

Virtual Carbon & Tangible Trees

Comparing actors' perceptions of the feasibility and potential benefits of the CDM scheme



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ABSTRACT

It seems to be a paradox that over the last fifteen years, as the role of deforestation in greenhouse emissions has been increasingly acknowledged, the world's forests have been disappearing at an alarmingly high rate. An average of almost 15 million hectares of forest was lost during the 1900s mostly in the tropics (FAO, 2010; 2011).

This thesis focuses on the tropical forests of Ghana, where deforestation occurs due to the combined effects of forest fires, logging, agricultural colonization, mining activities and other development projects (Appiah *et al.*, 2007).

The CDM project is intended to link Ghana's ability to grow forests with the interests of the developing world introducing gradual restrictions on greenhouse emissions. The theory is that Ghana has a competitive advantage in developing reforestation projects, because of its location in a tropical country and its position as an undeveloped economy. If Ghana could be rewarded for focusing on non-greenhouse emission based development, then the Ghanaian people and the developed world may each benefit.

Continued forest loss will have a detrimental effect on accelerated greenhouse gas emissions and threatens the livelihood of many forest dwellers that depend on forests for their subsistence and survival needs. Combined efforts to save the forest and mitigate the emissions have resulted in the proposal of financial mechanisms to support reforestation and afforestation projects, among which CDM is a proposed scheme to financially compensate countries to reduce such emissions by better managing forest resources through carbon sequestration to reduce the impact of climate change (Marfo *et al.*, 2011).

The objective of this study is to access the perceptions of the forest communities regarding the feasibility and potential benefits of implementing the CDM scheme in the Oda-Kotoamso and Koradaso communities. The CDM has yet to be fully implemented in Ghana. Therefore it is important to look into the perceived ideas at the local community level. Their expectations and fears of the feasibility and success can assist in their effective implementation. Moreover, these outcomes can lead to new CDM project development in other parts of Ghana. This research further presents the findings of the data that I collected from August to October 2011 and is based on research, questionnaires and interviews with key informant persons in Accra and Kumasi, as well as questionnaires and outcomes of PROFOR tool exercises and focus group discussions conducted with local community members in both study villages.

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LIST OF ACRONYMS

CDM	Clean Development Mechanism
CER	Certified Emission Reductions
CO ₂	Carbon Dioxide
CREMA	Community Resource Management Area
DNA	Designated National Authorities
EPA	Environmental Protection Agency
FBPA	Forest-based poverty alleviation
FC	Forestry Commission
FD	Forestry Department
FORIG	Forestry Research Institute of Ghana
FIB	Forest Investment Program
FSD	Forestry Services Division
HIPC	Highly Indebted Poor Countries
HFZ	High Forest Zone
IPCC	Intergovernmental Panel on Climate Change
ITTO	International Tropical Timber Organization
IUCN	International Union for the Conservation of Nature
KNUST	Kwame Nkrumah University of Science and Technology
MTS	Modified Taungya System
NFPDP	National Forest Plantation Development Program
NGO	Non-Governmental Organization
NTFP	Non-Timber Forest Product
OCAP	Oda-Kotoamso Community Agro forestry Project
ODA	Official Development Assistance
PADO	Private Afforestation Developers Organization
REDD	Reducing Emissions from Deforestation and forest Degradation
REDD+	Goes beyond deforestation and forest degradation, and includes the role of conservation, sustainable management of forests and enhancement of forest carbon stocks
PES	Payments for Environmental Services
PROFOR	Program on Forests Toolkit
SFM	Sustainable Forest Management
SLA	Sustainable Livelihoods Approach
SLF	Sustainable Livelihoods Framework
TBI	Tropenbos International
TUC	Timber Utilization Contract
UN	United Nations
UNDP	United Nations Development Program
UNFCCC	United Nations Framework Convention on Climate Change
VCS	Voluntary Standard Forest Carbon Projects
VPA	Voluntary Partnership Agreement

CHAPTER ONE

Background to the study

“The best time to plant a tree was 20 years ago, the next best time is now.”
Chinese proverb

1.1 Introduction

Paradoxically, as the tragedy of deforestation is increasingly acknowledged, the world's forests are disappearing at an alarmingly high rate. Approximately 15 million hectares of forest were lost during the 1900s, mostly in the tropics (FAO, 2010; 2011). Perturbed by this paradox, the scope of this thesis will focus on the tropical forests of Ghana, where deforestation occurs due to the combined effects of forest fires, logging, agricultural colonization, mining activities and other development projects (Appiah *et al.*, 2007). At the turn of the 20th century, it is estimated that one third of Ghana's land area was covered by natural tropical forests, but by the end of the 1980s, Hawthorn (1989) estimated that only 22% of the one third of the land area was still intact; a 78% decline. Since the 1970s many of Ghana's forest reserves have been heavily encroached upon and in the off-reserve areas¹, timber stocks are rapidly being depleted (Ghana R-PP, 2010). Sources differ in their estimates of exact deforestation rates. The International Union for the Conservation of Nature (IUCN, 2006) reported an annual 3% deforestation rate for Ghana. The Food and Agriculture Organization (FAO) (2010) estimates the annual deforestation rate in Ghana at 2.1% per year, which corresponds with an average of 115,000 ha/yr. since the turn of the century. More recent studies estimate a loss of 65,000 hectares of forest per year, suggesting a slightly lower rate of deforestation at 1.8% (Marfo *et al.*, 2011). No matter what statistics one considers, the overall deforestation rate remains alarmingly high when considering the decreasing percentage of original remaining forest.

The consequences of continuous deforestation have a detrimental effect for climate change. Over the last two decades, evidence has emerged that the accumulation of greenhouse gases in the upper atmosphere is leading to changes in climate, in particular changes in global temperature. In the next century, it is projected that world climate mean temperatures will rise by 1.4-5.8 °C. (Perez *et al.*, 2005). Forests, particularly tropical forests, play an essential role in global climate change mitigation as they have the potential to act as sinks for carbon storage. In order to reduce the impacts of climate change, global initiatives, such as CDM, have been proposed in order to prevent further losses from deforestation. Global warming will have multiple effects, from rising ocean levels to threats on crop and forest production, along with species extinction (Thomas *et al.*, 2004).

¹ Ghana's forest resources are under different governance regimes, including forest reserves (with protected, production and plantation areas) and off-reserve areas where patches of forest alternate with agricultural land, plantations and other forms of land use.

The disappearance of natural forests in the world has also had a significant impact on the livelihoods of the forest dwellers that are dependent on forests for food, medicines, fuel, construction materials, furniture, employment, income and overall wellbeing (Appiah *et al.*, 2007). A large share of the world's poorest people lives on 'fragile' lands such as arid zones, slopes, poor soils and forest ecosystems (World Bank, 2003, p. xvi). The World Bank (2003) estimates that 240 million people reside in forested areas, constituting 18.5% of the 1.3 billion people living on environmentally fragile lands (Sunderlin *et al.*, 2005: 1384). The connection between overlapping spaces of severe rural poverty and declining natural forests has been largely overlooked, according to Sunderlin *et al.*, and is fundamental to conceptualizing solutions (*Ibid*).

In many ways, the above reflects the situation in Ghana, where about 50% of the population lives in rural environments (FAO, 2011). Several initiatives in afforestation and reforestation (A/R) projects are being undertaken or are already in place in Ghana, especially since the introduction of the National Forest Plantation Development Program which began in 2001 and stimulated reforestation through the establishment of forest plantations and the planting of trees on farming land (FC 2008, cited in Insaadoo *et al.*, forthcoming). This led to an exemption of the common rule that tree ownership is vested in the state, meaning that the farmer or planter of the tree is now being considered the owner of the planted (but not naturally regenerated) trees. Since then, this initiative has resulted in an acceleration of on-farm tree planting initiatives throughout Ghana's high forest zone and, as a result, many farmers have benefitted from the policy reforms (Insaadoo *et al.*, forthcoming 2012). Reforestation also occurs in forest reserves in co-management with communities², but in these cases the uncertainty about the future of these projects is problematic due to, amongst other things, conflicts based on the (i) uncertainty regarding future timber benefit distribution among individual participants, (ii) slow pace in registering and signing MTS agreement, (iii) insecurity about future timber benefits due to risk of fire and theft before maturity, and (iv) fear of discontinuity of the scheme (Derkyi, 2011). There is also an underlying uncertainty among the rural population as to whether or not they will receive adequate compensation for their reforestation efforts and a growing frustration that any concrete financially guaranteed plan for future work is in place (see Chapters five and six). Nevertheless, Ghana's efforts remain focused on increasing the country's timber resources through expanding the areas with planted trees.

These efforts fit in with, and are supported by initiatives such as Reducing Emissions from Deforestation and forest Degradation (REDD) and the role of conservation, sustainable management of forests and enhancement of carbon stocks in

² Reforestation with communities is done through the modified taungya system (MTS) and so-called HIPC-funded plantations. The MTS is a co-management reforestation arrangement in degraded forest reserves between the Ghanaian government through the Forestry Commission and local communities, in which the latter are co-owners the trees and allowed to grow food crops between the planted trees. HIPC plantations are government-owned reforestation schemes meant for employment creation, financed from the Highly Indebted Poor Countries fund. Both schemes have recently been postponed (Insaadoo *et al.*, forthcoming).

developing countries (REDD-plus), the Voluntary Partnership Agreement (VPA) with the EU to combat illegal logging and Clean Development Mechanism (CDM) projects.

Due to the relatively new nature of such initiatives for people living in rural communities, more research is needed to see how effectively they can be implemented in order to achieve the combined objectives of increasing forested areas and enhancing people's livelihoods. This study examines the opportunities of the Clean Development Mechanism (CDM) – a climate change-related financial mechanism that generates revenues for carbon credits – for the livelihoods of people living in Ghana's high forest zone. The CDM was devised in 1997 under the Kyoto Protocol as a system of currency for trading in the global carbon market. The overarching goal of the Kyoto Protocol is to reduce global warming and the ensuing dangerous climate change. The CDM provides a framework for participants to buy or sell certified emission reduction credits (CERs), and was designed to stimulate sustainable development in the face of emission reduction (Haites *et al.*, 1999). This thesis is concerned more with the process of potential CDM projects than in the details of CERs. However, I do believe that CERs place a further governance burden on CDM as they are the new currency, subject to world financial institutions, and have the potential to become a serious commodity on the world market and thus will demand clarity and governance over ownership, rights and responsibilities (Boyd *et al.*, 2006).

The economic importance of CDM, despite the vagaries that continue to plague the Kyoto Protocol, is reflected in its growth in the last decade. More than 180 CDM projects were recorded in 2005 alone, channelling US\$ 2.5 billion of carbon finance to developing countries, an amount equal to 2.5% of the total amount of Official Development Assistance (ODA) (Capoor and Ambrosi, 2006, cited by Lecocq and Ambrosi, 2007: 135). As of today, this number has grown to 3,500 projects, according to Chokkalingham (2011), but other accounts state that there are 4,586 projects in 76 countries (Fenham, 2009, cited by Boyd, 2009). CDM literature seems to be inconclusive about the exact number of projects. Surprisingly, only 22 projects were CDM A/R projects, with an additional four in the pipeline awaiting registration (Chokkalingam *et al.*, 2011).

Global warming, or more precisely, the depletion of carbon stocks, represents a classic example of Garrett Hardin's "the tragedy of the commons", which has been used as a metaphor for the problems of overuse and degradation of natural resources. Ostrom (1999, p. 493-494) (who contradicts Hardin's thesis) summarizes this dilemma in *Coping with the tragedies of the commons* as "participants in a commons dilemma [who] are trapped in an inexorable process from which they cannot extract themselves. External authorities are presumably needed to impose rules and regulations on local users, since they will not do this themselves". The tragedy means that, when all contributors degrade something held in common, the temptation exists for none to accept responsibility. Every contributor to degradation finds reason for inaction. This was obvious in the latest Kyoto Protocol negotiations, where the greatest emitters did not agree to commit to binding emission targets.

Whatever the outcome of the continuing Kyoto Protocol negotiations or offshoots thereof, CDM-like projects in the form of reforestation and afforestation at community and farm levels have the potential to combine the objectives of increasing carbon stocks and enhancing people's livelihoods. Based on this hypothesis, this study focuses on the assessment and perceptions of villagers involved in a CDM A/R project and the potential livelihood benefits they stand to gain from this project. Particular attention will be paid to the governance arrangements associated with the CDM project under study and how they could be aligned with local governance mechanisms in order to facilitate community members' participation in the project. The ultimate goal of this study is to look at whether or not governance arrangements need to be adapted in order to ensure optimal community benefits.

This study is part of a cooperative program between the University of Amsterdam (Amsterdam Institute for Social Science Research), Tropenbos International (TBI) - Ghana and Kwame Nkrumah University of Science and Technology that aims to gain insight into and formulate recommendations on governance practices that promote pro-poor forest and tree management. For this study, cooperation was sought from the Forestry Research Institute of Ghana (FORIG), whose staff supported the selection of and introduction to the study area and provided local supervision. This study also aligns with other projects that are being carried out at FORIG.

1.2 Problem statement

The inhabitants of Ghana's high forest zone – a zone where forests alternate with degraded forest areas, farming land and forest plantations – are faced with what appears to be an unfair predicament. They are among the smallest contributors to carbon emissions yet they are being asked to revamp old agricultural systems, refrain from logging and spend time and care to rejuvenate the degraded forest for unseen future financial benefit. Meanwhile, they are being told that they are part of a worldwide effort to rejuvenate the forest for a better atmosphere. Ghana, with its tropical climate and large areas of depleted or degraded forests, has the potential to implement numerous CDM A/R projects. With the additional and diversified income stream available through carbon trading projects sanctioned by CDM A/R, one would expect an accelerated growth in these projects in Ghana. However, this is not the case. This thesis will evaluate the problems that seem to impede Ghana from increased participation. Not all problem areas are within the scope of this thesis, which concentrates on the role of governance, sustainability and local perception of CDM A/R projects.

1.3 Research objectives and questions

The CDM is yet to be extensively implemented in Ghana. Therefore, it is important to look into people's expectations, fears and perceived ideas at the local community level regarding the feasibility and success of such schemes, in order to assist their effective implementation. Hence, the overall aim of this study is to analyze the performance and perceptions at the community level regarding the feasibility and the future of CDM projects in Ghana, with the ultimate aim of generating insights into the changes needed to enhance sustainable forest-related livelihoods and poverty alleviation. Many scholars

have acknowledged that while addressing CDM schemes, governance arrangements often stand in the way of successful implementations of the scheme (Thomas *et al*, 2010; Perez *et al*, 2007; Boyd, 2009 etc.). This study focuses on the governance arrangements in place at the communities under study. More specifically, the research objectives of this study are:

- To identify the different actors and their roles in the CDM scheme within the two study areas;
- To assess the perceptions of local actors on the feasibility of CDM schemes in the two areas;
- To assess the perceptions of the actors regarding the potential future benefits and challenges;
- To analyze the governance arrangements under which the project operates at the community level in terms of land/tree tenure, responsibilities under the CDM project, rules of the game, future benefit sharing from the CDM and the conditions under which actors are entitled to these benefits.
- To draw implications for CDM development projects in the country that aim to reconcile sustainable forest management and community livelihood benefits.

The main research question for this study is:

What are actors' perceptions regarding the feasibility and potential benefits of a CDM scheme in the Oda-Kotoamso and Koradaso area and how can governance arrangements be improved to enhance livelihood benefits from such schemes?

The sub questions that guided me in answering my central research question were as follows:

1. What are the governance arrangements in place in both study areas (on/off reserve, tenure arrangements, actor constellations and institutional arrangements to regulate the allocation, use, and revenue sharing of the carbon sequestration projects)?
2. What are community members' (participants and non-participants) perceptions regarding the actual and future livelihood benefits of the project and their participation in decision-making?
3. What adaptations in governance arrangements are needed to align local governance arrangements with the requirements of the CDM project and local people's expectations?

1.4 Study area

This study was carried out in the villages of Oda-Kotomso and Koradaso, located in Ghana's high forest zone. This zone encompasses deciduous, moist evergreen, and wet evergreen forest cover (see *Map 1.1*), alternating with other land uses. Oda-Kotomso is situated in the Wassa Amenfi West District in the Western Region, in the wet evergreen forest zone in which a long-term agroforestry project is under way. The second community, Pamu Berekum, that is a part of the village of Koradaso, is located in the Dormaa District in the Brong Ahafo region, a dry semi-deciduous forest zone, where local communities are planting trees in a forest reserve in collaboration with Forestry Commission.



Figure 1.1 Map of Ghana showing research locations and ecological zones
Source: adapted from <https://www.uni-hohenheim.de/respta/pics/agriczones.jpg>

1.5 Thesis outline

This thesis is comprised of seven chapters. The first chapter functions as an introduction to the study. In the next chapter, I present the theoretical framework for this study, encompassing (i) the sustainable livelihood framework and theories on the importance of forests to rural people's sustainable livelihoods, (ii) theories of forest governance and institutions, and (iii) theories on the role of CDM in improving forest governance and livelihoods. Chapter three presents the methodology that I employed, paying attention to the conceptual framework, operationalization, and methods used for collecting data. It also reflects on the limitations and ethical considerations concerning this research. Chapter four goes into detail about the background of the CDM project. The subsequent chapters (five and six) contain the empirical data from the two case studies, addressing the CDM projects in Oda-Kotomso and Koradaso respectively. Here, I deal with the characteristics of the inhabitants and their current livelihoods, the characteristics of the project, governance arrangements in place, and people's perceptions regarding livelihood benefits, their say in the project and problems and challenges. Chapter seven, the final chapter, summarizes the research findings. It compares the two case studies, answers the research questions, relates the findings to the theoretical framework and provides suggestions for further research and recommendations with regards to the future of CDM for Ghana.

CHAPTER 2

Theoretical Framework

This chapter reviews the literature pertaining to this study and describes the three theoretical strands that are used: (1) the sustainable livelihood framework and theories on the importance of forests to rural people's sustainable livelihoods, (2) theories of forest governance and institutions and (3) theories on the role of CDM in improving forest governance.

2.1 Theories on the importance of forests to rural people's sustainable livelihoods

Livelihood issues are an integral part of CDM projects acceptance. Article 12.2 of the Kyoto Protocol specifies that CDM projects should assist host countries in achieving sustainable development (UNFCCC 1997, cited by Smith & Scherr, 2003, p. 2143). Sustainable livelihoods are therefore a qualifying category for CDM projects, necessitating the ability to understand the livelihood of the inhabitants and find avenues to improve their wellbeing (Haites, E. & Yamin, 1999).

Livelihood, in general, can be seen as how different people in different places live, including "the means of gaining a living" (Scoones, 2009: p.172). However, it consists of much more than just cash incomes. According to Sunderlin *et al.* (2005) it comprises "the assets (natural, physical, human, financial, and social capital), the activities, and the access to these (mediated by institutional and social relations) that together determine the living gained by the individual or household" (*Ibid*, pp.1385-6). These five assets or building blocks are instrumental and form the capitals of the livelihood approach. They can be further elaborated upon as human capital (represents the skills, knowledge, experience, ability, labor, resourcefulness and good health), social capital (involves social resources, networks, membership in groups and institutions that assist in securing access to goods and a means of living), natural capital (such as land, forests and water), physical capital (which includes: infrastructure, houses, tools and equipment) and financial capital (which consists of financial resources) (DFID, 1999, Boyd, 2007: p.353). Some capital can only be used in combination with other capital. For example, when a household does not have the financial capital to buy tools, it cannot expect to derive much profit from physical capital. Natural capital is usually the only asset close to a safety net available to the rural poor, and together with social and human capital, its use is vital to the recovery from unexpected losses and shocks (Boyd, 2007:253). Bebbington (1999) sums it up well when he states "Peoples' ability to gain access to those spheres is in turn greatly affected by the capabilities they have as a result of their endowments of the different types of capital assets" (Bebbington, 1999: p.2035).

Wallman (1994), quoted by De Haan (2010) added to this definition: "the task of meeting obligations, of security, identity and status, and organizing time are as crucial to livelihood as bread and water". These important concepts of security and status were

often neglected in former livelihood approaches. Bebbington expanded on this again with a more multi-dimensional understanding of assets or capital:

A person's assets, such as land, are not merely means with which he or she makes a living: they also give meaning to that person's world. Assets are not simply resources that people use in building livelihoods: they are assets that give them the capability to be and to act. Assets should not be understood only as things that allow survival, adaptation and poverty eradication: they are also the basis of agents' power to act and to reproduce (Bebbington, 1999: 2022).

Ian Scoones (2009) contributed another important aspect to the livelihood approach when he claimed "a livelihood is sustainable when it can cope with and recover from stresses and shocks, maintain and enhance its capabilities and assets, while not undermining the natural resource base" (Scoones, 2009: 175). This refers to the concept of resilience, which is understood as "the buffer capacity or the ability of a system to absorb perturbations or the magnitude of disturbance that can be absorbed before a system changes its structure by changing the variables and processes that control behavior" (Holling *et al.*, 1995, cited in Adger, 2000: 349).

The eradication of poverty is one of the primary objectives of individuals and institutions working to enhance the development of poor countries and has become more central with the rekindling of interest in poverty elimination since the 1980s, led by UNDP first Human Development Report in 1990 and the 1990 World Bank's Development Report on poverty (Laderchi *et al.*, 2003: 269). Exactly what is meant by poverty is open for academic debate with the four major defining approaches being monetary, capability, social exclusion and participatory approaches. However, All of these approaches lack homogeneousness. Each approach is "a construction of reality, involving numerous judgments, which are often not transparent" and have different implications for policy (*Ibid*, p.252).

The following graph conceptualizes the sustainable livelihoods approach and is helpful in illustrating the interconnectivity of the livelihood framework.

