**H4. Do you make use of informal loan systems (Pinjaman)? I yes, what kind of loan system is it and what advantages/disadvantages are involved for you and your household members?**

I. Access to Physical capital

I1. Do you use agricultural equipment? If yes, what kind of?	
Use of land manipulation (Use of fertilizer or pesticides)	Use of land preparation equipment (kerbau, tractors, diesel machine for irrigation, etc.)

I2. How is the quality of housing? Excellent, good, average, not so good.		
Material roofs	Material walls	Material floor

I3. What is the distance to the most proximate health care facility? What kind of facility is this (posyandu, pukesmas)?

I4. What is the distance to primary and secondary schooling?	**I5. What is the distance to the main road?**

I6. Which of the following assets do you have access to?			
	Yes, for private use	*Yes, for public use*	*No*
Sanitation (Flush Toilet or Pit Latrine)			
Piped Water			
Electricity			
Gas or fuel stove			
Radio			
Telephone			
Television			
Fridge			
Bike			
Motorbike			
Car			

J. Livelihood changes for households through CBFM introduction

J1. Has your living standard changed after CF introduction? If yes, how come? 1: increase, 2: no change, 3: decrease
J2. What are your expectations for the future concerning your living standard? Why?

K. Value of HKm

Value of CBFM participants

K1. What is the economic importance of CBFM to household? 1: Very important; 2: Quite important; 3: Not so important; 4: Not important at all.	**K2. To what extent are you satisfied with CBFM?** 1: Very satisfied; 2: Quite satisfied; 3: Not so satisfied; 4: Very unsatisfied.
K3. What would you want to change/improve?	

Value of CBFM non-participants

K8. Value of CBFM	**K9.Desire to participate in CBFM.** 1: no desire; 2: small desire; 3: strong desire.	**K10. Do you have feelings of competition towards CBFM- participants.** 1: never; 2: sometimes; 3: often	**K11. Feelings of jealousy towards CBFM participants**. 1: never jealous; 2: sometimes jealous; 3: often jealous
K12. Why or why not?			

K13. Do you have any comments or suggestions for government, NGOs or forest managers on how to improve the security of living of your household and the development of the village in general?

Appendix D. Results of Statistical Analysis

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	,575[a]	,331	,295	,35511
2	,538[b]	,289	,270	,36123

a. Predictors: (Constant), savings, incomeextra

b. Predictors: (Constant), savings

ANOVA[c]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	2,309	2	1,155	9,155	,001[a]
	Residual	4,666	37	,126		
	Total	6,975	39			
2	Regression	2,017	1	2,017	15,454	,000[b]
	Residual	4,958	38	,130		
	Total	6,975	39			

a. Predictors: (Constant), savings, incomeextra

b. Predictors: (Constant), savings

c. Dependent Variable: HR

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	,001	,190		,003	,997
	incomeextra	,191	,125	,209	1,523	,136
	savings	1,284	,304	,580	4,225	,000
2	(Constant)	,110	,178		,618	,541
	savings	1,190	,303	,538	3,931	,000

a. Dependent Variable: HR