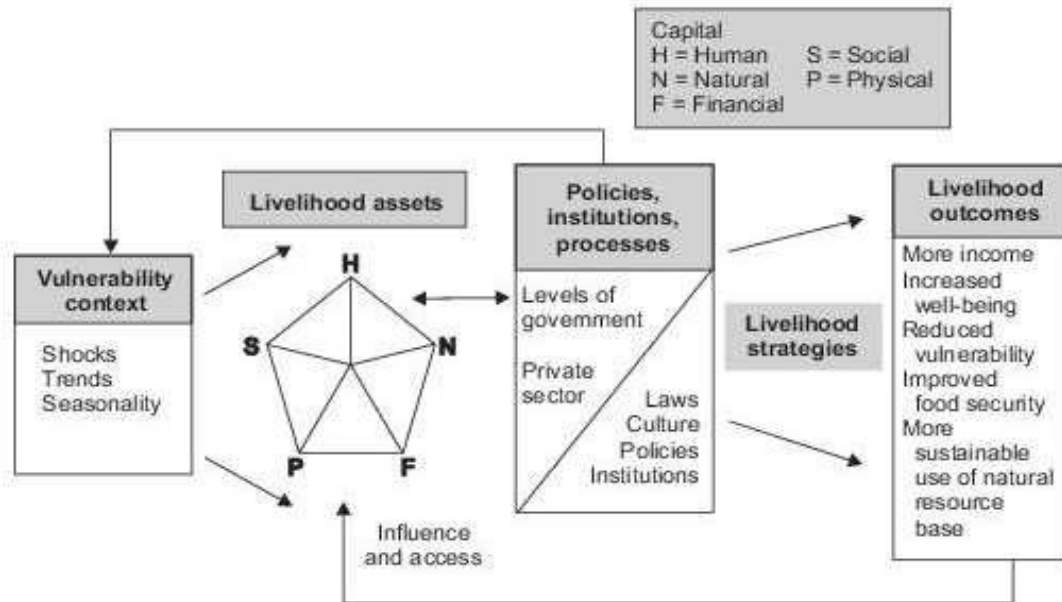


Figure 2.1 Sustainable Livelihoods Framework
Source: DFID, 1999

There is a direct correlation between the location of chronic poverty and the remaining areas of natural forests. These two areas tend to overlap. Rural people need to survive on forest resources for poverty mitigation and avoidance, but, at the same time, need to maintain the forests in order to continue to use these vital services of the forest in the future (Sunderlin *et al*, 2005: 1385).

With regard to poverty alleviation, Sunderlin *et al.* (2005) distinguish between (i) poverty mitigation or avoidance and (ii) poverty elimination. The first one can be defined as “the use of forest resources to meet household subsistence needs, to fulfill a safety net function in times of emergency, or to serve as a “gap filler” in order to lessen the degree of poverty experienced or to avoid falling into poverty” (*Ibid*, p.1386). Poverty elimination, on the other hand, uses “the forest resources to help lift the household out of poverty by functioning as a source of savings, investment, accumulation, asset building, and lasting increases in income and well-being” (*Ibid*, p.1386). Sometimes this alleviation is only temporary, depending on a variety of economic, political, social and geographical factors. Finding solutions to generate income and employment from the forests for poor people and avoiding irreversible depletion of natural resources can be addressed by livelihood theories.

The livelihood approach gives further insight into poverty with the realization that economic growth may be essential for poverty reduction, but there is not an automatic relationship between the two. It all depends on how capable the poor are to take advantage of these economic opportunities and how resilient they are in the face of shocks and stresses (DFID, 1999).

Poverty alleviation embraces more than just decreasing poverty as a goal. One must factor in other dimensions, including poor health, illiteracy and lack of social services. One also has to take into account that forest products have a limited market and yield small returns. When considering rural people's livelihoods, we must consider resources to endure mitigating poverty in a lasting way, such as having access to education and healthcare (DFID, 1999).

2.2 Theories on forest governance, tenure and institutions

In the 20th century the population of southern Ghana grew by almost ten times, putting pressure on the cultivation of food crops. Rural populations increased, coinciding with deforestation of the original primary moist tropical forests to fulfill the increasing demands for timber and farmlands (Wiggins, 2004: 1944). This poses a major challenge to forest governance, as does the key problem of Ghana's forestry sector, illegal logging, which is symptomatic of the underlying problem of governance failures (Logging Off, 2010). The main challenge is to find alternative ways and take appropriate action on how forest resources are being governed in a way that allows various actors to find an alternative to the trap of illegal trading and logging of wood products and associated bribery, corruption, land grab and encroachment (World Bank, 2009, p. ix).

These actions call for improved governance, which can be defined as "the setting, application and enforcement or non-enforcement of regime rules" (Hyden 1999, cited by Hansen *et al.*, 2009: 444). Yet another definition by Macqueen and Bila (2004, cited by Ros-Tonen *et al.* 2008: p.1483) is "the process of policymaking, implementation and monitoring the allocation and use of scarce forest resources".

An important concept in development studies is the encouragement of interaction and participation, which is well-defined as governance by Kooiman *et al.* (2005: 17) in their book *Fish for Life*:

"Governance is the whole of public as well as private interactions taken to solve societal problems and create societal opportunities. It includes the formulation and applications of principles guiding those interactions and care for institutions that enable them."

In this definition, institutions are defined as the building blocks of governance, offering structure, order and predictability in human relationships, such that social actors would know how to interact, what is expected of them, and what they can expect from others (Ibid). There are many stakeholders involved where governance is concerned, including forest dwellers, local communities, chiefs, landowners and the private sector, etc. They can all lay claim to the resources and have a hand in their use and overall management (World Bank, 2009, p. x). These actors work within overlapping frameworks that are responsible for carrying out forest-related laws and regulations. These governance structures include formal/statutory, traditional/customary, market, civil society, and hybrid structures. The last one is a combination of two or more of the

aforementioned frameworks (Derkyi, forthcoming 2012). Many challenges are involved when it comes to governance processes, which include, among others, conflicts over forest and trees resources and lack of political and administrative will to address the societal problems that emanate from natural resource management (*Ibid*). According to the World Bank (2009), conflict management is a key building block for forest governance, but has received little or no consideration in the ongoing governance incentives in Ghana, except for the REDD+ process (FC 2010: 1963, cited by Derkyi, forthcoming 2012). The position of conflict management in forest governance has been explored in a recent paper: *From images to action: Interactive forest governance for conflict management in Ghana* by Derkyi *et al.* (in press), in which the authors explore the images of Ghanaian forestry experts regarding conflicts and conflict management and their proposed instruments and actions, which will be a reference for reflecting on the findings from my study.

Poor governance also stands in the way of the recent initiatives of REDD, VPA and CDM. In order for the mechanisms to be successful, forest governance needs to be transparent and be reconciled with the different interests of various stakeholders. Otherwise, it will inevitably lead to conflicts, resulting in losses of income, employment, government revenues, and inclusive, transparent, local and global environmental governance that allows stakeholders with different degrees of political influence to participate in formulating and implementing policy (Forsyth, 2009: 113). REDD+ and CDM can play an important role here, because reducing emissions from deforestation and degradation, together with conservation of carbon stocks, require multi-level, multi-actor governance, while at the same time, it can boost the participation of local people and reduce potential conflicts (*Ibid*, p.114).

Ghana's forest governance is viewed as problematic because of its land and tree tenure policies. Tree tenure is understood here as "the bundles of rights over trees and their produce which may be held by different people at different times" (Fortmann, L., 1985:229). These rights can be divided into: "the right to own or inherit trees, the right to plant trees, the right to use trees and tree products, the right to dispose of trees and the right to exclude others from the use of trees and tree products" (*Ibid*). Land and tree tenure are clearly described by Ghanaian law. One of the most challenging issues in Ghana is that tree tenure does not coincide with land tenure for naturally regenerated trees. Furthermore, Ghanaian law makes a distinction between the rights to naturally occurring trees and those that are planted. Since A/R projects depend on people's rights to plant and use trees, it is important to note that the law on rights to planted trees has been amended to encourage afforestation/reforestation and private plantations. The Timber Resource Management (Amendment) Act 2002 (Act 617) specifically states that a person who invests in any forestry or wildlife enterprise is entitled to the benefits and incentives related to the investment, whereas the same law provides guarantees against expropriation. However, through the 1962 Concessions Act (Act 124: Section 16 (4)), all rights to "economic trees" are vested in the President.

There is a fundamental difference between tenure rights in forest reserves and in off-reserve areas.

“Forest reserves are fully vested in the State through the Forest Ordinance of 1927, and all forest and timber resources are held in trust by the government on behalf of the stool landowners. (...) The management of trees within forest reserves, and the rights to own, plant, use and dispose of them are controlled by the State through Forest Protection Decree of 1974” (Boakye and Baffoe, 2006: 4).

In the off-reserve areas there are different rules. Land and tree entitlements here are founded on the customary system of land tenure and administration. This means that the landowner holds all the rights (except for commercial rights to the tree), which could be stool³, family or communities (Osafo, 2010: 4). Forest reserves can be described as ‘permanent forest estates’, while the area outside the reserves is known as “off-reserves” and largely consists of farmland, dominated by perennial crops like cocoa (Hansen, 2010).

Under customary ownership, land belongs to the whole social group (stool, family or clan) and not to an individual. Yet individuals within the collective enjoy unrestricted rights of access and use. Therefore, property must serve the greater interest of the whole community, as a famous chief, Nana Sir Ofori once said “Land belongs to a vast family of whom many are dead, a few are living and a countless host is still unborn” (Agidee, 2011: p. 6). The West African Court of Appeal delivered judgment on this issue of customary land tenure by noting:

“The notion of individual ownership is quite foreign to native ideas. Land belongs to the community, the village or the family, never to the individual. All the members of the community, village or family have an equal right to the land, but in every case the chief or headman... has charge of the land, and in loose mode of speech is sometimes called the owner. He is to some extent in the position of a trustee, and as such holds the land for the use of the community or family” (Agidee, 2011: p. 6-7).

Citing Makundi (1998), Unruh (2008) claims, “Land tenure and land law may prove to be the strongest hindrance in implementing the [sequestration] mitigation options, especially in this region where land and politics are so intertwined” (Makundi, 1998: 10, cited by Unruh, 2008: 701). Unruh narrows down the complications and obstacles regarding land tenure and carbon-related A/R projects as follows:

- (1) The pervasive disconnect between customary and statutory land rights
- (2) Legal pluralism
- (3) Tree planting as land claims
- (4) The functioning of treed area expansion in smallholder land use systems, and
- (5) The abandoned land problem (*Ibid*).

³ Stool or Skin known in Ghana as the traditional authority or Chieftaincy

The difficult relationship between the indigenous tenure system and statutory forest policies stems partly from a limited understanding and often cultural disconnect between the two and this will affect sustainable forest management (*Ibid*). Owubah *et al.*, postulated that forest tenure structure determines the conduct of the tenure holder that, in turn, determines tenure performance. The farmers' willingness to conserve the forest and naturally regenerated trees depends on the fundamental question of whether "the benefit stream reaped by the farmer and the farmer's family [will] outweigh the benefit stream from alternative uses" (Owubah *et al.*, 2001: 256). Lack of clarity around the rights of trees is partly due to conflicts between statutory laws (that refers to public land and naturally regenerated trees) and customary laws (land held according to customary laws), which means that landowners do not automatically own the trees that grow on their lands if they were not planted by themselves. Therefore, there is little incentive to protect naturally regenerated trees, because the government has the right to grant permission to contractors to cut the trees and in doing so often damage the crops. As a result, the farmers often cut the trees before maturity in order to minimize the effects of contract loggers ruining their lands (Hansen *et al.*, 2009). Farmers and forest fringe communities are not directly included in benefit sharing with the local government, so there are no incentives to conserve the trees, especially with the minimal enforcement of rules on farmers' rights (Owubah *et al.*, 2001: 254). Therefore Hansen *et al.*, claim that "the benefit sharing provides perverse incentives for farmers and communities to engage in illegal activities (chainsaw lumbering) or kill or burn valuable timber, i.e. contributing to deforestation and forest degradation" (Hansen *et al.*, 2009: 446).

Changes to the forest system will only be realized if the alternatives are more lucrative and if the tenure holder can see 'the big picture' of forest conservation. Osafo (2010) concludes that owners or planters of planted trees have a much better deal than the key stakeholders in naturally-occurring forests, because they are entitled to keep 90% of the revenue, while 10% goes to the state (*Ibid*, p. 4). Inevitably, Ghana must also consider reforming the tenure of naturally regenerated on-farm trees to give farmers the right to sell their trees. This will in turn provide them with incentives to engage in the conservation of forests and trees (Hansen *et al.*, 2009: 447). Those incentives could be created by monetary compensations from global financial initiatives, such as Voluntary Standard Forest Carbon Projects (VCS), REDD (Reducing Emissions from Deforestation and Degradation) and the Clean Development Mechanism (CDM).

The institutions that negotiate, manage and support projects such as these under the CDM are evolving rapidly, but tend to be highly problematic, with many conflicts and challenges (Brown *et al.*, 2004:5). The institutional challenges facing the establishment of the CDM A/R projects demand a marked increase in the institutional capacity of most non-Annex 1 countries if the program prerequisites are accomplished. Information and educational systems and programs must be established in order to assist the farmer and other resource users, so they can collectively adapt and maintain land resource practices that sequester carbon. Furthermore, these programs should allow for technical capacity in order to enhance carbon storage and production systems. Financial institutions, whether for profit or not for profit, will demand the ability to monitor the carbon stocks at a local level and need a critical mass of carbon credits in order to satisfy a credible dealer

network. In addition to the reporting mechanism, the financial institutions must be in place to allow for incentive payments to reach the farmer with transparent and accountable governance structures in order to ensure equitable distribution of benefits (Perez *et al.*, 2007). While the CDM A/R projects will put strains on the present institutions (mainly the Forestry Commission, policing and fire monitoring), the successful projects must work on building synergies between new and old institutions (Boyd *et al.*, 2007).

2.3 Theories on the role of CDM in improving forest governance and livelihoods

The CDM, under the Kyoto Protocol, is designed with the dual aim of assisting developing countries in achieving sustainable development and helping developed countries to achieve compliance with their greenhouse gas emissions. However, the sustainable development dimension should be seen as the main driver for a developing country's interest in participation in the CDM project (UNEP, 2004). Boyd *et al.* (2007: 251) note that experience from observers tells a different story: "pilot sinks projects have fallen short of their equity and local development objectives" and more attention has been paid to economic and technical matters. Environmental groups have also warned against the inclusion of carbon sinks in the CDM, because the projects are often concentrated in rural areas where the majority of the poor people reside, possibly displacing and marginalizing the local population even further, by denying them access or excluding them from harvesting any timber or other NTFPs, resulting in loss of income for the entire community (Jindal *et al.*, 2008:124). Other concerns relate to the establishment of large-scale mono-species plantations, which can further displace the indigenous community and oppose the basic principles of the CDM. Small-scale community-based reforestation projects, on the other hand, would deliver the benefits that are meant to be implemented under the Kyoto Protocol (Boyd *et al.*, 2007).

The CDM was formulated as a means to form official partnerships for funding reforestation as a way of sequestering carbon dioxide. Through this mechanism, developed countries were allowed to meet a part of their committed reduction of CO₂ emissions by supporting projects for emission reductions in developing countries. These projects are perceived, in many theories, as an attractive way to help mitigate climate change and transfer income to the rural poor, especially with the many economic, social and environmental benefits that such activities potentially offer (Gong *et al.*, 2010). Perez *et al.* (2007) describe the CDM as a win-win opportunity for buyers and sellers. However, researchers see many constraints to the development of CDM A/R projects. These constraints include financial, administrative and governance issues. According to Thomas (2010), a successful project is likely to be characterized by the following:

"Initial funding support; design and implementation guided by large organizations with technical expertise; occur on private land (land with secure property rights attached); and most revenue from Certified Emission Reductions (CERs) is directed back to local communities" (Thomas, 2010: 880).

Thomas sees a need to reform the CDM, incorporating greater flexibility and simplifying the methodology to support more projects (*Ibid*).

Some critics claim that the CERs simply allow corporations to buy the right to pollute, but completely ignore the fact that the CDM, under the Kyoto Protocol, heralds the formal start of payment systems for reforestation as a means for carbon sequestration (Wiersum, 2009). The CER financial structure will demand improved governance from the A/R projects, if it seeks credibility from international financial institutions.

2.3.1 The need for income perspectives

Despite initial optimism about the potential economic impact of CDM on developing countries, (Olsen, 2007) not everyone shares the high hopes for the success of implementing CDM. The CDM can have enormous impacts on the host countries, especially in economic and social development and on the local environment. The drive for economic growth presents both threats and opportunities for sustainable development. While environmental quality is an essential element of the development process, in practice there is a considerable tension between the two (UNEP, 2004).

While acknowledging the potential economic benefits of carbon sequestration, many local communities and scholars have concerns about the adverse effects of carbon sequestration, such as access termination, ground water fluctuations and a proper allocation of the carbon revenues. These issues must be addressed so local forest communities will not lose out or be directly harmed by the implementation of carbon-offset mechanisms (Jindal *et al.*, 2008). There is also a worry that privatizing a natural resource, such as forests, will mean “switching from one regime of free access to one of exclusive ownership, normally by allowing an outside firm, individual/or country to ‘access the resource while it is declared illegal’ for local communities to do so” as Razak Saeed quoted in *Addressing the Climate Crises: Which path for REDD+?* (2011). Marfo *et al.* are also highly doubtful of the benefits that these financial mechanisms will bring. They suggest that local people may not benefit and that the mechanisms “may reinforce the rich-poor gap” (Marfo *et al.*, 2011: 2).

Government arrangements must be adapted to align CDM with local conditions, through serious education and capacity building projects involving communities in forest management. The FAO (2002) (cited in Boyd *et al.*, 2007: 252) argues that poor land users are not likely to become the beneficiaries from carbon sequestration credits without serious efforts to build institutions and capacity, and provisions of information. This issue will be addressed in the next sub-section.

In defining the components of the livelihood aspects of the two Ghanaian CDM pilot projects studied in this thesis, the ‘diversified portfolio’ of income-generating activities on which the forest farmers depend rely on continued access to the five capitals in the sustainable livelihood framework (Figure 2.1). The introduction of a CDM A/R project, while representing a potential new source of income, could set new standards of governance and credibility that deny the farmer the right to randomly use this income

source (FAO, 2002). Furthermore, it may also create a trade-off between capitals if trees or land for trees can no longer be used for subsistence or cash crops that generate immediate income (Brown *et al.*, 2004; Boyd *et al.*, 2007). In conducting my research, the sustainable livelihood model was used, which recognizes the five capitals and how they contributed to the balance of offsetting any new CDM A/R projects.). In their research on small-scale forest carbon projects, Boyd *et al.* (2007) clearly warn that the marginal farmers are often stressed to their limit, caring for their natural capital, which is usually the only thing close to a safety net available to the rural poor, providing for their physical capital and covering their everyday basic need for food. They often have memories dominated by experiences of unfinished projects and broken promises. Any successful project will have to show a proven acceptable return on investment and assure continued access to the various forms of capital (Boyd *et al.*, 2007: 253).

2.3.2 The need for proper governance arrangements

As previously mentioned, the implementation of CDM projects requires specific attention to governance in order to ensure that the poor will benefit from CDM projects. Thomas *et al.* (2010), for example, argue that the complexities of such projects demand fundamental governance and accountability improvement.

“Nearly 50% of forests are in countries judged as rampantly corrupt (Ireland, 2008) and forestry activities are threatened by the illegal behaviours of non-participants. Nearly a quarter of hardwood lumber and 30% of hardwood plywood traded internationally is considered to be illegally harvested (SCA, 2004). Development projects fail or perform poorly when subject to ineffective governance and weak accountability in environmental management” (Thomas *et al.*, 2010: p.882).

Similarly, in an overview of small-scale forest carbon projects Boyd *et al.* argue that:

“The weakness in every case, like in so many development projects in the last decades point to a lack of attention to governance aspects as a crucial factor - that is weak rights and lack of governance services and weak accountability and environmental management” (Boyd *et al.*, 2007: 251).

More specifically, Boyd *et al.* (2007) mention three basic governance conditions to adapt CDM to low-income communities, including (i) stakeholder participation, decentralization (including the allocation of property rights in public forest areas) and local representative organizations, (ii), building on compatible development and land-use strategies, and (iii) flexible and adaptive project design. Such governance adaptations involve all of the actors that play a role in society, including those governed by statutory, customary and hybrid rules of law, market forces and civil society governing structures (Derkyi, forthcoming 2012). This will require a decentralized and interactive approach to forest governance, a sharing of responsibilities, ensuring cooperation with equitable benefits, power for key actors in communities and a well-defined definition of customary law within the statutory forest laws (*Ibid*, p. 106).

2.4 Summary

The three theoretical strands that were described above – the sustainable livelihood framework and notions of forest-based poverty alleviation, theories on forest governance and institutions, and theories regarding livelihood and governance impacts of CDM projects – can be connected in an effort to understand the underlying obstacles faced in the mitigation of poverty and to finding solutions to alleviate poverty through CDM projects that are being implemented in Ghana's high forest zone. The emerging CDM implementation process is expected to have a positive impact on the forest sector in Ghana by providing an opportunity to combat forest degradation while improving the livelihoods of people who depend on forests. Initially, CDM was seen as an attractive option for improving the livelihoods of people in forest fringe communities. However, there is evidence of numerous obstacles related to governance arrangements, with insecure (and in Ghana: ambiguous) land and tree tenure as one of the main culprits. The review of literature in this chapter demonstrated that for the CDM to act as a new source of livelihood and poverty alleviation, several conditions must be established, including (i) secure tenure, (ii) income perspectives and proper benefit-sharing arrangements, (iii) good governance, reflected in transparency, accountability and participation of the stakeholders involved, (iv) technological capacity, to be strengthened where necessary, through extension services and training, and flexible arrangements. These issues must be to be fully addressed to ensure successful implementation of the CDM, particularly in terms of generating community benefits.

CHAPTER 3

Research methodology and methods

This chapter discusses the methodology and methods for data collection that were undertaken during my ten-week stay in Ghana. The chapter begins with a conceptual scheme, which was created to help break down the concepts that I would employ during the field study. Following the conceptual scheme is the operationalization table that further breaks down the concepts into dimensions, variables, indicators and the sources of information on these indicators. The chapter then continues to explain my research methods and concludes by stating the research limitations and ethical considerations.

3.1 Conceptual scheme

The following model (*Fig 3.1*) shows the most important concepts that are used in this study and the relationship among the different theoretical approaches.

The diagram in the top right hand corner represents the actors in forest governance. This model was developed by Ros-Tonen *et al.* (2010) and includes all of the actors with roles, responsibilities and interests in decision-making, implementation and enforcement of rules in the forestry sector of Ghana.

Furthermore, it shows how a climate change financial mechanism, such as the CDM, could be an influence towards governance and livelihood adaptations. The livelihood adaptations that could be perceived from the point of view of the farmers are financial capital that they will receive from the CDM project and the know-how and the specific skills, which form the human capital. Natural capital involves the land on which they plant the seedlings. Physical capital pertains to the tools for planting, maintaining and harvesting the trees. Social capital refers to social networks, mutual assistance and the expectations around reciprocity, which represents tangible benefits for individuals, households and society as a whole. In this case, social capital could be achieved when all of the workers are involved in the same project, working towards the same goal of climate change mitigation through agroforestry and CDM projects.

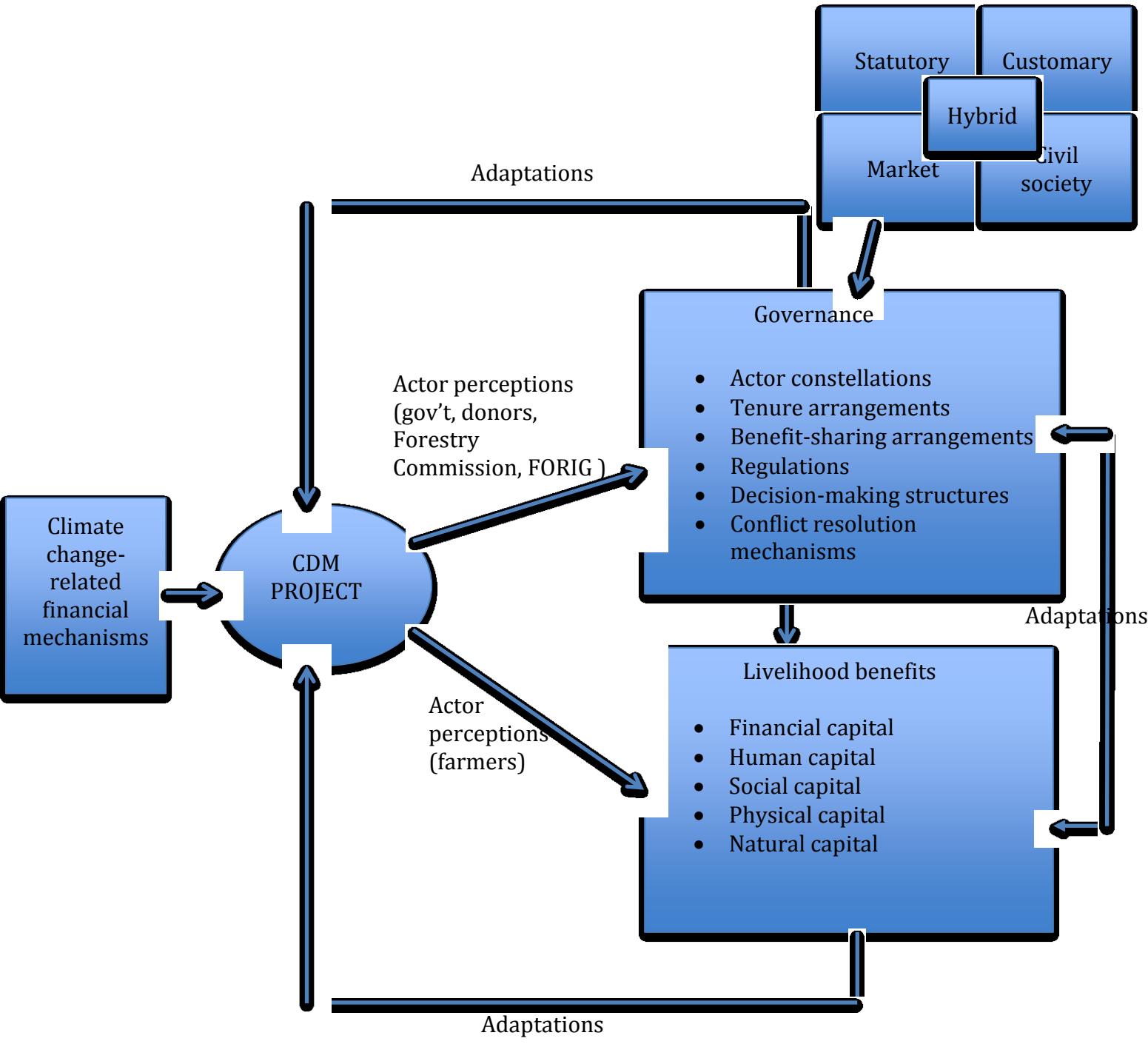


Figure 3.1 Conceptual scheme

3.2 Operationalization

This schedule breaks down the operationalization of the concepts of this research.

Table 3.1 Operationalization table

Concept	Dimensions	Variables	Indicators	Source of information / data
Governance	Actor constellations	<ul style="list-style-type: none"> Actors 	<ul style="list-style-type: none"> Kind and number of actors involved Their roles/responsibilities/interests 	<ul style="list-style-type: none"> Formal, traditional, market, civil and hybrid societies Secondary data
	Tenure arrangements	<ul style="list-style-type: none"> Land tenure 	<ul style="list-style-type: none"> Who has access to land and under what conditions? Who decides? 	<ul style="list-style-type: none"> Government officials (Lands Commission etc.) Existing legislations (Land policy) Secondary data
		<ul style="list-style-type: none"> Tree tenure 	<ul style="list-style-type: none"> Who has access to trees and under what conditions? Who decides? 	<ul style="list-style-type: none"> Formal and customary societies, clan, chiefs and stool system Existing legislations, constitution of Ghana
	Regulations	<ul style="list-style-type: none"> Rules of the game 	<ul style="list-style-type: none"> Who can participate in the CDM project? Under what conditions? Who decides? What are the responsibilities of each actor involved? 	<ul style="list-style-type: none"> Government officials Villagers, Forestry Commission
		<ul style="list-style-type: none"> Benefit-sharing arrangement 	<ul style="list-style-type: none"> Who gets what share and under what conditions? Who decides? Who monitors? 	<ul style="list-style-type: none"> Govt. officials, investors, villagers
	Decision-making structures	<ul style="list-style-type: none"> Organisational set-up 	<ul style="list-style-type: none"> Cooperative arrangements in place Frequency of meetings 	<ul style="list-style-type: none"> Govt. officials, chiefs, villagers, investors

		<ul style="list-style-type: none"> • Conflict-resolution mechanisms 	<ul style="list-style-type: none"> • What institutions are in place to resolve conflicts? 	<ul style="list-style-type: none"> - Traditional leaders, FC, local community organisations (if they exist) - TBI-Ghana, FORIG, FRNR-KNUST
Livelihoods benefits	5 Capitals	<ul style="list-style-type: none"> • Financial capital 	<ul style="list-style-type: none"> • Relative contribution of several economic activities to household cash and non-cash income • Relative allocation of expenditure to different capitals • Ways of earning money 	<ul style="list-style-type: none"> - PROFOR tool, villagers
		<ul style="list-style-type: none"> • Physical capital 	<ul style="list-style-type: none"> • Tools for planting, maintaining and harvesting trees. • Timber for domestic uses. 	<ul style="list-style-type: none"> - Villagers, PROFOR
		<ul style="list-style-type: none"> • Human capital 	<ul style="list-style-type: none"> • Knowledge and skills related to tree planting 	<ul style="list-style-type: none"> - Village people
		<ul style="list-style-type: none"> • Social capital 	<ul style="list-style-type: none"> • Membership/ community contracts with investor/plantation 	<ul style="list-style-type: none"> - Villagers, FC
		<ul style="list-style-type: none"> • Natural capital 	<ul style="list-style-type: none"> • Access to/rights of land, ownership or lease of land, Distance to plantation 	<ul style="list-style-type: none"> - Villagers, FC chiefs, Stools, communities

3.3 Research methods

3.3.1 Research methodology

The framework within this research depends on epistemological assumptions. My research used constructivism as a theoretical perspective to translate the realities of the livelihoods of the villagers under the CDM projects.

“Constructivism (...) points up the unique experience of each of us. It suggests that each one’s way of making sense of the world is valid and worthy of respect as any other, thereby tending to scotch any hint of a critical spirit. (...) Being constructionist/constructivist has crucial things to say to us about many dimensions of the research task. It speaks to us about the way in which we do research. It speaks to us about how we should view its data. We will do well to listen (Crotty 1998, p. 58 and 65).”

The constructivism perspective argues that humans generate knowledge and meaning from an interaction between their experiences and their ideas. In keeping with the nature of the interviews, this approach was conducive to maintaining a level of respect I was hoping to achieve.

3.3.2 Methods

For data collection, a mixed methods approach was used to help me answer the central research and sub-questions. My approach involved acquiring both quantitative and qualitative data. The qualitative parts of my study were based on semi-structured interviews, focus group discussions at the village level, key informant interviews with experts (mostly conducted in Accra),⁴ as well as general observations that I made while visiting the communities and informal discussions related to my area of research. The quantitative section includes a questionnaire at community level, including participants and non-participants in the project as well as a separate questionnaire designed for respondents on a professional level.

Before going to the communities for data collection in both locations, a familiarization visit was conducted. This was not only to familiarize myself with the area but also to introduce myself to the chief or village leader in order to ask permission to conduct research. Additionally I participated in a transect walk with the local people to get the lay of the land and pilot the questionnaire. I wanted to give some initial insights into what my research was about and why I was there. It gave me the opportunity to give the village leader some time to ask community members if they would like to participate. I did meet and interact with a fair number of village residents during my familiarization visit.

⁴ Mercy Derkyi and Thomas Insaadoo, PhD researchers at the University of Amsterdam and Kwame Nkrumah University of Science and Technology (KNUST) respectively and affiliated to the TBI-Ghana program, kindly paved the way to get access to the interviewees in Accra, while Thomas was of further assistance by accompanying me to facilitate the personal introductions.

The remainder of my time in Ghana was spent at the TBI-Ghana or the Forestry Research Institute of Ghana (FORIG) campus. During that time, I made arrangements to plan my field trips (including familiarization visits), refine and revise my community level questionnaire, and finalize my research and sub-questions. I also administered my professional level questionnaire to key informants in the Accra and Kumasi area. After I arrived in Ghana, my research question changed from what I had initially planned. I was to be working strictly under the guidance of TBI-Ghana, but as it turned out, my original local supervisors were no longer available, so I had to adapt my proposed research. Luckily, there was already a CDM project being carried out at FORIG by Dr. Emmanuel Opuni-Frimpong and Dr. Beatrice Darko Obiri. This is where I learned of the additional proposed CDM projects as initially I had only planned to look at Oda-Kotoamso. As a result, this took a bit of revising and delayed my proposed time frame for the field trips.

Part of my study also included what I will refer to as desk study, in order to prepare my questionnaires, as well as review literature of recent publications. Answers to the first sub-questions were mainly to be found through document and Internet research, as well as interviews with forest governors and experts in Accra and Kumasi.

Key informant interviews

Upon my arrival in Accra, I was able to conduct four key informant interviews with experts affiliated to organizations ranging from the Ghana Wildlife society, the International Union for the Conservation of Nature (IUCN), Environmental Protection Agency (EPA) and Civic Response. These experts were targeted as key informants, because they were people deemed to have particular insight into or opinions about the subject under investigation. All of these organizations share a similar goal of promoting the sustainable use of Ghana's forests.

Having these key informant interviews as my first method of data collection proved to be very beneficial, as it not only gave me a governmental and official perspective on my topic, it also provided an opportunity to ask for additional literature related to my research. These extended semi-structured interviews were intended to collect information about CDM projects in Ghana, the wider context of climate change-related financial mechanisms, governance arrangements associated with these mechanisms and governors' and experts' opinions about the feasibility and effectiveness of the schemes. The people I interviewed answered questions from a list that I prepared prior to arriving in Ghana. The data collection took place between July 2011 and October 2011.

Questionnaires

After conducting the key informant interviews, I realized that it would be more effective to devise a short questionnaire that highlighted a few of the key questions that I wanted to have answered. Many of the people I wanted to interview had very busy schedules, and sitting down for an interview of 23 questions (see Appendix 1) seemed to

be a big deterrent. While transcribing the long interviews, it became apparent that a lot of the information was repetitious and, although it seemed quite interesting at the time, was not really important for this study. In response to this, I developed a short seven question questionnaire (see Appendix 2) that incorporated the questions asked in the longer version of the questionnaire and choose questions that I thought would really help me to gather data on governance and livelihoods. In total, twelve key informant questionnaires were completed.

This seemed to work better. I also found it to be helpful to actually have the key respondents fill out the questionnaire themselves. This I thought this helped to minimize my rewording of their thoughts. In most cases, after the respondent completed the questionnaire, a small discussion was generated. In some ways, the questionnaire acted as an icebreaker to get the discussions moving.

A second questionnaire was created and revised many times before it was ready to be used at the community level. This was a 45-question questionnaire (see Appendix 3) that took approximately 20 to 30 minutes to complete with the aid of research assistants. Although the questionnaire was written in English, the interviews with the community respondents were conducted in Twi, their native language. Afterwards, research assistants recorded their responses directly onto the questionnaire, while converting their responses back into English. As a token of appreciation to the interviewee for agreeing to take the time to complete my questionnaire, the respondent was given a bar of soap – which is common practice in research projects under the TBI-Ghana program and well appreciated by the respondents. The questionnaire was broken down into four sections:

- Section A: Socio-economic characteristics of respondents,
- Section B: Dependency on forest resources,
- Section C: Timber tree planting on farmlands/fallow lands, and
- Section D: Awareness of climate change and preparedness towards CDM project, including perceptions of actual and potential benefits.

The questionnaire was created based on my operationalization table, which helped me to formulate the questions.

The questionnaire provided insight into what community members' perceptions were regarding their actual and future livelihood benefits and their participation in decision-making. Issues that I addressed in the questionnaire included: "What benefits can be gained from CDM?", "What are the most important forest livelihoods for you?", "Do you have easy access to the forest?" as well as questions related to standard of living, including employment, land for farming, food, firewood, income from food crops and trees. I also wanted to know about their contacts with officials, and whether or not they had had previous visits from, for instance, officials of the Forestry Commission.



Photo 3.1 Questionnaire administration in Oda-Kotoamso community

PROFOR Tool and focus group discussion

This study employed various tools of the PROFOR ‘Poverty-Forests Linkages Toolkit’⁵. Ten males and ten females, all over the age of 18 and from different households, participated in the exercise. The majority were farmers and some were part of a planting project while others were not. Since the PROFOR activity took the majority of the day, I provided snacks and beverages and all participants received five Ghana Cedis (national currency), which offset any financial losses to the farmers for the day. When I conducted the PROFOR tools, it was a national holiday in Oda-Kotoamso, which worked in my favor, because many people were available and keen to participate.

One full day of my time spent in the field was dedicated to the PROFOR toolkit program. The PROFOR was developed by the World Bank and other donors as a way to collect rapid data on people living in forests. It is an analytical tool used to better understand the forest as a source of livelihood. For my particular project, I used a modified version of three of the eight tools. These were Tool 2, local landscape situation analysis, Tool 4, livelihood analysis and Tool 7, the forest and tree plantations problem and solution matrix. The latter enabled me to discuss CDM governance aspects with the villagers.

⁵ The Program on Forests (PROFOR) is a multi-donor trust fund hosted by the World Bank, which shares the goals of enhancing forests’ contribution to poverty reduction, sustainable development and protection of environmental services. See <http://www.profor.info/profor/about-us>.

Before going into the field, a PROFOR training session was conducted to familiarize the research team with the format of the session. The training involved the simulation of each of the tools that would be used while gathering data in both communities.

Once the questionnaire was written in English, we discussed how to properly translate the questions in Twi. Each of the research assistants was instructed on how exactly to phrase each question and to use the same examples or explanations if questions from the interviewees were to arise. This was done in an attempt to create consistency in the questionnaires. As much as this can be practiced, it must be noted that each interview session was unique and there was no way to predict how the open discussion would unfold.

Tool 2: Local landscape situation analysis

This method was used to understand how villagers used the local resources. The villagers were then asked to make a pictorial map of the local landscape in order to indicate where certain resources were found and where most of the work was done. While creating the map as a part of the focus group discussion, questions were asked such as: “who owns the forest/land” and “what type of trees did you plant?” This tool was also used to gain information on the five capitals, mentioned in the conceptual scheme.

Tool 4: Livelihood analysis

This tool was used to discover the extent of cash and non-cash subsistence reliance on forest resources and to find out the proportion of the total annual livelihood (from all sources) of both income and expenditure. The tool is useful in livelihoods research and it is an easy way to look into the livelihood portfolios of the participants. It provides a “snapshot data” on forest reliance and the relative importance of various economic activities and their contribution to peoples’ livelihoods in situations where obtaining absolute data is hardly feasible due to respondents not keeping books or recording numbers.

Flip chart sheets were prepared ahead of time, so as to minimize the amount of time required while conducting the activities. Twenty stones from the ground were collected and were used as ‘money’ that had to be placed on a grid sheet to indicate the relative importance of each forest product that they utilized (see below). I divided my sample population by gender into two groups of ten: a mixed group of participants and non-participants in a tree-planting project. I also made sure that each respondent was over 18 years old and from a different household, which is defined in this case as those who regularly take food from the same pot. In order to get a better overall picture of the situation, I asked them to list their cash and non-cash income-generating economic activities on a grid sheet and allocate the twenty stones as to indicate the relative importance of each activity for their livelihoods. I repeated the exercise for expenditure, with the intent of assessing whether or not the CDM project could enhance people’s assets. The amount of stones that were allocated to the economic activities indicated the relative importance of each activity to the members of the focus group. It is a very simple

yet effective ranking exercise that I used to gather information on components of people's livelihoods.

Tool 7: Problem solution matrix

The last modified PROFOR tool that I used in the community came about as a result of a general discussion. The focus group discussion used the 20 participants that were selected for the PROFOR Tool 4 activities. However, the group was not separated by gender, rather it was a general discussion amongst the whole group. The discussion started by posing one of my sub-questions regarding the actual and future livelihood effects of the CDM project. They were questioned about their participation and role in decision-making, which made for a nice transition into the PROFOR Tool 7, the problem solution matrix. After the discussion, the participants were asked to identify areas that they saw as problematic for the success of the CDM project. After discussing the problems, they were asked to come up with solutions.



Photo 3.2 and 3.3 PROFOR Tool 4 in Oda-Kotoamso and Koradaso communities

Data processing

The four key informant interviews were all recorded using a voice recorder and then later transcribed. The data collected from the community level questionnaire was transformed into coded data that would allow it to be readable for the computer program Statistical Package for Social Sciences (SPSS)⁶. After coding, the data was entered into SPSS and then analyzed. The results from the PROFOR tool four were then totaled by adding up the different outcomes and then converted into percentages. The flip charts were then entered into Excel and then pie charts were generated from this information (see Chapter 5 and 6). The responses from the key informant questionnaires were typed and then grouped together so that all of the responses from question one were listed consecutively. This was done in a way that allowed general themes or similarities in responses to be identified more easily.

⁶ The statistical analysis did not always total to 100% due to some respondents not answering all the questions.

3.4 Limitations and ethical considerations

Before beginning my fieldwork, I recognized that there were numerous limitations to what could be encountered in my research. The first and maybe the most obvious limitation would be my time constraint. Three sites had been identified as potential sites for CDM projects. They are the villages of Oda-Kotoamso in the Western region, Koradaso in the Pamu Berekum forest reserve in the Brong Ahafo region and the Nkranka community in the Nkoranza district in Brong Ahafo. For this project, only the Oda-Kotoamso and Kordaso communities were visited. For a more complete study of the perceptions of CDM, it would have been optimal if all three communities could have been visited, but because of time and financial constraints, this was not possible. It would have been an interesting comparison since each of the tree projects is located in different ecological zones. In the end, it was decided that I would only visit two of the three communities.

In the Oda-Kotoamso community, there was a bit of curiosity around why and what the “*obruni*” (white foreigner) was doing. There was some skepticism as to my actual purpose since many villagers thought I was there as a consultant of Samartex Timber & Plywood Co. Ltd. – one of the largest timber companies in Ghana, which is active in the area. I did not feel that it mattered much that I was a woman (as I had anticipated); they treated me equally, the same as the other male or female research assistants and translators.⁷

Other limitations I anticipated were related to communication. While English is the official language of the country, I relied on the services of research assistants, due to the fact that English was not widely spoken in the communities that I visited. Their primary language is Twi. When having to rely on translators for research, the issue of interpreter bias should always be considered, but I was very grateful to have the aid of interns and research technicians of Dr. Opuni-Frimpong and Dr. Obiri.

My final limitation concerned financial restrictions and the limited budget to which I had to adhere.

3.4.1 Ethics

Ethical issues are an important part of research and my specific ethical concerns were related to going into the field and standing out as a foreigner.

A fundamental part of ensuring that ethics are guaranteed is the anonymity and confidentiality of the respondents/interviewees. One way of trying to ensure anonymity is by not asking the names of my respondents, and rather assigning pseudonyms or

⁷ I am indebted to the help that the team of national service students and research assistants and technicians from FORIG. Thank you Alex Aboagye Bampo, Collins Baah Darko, Dr. Emmanuel Opuni-Frimpong Esther Opoku, Godwin Kwarkye, Isaac Arthur, Makoe Kwesi Mensah, Nana Yaa Nyarko Duah, Richard Agyei. As well as a thank you to Baba Mohammed and Peter Otu for driving and delivering us safely at our research locations.

numerical associations to the respondents of the interview. For all of my interviews and focus group discussions, an ethical standard was upheld with regards to informed consent.

Going into the community with the knowledge that I had to uphold the anonymity of my respondents, I felt that it was not necessary to ask the name of the respondents when filling out the questionnaires. However, after piloting the questionnaire on the first familiarization visit, it turned out that the interviewees preferred to give their names. It made them feel that this way their responses would be taken more seriously.

3.5 Summary

After developing a conceptual scheme and operationalization table, data collection using mixed methods in both communities went smoothly, mainly due to the initial familiarization visits to each village and the assistance of my dedicated research team. A total of 115 questionnaires were completed between the two study villages Oda-Kotoamso (n=53) and Koradaso (n=62) on the community level and the respondents were keen to talk about the changes that had taken place in their communities and about their perceptions for the future. They were interested in using the PROFOR tools and were, in various degrees, receptive to participate in this exercise. At first, in the Oda-Kotoamso village, there were signs of 'research fatigue'. People interviewed so many times before and were suspicious about doing it all over again. Once they understood that I was a graduate student conducting research for my thesis, they took part enthusiastically. Key informant questionnaires proved effective in assisting me to obtain the perceptions of the professional stakeholders, whereas focus group discussions using adapted versions of the PROFOR toolkit helped me to gather more in-depth information on livelihood and governance aspects of the CDM project, to which I will provide more information in the next chapter.

CHAPTER 4

The Clean Development Mechanism

Based on a review of secondary sources and interviews with key persons in Accra and Kumasi, this chapter describes the background to the Clean Development Mechanism (CDM) under the Kyoto Protocol. It then concentrates specifically on Ghana, with a focus on the actors involved in the proposed projects in the communities of Oda-Kotoamso and Koradaso.

4.1 Background: The Kyoto Protocol and the Clean Development Mechanism

The Clean Development Mechanism (CDM) is a financial mechanism, defined in Article 12 of the Kyoto Protocol, which enables developed countries to meet their mandated emission reduction targets by financing greenhouse gas emission reduction projects, such as afforestation and reforestation projects, in developing countries (Chokkalingam, 2011). Greenhouse gases mix evenly in the atmosphere, so it does not matter where the emissions take place to cause an overall effect on the world environment. Mitigation costs would be higher in Annex I countries, so it is an additional benefit to invest in projects in non-Annex I countries (*i.e.* developing countries), where emission tariffs are lower. Investors can buy certified emission reductions (CERs) that they can use to meet their greenhouse gas reductions under the Kyoto Protocol, while at the same time contributing to sustainable development in developing countries. By acquiring these CERs (each of which is equivalent to one ton of carbon dioxide), developed countries have more flexibility in meeting their emission reduction targets set by the Kyoto Protocol, with the end result being the CDM projects helping developing countries achieve sustainable development and developing countries decrease their emissions (CDM Ghana, 2008).

The CDM was created in 1997 as an emission trading system to assist industrialized countries, the so-called Annex I countries⁸, to help mitigate climate change, meet their emission reduction targets and aid developing countries in achieving sustainable development. The mechanism was first defined at the Conference of Parties 3 (CoP) in Kyoto 1997, which city became synonymous with the struggle to reduce man made greenhouse gas emissions. The rules for implementing the CDM were put in place four years later with the 2001 Marrakesh Accord. According to the stipulations of the Marrakesh Accord “The CDM was formulated as a means to form official partnerships for funding greenhouse gas reduction projects. This agreement was the formal start of payment systems for carbon sequestration” (Wiersum, 2009, p x).

¹ Annex 1 countries are Australia, Austria, Belarus, Belgium, Bulgaria, Canada, Czech Republic, Denmark, Estonia, European Community, Finland, France, Germany Greece, Hungary, Iceland, Ireland, Italy, Japan, Latvia, Liechtenstein, Lithuania, Luxembourg, Monaco, Netherlands, New-Zealand, Norway, Poland, Portugal, Romania, Russian Federation, Slovakia, Slovenia, Spain, Sweden, Switzerland, Ukraine, United Kingdom, and the United States of America.

The CDM was a late invention during the last negotiation day of the Kyoto Protocol in 1997, also called the “Kyoto surprise”. It was put forward by Brazil to satisfy developing countries’ demands for financial transfers, while allowing flexibility in meeting their emission targets (Streck, 2007). At the time few of the negotiators could have foreseen the enormous impact this new financial mechanism would have on the international markets. In 2005 alone, more than 180 transactions have taken place, channeling US\$ 2.5 billion of carbon finance to developing countries (Lecocq, 2007).

The CDM has been operational since the beginning of 2006 and has registered more than 3,500 projects worldwide.⁹ There are over 3,600 projects in various stages of development in 72 developing countries. This number has risen to 4,586 projects in 76 developing countries, according to Fennhan (2009) cited by Boyd (2009). The latest numbers, according to the UNFCCC (1 February 2012) consist of 3,812 registered projects and 55 requesting registration with 5,600 in the pipeline. Surprisingly there are only a small number of A/R projects, with an additional four waiting in the pipeline. It is extremely difficult to pinpoint the exact number of CDM and CDM A/R projects as various reports differ. Thomas *et al.* put the number at four (2010)¹⁰, while Jindal (2008) mentions 23 and Chokkalingham (2011) counts 22 projects.

The CDM has proven to be a powerful mechanism for delivering finance for emission reduction projects and sustainable development. To date, the CDM has been a successful instrument issuing more than 770 million CERs¹¹ (UNFCCC, 2011). In the words of Streck (2007):

“[However,] the CDM is more than a simple burden sharing mechanism where industrialized countries cover compliance costs of developing countries and offer financial aid and technology transfer. It provides Annex I countries with an intrinsic incentive for investments in non-Annex I countries ...this is one way of addressing the problem of global warming on an international level through mechanisms based on the principle of trading emission off-sets” (Streck, 2007, p. 92).

The CDM did not only make the developing countries aware of the potential economic benefits of carbon trading with non-Annex I countries, it has also been instrumental in the involvement of developing countries in the Kyoto Protocol, which was not an obvious outcome in 1997 (Lecock, 2007).

As stated above, one of the goals of the CDM is to help promote sustainable development in developing countries. One way of reaching this goal is through afforestation and reforestation projects called CDM A/R. Only A/R projects are eligible for carbon credits under the CDM during the first commitment period 2008-12. A/R involves “human-induced conversion of non-forest land uses to forest through planting,

² URL: <http://cdm.unfccc.int/Statistics/index.html>.

¹⁰ Guangxi Watershed Project China, Moldova Soil Conservation Project Moldova, Cooperative A/f Haryana Project India and Cao Phong Project Vietnam.

¹¹ CER is considered equivalent to one metric ton of CO₂ emissions.

seeding and or human-induced promotion of natural seed sources” (Scherr, 2003: 2144). Afforestation, on the other hand, “takes place on land that has not been forested before for at least 50 years, while reforestation refers to land that was not considered forest before 1990” (*Ibid*). Both these initiatives involve the growing of new trees through which tree growers can apply for carbon credits under the CDM. However, the CDM only accepts these forestry projects during the first Kyoto Protocol commitment period due to the difficulties of quantifying and accounting for forest-related emissions (Chokkalingam, 2011). Looking at the implementation of CDM – the largest offset scheme in the world – there are very few projects in Africa, and even fewer projects if one excludes South Africa. Most CDM schemes are in low-risk, high-gain supply economies such as China, Brazil and India (Razak Saeed, 2011). These projects are often criticized for the scarcity of registered projects, linked to a long and tedious bureaucratic process, complicated methodological requirements and issuance of temporary credits.

In 2009 the A/R sector comprised only ten percent of all transactions (Merger, 2010). The major reasons for the slow growth of the A/R sector can be contributed to the difficulties surrounding the complexity of the land-based projects, the non-permanence of forests and the perceived high risks (*Ibid*). Generally speaking, A/R projects do not deliver carbon credits in the first three to ten years. Furthermore, the bulk of the costs occur at the beginning of a project, mainly due to planting activities and certification in the first year (*Ibid*). Another concern is balancing the farmers urge to grow the most efficient (profitable) carbon storing trees, creating forest lands dominated by fast-growing exotic monocultures that harm ecosystem services, disrupt water flows, reduce biodiversity or negatively affect rural communities (Hamilton *et al.*, 2010). Despite all these problems, CDM projects have made substantial progress in Asia and in South American countries, but only a handful of projects have been initiated in Africa.

In 2007 Africa accounted for just 2.6 per cent of all CDM projects. However this is changing drastically, because half of the total CDM projects and CDM-related project investments in Africa have occurred in the last 18 months (UNFCCC, 2011). Many projects are ‘in the pipeline’ or project phases, which means that they are under validation, requesting registration or are being registered (Africa Carbon Forum, 2010). Figure 4.1 illustrates the number of registered and proposed CDM A/R projects across the globe. Sixty-seven CDM A/R projects (registered plus pipeline projects) are almost equally divided between Latin America, Asia and Africa; and three are in the developing countries of Europe. It shows that Africa’s projects are largely in the pipeline (Chokkalingam, 2010, p.3).

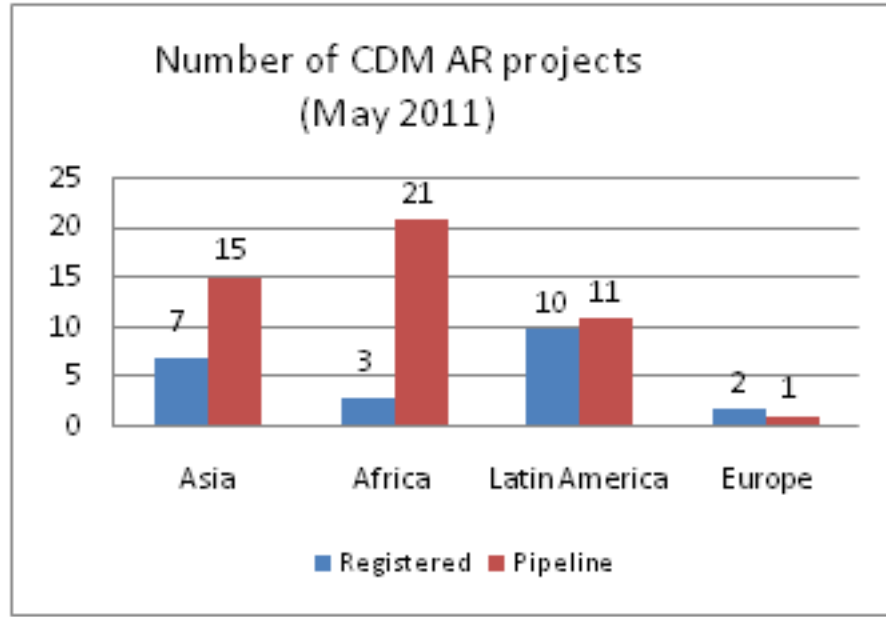


Figure 4.1: CDM projects around the globe (Chokkalingham, 2011).

The uncertainty about the future of the projects depends on the fate of the Kyoto Protocol or any agreement that embellishes or replaces it. Since the Kyoto Protocol is expiring at the end of 2012 and no new binding agreements to replace Kyoto have come forward as yet, the success of the Protocol is more or less in jeopardy, especially since a number of developed countries, such as Russia and Japan are threatening to withdraw after it expires. Canada, for example, has formally withdrawn its support. However, there appears to be a willingness to extend the Kyoto Protocol, at least until a new climate change accord can be negotiated. The United Nations Climate Conference in Durban (2011) has brought forward a treaty to extend the Kyoto Protocol until 2015 with a possible new accord that has to be implemented by 2020. Many countries were disappointed by the vague outcome of the Durban Conference and worried about the environmental consequences with such a long time lapse until the new treaty will be ratified. The committee may also focus on a planned US\$ 100-billion fund to help poor countries adapt to climate change. Many countries are pledging sums of money for the Green Climate Fund (see Table 4.1 for a description), but there are still serious disputes on how the fund would work, who would control it, and what mechanisms would be used to generate money for the fund.

It has to be stated, however, that all projects started under the Kyoto Protocol will be allowed to continue. Other initiatives (see Table 4.2 below) will be able to fill the void after 2012.

Table 4.1: Global financial initiatives

Initiatives	Brief description
Green Climate Fund	UN fund designed to channel US\$ 100 billion a year in climate-related investments in the developing world by 2020.
Improved Forest Management (IFM)	Management to facilitate the transition of unsustainably managed forests towards management with reduced greenhouse gases.
Reducing Emissions from Deforestation and Degradation (REDD)	Global climate protection regime to arrest the destruction of forests.
Reducing Emissions from Deforestation and Degradation Plus (REDD+)	The same definition as REDD, but including sustainable forest management, conservation, and enhancement of forest carbon stocks.
Voluntary Standard Forest Carbon Projects (VCS)	Quality standard for the voluntary carbon offset industry.

Sources: UNFCCC and Mayers et al., 2010. (REDD Readiness Requires Radical Reform)

4.2 CDM in Ghana: actors and institutional arrangements

The selected project sites of Oda-Kotomso and Koradaso represent the few areas in Ghana where government, international organizations, private individuals and local communities act together as stakeholders on forest rehabilitation. The Government of Ghana as the host country decides first on the project's suitability and the Environmental Protection Agency (EPA) is the designated national authority for CDM projects in Ghana (Stanturf *et al.*, 2011). The designated national authority is a unit of the EPA that is responsible for vetting and approving CDM projects. In conjunction with the government and EPA are the other stakeholders, such as the UNFCC, various forestry committees, international organizations, the private sector and NGOs. Of course, the most important stakeholders are the community workers. They are ultimately the ones executing the plantation directives, investing their time in capacity-building workshops to acquaint them with the different procedures.

There are many reasons why, on paper, it is beneficial to implement CDM in Ghana. First and foremost, it would help to mitigate global warming by planting trees for sequestration of atmospheric carbon dioxide. In addition, it would provide an opportunity for tree farmers to benefit from the sale of CERs due to carbon sequestration under CDM. Additional impacts could be seen on conservation of biodiversity with improved soil and water conservation. Other positive changes could be observed in the livelihoods within local communities, as CDM projects could generate employment and sustainable development for the area, resulting in a wide range of benefits for local people (Scherr, 2003).

It must be noted that the responses of my key informants to the questionnaire (Appendix 2) questions show that implementation of the CDM is not without criticism. The respondents commented on the slow and cumbersome implementation process of the projects. At the moment, only NGOs and other international organizations are distributing

information about the application process. The participation procedure is lengthy, with preparation that involves submission to the CDM Executive Board through the designated national authority for approval. This is followed by a validation process, in which they review:

- a. The eligibility of the project;
- b. Approval of the host country;
- c. The baseline scenario;
- d. Monitoring plans;
- e. Analysis of socio-economic and environmental impacts;
- f. The public consultation process.

The rules for CDM land eligibility state that land should be degraded and not have been a forest as of 1 January 1990, as by the countries' definition of a forest. Every country can set its own parameters for a forest and the definition for Ghana's forest involves three important components, namely: a tree height of five meters, a crown cover of 15% and a minimum land area of 1 hectare. In Ghana only reforestation and afforestation projects are being considered for CDM. Furthermore the projects should also contribute to biodiversity conservation and should lead to sustainable development.

Once the above requirements are met, the validated project has to be registered and formally accepted by the CDM Executive Board. This is a pre-requisite for the verification, certification and issuance of CERs related to that project activity (Opuni-Frimpong, FORIG, pers. comm. August, 2011).

4.3 CDM projects in Ghana

Ghana has done little to develop forest-based carbon offset projects through the Kyoto Protocol's CDM to help mitigate climate change. The CDM strategy focuses on integrating CDM into its plantation development program, targeted at 30,000 acres/year both on and off of forest reserves (Stanturf, 2011).

Only one Afforestation/Reforestation (A/R) project has hitherto been submitted to the CDM Executive Board of Ghana for review: the "ARNM0029: Rubber outgrowing and carbon sequestration in Ghana" ROCS-Ghana (UNFCC). This is a rubber plantation located in the Western region. There are also some small reforestation and agroforestry projects¹² under way in Ghana that are linked to the CDM, such as the Oda-Kotoamso project addressed in Chapter five and the Koradaso project that is dealt with in Chapter six. These projects provide a potentially important source of extra funding for Ghana's reforestation and plantation programs (Karnosky *et al.*, 2006).

¹² One of the first definitions of agroforestry, cited in King (1987: 4) is: "Agroforestry (...) combines the production of crops (including tree crops) and forest plants and/or animals simultaneously or sequentially on the same unit of land, and applies management practices that are compatible with the cultural practices of the local population" (Bene *et al.*, 1977; King and Chandler, 1978).

Not yet integrated into the CDM scheme, but potentially qualified to be so in the future is the Modified Taungya System (MTS), which is a co-management reforestation scheme in degraded forest reserves between the Forestry Commission and local farmer groups, whereby the latter plant, weed and thin timber trees in return for a share in future timber benefits and the right to grow food crops between the planted trees until canopy closure (Isaidoo *et al.*, 2011).

Barriers to CDM projects include a lack of financing to invest in plantation development, the rigor and high costs of verification and compliance, weak carbon markets, and uncertainty over CDM's future once the Kyoto Protocol expires in 2012. Thomas *et al.* (2010: p. 881) classify the constraints on the development of CDM A/R into two major issues:

“(1) financial constraints, particularly from the landholder's perspective; and (2) constraints associated with proponent's lack of the technical knowledge and skills which are required to successfully manage the complex administrative and governance aspects of CDM development”.

The most critical financial barrier, however seems to be the length of time it takes to gain revenue from the CDM A/R project. This delay serves as a disincentive for considering CDM A/R projects (*Ibid*). Not only do the CDM A/R projects have to grapple with longer delays in cash flow periods and extensive bureaucratic arrangements, they also have to convince local stakeholders that the long-term pay back is of greater benefit to them than the immediate returns available from current farming activities. Thomas *et al.* conclude that “Overall, it is CDM's complex structure, onerous monitoring and reporting requirements, and the potential omission of important carbon data that may be the major contraindications for potential participants in CDM A/R activities (Cowie *et al.*, 2007b) (*Ibid*, p.884).

Slowly, especially in the last year and a half, Ghana seems to be developing more CDM projects, though no plan is yet in place that identifies which schemes qualify for the CDM and how money earned by selling CERs will be distributed (Stanturf *et al.*, 2011).

Whether all these new developments will be successful in terms of livelihood benefits and forest restoration or that they will lead to more conflicts, stemming from a lack of transparency of its ‘virtual product’ of carbon credits, remains to be seen.

4.4 Expectations regarding livelihood benefits

The results of the questionnaire showed that when community respondents were asked about their expectations for the CDM project they were mostly positive about the expected outcome (see Tables 5.5 and 5.6 in the next chapter). They had high expectations about and were looking forward to employment opportunities and the consequent reduction in poverty that they would provide. They also anticipated regaining natural forest and forest resources and supplementing their income by planting the trees. CDM projects produce the added benefit of strengthening capacity building for people in

forest fringe communities. Since the communities have now been sensitized to the potential benefits of the project (realistically pictured or not), illegal logging will not be as readily tolerated with the knowledge that future revenues would be diminished. In addition to poverty reduction through employment and income generation in Ghana, CDM projects are expected to provide the long-term benefit to farmers by restoring their forest resources.

4.5 Summary

On the one hand one can say that the basic idea behind the CDM is groundbreaking and innovative. Investing money into renewable resources can contribute to sustainable development in developing countries proving an economical way for developed nations to meet emission reduction targets. It can advance international cooperation and partnerships, as well as reduce poverty in developing countries. It is a potentially worthwhile financial instrument that can result in making a difference between the balance of inequalities in the developed and the developing world and above all make us 'fit for the future'.

On the other hand, it has not been very groundbreaking for Ghana or for Africa in general. At the moment there is really just a rush to get these projects off the ground before the Protocol ends, a sort of last minute scramble, with a view to not missing out on a chance to get funding. In my view, at the end of the day, the procedures and bureaucracy to get accepted are complicated, especially in Ghana with the added complications of land tenure issues

At the time of this writing, the announcement was made that the Kyoto Protocol will be extended to 2015 with an implementation date to take effect in 2020. A new climate change accord should indeed provide the opportunities for Ghana that it has not been able to realize to this point under The Kyoto Protocol. A new time frame is precisely what is needed in Ghana, because of the high volume of projects already stalled in the pipeline. In the next two chapters I will have a closer look at two CDM projects that are currently being implemented in Ghana, with a view to assessing whether the expectations are realistic.

CHAPTER 5

The CDM project in Oda-Kotoamso

The Clean Development Mechanism (CDM) project has been introduced in the Oda-Kotoamso community in January 2007 (Würtenberger, 2011) as a way to improve livelihood needs and to facilitate alternative sources of income for the rural population. A significant number of trees in the area have been lost in fires, or by logging and chainsaw felling. In order to preserve and help maintain the forest cover, regeneration and afforestation schemes are being developed, of which the CDM project represents a financial opportunity and an enhancement of the livelihoods for the community.

5.1 Characteristics of the village

The village of Oda-Kotoamso is located in the Wassa Amenfi West District in the high forest zone in the Western Region of Ghana (see Map 1.1), more precisely in the wet evergreen to moist evergreen forest ecological zone, latitude 5°48'0"N; Longitude. 2°26'0"W. This is one of the wettest parts of Ghana with an average rainfall between 1,400 mm to 1,730 mm. The temperature fluctuates rarely during the year with temperatures ranging from 20-24 °C. The topography is slightly undulating with a good network of rivers and streams, notably the Tano and the Tetua rivers.

The district was relatively sparsely populated until the 1950s. Since then, however, it has experienced significant off-reserve deforestation – particularly in the latter quarter of the 20th century, when the deforestation rate was about 2% per year. The high deforestation rate was due primarily to the influx of migrant farmers from elsewhere in Ghana. Lately deforestation has declined, because most of the off-reserve forests have been deforested (Mayers *et al.*, 2010). The whole district's land-tenure system is shaped by customary law, although the large number of migrants who farm land through tenancy or share-cropping arrangements indicate that land-tenure issues are complex (*Ibid*).

Oda-Kotoamso (see Photo 5.1) is a small community of approximately 1,800 inhabitants with a preschool and a basic school. A higher concentration of facilities, such as hospital and a secondary school can be found in the community of Asankranga, which is the nearest market centre. The whole Wassa Amenfi West District is greatly handicapped by its poor road network and quality, which adversely affects the delivery of services to the area. The roads are prone to flooding during the rainy season and the high groundwater table in the area leads to impassible roads with deep potholes that combined with the heavy rainfall intermittently closes the road for close to eight months of the year. The poor road conditions result in disruptions to the transportation of agricultural and timber products to other major markets in the district¹³.

¹³ URL: <http://www.wassaamenfiwest.ghanadistricts.gov.gh> [assessed on Dec. 6th 2011]



Photo 5.1: Oda-Kotoamso community

5.2 Characteristics of the OCAP project

The Ongoing Community Agroforestry Project (OCAP) project is being implemented in the concession area of the timber company *Samartex* Timber & Plywood Co. Ltd. (commonly referred to as Samartex) in the Wassa-Amenfi District, which is 10 km north of the district capital of Asankrangwa. Samartex is one of the largest wood-processing industries in Ghana that became FSC-certified in 2008 (Insaيدoo *et al.*, in press).¹⁴

The project was initiated in 1997 in collaboration with the people of Oda-Kotoamso out of concern about the rapid degradation of the forest cover and the deteriorating living standards of the farmers. The project aim was to promote viable farming practices that were not only economically sound, but would simultaneously regenerate the forests in order to slow the rate of deforestation in Ghana.¹⁵ It fits into the broader strategy of Samartex's Forest Development Division (FDD) to (i) collaborate with communities and farmers to develop agroforestry systems and plantations, (ii) establish plantations on degraded lands, and (iii) promote the development of non-timber forest products (NTFPs). Especially encouraging is the cultivation of the herb plant *Thaumatococcus danielli*, which is used as a natural sweetener, and the production of honey¹⁶ (Insaيدoo *et al.* in press).

The OCAP is a partnership between various stakeholders, including Samartex, chiefs, individual farmers, the German development service (GTZ) (which provided technical support since 1999), the District Assembly, the Forest Services Division (FSD) of the Forestry Commission and the Ministry of Food and Agriculture (MoFA). Its steering committee consists of nine members, all of whom are participating farmers.

¹⁴ URL: info.FSC.org, [accessed 11 January 2012].

¹⁵ URL: <http://www.samartex.com.gh/AgroForestry.aspx>, [accessed 11 January 2012].

¹⁶ Ibid

Samartex has been an important partner and sponsor in the project. It claims to operate under a banner of corporate social responsibility that recognizes the need to have a long-term plan for a continued supply of timber in order to maintain its business. It is the first Ghanaian timber company that has implemented a collaborative strategy for off-reserve management. The off-reserve area has always been more susceptible to degradation because there was no management plan in place for the area, as far as rights to cut and burn trees and establishing farms are concerned. The main problem, according to Bach (1998: 92), in forest reserves and especially off-reserves seems to be inadequate implementation and enforcement, mainly due to lack of means and institutional capacity.

The OCAP project model has been developed on 450 ha of plantations and has involved nearly 500 farmers, villagers and young people in various aspects of clearing, planting and maintaining tree plantations, in addition to short and midterm agricultural and horticultural crops. They use fast growing and commercially important trees, such as cedrela (*Cedrela odorata*) and ceiba or kapok tree (*Ceiba pentandra*) (which is among five native Ghanaian origin timber species that were recommended by FORIG for large-scale planting) together with crops such as black pepper (ITTO, 2002, p. 5). The OCAP projects also include a wide range of sub-projects, including agroforestry, plantations of timber, citrus and passion fruit, tree nurseries, fish farming, black pepper plantings, beekeeping, snail rearing, piggery as well as a number of various non-timber forest product (NTFP) projects. As regards the latter, attention is focused mainly on the high potential of the production of *Thaumatococcus danielli*, which is a tropical flowering plant used as a natural sweetener and it has proven to be 1000 times sweeter than cane or beet sugar.¹⁷

According to ITTO (2002) OCAP can be described as a unique project as it involves technical outreach, profit sharing and land ownership agreements between chiefs, elders, villagers and a timber company that will provide a mechanism for long-term sustainable forest management. The OCAP project in Oda-Kotoamso is a pilot project that has been extended to other villages in the company's concession area as a public-private partnership (PPP) with the German Agency for Technical Cooperation (GTZ) known as the GTZ/Samartex PPP (Suglo, 2009). The project now consists of three projects: OCAP with 120 farmers, the DIKOTO project with two farmers and GTZ/Samartex PPP with 104 farmers. Progress also has been made with timber ownership rights with a revision of the Timber Resource Management Act 2002. This has led to tree ownership being vested in the farmer or planter of the tree, which is an exemption to the usual practice in Ghana, where tree ownership is vested in the state. Since then tree planting initiatives have mushroomed and as of November 2010 property titles have been given to tree planting farmers on 212 farm plots that have been officially mapped and registered (Insaadoo *et al.*, under review).

The agroforestry part is considered the most important component of the project. Agroforestry is an approach to sustainable land use that does not require huge investments¹⁸. Agroforestry is an integrated land-use management system, in which

¹⁷ URL: <http://www.samartex.com.gh/AgroForestry.aspx>, [accessed 11 January 2012].

¹⁸ Ibid

farmers deliberately cultivate trees or shrubs on the same piece of land as food crops and/or livestock. They are especially suited to small-scale farmers in the tropics. It can also be described as “a form of multiple cropping in which at least two plant species interact biologically, with at least one of them being a woody perennial and at least one plant species is managed for forage, annual or perennial crop production” (Insaadoo *et al.*, under review).

Demonstration farms are also an important aspect of the project. Participants are educated on tree planting and how to combine this with ecologically viable farming systems, such as snail farming and beekeeping and how they can increase farming production per unit area. Helping farmers to integrate honey production with tree growing is thought to be helpful in providing alternative sources of livelihood. At the moment there are 51 beehives in operation that produce 400 kg of honey per annum. Snail farming, which is considered a delicacy in southern Ghana, could offer another good alternative to slash and burn practices. It can be established very easily and could provide farmers additional income compared to in the past when local people had to search vast areas to find a single snail. (Appiah *et al.*, 2007, p. 484). However, to date there has not been a single project in Ghana that has benefitted from the CDM program. There has been capacity building with assistance from ITTO in Japan and awareness in forest fringe communities, but as of yet no revenue has come from the projects (Marfo *et al.*, forthcoming).

5.3 Characteristics of the respondents

A total of 53 people who live and work in the community were interviewed, including both OCAP project participants (23) and non-participants (30). Forty-six members of the interviewees questioned were native to the area with seven migrants amongst the 53, mainly coming from northern Ghana. The overwhelming majority of the participants were working in the food/cash-farming sector while only three had formal employment as teachers and agricultural officers and two were engaged in petty trading.

For reasons beyond my control the survey is heavily weighted to the male viewpoint, with 39 male and 14 female respondents. It was discussed and agreed on with the research assistants to seek parity in the representation of the sexes, but when it came to completing the questionnaires more males were readily available than females. Participants were selected based on convenience and availability on the part of the interviewee. The respondents' ages ranged from 18 to 54 with the middle group age 36-53 representing most of the interviewees. The majority of the group was married (38), nine were divorced and three were single. The education levels varied amongst the group; no education (10), some informal education (3), primary education (7) completion of junior high school and middle school (24), senior high school (4), finishing at a tertiary level (5). While it is not the purpose of this paper to comment or investigate the qualifications necessary to complete any of the aforementioned education levels in my brief exposure I never felt that I was dealing with a primitive or uneducated culture.

Table 5.1 Socioeconomic data of the respondents (N = 53)

Variable	n	%
Gender		
Male	39	73.6
Female	14	26.4
Age range		
18-35	15	28.4
36-53	23	43.7
53+	15	28.5
Education		
Post Secondary/Secondary	9	16.9
Middle school/Junior High School	24	45.3
Primary	7	13.2
Informal	3	5.7
No Education	10	18.9
Origin		
Natives	46	86.8
Migrants	7	13.2
Occupation		
Food/Cash crop farming	46	86.8
Petty Trading	2	3.8
Formal Employment ^a	5	9.5
<u>Additional income sources^b</u>		
(n=36)		
Livestock rearing	24	45.3
Remittances	5	13.9
Bee keeping	3	8.3
Gold duster	1	2.8
Bar operator	1	2.8
Carpenter	2	3.8

^a Including teachers, seamstress, agricultural extension officers

^b Only 36 of the 53 respondents mentioned additional income

Source Field survey, 2011.

While I was in the Oda-Kotoamso community, I employed an adapted version of PROFOR Tool 2 (see Chapter 3), which generated a participatory local landscape situation analysis. The purpose of this tool is to understand and visualize how members of the community are using local resources. The results are presented in Figure 5.1.

The local landscape resource map illustrates not only the location, but also shows where forest-related activities occur the most. For example, it shows that the majority of the food crops are grown in the Bokayaa area and that there is a sacred grove¹⁹ located in the area known as Cocoa Marketing Board C.M.B/OCAP area. It also indicates the proximity of the roads, which is important in terms of accessibility and getting goods to the market in Asankranga. One further insight that can be drawn from the map is the high occurrence of illegal gold mining located in the Bomoddan area.²⁰ Illegal mining in Ghana is also a big problem in Ghana and a big contributor to deforestation (Appiah *et al.*, 2007). After the mines have been exhausted and the trees have been cut down, this area could turn into a potential development site for Clean Development Mechanism (CDM). Tree seedlings could be planted here and when left untouched and not harvested could be made into carbon sequestration projects. This map visualizes where it would be best to make changes in the area, such as the mining site and where different plantations can be added or taken away.

¹⁹ These are revered patches of forest and their streams that are believed to be the dwelling places of gods or sometimes the burial ground of a royalty. Special trees grow in these areas, which often are ceremonial sites for the indigenous people. Farming, logging and other activities, such as gathering wood are forbidden here and also anything that might pollute the water, such as washing clothes. These are places with great biodiversity, because it was not disturbed by the damages of deforestation, mining, logging and road building. This reference for the sacred groves may translate into environmental preservation and sustainable livelihoods (Amy Corbin, 2008).

²⁰ Bomoddan means work hard in the local language Twi.

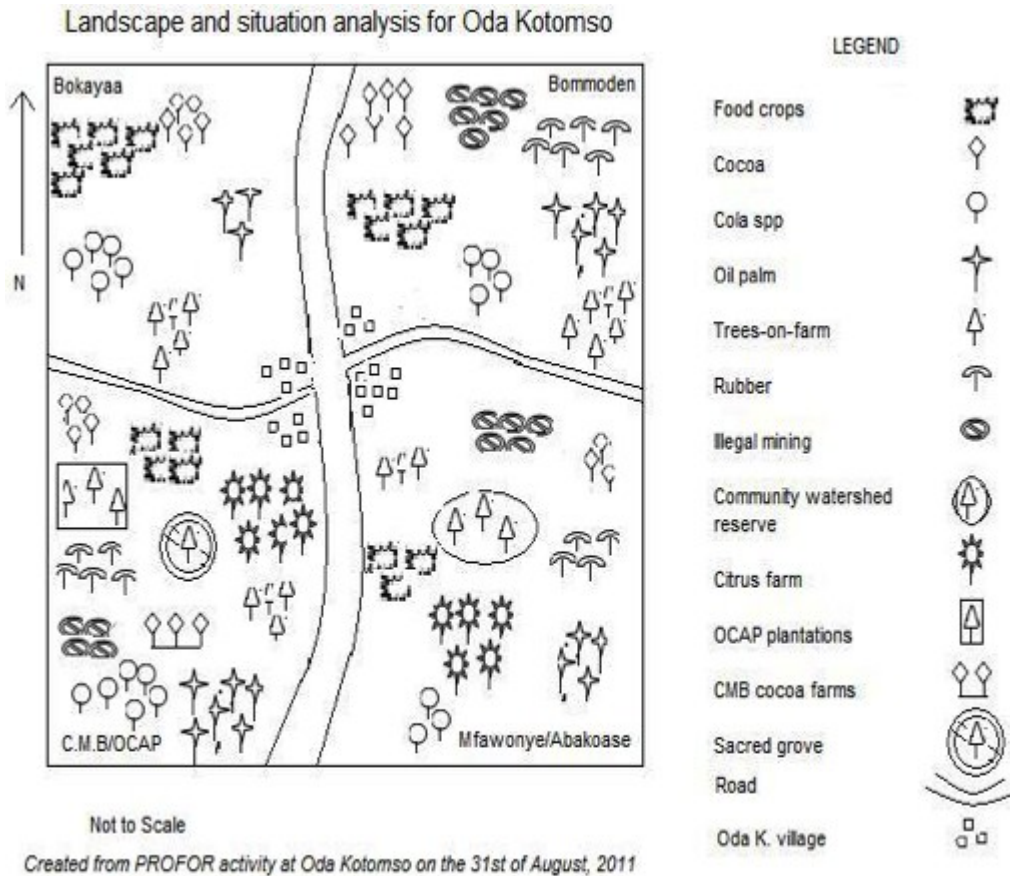


Figure 5.1 Landscape and situation analysis for Oda-Kotoamso

5.4 Current livelihoods

With a view to analyzing the livelihoods in the Oda-Kotoamso community, a modified version of the PROFOR Tool 4 (see Chapter 3) was used. A group composed of twenty OCAP and non-OCAP farmers, divided into one group of ten males and one group of ten females, participated in this exercise. They were asked from where they derived their income and how much they relied on these income-generating sources, measured on a yearly basis. The following six categories were used: natural forest, fallow land, agroforestry, petty trading, wage employment and remittances. The charts distinguished between cash and non-cash income. Cash income is being understood as money from the sale of items grown on farms or gathered from the forest and other off-farm natural resources, money received from wages or through trading, and remittances sent by other family members who live or work outside the community. Non-cash income is derived from items grown on farms and gathered from other natural resources that are eaten and used at home. The raw data was transferred from the various charts onto spreadsheets to facilitate the reading of the outcomes. Below, first the results for the women are presented, followed by those for the men.

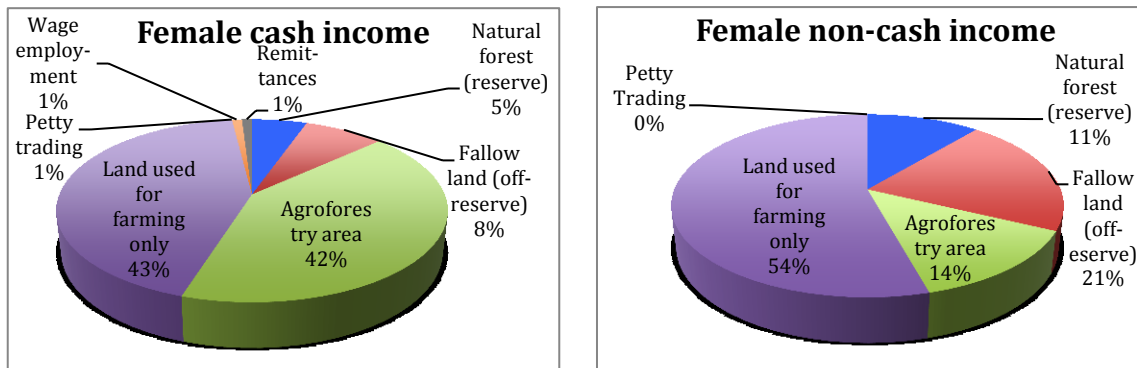


Figure 5.2 Female cash and non-cash income sources.

5.4.1 Female cash and non-cash income

As can be seen in the pie charts in Figure 5.2, participants obtain the major part of their cash and non-cash income from farmland exclusively used for farming (43% and 54% respectively). Crops cultivated on this land include maize, cassava, yam, plantain, cocoa yam and oil palm, while firewood, mushroom and snails are derived from fallow land. The second largest source of cash income came from the agroforestry farm area (42%); the area designated for purposely planting trees and food crops on the same plot of land. This cash income is mainly realized through the sale of crops such as plantain, cassava and cocoa.

The agroforestry area contributes a much smaller proportion to non-cash income (14%). The second most important source of non-cash income (21%) was the fallow-land area, probably consisting of non-timber forest products (NTFPs). Natural forests (reserves) contribute a small portion of female total cash and non-cash income, respectively 5% and 11%. Wage employment, petty trading and remittances accounted for only a meager 1% of cash income.

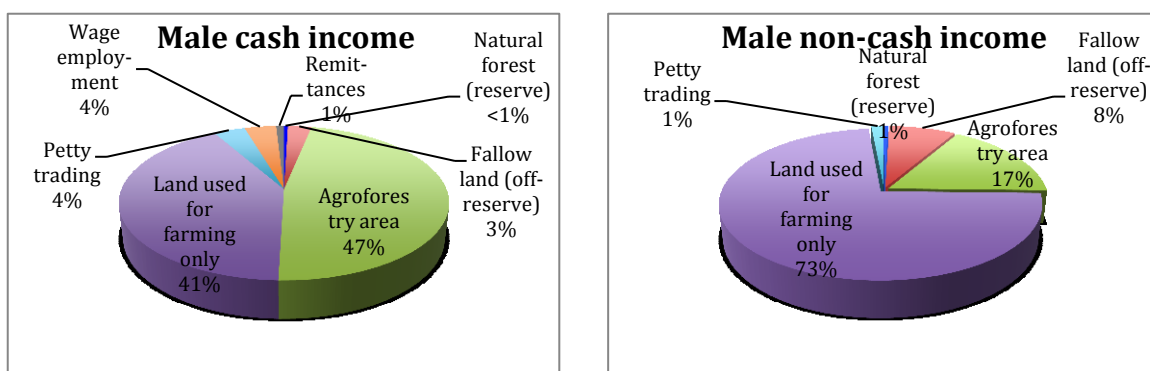


Figure 5.3 Male cash and non-cash income sources

5.4.2 Male cash and non-cash income

The main sources of male cash income are nearly evenly divided between agroforestry and land exclusively used for farming (41% and 47% respectively) with

lower percentages for the other categories. The chart shows a completely different picture for non-cash income compared to female non-cash income, with land that is exclusively used for farming contributing an overwhelming share of 73%, followed by agroforestry with 17% and fallow lands with 8%.

From these charts it can be concluded that male income is less varied than female income and mostly derived from land used solely for farming.

5.5 The role of forests and trees in people's livelihoods

Trees have always played a very important role in people's livelihoods, especially in the rural tropics where there are not many diverse livelihood opportunities. Trees constitute a vitally important subsistence resource for the rural poor who fell the trees to build houses, as a source of fuel wood for cooking and use the bark for medicinal purposes. Culturally, trees are also revered and play a crucial role in religious rites and ceremonies such as e.g. marriage, male circumcision, and female initiation rites (Dei, 1992).

As Figures 5.2 and 5.3 in the above section show, a large percentage of cash and non-cash income in Oda-Kotoamso is derived from the agroforestry sector that has been implemented in the area. The development of a CDM project could be feasible here, because an agroforestry project, which combines the intercropping of trees with cash crops has been in development in this area since 1997. This project has helped with capacity building and informed many farmers about the financial possibilities of agroforestry, which could be a benefit for the development of a CDM project. International support, interest and the 'know-how' are already there, so it would be not a big change for the people that are already making a living from tree resources. The potential benefits for the people's livelihoods could be significant, although not in the short-run, because of the long time gap between investment (planting and weeding) and profit (from harvesting) (Boni, 2006, cited by Insaïdoo *et al.*, forthcoming). Future benefits can be seen not only in terms of added income, but also in terms of rehabilitation of the degraded landscape that could be utilized for many years to come. Drawbacks besides absence of short-term benefits would be the extra work and costs involved in the tree planting and maintenance (*Ibid*). Many researchers are hopeful that financial approaches, such as the CDM, can provide powerful incentives and efficient means to keep the forests growing, while at the same time offering new sources of income to support rural livelihood and reduce poverty for forest-dependent communities (Marfo, 2011, p. 3).

5.6 Villagers' perceptions of climate change and livelihood effects

From the results of the questionnaire survey and the outcomes from the focus groups, it became apparent that the villagers in the Oda-Kotoamso community are aware of climate change.

The majority of the respondents described climate change to be a change in rainfall and weather pattern. They noted that the rainy season was shorter than it used to be and that there was the occurrence of erratic rainfall. It was also noted that the temperature was perceived to be increasing in relation to other years. Another common

remark was “it was a windy atmosphere”. This was an interesting observation since an increase in wind has a link to deforestation as trees provide windbreaks and less trees would naturally allow for a windy atmosphere. The most common recurring response was that there was a change in weather conditions.

Consistent with the outcomes regarding the relative contribution of forest resources to people’s cash and non-cash income (PROFOR Tool 4), the survey revealed that deforestation had no effect on the livelihoods of the farmers. One response of a particular farmer was that “Deforestation is good, because it creates more land for farming!” This can be related back to PROFOR Tool 5 in which focus groups were asked about their knowledge and understanding of the project. Some respondents were just looking at what was happening right now (with the traditional slash-and-burn methods), instead of seeing the potential of changes in the long run of preserving trees and the forest.

5.7 Villagers’ awareness and perceptions of the CDM project

The villagers know and are quite aware of the CDM project planned for their community, which is aimed at providing incentives to plant and care for new trees and not harvest them in the immediate future. They have been interviewed many times and heard lectures about the changes that are happening in their community. There are still many questions to be answered about remuneration, when the farmers can expect the revenues to be paid out, how these will be divided, and who will pay them (government, timber company or OCAP)? The farmers involved are getting tired of being prodded to answer questions without seeing any benefits coming their way any time soon. Their main concern is the long wait towards getting any remuneration for their work on planting the trees.

5.7.1 Awareness of the CDM project

The following questions 40, 41 and 43 of the questionnaire deal with the awareness of the CDM project. From question number 40 “Are you aware of the CDM project?” can be concluded that just over half of the respondents were aware of the CDM project.

Table 5.2 Awareness of CDM in Oda-Kotoamso

		Frequency	Percent	Valid percent
Valid	Yes, I already knew	26	49.1	50.0
	I just heard of it for the first time	1	1.9	1.9
	No	25	47.2	48.1
	Total	52	98.1	100.0
Missing	Non-response	1	1.9	
Total		53	100.0	

Table 5.3 Source of information about CDM in Oda-Kotoamso

	Frequency	Percent	Valid percent
Radio	9	17.0	42.9
Forestry Commission	2	3.8	9.5
Samartex	3	5.7	14.3
Family member	2	3.8	9.5
FORIG	1	1.9	4.8
Hearsay	4	7.5	19.0
Subtotal	21	39.6	100.0
Non-response	32	60.4	
Total	53	100.0	

Table 5.3 shows the important role that the radio plays in informing the community, which was the source of information for 43% of the respondents. It was my initial and I presume a naive thought that community knowledge of climate change would be limited. I was pleasantly surprised to discover that the knowledge level and understanding of climate change and the CDM project was in place. Also hearsay played an important role in communicating the project, more than information provided by Samartex, FORIG and the FC. Although exact details/specifics were not always totally accurate, the results show that there is a good basic understanding. It was more in the logistics of the reasons why the farmers were actually planting the trees and who was responsible for this idea that the perceptions began to vary.

Table 5.4 Explanation of CDM by Oda-Kotoamso inhabitants

		Frequency	Percent (%)
Valid	Being paid for protecting trees in improving air quality (sequester carbon)	4	7.5
	Revenue generation projects that help to improve livelihoods	1	1.9
	Trees are to be allowed to grow for some period before harvesting, for which every farmer is compensated	3	5.7
	Protect established trees for the government against payment	3	5.7
	There is an institution that is willing to pay for planting and not harvesting of trees	2	3.8
	Protecting trees for carbon credits	3	5.7
	Total	16	30.2
Missing	Non-response	37	69.8
Total		53	100.0

The open-ended question: “where did you hear about CDM? Can you explain in your own words what CDM is?” generated several responses that could be combined to form the various categories that are shown in Table 5.3.

The most commonly occurring definition of CDM was the explanation of being paid for protecting trees to improve air quality. As can be seen from the Table 5.3, there is not a great difference between the various categories. According to the respondents who had heard about the CDM project, most were able to talk about protecting trees for future benefit.

5.7.2 Expected benefits

The overall expected benefit would be income generation that would enable the villagers to purchase material goods. This appeared to be the most important consideration for the villagers to engage in the project. The second most important benefit to them was the improved or increased availability of forest and tree resources. Environmental improvements were seen as the third most important expected benefit. This outcome is not surprising, since it is human nature to want to meet one’s material needs before considering healthy environmental and sustainable development.

The responses to the question “What benefits do you expect from the CDM Project?” can be grouped together as material and environmental benefits, which highlight the importance of material benefits of more income to buy a bicycle or a house. A surprisingly high number of 32.9% was interested in a better climate.

Table 5.5 CDM expected benefits from Oda-Kotoamso community members

CDM expected benefit	Responses (n=52)	
	n	Percent
More income	43	56.6%
Other material benefits	4	5.2%
Better climate	25	32.9%
Other environmental benefits	4	5.2%

(No carbon payments have been made to the villagers as of yet)

5.7.3 Villager’s perceptions of the challenges regarding the CDM project

Based on PROFOR Tool 5 (see Chapter 3) a problem and solution matrix was constructed with the villagers (n= 53) to gather data on what they perceive as the main challenges at the local level for the successful implementation of the CDM project. This chart could aid in the proper understanding of what the expectations and fears are regarding CDM Afforestation and Reforestation (A/R). Since this tool was employed in a focus group setting it played an important role in generating knowledge and understanding among farmers about their role in the project. Such an understanding is important to enable farmers to effectively contribute to the scheme and its success.

Table 5.6 CDM problem and solution matrix

PROBLEM / SOLUTION MATRIX <i>Oda-Kotoamso community</i>	
PROBLEM	SOLUTIONS
1. Delays in the payment of carbon money	<ul style="list-style-type: none"> – Provision of focal points in the districts for cash disbursement – All agreements on payments should be binding
2. Fluctuations in price per ton	<ul style="list-style-type: none"> – Stable and progressive increase in price
3. Lack of seedlings to expand agroforestry farms	<ul style="list-style-type: none"> – Continuation of Samartex' role in supplying seedlings – Support from other agencies such as NGOs and the Forestry Commission. – Farmers taking initiative to produce seedlings themselves
4. Illegal chainsaw menace	<ul style="list-style-type: none"> – Active involvement/ participation of farmers in checking illegal operations
5. Lack of sensitization programs	<ul style="list-style-type: none"> – More education – Expansion of programs to other communities
6. Lack of available land	<ul style="list-style-type: none"> – Make changes in land tenure system – Participation in other communities

The problem-solution matrix gives good insight into what the villagers of the Oda-Kotoamso community perceive as the challenges to implementing the CDM project into their community. In addition to the problems listed in Table 5.5, members of the focus group were asked to come up with solutions to these perceived problems.

What becomes obvious from the focus group discussions is the point that the community would like direct involvement with each step of the project, as well as to have some form of tangible contract or agreement, which would be legally binding in order to secure a future for themselves and their children. These are all valid points that should be taken into account while implementing the project.

5.7.4 Villagers' expectations regarding their role in decision-making

The problem-solution matrix shows that the farmers of the Oda-Kotoamso community have a good idea of what challenges the CDM project presents. They have expressed some of the main problems, especially about the prospected delays in the payment of carbon money and the fluctuations of the carbon prices on the international markets. The carbon project is still in its initial phase, so no carbon payments have yet been made. The farmers are also unsure about how they will obtain seedlings for future projects when the funding for supplying new seedlings will dry up. They are considering new initiatives to produce their own seedlings, so that they would not be dependent on other agencies, such as Samartex, NGOs or the FC. Then there is often the worry of illegal chainsaw felling after their trees have just matured enough to be considered for the CDM project. There is also the consideration of the availability of lands that could be used for the CDM project. The land tenure system is a complicated issue in rural Ghana (see Chapter 2). Local

tenure systems may incorporate official legislation as well as traditional or customary tenure systems (Marfo, 2011: p. 6).

The nature of the CDM project involves a close relationship with the farmers, Forest Services, the Forestry Commission and the Forest Research Institute of Ghana (FORIG) and other non-state actors (NGOs, timber and mining companies) in order to successfully implement the project

5.8 Summary

The primary obstacle for the advancement of the CDM project in the opinion of the farmers is the lack of evidence of valid guarantees that payment is forthcoming for both immediate and future work efforts. Samartex and FORIG have supported a seedling program, but it is beyond their claimed capacities to support a maintenance and forest protection program of the scope of CDM. The farmers take the position that they should be compensated for tree care and the loss of planting zones when the trees mature and the canopy closes about three years after tree planting and food crops can no longer be planted between the trees. Insecurity about benefits is subject to a number of variables such as destruction by natural causes and fire, the fluctuation of timber prices on the world market, the economic stability of the world market and the constant threat of illegal chainsaw cutting. Simply put, the farmers would like to get a binding guarantee backed by substantial institutions as a way of securing their present and future livelihood.

CHAPTER 6

The CDM project in Koradaso

This chapter summarizes the data collected in the Koradaso community, located in the Pamu Berekum forest reserve. This community differs from the Oda-Kotoamso, which was discussed in Chapter five not only by its geographical location and ecological zone, but also by the fact that tree planting for CDM purposes will be conducted on forest reserve land which is subject to a different governance structure. This chapter follows the same structure as the previous one, so that common trends and differences can be more easily identified. As in Chapter five, this chapter first describes the general characteristics of the study village and the CDM project. It then focuses on the perceived effects of climate change and awareness of the potential of the CDM project for the livelihoods of the inhabitants of Koradaso, before arriving at some concluding remarks.

6.1 Characteristics of the village

The proposed CDM project in Koradaso is located in the high forest zone in the Western Brong Ahafo region. (See map in section 1.4) More precisely it is located in the dry semi-deciduous ecological forest zone, longitudes 2°56 West and latitudes 7°25 North. This area is characterized by a mean annual rainfall of about 1,120mm and has mean daily temperatures ranging from 25-27 degrees Celsius. The forest area, called Dormaa Ahenkro, covers 3.5% of the Brong Ahafo Region. Within the Dormaa district there are approximately 350 settlements with a combined population of approximately 150,000 people, predominantly living traditional lifestyles (Blay, 2010). The village of Koradaso is one of these small communities within the Pamu Berekum forest reserve (189 km²), with a population of 1,200 people²¹. This forest area has been severely degraded after years of unsustainable logging and rampant bushfires. The situation has been worsened due to shifting cultivation, poverty and encroaching population. The degraded forest is now characterized by large areas of an invasive weed *Chromolaena odorata* (which is locally referred to as Acheampong weed) and some kind of secondary grassland, in which *Panicum maximum* (a large grass) is dominant. (Blay, 2010). This seems contradictory as forest reserves are intended to act as safeguards from forest degradation that usually plague other communities in off-reserve lands.

²¹ According to estimates from the district office of the Forestry Commission per Dr. Opuni-Frimpong.



Photo 6.1: Koradaso community [September 2011].

6.2 Characteristics of the project in Koradaso

The initiative for developing the Koradaso project was undertaken by the Ghana Forestry Commission (FC), the Dormaa District Assembly and Forestry Research Institute of Ghana (FORIG). Other partners and donors involved include several community participants, the International Tropical Timber Organization (ITTO) for capacity building and the World Bank Carbon Fund. Thus far, the project has generated employment and sustainable income to one hundred and twenty local farmers in the communities in the Pamu Berekum forest reserve²². There is also a newly proposed site at Koradaso, which is over 24 hectares that will be planted this year.

The project is governed in a similar manner as the Modified Taungya System (MTS), wherein farmers' participation in decision-making is greatly considered (Opuni-Frimpong, FORIG, personal communication, December 2011). The MTS is an agroforestry system that was introduced in Ghana in 2002 to support rural livelihoods and address Ghana's deforestation problem. Under this reforestation scheme farmers receive land to plant timber trees and grow food crops in between the trees during early years of plantation development. This can be done as long as the canopy has not been closed, which usually takes 3 years on average. When the timber is sold, the benefits must be shared between the Forestry Commission (40%), the farmers (40%), the traditional landowners (15%) and the forest-adjacent community (5%). However, the proceeds from agricultural crops go for 100% to the farmer, who planted the crops, which are mostly a mixture of cocoyam, plantain, maize, and vegetables such as tomatoes, onions, peppers

²² URL: http://www.forestlandscaperestoration.org/regional-networks/westafrica/pamu_berekum/

and garden eggs²³ (Insaidoo *et al.*, 2012 forthcoming).²⁴ Forest government arrangements in place are crucial for the performance of MTS, because governance determines farmer's access to assets and the institutions that regulate the access, as well as clarity about the rules of access (Scoones, 2009).

The MTS scheme is a legally binding Land Lease and Benefit Sharing agreement in which farmers are considered co-owners of the plantations with the FC. Interested farmers can join an MTS group and are required to establish a Taungya Committee to be headed by the FC in the communities at the early stages of MTS implementation. This committee is responsible for the allocation of degraded land to farmers, monitoring the performance of farmers and the FC, ensuring compliance of all parties with the contract, instituting sanctions and settling disputes (Agyeman *et al.*, 2003, cited by Insaidoo, forthcoming 2012). Its supporting and overseeing tasks include pegging of plots to enable individuals to plant the timber trees in rows, supervising tree planting, controlling that the individual members plant the trees in the plots allocated to them, and supervising nursery and alternative livelihood activities where applicable (*Ibid*).

All this is guided by the MTS Agreement Document (FC, 2002), which spells out the responsibilities of the parties involved and the regulations guiding the operation of the system.

In addition to the MTS scheme, tree planning in the village also occurs in the form of on-farm tree planting, in which timber trees are integrated in farming systems like cocoa farms and oil-palm plantations (Insaidoo, pers. comm., March 2012).

The proposed objectives of the CDM project in the area can be summed up as follows:

1. To sequester CO₂ through the rehabilitation of degraded lands and marginal lands in the Pamu Berekum FR.
2. To help in mitigation of global warming by planting trees for sequestration of atmospheric carbon dioxide.
3. To provide opportunity for the fringe communities to benefit from the sale of certified emission reductions (CERs) through carbon sequestration by the trees planted under the CDM.
4. To enhance biodiversity conservation of the forest reserve by increasing its connectivity to other forest reserves surrounding it.
5. To improve soil conservation and water erosion control in the reserve.
6. To generate employment and sustainable income for the communities fringing the Pamu Berekum forest reserve with a view to reducing their poverty levels.

²³ Also known as African garden egg, huckleberry or gilo, a popular ingredient in West African cooking

²⁴ The provisional title for the thesis is: "Forest governance arrangements for improved forest and tree-related livelihoods (reforestation schemes) in Ghana's high forest zone".

6.3 Characteristics of the respondents

Data collection in the Koradaso community occurred between 21 and 23 September 2011, paralleling the time frame available for the study reported in Chapter five. The majority of the research assistants were also the ones present during the data collection in Oda-Kotoamso. Familiarity with the objectives of the study and the addition of one more research assistant for this trip allowed for a greater number of questionnaires to be completed. During my stay, 62 questionnaires were completed through which the following socio-economic data was collected. According to the respondents of the questionnaire, the majority (48, 77.4%) were engaged in tree planting and 14 (22.6%) were not participating in any reforestation project. As in Oda-Kotoamso, only respondents of at least 18 years old were selected with an effort to have equal representation of male and female. Despite this effort again most of the respondents were male (39, 63% and 23 (37%) were female and ranged in age from 18 to 84. More than half were in the 36-53 age category (31; 50.1%) and only eight persons 12.8%) were older than 54. A majority of the participants were married (45, 76.5%) and 12 (19.4%) were single (of which 2 were divorced, 2 single and 1 separated) Their education levels were very similar to those of the respondents in Oda-Kotoamso with ten persons 16.1%) having no formal education at all, 12 people (19.4%) with a primary education and the majority (33, 52.3%) reaching a level of Junior High School and Middle School (of which 1 had informal education and 6 had attended Senior High School). An interesting finding was that there were more migrant participants taking part in the project. Of the respondents, 42, 67.7%) were migrant and the rest (20, 32%) were native to the area. This proportion was 67.7% migrants and 32% natives among the respondents in the community level questionnaire. This was a different finding than the one at the Oda-Kotoamso community, where almost all of the participants were from the area. This is mainly due to the fact that the project in Chapter 5 refers to on-farm tree planting, which requires tenure security that most migrant farmers don't have, whereas both migrant and non-migrant farmers can participate in the MTS in the case of which land ownership (forest reserve) is vested in the state. The majority of respondents were engaged in food/cash crop farming (60, 96.8%) with only two people working in formal employment (teacher and agricultural extension officer respectively). Some (5, 14.7%) counted on livestock rearing as an additional source of income (Table 6.1).

Table 6.1 Socioeconomic data of the respondents (N = 62)

Variable	n	%
Gender		
Male	39	62.9
Female	23	37.1
Age range		
18-35	23	36.9
36-53	31	50.1
53+	8	12.8
Education		
Post Secondary/Secondary	6	9.7
Middle school/Junior High School	33	53.2
Primary	12	19.4
Informal	1	1.6
No Education	10	16.1
Origin		
Migrants	42	67.7
Occupation		
Food/Cash crop farming	60	96.8
Formal Employment	2	3.2
<u>Additional income sources</u>		
Livestock rearing	5	14.7
Remittances	3	8.8
Masonry	4	11.8
Sawing timber/Chainsaw operator	3	8.8
Carpentry	3	8.8
Bar operator/caterer	1	2.9
Food/cash crop production	4	11.8
Petty-trading	3	8.8
Driving	4	11.8
Knitting of clothing	1	2.9
Evangelism	1	2.9
Basket weaving	1	2.9

Source Field survey, 2011

A participatory map (Figure 6.1) was also created in this community, showing the main boundaries and food crops of the area, as perceived by the Koradaso community members.

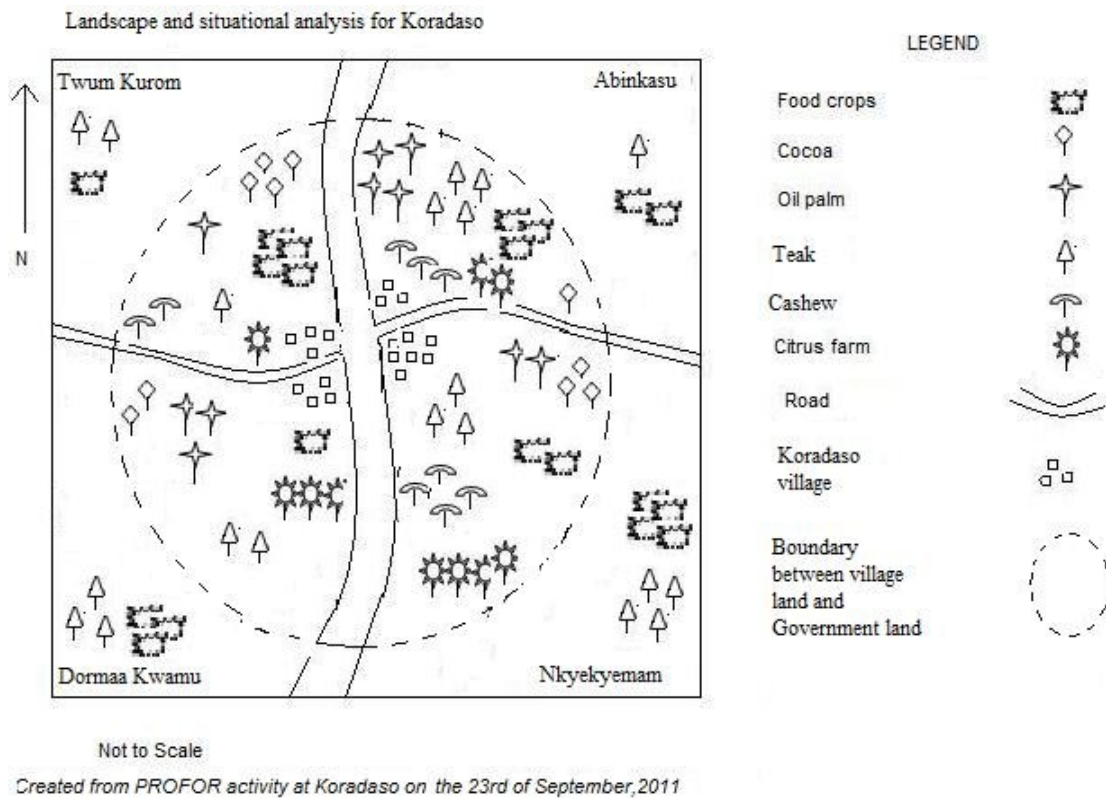


Figure 6.1 Landscape and situation analysis for Koradaso

Figure 6.1 is a pictorial representation created on a flip chart and then later transferred into Microsoft Paint. As explained in the methodology chapter (Chapter 3), this participatory drawing was generated out of the focus group discussion for the purpose of gaining an understanding of the area and to understand the interaction of the community members with their landscape, resources, food crops and from where they obtain the particular crops.

Some observations can be made from this map. For example the village is situated along a main road with an intersecting cross road. Teak trees are planted both within the village and in the reserve area. This illustrates that there are two reforestation projects going on: one within the village borders, in which tree planting is integrated in existing farming systems and a second project within the forest reserve, which is the MTS. An interesting finding is that the community made sure to include the boundary lines, which shows that they make a distinction between village land and government land. This is probably due to the fact that the Koradaso community is located in a forest reserve. The map also shows that the teak tree plantations are interspersed with food crops in and outside the forest reserve. One can mostly find on-farm tree planting with the lucrative cocoa and other permanent agrarian crops such as cashew, oil palm and citrus at the

fringes of the forest reserve and in the off-reserve area where there is still a substantial level of vegetation.

Compared to the same map that was produced in the Oda-Kotoamso community, this map was less elaborate, not showing e.g. watershed reserves, (sacred groves, mining activities) or other tree plantations. The purpose of these maps is to see how the villagers use the local resources. Informal discussions following the drawing session often proved to be more valuable than the drawings themselves. The process usually led to debates, in which participants express their understanding of the landscape and their wishes for the future. These focus group discussions were highly valuable and led to the development of this map (Fig. 6.1), which exhibits the way the villagers conceptualized their community.

6.4 Current livelihoods

With a view to analyzing the livelihoods in the Koradaso community, a modified version of the PROFOR Tool 4 was used (see Chapter 3 for a more detailed description of the methodology). This was to facilitate the collection and analysis of relevant field data.²⁵ A group of twenty participants was divided equally by gender. They were asked from where they derived their income and how much they relied on these income-generating sources, on a yearly basis. A distinction was made between tree farms in the forest reserve (i.e. the MTS), fallow land, agroforestry farms (i.e. land where trees were integrated in agricultural systems like cocoa farms and small-scale oil palm plantations and interplanted with food crops), land used for farming only, petty trading, wage employment and remittances. The pie charts (Figures 6.2-6.5) differentiate between cash and non-cash income. Below, first the results for the women are presented, followed by those for the men.

6.4.1 Female cash and non-cash income

Females in the Koradaso community obtain the majority of their cash and non-cash income from the agroforestry farm area within the village (53.5% and 43% respectively). These are areas where timber trees are integrated in plantations of cocoa and other permanent agrarian crops such as cashew, oil palm and citrus trees. Food crops interplanted in these agroforestry systems consist mainly of plantain, cocoyam and maize and other vegetables such as tomatoes, onions and peppers.

The second largest income percentage of the pie refers to reforestation schemes within in the forest reserve, i.e. the modified taungya system. Research in this category indicates that the tree plantations under the MTS generate between 23.5% and 34.5%, of cash and non-cash income for females, as long as they can harvest food crops from them. The farmers would like to plant cassava in the modified taungya system as well, because it is a popular staple in the Ghanaian diet, but are mostly prohibited from planting this crop in the MTS, because of its quick growing nature and competition for water and nutrients that could inhibit the growth of food crops, other trees and seedlings. Mixing

²⁵ Provisional thesis title, “Forest governance arrangements for improved forest and tree-related livelihoods (reforestation schemes) in Ghana’s high forest zone”).

14. <http://www.profor.info/profor/knowledge/poverty-forests-linkages-toolkit>.

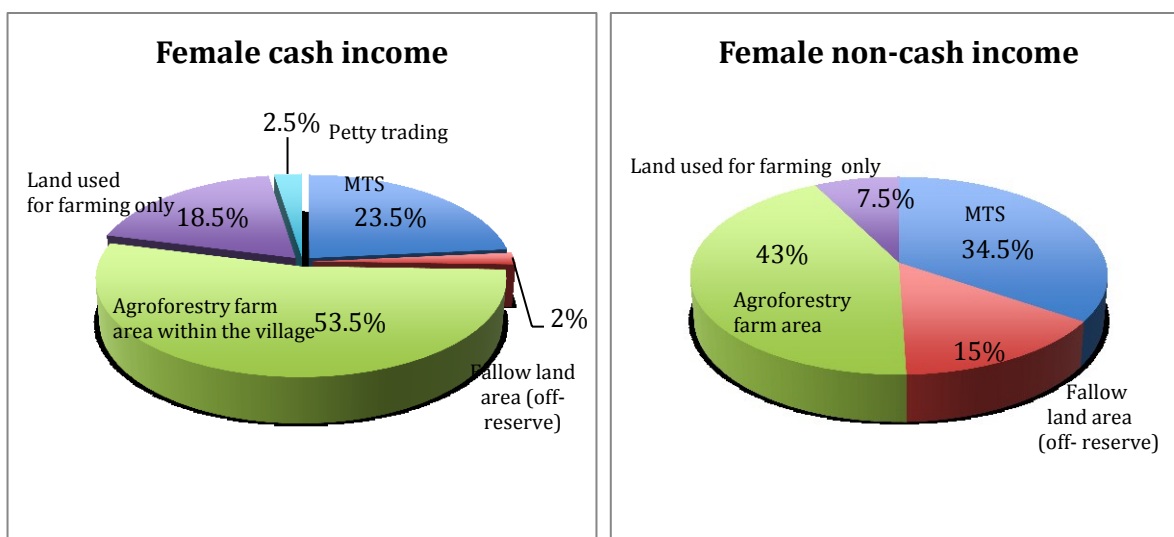


Figure 6.2 and 6.3: Cash and non-cash components of income sources of females

these crops amongst planted trees makes the farm area more resilient to inclement weather and the trees serve as a natural windbreak to protect the crops.

The third largest source of income derives from land used for farming only in the cash income category (18.5%), but it proved to be less significant in female non-cash incomes (7.5%).

Fallow land where NTFPs are collected still play a role in non-cash income providing mushrooms, bushmeat, wild yam, fruits, snails, canes and raffia palm branches representing 15% of female non-cash income but is only marginally important (2%) in female cash-income. The latter comes from products like cocoa drying mats and baskets from the cane and raffia that they can sell on the market (see Photo 3.3).

6.4.2 Male cash and non-cash income

The results of the PROFOR activity show that the male population of Koradaso also relies on the agroforestry area within the village as an important source of their cash and non-cash income (34.5% and 31% respectively). This area contributes substantially to the incomes of both sexes, but food crops derived from it constitute a relatively more important source of cash and non-cash income for women.

According to this study, males also receive a nearly equal amount of income from plantations (the MTS) in the forest reserves (32.5 and 33%), which is a bigger percentage for male cash and non-cash incomes than for the female incomes.

The land used for farming only delivers nearly a quarter 23% and 24% of all cash and non-cash components of their income. The following products from this land are cocoa, plantain, maize, cocoyam, cashew, cassava, oil palm and other vegetables such as tomato, avocado and cucumber. It is clear from the above figures that agriculture is the major source of all income.

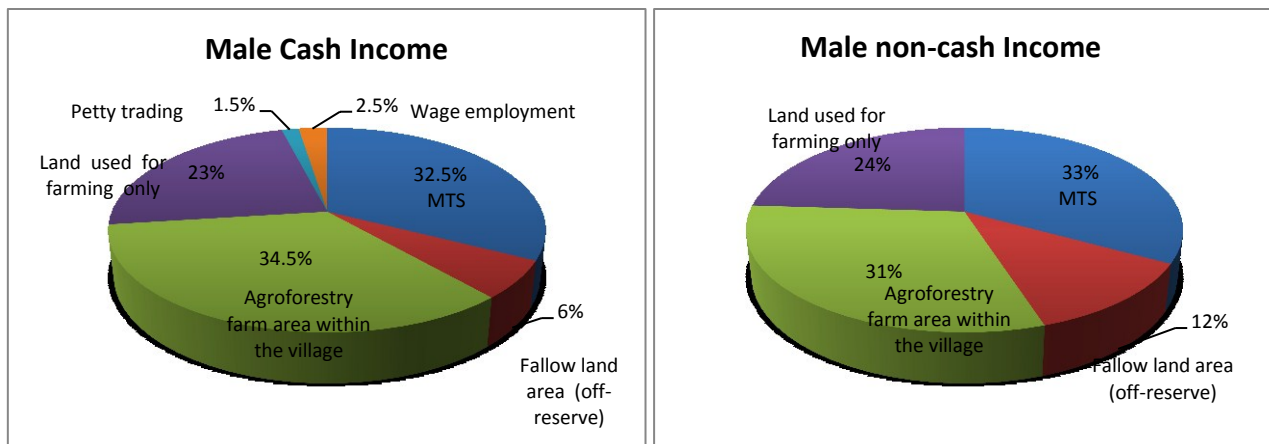


Figure 6.4 and 6.5: Cash and non-cash components of income sources of males

6.5 The role of forests and trees in people's livelihoods

Although Pamu Berekum is a forest reserve, the term is misleading. Photo 6.2 depicts a forest that has been totally degraded. The 'forest' appears to be more a grassland than a lush forest. The degraded areas often have nutrient-deficient soils, which reduce their productivity and biodiversity. Wildfires have become a major challenge in this area, mainly because of the replacement of the original vegetation by very combustible grasses (Blay, 2010). This situation enlarges the risk of new intense wildfires. Dr. Blay goes as far as to say that "fires in this region are unprecedented and



Photo 6.2: Degraded Pamu Berekum forest reserve [September 2011].

almost nowhere on earth is the intensity so high” (Blay, 2010). Other reasons why degradation is so high, is because of illegal logging, intense NTFPs collection and population pressure. As the population grows, these forests are even more threatened. Perhaps due to all these factors and having experienced these threats from close by, the community members are interested to make livelihood changes with reforestation programs such as MTS which has shown some marked progress since its implementation (Derkyi, 2012).

6.6 Villagers’ perceptions of climate change and livelihood effects

According to the results of the questionnaire survey (see particularly questions 37 and 38 in Appendix 3), the villagers are very much aware of climate change. An overwhelming percentage of 83.9% stated positively that they knew about weather changes. They had noticed a change in rainfall and weather patterns (64%) with 18% noticing incidences of erratic rainfall and another 22% cited adverse weather conditions, such as short periods of very heavy rainfall and strong winds. Most of the respondents (47.4%) stated that the rainfall period was shorter, while 28.1% believed that the rainfall period was longer, and only 8.8% did not notice any change at all. This shows, perhaps, the subjective nature of the interviews with people only remembering what they perceived as important in their lives such as whether they needed rain or no rain for successful cultivation of their crops.

Overall, 69.1% of the respondents were aware of higher average temperatures, while 21.8% were claiming that the temperatures were lower, and 5.5% found the temperature changes erratic and no response from the remaining respondents. An interesting observation was the answer about a windy atmosphere: 84.6% had noticed an increase in windy days, which some associate with an increase in bushfires (7.7%). These forest fires pose a constant threat in Pamu Berekum. They are mostly caused by human negligence and are strongly linked with livelihoods and impact negatively on the sustainability of the agriculture and the forestland used.

6.7 Villagers’ awareness and perceptions of the CDM project

As mentioned above, the villagers were aware of climate change, but more than half of the respondents had not heard about the CDM or heard about it during the interview for the first time (66.1%), while 32.8% already knew about the mechanism. The main source of their information came from listening to the radio (44.4%). During my stay in Pamu Berekum, I noticed that many people were walking around with handheld radios and were listening to the various broadcasts all day long. Thus, it came as no surprise to me that the radio was their main source of information on CDM. ‘Hearsay’ was their second source of information with 22.2%. Other sources included staff of the Forestry Commission’s Forestry Services Division with a large percentage of 27.8%. ITTO workers only accounted for 5.6% of the information sources. These last two proportions may indicate that the various workshops that were conducted in the community by the Forestry Commission, are delivering positive results in terms of awareness of the CDM.

6.7.1 Awareness of the CDM project

Tables 6.2 reveals that the majority of respondents in Koradaso are unaware of the CDM project. This is remarkable considering their engagement in tree planting either on-farm or in the MTS.

Table 6.2 Awareness of CDM in Koradaso

		Frequency	Percent	Valid percent
Valid	Yes, I already knew	20	32.3	32.8
	I just heard of it for the first time	3	4.8	4.9
	No	38	61.3	62.3
	Total	61	98.4	100.0
Missing	Non-response	1	1.6	
Total		62	100.0	

Those who are aware of the project mostly heard of it through the radio (8, 44.4%), the Forestry Commission (5, 27.8%) or 'hearsay' (4, 22.2%) (Table 6.3).

Table 6.3 Source of information about CDM in Koradaso

	Frequency	Percent	Valid percent
Radio	8	12.9	44.4
Forestry Commission	5	8.1	27.8
ITTO workers	1	1.6	5.6
Hearsay	4	6.5	22.2
Subtotal	18	29.0	100.0
Non-response	44	71.0	
Total	62	100.0	

Table 6.4 demonstrates the varied understandings of the CDM project by those who had heard of it.

Table 6.4 Explanation of CDM by Koradaso inhabitants

		Frequency	Percent (%)
Valid	Land for tree planting project	1	5.0
	Paid for not harvesting trees	3	15.0
	Paid for large scale tree planting	2	10.0
	Money and seedlings given based on size of farm	1	5.0
	Planting trees for 30 years and then being paid	1	5.0
	Paid for carbon sequestered	3	15.0
	Leaving trees unharvested	1	5.0
	Growing trees on own farm	2	10.0
	Growing trees to be paid by government	5	25.0
	Planting trees to absorb atmosphere heat	1	5.0
	Sub-total	20	100.0
Missing	Non-response	42	
Total		62	100.0

6.7.2 Expected benefits

First and foremost the most expected benefit for the farmers would be an increase in income. The second most important benefit is expected from an improved climate.

Table 6.5 CDM expected benefits from Koradaso community members

CDM expected benefit	Responses (n=62)	
	n	Percent (%)
More income	54	49.5
Better climate	38	34.9
Increased productivity	3	2.8
Increased access to NTFPs	2	1.8
Increase in size of farm	2	1.8
Forest restoration	2	1.8
Improving soil conditions	5	4.6
Provides tree barrier	1	0.9
Job creation	1	0.9
Social amenities	1	0.9
total	109	100.0

*(>1 answer was possible for this question, that is why total is 109).

6.7.3 Villagers' perceptions of the challenges regarding the CDM project

Table 6.6 lists the problems and solutions that were highlighted by the participants in the focus group held in Koradaso. Each of the eleven points were identified and agreed on by the participants. The very first point that was brought forward was the occurrence

of bushfires. It was the most pressing issue on people's minds and three constructive solutions were brought forward to combat this problem: greenbelt establishment, a fire monitoring team, promoting greater vigilance and a committee to stop illegal farming. These measures were seen as the most practical solutions for the ever-existing threat of bushfires.

Table 6.6 CDM problem and solution matrix

PROBLEM / SOLUTION MATRIX <i>Koradaso community</i>	
PROBLEM	SOLUTION
1. Bush fires	<ul style="list-style-type: none"> - Green belt establishment - Fire monitoring team - Need to be vigilant - Committee to stop illegal farming
2. Lack of technical advice	- Education by FSD on plantation management (e.g. spacing and mixing percentages).
3. Monitoring	<ul style="list-style-type: none"> - FSD should effectively monitor the project - Comply with written agreement between FS and farmers
4. Incompetent FSD officials	<ul style="list-style-type: none"> - Clear forest boundaries - Collaborative forest management
5. Non-commitment (on the part of the CDM officials)	<ul style="list-style-type: none"> - Constant visit by officials - Official documentation - Written agreement backed by legal arrangements
6. Lack of irrigation	- Government should provide bore holes/ water for farming activities
7. Insecurity about when the CDM money will be materialized	- Clarification is needed and more information be passed on to the farmers
8. Lack of financial incentives to start and maintain the project	- Financial incentives should be given to farmers with advanced timber payments for maintaining and monitoring trees until they mature
9. Distance to project site	- Provision of bicycles to shorten distance to the project site
10. Insincerity on the part of the community leaders ("embezzlement")	- Transparency about the amount of money to be given to farmers
11. "Incompetent farmers" (free rider problem)	<ul style="list-style-type: none"> - CDM benefits should be not be given to groups but be distributed on an individual basis according to each person's inputs - Written agreements by farmers to comply with the requirements

An interesting concern expressed by the focus group was the lack of technical advice or even its availability, compounded by the fact that the group felt that the Forestry Services Division officials were often incompetent in dealing with their

problems. This led to frustration among the farmers and a disconnection between the officials and the community.

Other common trends in this matrix show that the community expects more support from the government with financial incentives to start and maintain the project and with written, legally binding guarantees and transparency between the FS and the farmers.

In all, five more problems were identified in this community, compared to the Oda-Kotomso community, where only six problems were on their list of grievances.

The answers to the expected CDM benefits are represented in Table 6. The table shows an overwhelming response for the category of ‘more money’ (49.5%) and a ‘better climate’ (34.9%). The other categories were negligible, hardly adding up to 2% each, with the exception of ‘improving soil conditions’ that contributed 4.6%. When asked about the challenges of CDM the farmers expressed that they were worried about the ‘carbon money not coming as proposed’ (33%) and another 22.9% was unsure about ‘what they would receive may be lower than the harvested trees’ that they otherwise would have been compensated for. No carbon projects in Ghana have delivered any revenue as off yet, so it is hard to anticipate how much money the farmers will derive from the project. Another 11% of the respondents were concerned about illegal felling or theft of the planted trees. This last proportion surprised me, because I expected that more farmers would have been worried about theft and illegal logging considering that this area is notorious as a centre for illegal logging. Another surprise was that 17.4% saw no challenges at all.

6.7.4 Villagers’ expectations regarding their role in decision-making

When community respondents were asked about their expectations for the CDM project, they were generally positive about the expected outcome (see Appendix 3). They were looking forward to employment opportunities and the consequent reduction in poverty that they would provide. They also anticipated regaining natural forest and forest resources and supplementing their income by planting the trees. CDM projects produce the added benefit of strengthening capacity building for forest fringe communities. The focus group acknowledged the potential of the CDM project to assist poverty reduction in Ghana, and provide the long-term benefit to farmers with the added bonus of restoring their forest resources.

After conducting the focus group discussion, I observed that there was a feeling of uncertainty among the community members about their degree of participation in the project. They wanted to take a more active role, not only in the implementation segment of the project, but also during the decision making process. FORIG researcher Dr. Blay, who also has been conducting research in Koradaso, reported active community building sessions through various workshops, in which the local community was invited to discuss their roles, enabling the forest fringe community to collaborate in, for instance, creating new plantations of highly valued indigenous species (ITTO/FORIG Community

Collaborative Restoration Project, 2010). Similar workshop sessions informing the community about CDM could take away those uncertainties.

6.8 Summary

Despite the many challenges that the Koradaso community is facing, the conditions seem to be ideal to get the CDM project started. One focus of the CDM is afforestation and reforestation and since it is a degraded forest reserve, there is an obvious need and value for replanting trees. By being on a reserve, farmers do not have to forfeit their land for the project. Land ownership/tenure issues are often one of the biggest stumbling blocks for successful implementation of CDM projects. In this case land issues are of minimal importance and there is ample opportunity for successful reforestation projects. It would lead one to believe that due to all these factors, the Koradaso as well as other communities within the Pamu Berekum forest reserve have only to gain by taking part in the project. However, such projects will only succeed if there is clarity and transparency about mutual obligations, income prospects and benefit sharing procedures. Adequate measures should also be taken to prevent bushfire and illegal felling. At the same time efforts need to be made to include farmer's participation in decision-making and evaluation processes.

CHAPTER SEVEN

Summary, conclusions and recommendations

This final chapter summarizes the findings of the previous chapters, provides answers to the research questions and links the results to the theoretical framework outlined in Chapter 2. Additionally, I give some suggestions for future research and formulate recommendations for policy and future implementation of CDM projects.

7.1 Research findings per research question

In this section, I will address the results of the study per research question.

7.1.1 What are the governance arrangements in place in both study areas?

Oda-Kotoamso is part of an off-reserve and on-farming tree planting project (the Oda-Kotoamso Community Agroforestry Project, OCAP) in collaboration with the Samartex timber company, which provides capital, tree seedlings, capacity building and market access in cooperation with the German Development Agencies (DED) who, in turn, provide additional capital and know-how. In contrast with the project Koradaso, OCAP has been in operation for more than fifteen years and is well established in the area. OCAP provides capacity building in support of policies for ecologically sound and economically viable farming practices and promotes sustainable tree resource management with a strong interest in NTFPs. OCAP attempts to confront governance problems by allowing active participation of community members in the decision-making process, by having a unique profit sharing and land-ownership agreement between chiefs, elders and village people. This leads to the strengthening of community acceptance of institutions. The OCAP project has worked in close collaboration with the traditional landowners to find agreement on individual land/tree ownership rights. At first glance, the OCAP seems to be a natural transition into the CDM A/R project, which would provide further income enhancement to the stakeholders involved.

The more recent Koradaso forest reserve restoration project is a collaborative arrangement between the Government of Ghana through the Forestry Commission (Forest Services Division), the International Tropical Timber Organization (ITTO) and the Forestry Research Institute of Ghana (FORIG) and is located within the severely degraded Pamu-Berekum forest reserve. The land was leased from the FC in a semi-deciduous forest zone. The main objective of the project is to gain carbon credits, contribute to sustainable forest management and restore biodiversity of the forest reserve.

On a national scale, CDM in Ghana is represented by the CDM secretariat, as a part of the Ministry of Environment Science and Technology (MEST) that coordinates all CDM activities in the country. The secretariat is made up of inter-sectorial representatives including the forestry commission, Environmental Protection agency (EPA), Energy commission, Food and Agriculture Organization (FOA) and the Ministry

of Finance and Economic Planning (MOFEP)²⁶. CDM arrangements are similar to the arrangements that are in place for the Modified Tangya System (MTS) under Act 617. (See section 4.3). These initiatives and arrangements were created to increase community benefits from reforestation schemes (see Chapter 5 and 6), but the implementation needs to be improved. On the whole, based on the information that I derived from my key informant interviews, there appears to be adequate government arrangements toward policies for plantation establishments, but until the issue of tenure is solved, no CDM progress can be made (Opuni-Frimpong, interview).

7.1.2 What are community members' (participants and non-participants) perceptions regarding the actual and future livelihood benefits of the project and their participation in decision making?

When discussing future livelihood benefits of the project and participants' input in the decision-making process, the answers and inferences taken from the questionnaire and focus group discussions are surprisingly similar between the two communities. Community members like to be more involved, but lack of technical knowledge and education often hinders the participation process. Their perceptions vary. Some have a positive outlook regarding the projects, with a better future in sight for their children and additional income coming in from the 'tangible' trees while others are somewhat skeptical about when and where the money will come from and when and how it will be distributed. The farmers would like to see more involvement, preferably with every step of the project, as well as to have some form of tangible contract or agreement about mutual obligations and benefit sharing that would be legally binding. They also expressed other concerns, such as delays in payment of carbon money and they question whether there is any guarantee that there is a future in the carbon market at all. Waiting for the trees to mature can take up to 15-30 years, depending on the tree variety. Much can happen in the intervening years with the ever-existing threat of bushfire, disease and illegal logging. The questions surrounding financing seedling supply (see Table 5.6) have had the positive effect of generating discussions and start-up projects around seedling supply. The perceived fear for the farmers is the time and money spent on controlling and monitoring the trees without any prior knowledge of how much they will be compensated in the future. Not only do they question the vagaries of the payment scheme, but they question the actual loss on what they could have derived from continued subsistence farming and alternative agroforestry.

The farmers strongly support a more equitable sharing arrangement, where they will be protected from losing their share of the proceeds from trees, by providing a national legal forest framework. This is similar to the proposals of Blay *et al.* (2006) or, taking it a step further as Darko Obiri (interview) commented, benefit sharing arrangements need to be formalized or nationalized.

²⁶ <http://www.mest.gov.gh/newsite/index.php?id=40>

7.1.3 What adaptations in governance arrangements are needed to align local governance arrangements with the requirements of the CDM project?

An important adaptation for a successful CDM A/R program in Ghana would be for the government to legislate a national process for approving CDM A/R projects (Haites & Yamin, 2000). The Ghanaian government has to establish a clear and concise ownership structure and, more importantly, a profit-sharing structure in the tree itself and a percentual distribution in the carbon sequestration payments. Serious policy interventions are necessary to improve government arrangements and enhance livelihood benefits. Unless there are changes to the tenure system, the likelihood of a CDM A/R project being accepted by the CDM Executive Board (EB) remains questionable. The acceptance by the EB lacks transparency and the current Ghanaian land/tree tenure policies have too many obstacles that impede successful implementation of CDM A/R projects, such as the pilot projects in Oda-Kotoamso and Koradaso. If the Ghanaian government commits to a full endorsement of the program with a review of land and tree tenure, it must also be ready to structure a democratic decentralization of benefits and co-management arrangements. If decentralized governance mechanisms, backed by credible local institutions, are in place with stakeholder participation, the local community will be more motivated to monitor chainsaw logging, bushfire occurrences and disease and encroachment by outsiders (Boyd, 2007). The above suggestions may seem a little too much and too soon for the Ghanaian government, if it weren't for the successful implementation of tree-planting efforts under MTS.

With these adaptations, the following challenges must be met. First of all, decisions about tenure reform in relation to carbon rights will have to be addressed and changes to legislation are likely to be required to operationalize carbon rights. Second, the use of law enforcement in order to control chainsaw logging must be seriously enforced under already existing laws to conserve the timber stock. Third, special attention is needed in the area of fire management. Support projects with local communities need to be established in order to find ways to improve fire control and address the causes of fire in agricultural areas, both anthropogenic and natural, as was noted in the Ghana REDD Readiness Preparation Proposal (R-PP 2010).

Furthermore, tree ownership arrangements under the CDM must be clearly defined, in order for communities to benefit adequately from carbon benefits. Additional benefits from the CDM can be observed in the enhancement of communities' commitment to their forests, which will ultimately result in improved management and protection of forest resources (against encroachment) at the community level (Darko-Obiri).

7.2 Discussion: comparison between the two villages

When comparing the projects in the two villages of Oda-Kotoamso and Koradaso, one can conclude that there are many similar challenges and concerns. From the community level questionnaire, in both studies it can be concluded that the most pressing issues concerning the CDM project are that carbon money may be elusive and it may take

a long time before reaping any real benefits (see Appendix 4). The number one concern for the Koradaso project was the threat of bushfires. Wildfire occurrence is not uncommon in Ghana, but the region of Koradaso has seen an unprecedented intensity of fires. The nutrient-deficient soil, supporting only scrubby bush growth and combustible grasses, enlarges the risk of new, intense wildfires even more (Blay, 2010).

In both communities, agriculture is the main form of current land use, with crops such as plantain, cassava, cocoyam and yam. The main tree crop that is cultivated is cocoa. Livelihoods are also supported by intensive NTFP collection. These products can be used as medicinal plants, or food in the form of wild fruits and bush meat (Blay, 2010).

Some successes are already visible in the forest afforestation project. There is more land available for the communities, in order to meet the increase in demand for land, which translates into increased food production and consequently improved livelihoods although this could only be temporarily until canopy closure in 2-3 years.

Local actors anticipate improvement of their own - and their children's - living standards through benefit sharing, once the trees have matured (or when the first payments for carbon credit are received). They also anticipate an improvement in the degraded forest area by reducing the pressure on the remaining forest with new afforestation projects. The timber plantations will not see any profit for about fifteen years so, in the meantime, they have to intercrop food and cash crops between the trees to provide income. The farmers can only do this for two to three years (maybe a longer time in off-reserve areas) until the canopy casts shade over the crop growing area. Therefore, alternative sources of income must be established, by encouraging agroforestry systems of which vegetables, black pepper and NTFPs are also a part. Alternative income-generating activities such as beekeeping, snail rearing, fish farming and tree nurseries are also required in order to bring in much needed income.

Positive developments can be observed in the Koradaso project. Here, the increased availability of forest reserve land for farming (as farmers are allowed to plant food crops between the planted trees during the early years of plantation development, where they were not allowed to grow food crops before) translates into increased food production for the communities seeking land and consequently leads to livelihood improvement.

Early reports from OCAP also show positive results. The agroforestry project has achieved considerable success since it started: 1,044 farmers are practicing agroforestry and the project has created employment for about 150 youth, including women working on non-timber forest products (NTFPs). Since this project is already well established and the rural population is sensitized about the new developments, it would provide an ideal opportunity to implement the CDM project. This OCAP pilot project is also instrumental in getting other communities involved in restoring degraded landscapes in their areas. They can develop similar projects, with the ultimate goal of mitigating poverty and restoring large hectares of land. Moreover, these projects demonstrate that these

plantations can restore forest cover and create new sources of timber trees with the help of local involvement and participation.

7.3 Theoretical reflection

It is evident from the theoretical chapter that the number one governance concern in CDM projects is secure land tenure rights. As was summarized in Chapter two in addition to secure land tenure, several conditions need to be in place in order to start the process of poverty alleviation: income perspectives and proper benefit-sharing arrangements in place, good governance, reflected in transparency, accountability and participation of the stakeholders involved, technological capacity.

Without a clear legal understanding of tree ownership and an acceptable division of the subsequent profits, the CDM cannot function within its mandate, let alone satisfy financial requirements in an open market system. In effect, there will have to be strong community support and leadership to package the various farmers plots into a big enough landmasses capable of sustaining a CDM A/R project, where the betterment of the community will overtake the want of the individual, by delivering improved livelihood for each farmer. If in fact the community benefit can be accepted, it will allow for the proper addressing of supporting institutions, mainly fire patrol, forest policing and conflict management, with community backed policies relevant to their immediate needs and concerns at their local level. Ownership is not only a right of possession. It is more of a feeling that you have a part and are in control of the asset. According to the concerns of the focus groups and the positions of the literature reviewed in my theoretical chapter, the Ghanaian government must address a decentralization of institutional authority in forest management in order to create a collaborative effort between the state and local community (Smith & Scherr, 2003).

The CDM can have a positive impact on the livelihoods of forest communities by providing an opportunity to combat forest degradation while, at the same time, dealing with the possibility of poverty alleviation in rural areas that do not have possibilities for alternative sources of income. Whether or not the initial reports on the attractive option of improving livelihoods can be verified, one must first deal with the numerous obstacles that are related to governance arrangements, with insecure land and tree tenure as one of the main problems. Access to and tenure of land is complicated and ambiguous in Ghana and planting trees does not automatically give rights to the ownership of trees, because tree ownership is vested in the state. However, with a policy reform in 2002, provisions were made to grant ownership rights to individuals who plant timber trees on farmlands in off-reserve areas, which was an exception to usual practices in Ghana (Insaadoo *et al.*, 2011). With more farmers benefitting from revisions to the Timber Resource Management (Amendment), it is not as great of an adjustment for the inclusion of CDM A/R tree tenure policies in government legislation.

7.4 Suggestions for further research

Further research needs to be conducted in order to see how the A/R projects will develop in the future and to what degree the local community has benefitted from the reforestation projects. It would be interesting to do another PROFOR tool exercise in two or three years when the canopies have closed and farmers can no longer grow food crops between the trees, to see whether or not people's lives have really improved. By that time, it would also be interesting to assess whether or not pressure on the natural forest will have been reduced by then.

7.5 Recommendations for policy and practice

CDM A/R projects can be an additional source of future income for rural communities, if there is an equitable distribution of benefits of carbon proceeds and if, at the same time, it will promote tree planting in genuine multipurpose agroforestry systems. The latter means that these initiatives should not only focus on timber tree planting but also on integrating fruit trees, non-timber forest products, and other components that are capable of generating cash and non-cash income in the time lapse between canopy closure (when food crops can no longer be grown between the trees) and the generation of carbon and/or timber benefits. Successful implementation of the CDM project will also require a real commitment from all stakeholders with clear and transparent legally binding agreements regarding obligations and benefit sharing. These obligations include support in the form of technical advice and extension services on the part of the Forestry Commission, and the obligation to plant and maintain trees on the part of the farmers. Although the CDM has the potential to create new opportunities for marginalized farmers, it may also bring additional risks, such as inability to access land and unrecognized customary and ancestral rights. Peoples' vulnerabilities might even be exacerbated by the lack of clear land tenure and policy frameworks. Only with effective law enforcement and fully recognized rights and safeguards for forest-dependent communities can CDM deliver potential benefits for all stakeholders.

7.6 Perspectives for the future

Ideally, the way forward to a healthy environment would be to develop more afforestation and reforestation projects in Africa where there is a high degree of "biophysical and spatial potential for carbon sequestration" (Unruh, 2008: 700). These projects would enhance carbon sequestration and livelihood opportunities for the rural populations, provided that proper governance arrangements are put in place. The biggest hindrance, however, is the issue of land tenure. According to Unruh "no clear way ahead exists, despite the well-intentioned recommendations in the afforestation and reforestation carbon sequestration literature for the development and implementation of Western notions of property rights, along with improved governance, local participation and sustainable development" (*Ibid*). Unruh warns against too much optimism in realizing the carbon sequestration via A/R projects, because decades in development effort and billions of dollars in foreign assistance have not changed the rules with regard

to tenure in Africa. Unruh finds it unrealistic that improved governance structures will bring about the necessary changes for successful A/R projects.

My point of view is less pessimistic; any A/R project can initiate changes with the tree planting efforts and can have positive effects on the environment and on the local community. While not all community members may be familiar with the inner workings of the carbon market, they are anxious to participate, if compensated fairly. I recognized a strong willingness by the villagers I met with in Ghana to initiate changes to their tree planting efforts and an awareness of the resulting positive effects to both the environment as well as their standard of living. CDM projects will be successful only when they are designed to meet the immediate financial needs of those participating, as well as provide for long-term improvements to the livelihoods of a growing rural population. CDM projects, which can function within existing tenure arrangements, may be difficult to achieve, but I believe that every effort should be made to go forward in Ghana with carbon sequestration projects, to the benefit of both the people of Ghana and the environment in the rest of the world. The world is realizing that doing nothing is not an option.

A further consideration is the success of the carbon market. The question is to what extent would fluctuations in carbon prices affect the success of the CDM projects? Not much has been written regarding the possible collapse of the carbon market and when carbon prices will fall below their anticipated value. Unfortunately, the most pressing problem for the CDM A/R is not the credibility of the program itself, but the global acceptance and implementation of the Kyoto Protocol and the deterioration of the carbon market. From a peak of over US\$ 40 a ton five years ago, the carbon market has fallen to just over US\$ 12 (prediction December 2012), a fifty four percent decline²⁷. The European Union has been putting forth a valiant effort to support the carbon initiative, but has been met with strong opposition from the United States of America. The erosion of the carbon market is far beyond the scope of this thesis, but it is vital to the prospects of the CDM structure for it to be acknowledged. I am of the viewpoint that the CDM/CER concept is essentially a good starting point in the development of carbon credit allowance schemes and my hope is that the CDM will be worked out internationally, before it is allowed to fail.

²⁷ URL: <http://www.pointcarbon.com/news/1.1726180>.

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APPENDICES

Appendix 1: List of interview questions

Interview questions

Greetings, I am a MSc Student at the University of Amsterdam conducting research for my thesis on the effect that the CDM project has on the governance and livelihoods of the villages of Ghana's HFZ.

Thank you for your time in agreeing to meet with me to answer my questions.

My particular research question is: What are actors' perceptions regarding the feasibility and potential benefits of a CDM scheme in the Oda-Kotoamso and Pamu Berekum area and how can governance arrangements be improved to enhance livelihood benefits from such schemes?

KEY INFORMANTS IN ACCRA

General policy framework and governance arrangements

1. Could you please explain what is the general policy framework of CDM projects in Ghana?
2. How do CDM projects relate to REDD+ policies?
3. Which communities are eligible for CDM projects and how is the procedure to get involved? (who applies, who decides?)
4. Which organizations are involved to get a CDM project off the ground?
5. What is the specific role of your organization?
6. What kind of CDM projects are currently being implemented in Ghana?
7. Is any data available on number of projects and communities involved?

Awareness at community level

8. How is the issue of deforestation perceived amongst the rural inhabitants of Ghana?
9. What is the level of awareness at the community level of the CDM and REDD+ schemes?
10. Who is responsible for communicating the information and creating awareness about CDM and REDD+ schemes towards the village level?

Information about the CDM projects in the Oda-Kotomso community

11. Are you familiar with the CDM projects in the Oda-Kotomso community?

If yes... In your opinion how successful has the CDM been there so far?

If no... are you familiar at all with CDM projects in Ghana? Can you elaborate on that?

12. What is your opinion of the governance arrangements currently in place? Do they perform well? (Explain answer)

13. What role do villagers play in the decision-making processes regarding the CDM project?

14. What is your opinion about villagers' role in the project? (explain answer)

15. Do you see any impact of the CDM project on local governance arrangements, e.g. with regard to chief authority to increased influence of villagers on natural resource management?

16. Do you think changes are needed as regards the institutional arrangements in place?

17. Do you see the CDM project as a reliable and feasible project to generate income for the communities?

18. Since the introduction of CDM projects have you been able to notice any changes in the standard of living of the villagers?

19. What do you see as the main threat to the CDM being successful in the communities?

20. What advantages or benefits does Ghana as a whole gain from the CDM?

Follow-up to the CDM

21. With the Kyoto Protocol coming to an end next year how well do you think does REDD+ fill in the gaps of the CDM? How?

22. Can you foresee more opportunities for CDM projects in Ghana?

23. What is your view on carbon trading in general and the opportunities it offers both for communities and for Ghana as a whole?

Appendix 2: Key informant questionnaire



Greetings, I am a MSc Student at the University of Amsterdam conducting research as part of a joint program with Tropenbos International Ghana, and the Forestry Research Institute of Ghana (FORIG). The information collected will be used in my thesis on the Clean Development Mechanism scheme in two communities of Ghana's HFZ. (Oda-Kotoamso and Pamu Berekum). Your participation in this study would be greatly appreciated.

Name: _____

Organization: _____

Position: _____

1. What is your opinion of the governance arrangements currently in place for successful implementation of A/R CDM in Ghana?

2. What adaptations in governance arrangements are needed to align local governance arrangements with the requirements of the A/R CDM project?

3. Do you see any impact of the A/R CDM project on local governance arrangements? Will it have any impact on the values the communities place on conservation of forest resources?
E.g. community helping to stop illegal logging.

4. What is your opinion about villagers' role in the A/R CDM project?

5. Do you see the A/R CDM project as a reliable and feasible project to generate future income for the communities?




6. What do you see as the main threat to the A/R CDM being successful in the communities?

7. What advantages or benefits does Ghana as a whole gain from participation A/R CDM?

Appendix 3: Community level questionnaire (Used in both Oda-Kotoamso and Koradaso)

Questionnaire

Comparing actors' perceptions of the feasibility and potential benefits of the CDM scheme

					
Interview #		Interviewer:		Location:	
Name:					
<p>Greetings, I am a MSc Student at the University of Amsterdam conducting research as part of a joint program with Tropenbos International Ghana, and the Forestry Research Institute of Ghana (FORIG). The information collected through the questionnaire below will be used in my thesis on the Clean Development Mechanism scheme in two communities of Ghana's HFZ. Your participation in this study would be greatly appreciated.</p> <p>Please feel free to ask questions if there is anything that you do not understand.</p>					
A. Socio-economic characteristics of respondents					
Code	Please tick the respondent's status	Participant of the tree planting scheme		Non-Participant of the tree planting scheme	
Sex	Q1. Sex	1. Male		2. Female	
Age	Q2. Age				
Marital status	Q3. Marital Status	1. Single	2. Married	3. Divorced	4. Widowed
		5. Separated			
Household size	Q4. Household size (specify)				
Number of children	Q5. Number of children (specify)				
Level of education	Q6. Level of education	1. Informal education		2. No education	
		3. Formal education:			
		a. Primary	b. JHS /Middle	c. SHS/ (O/A level)	d. Tertiary
Origin	Q7. Origin	1. Native		2. Migrant	
If migrant	Q8. If migrant				
	a. Home town				
	b. District				

	c. Region					
	d. Number of years lived in current village					
<i>Occupation</i>	Q9. Main occupation (that provides lion's share to cash and non-cash income)	a. Food/cash crop farming	b. Petty-trading	c. Formal employment		
		d. Other (specify)				
<i>Alternative income</i>	Q10. What other sources of income do you have?	a. Livestock rearing	b. Charcoal production	c. Remittances	d. Other (specify)	
B. Dependency on forest resources						
<i>Forest reliance</i>	Q11. Do you or any household member rely on a forest resource as a supplementary source of income?			a. Yes	b. No	
<i>Forest resources</i>	Q12. If yes, what forest resources do you/your household rely on?	a. Timber		b. NTFPs (specify)		
<i>Resource location</i>	Q13. Where are these forest resources located?	a. Forest reserve	b. Farmlands	c. Fallow lands	d. Other (specify)	
<i>Difficulty in accessing resources</i>	Q14. Do you find it difficult to access forest resources?				a. Yes	b. No
<i>Reason for access difficulty</i>	Q15. If yes, reason for access difficulty	a. Difficulty in accessing permit	c. Need to travel far	d. Other (specify)		
<i>Easy access of resources</i>	Q16. If no, what makes access easy?					

<i>Suggestions for easy access of resources</i>	Q17. Do you have any suggestion to help get access to forest resources easily?					
<i>Deforestation affect on livelihood</i>	Q18. How has deforestation affected your livelihood? (Explain)					
C. Timber tree planting on farmlands/fallow land (OCAP or other)						
<i>Trees planted</i>	Q19. Have you planted trees on farmlands/ fallow lands?	a. Yes			b. No	
<i>Reasons for planting</i>	Q20. If yes, reason for planting tree (explain) (<i>if no</i> → Q23)					
<i>Size of tree farm/ No. of trees</i>	Q21. If yes, what is the size of the tree farm/ number of trees you have you planted?					
<i>Method of planting</i>	Q22. If yes, did you plant individually or in a group?					
	a. Individually		b. In a group (specify)		c. Both	
<i>Reason for not planting trees</i>	Q23. If no, reason for not planting tree (<i>explain challenges faced with tree planting</i>)					
<i>Institutional support</i>	Q24. Which institution/organization supported you in tree planting?					
	a. Samartex (OCAP)	b. FSD	c. FORIG	d. Self-initiation	e. NGO (specify)	f. Other (Specify)
<i>Confirmation of institutional support</i>	Q25. Has the institution supported you/your group with incentives to assist the tree planting?			a. Yes		b. No
<i>Institution incentives</i>	Q26. If yes, what incentives? (More answers possible)					
	a. Tree seedlings		b. Planting tools (specify)		c. Wellingtons boots	
	d. Other (specify)					

<i>Institutional arrangement</i>	Q27. What arrangement do you have with the institution that supported you with tree planting? (Please indicate the name of the institution).		a. Have the first right to buy the tree	b. Will provide technical advice with/without cost	
			c. No arrangement	d. Other (specify)	
<i>Land ownership</i>	Q28. Does the land where you plant trees belong to you?				
	a. Yes, I am a land owner	b. No, I am a tenant		c. Other arrangement (specify)	
<i>Land ownership arrangements</i>	Q29. If tenant what benefit sharing arrangement do you have with your landowner?				
	a. 67% farmer 33% landowner	b. 60% farmer 40% landowner		c. No arrangement	
	d. Other (specify)				
<i>Plantation age</i>	Q30. How old is your tree plantation? (specify)				
<i>Farmer training</i>	Q31. What training have you/your group received in tree planting? (>1 answer possible)	a. Nursery management techniques	b. Plantation management techniques e.g. thinning	c. Group dynamics	d. Other (specify)
<i>Duration of tree planting project</i>	Q32. How long has the tree planting project been introduced to you?	a. One year	b. More than a year	c. Less than a year	d. Not introduced yet
<i>Planting program impact</i>	Q33. What has been the impact since the planting scheme has been introduced?	a. Positive (reason)		b. Negative (reason)	c. No impact yet
<i>Perceived tree planting benefits</i>	Q34. What benefits do you hope to get from tree planting?				
	a. Generate income while maintaining my trees for a longer period				

(Personal)	b. Shade to sustain crop production					
	c. Other (specify)					
Perceived tree planting benefits (Community)	Q35. What benefits do you expect the community will get from participating in tree planting?					
	a. Access to social amenities					
	b. Reforest degraded area					
	c. Other (specify)					
D. Awareness of climate change and preparedness towards CDM²⁸ project						
Climate change awareness	Q36. Are you aware of climate change?	a. Yes	b. No			
Climate change explanation	Q37. If yes, can you explain in your own words what it is?					
Weather related changes	Q38. What changes in the weather have you noticed that affect your farming /tree planting activities?					
	a. Rainy Season	1. Longer	2. Shorter	3. No change		
	b. Temperatures	1. Higher	2. Lower	3. No change		
	c. Other (specify)					
Trees ability to prevent climate change	Q39. Do you think trees can help prevent or stop these changes?					
	a. Yes (specify reason)		b. No (specify reason)			
CDM awareness	Q40. Are you aware of the CDM project?					
	a. Yes, I already knew	b. I just heard of it for the first time	c. No * For response of 'no' please explain CDM			
Source of information about CDM	Q41. If yes, where did you hear about CDM? Can you explain in your own words what CDM is?					

²⁸ CDM is an agreement between countries to combat climate change. Under this agreement countries are willing to pay for planting and not harvesting trees. They call that carbon money. That is what the CDM project is about: to pay people for leaving the trees on the land.

<i>Willingness to participate</i>	Q42. If you would receive money for leaving your trees on the land, would you abstain from harvesting the trees?	
	a. Yes	
	b. No, I prefer to harvest my trees (<i>Specify reason</i>)	
	c. Depends on the price that they are going to pay for not harvesting.	
	d. I have not decided yet	
<i>Expected CDM project benefit</i>	Q43. What benefits do you expect from the CDM project? (<i>> 1 answer possible</i>)	
	a. More income	b. Better climate
	c. Other (specify)	
<i>Expected CDM project challenges</i>	Q44. What challenges can you envisage for the CDM project?	
	a. Carbon money may not be coming as proposed	
	b. What I may receive may be lower than if the trees are harvested	
	c. Illegal felling or theft of the trees	
	d. Other (specify)	
<i>Suggestions for CDM feasibility</i>	Q45. Please recommend 1 or 2 suggestions to enable to CDM to become feasible in your community.	

Thank you for your participation!

Appendix 4: Results from Community level questionnaire question 44,45 (Oda-Kotoamso & Koradaso)

Question 44: What challenges can you envisage for the CDM project?

Oda-Kotoamso		Responses		Percent of Cases
		N	Percent	
Expected CDM challenges	Carbon money may not be coming as proposed	35	47.9%	66.0%
	What I may receive may be lower than if the trees are harvested	17	23.3%	32.1%
	Illegal felling or theft of the trees	6	8.2%	11.3%
	Future use	4	5.5%	7.5%
	No challenges	3	4.1%	5.7%
	Not interested	2	2.7%	3.8%
	It will result in hardships	1	1.4%	1.9%
	Reduced farmlands	1	1.4%	1.9%
	Natural disaster	1	1.4%	1.9%
	availability of land to sustain expansion	2	2.7%	3.8%
	Bureaucracy in obtaining carbon money	1	1.4%	1.9%
	Total	73	100.0%	137.7%

Question 45: Please recommend 1 or 2 suggestions to enable the CDM to become feasible in your community

Oda-Kotoamso		Responses		Percent of Cases
		N	Percent	
Suggestion for CDM feasibility ^a	More education	26	31.0%	50.0%
	Provision of cash and no cash incentives	18	21.4%	34.6%
	Provision of social amenities	8	9.5%	15.4%
	Regular interactions with farmers	4	4.8%	7.7%
	Local institutions to implement CDM	4	4.8%	7.7%
	Comply with written agreements	9	10.7%	17.3%
	Annual increment of carbon credits	2	2.4%	3.8%
	Protection against illegal logging	3	3.6%	5.8%
	Not interested in CDM	1	1.2%	1.9%
	Pay tree owners annually	2	2.4%	3.8%
	No suggestion	2	2.4%	3.8%
	Formal documentation	3	3.6%	5.8%
	Technical training on tree planting	1	1.2%	1.9%
	Monthly payment for carbon credits	1	1.2%	1.9%
Total		84	100.0%	161.5%

Question 44: What challenges can you envisage for the CDM project?

Koradaso		Responses		Percent of Cases
		N	Percent	
Expected CDM project challenges	Carbon money may not be coming as proposed	36	33.0%	58.1%
	What I may receive may be lower than if the trees are harvested	25	22.9%	40.3%
	Illegal felling or theft of the trees	12	11.0%	19.4%
	Not following agreement	9	8.3%	14.5%
	Death of the trees/Pest outbreak	1	.9%	1.6%
	Bush fire	3	2.8%	4.8%
	No challenges	19	17.4%	30.6%
	Wanting to use the trees earlier	2	1.8%	3.2%
	Leads to land scarcity	2	1.8%	3.2%
Total		109	100.0%	175.8%

Question 45: Please recommend 1 or 2 suggestions to enable the CDM to become feasible in your community

Koradaso		Responses		Percent of Cases
		N	Percent	
Suggestion for CDM feasibility	There should be registration/clear formal agreements	7	6.8%	11.3%
	More education/technical knowledge	22	21.4%	35.5%
	Monthly salary/income/incentives	38	36.9%	61.3%
	Comply with agreement	11	10.7%	17.7%
	Local representatives	6	5.8%	9.7%
	Fire volunteer groups	2	1.9%	3.2%
	Increased participation/more lands	5	4.9%	8.1%
	No suggestion	3	2.9%	4.8%
	Provision of alternative source of livelihood	3	2.9%	4.8%
	CDM focus group formation	1	1.0%	1.6%
	Regular visits to farmers by FSD or forest experts	4	3.9%	6.5%
	Provide social amenities	1	1.0%	1.6%
Total		103	100.0%	166.1%

Appendix 5: Example of raw data results from PROFOR tool 4

TOOL 4: LIVELIHOOD ANALYSIS												
STEP 1: CASH INCOME FOR FEMALE GROUP												
Location: Koradaso												
Livelihood Sources	Group Participants										Totals	%
	1	2	3	4	5	6	7	8	9	10		
Natural Forest (Reserve)											47	23.5
Snails												
Bushmeat												
Mushroom												
Fire wood												
Cassava	1	1									2	
Yam												
Maize	1		4	7	5						17	
Plantain	3	6	5		2		5				21	
Vegetable	1										1	
Cocoyam	1				1		4				6	
Fallow Land area (off-reserve)											4	2
Wild yam	1										1	
Bushmeat												
Fire wood												
Timber												
Mushroom												
Pestles												
Fruits												
Oil palm	1	2									3	
Agroforestry farm area											107	53.5
Cassava			2								2	
Plantain	2			3	2	5			2	5	19	
Cocoyam	1			3	2	6		7	1	2	22	
Vegetable	1		2		3		4		3	1	14	
Fruits												
Oil palm												

Cocoa												
Maize	2			5	5	9	7	13	3	6	50	
SOLE AGRIC											37	18.5
Animals			3	2					4		9	
Cocoa									6		6	
Plantain	3		3								6	
Maize										3	3	
Cocoyam	1									3	4	
Cashew												
Vegetables	1										1	
Cassava		4	1								5	
Fruits		2									2	
Oil Palm									1		1	
Petty Trading											5	2.5
Food vendor/ Drinking bar		5									5	
Wage Employment												
Remittances												
TOTALS	20	20	20	20	20	20	20	20	20	20	200	