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REDD+ IN KOLO HILLS, TANZANIA

IMPACTS ON FOREST GOVERNANCE AND LIVELIHOODS

Irina Pleva
International Environment and Development Studies

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By

Irina Pleva

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irina.pleva@gmail.com

Noragric Department of International Environment and Development Studies
P.O. Box 5003
N-1432 Ås
Norway
Tel.: +47 64 96 52 00
Fax: +47 64 96 52 01
Internet: <http://www.nmbu.no/noragric>

Declaration

I, Irina Pleva, declare that this thesis is a result of my research investigations and findings. Sources of information other than my own have been acknowledged and a reference list has been appended. This work has not been previously submitted to any other university for award of any type of academic degree.

Signature.....

Date.....

To the rural communities in Tanzania who shared with me their stories, struggles and hopes.



The author during the fieldwork in Tanzania, 2015

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Abstract

Reduced Deforestation and Forest Degradation (REDD+) is a resource regime framework developed to enhance global carbon stocks from forests. It is based on the idea to pay national governments and rural communities of the Global South to protect and regenerate their forests for increased storage of carbon. REDD+ represents a global intervention applied as a means to mitigate climate change. In Tanzania, REDD+ has been piloted since 2010. The pilot projects across the country seek to generate experience regarding how to establish REDD+ and learn how to enhance carbon stocks as well as increase biodiversity and improve the livelihoods of forest adjacent communities. Setting up REDD+ at the local level has been a process involving many institutional changes. REDD+ demanded establishing new governance structures – actors and institutions – for managing forest resources and new alternative livelihoods for adapting to change. These changes are expected to benefit communities, protect the forests and climate.

This thesis evaluates impacts from REDD+ on forest governance and livelihoods. I have conducted a case study in Kondoa district, central Tanzania, to document local experiences and assess impacts of REDD+ on people's income and the status of forests. The REDD+ project in Kondoa has been piloted from 2010 to 2014 by the African Wildlife Foundation, covering the area around the government Kolo Hills forest reserves as well as forests on village land. The Kolo Hills is a watershed area to the Tarangire National Park and has been under protection for many years. Some parts of forests are owned by the central government, some by the local government (district), while other parts are owned and managed by the communities. Hence, the project combines emphasis on both JFM and CBFM.

The primary data were collected in November 2015 using key resource person interviews, household questionnaires and focus group discussions in villages surrounding the Kolo Hills. BACI (before-after-control-impact) format is applied to compare pre-project and post-project conditions, and evaluate results against the counterfactual - the control sites which are sites where REDD+ is not introduced. Data for 2010 - pre REDD+ observations - had been collected at the time, and made available for my analysis. Acknowledging potential errors associated with the method, the study therefore investigates if changes are due to REDD+ or other factors.

I develop a conceptual framework for the analysis to explain how change in the governance structures influence environmental and livelihood outcomes. The results have shown that changes in the governance structures have introduced the new type of actors and formed new institutions for managing forest resources. It implied change in property rights, as well as in rules over forest resource use. Despite these changes, I find that REDD+ in Kondoa has had no significant effect on rural livelihoods nor on deforestation. Income goes down quite substantially from 2010 till 2015. This reduction seems, however, mainly explained by a severe drought in 2014. Under various pressures of population growth, land scarcity, droughts and soil erosion, informal institutions for farming and especially livestock grazing in the government Kolo Hills reserves dominate over the introduced institutional changes under REDD+. Communities are highly aware of importance to protect their forests, however, changes in the governance structures has not addressed the core problems communities face. REDD+ institutionally seem to be more prospective under CBFM than embedded with JFM. Nevertheless, what happens when REDD+ meets realities on the ground also depend on the core foundation of a good governance in the villages it is built on.

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Abbreviations and Acronyms

ARKFor	Advancing REDD in the Kolo Hills Forests
AWF	African Wildlife Foundation
BACI	Before – After – Control – Impact
CBFM	Community Based Forest Management
CSO	Civil Society Organization
FPIC	Free Prior and Informed Consent
JFM	Joint Forest Management
JMA	Joint Management Agreement
JUHIBECO	Joint Village Forest Management Committee
LUP	Land Use Plan
NGO	Non-governmental organisation
NTFPs	Non-Timber Forest Products
PFM	Participatory Forest Management
REDD+	Reducing Emissions from Deforestation and Degradation, plus the role of conservation, sustainable forest management and carbon enrichment
SUA	Sokoine University of Agriculture
TANAPA	Tanzania National Parks Authority
TFS	Tanzanian Forest Service
VA	Village Assembly
VC	Village Council
VLFR	Village land forest reserve
VAO	Village Agriculture Officer
VEO	Village Executive Officer
VLUMC	Village Land Use Management Committee
VNRC	Village Natural Resource Committee



A rural household adjacent to the forest (picture from the fieldwork 2015)

1 Introduction

Forests constitute one of our most important global commons. The history of human life is strongly bound with our relationship with forests. It shaped our subsistence and evolution, merging cultural, social and economic progress over centuries. Forests offer a unique set of renewable materials and energy, protect water resources and the soil, serve for recreation, provide habitat for biological diversity and regulate our climate.

The role forests play to regulate climate became especially critical in the present phase of climate change. Forests have a biological ability to absorb and sequester CO₂ during the photosynthesis process (Nellemann 2012; Noble et al. 2000). They absorb billions of tons CO₂ every year, a service estimated by economists to be worth approximately \$43 billion of dollars (Trivedi et al. 2008). Deforestation and degradation of forests, however, reduces this ecosystem service. In response to an international appeal to enhance global carbon stocks, the world was waded with projects to reduce carbon emissions from deforestation and, most importantly, to offset emissions elsewhere. Numerous market-based mechanisms and other institutional arrangements have allowed to trade and offset carbon world-wide, either voluntary or as a means to comply with international climate agreements (Leach & Scoones 2015).

The ‘Reduced Emissions from Deforestation and Forest Degradation’ or REDD developed throughout the several international climate negotiations as an effort to put financial value onto carbon sequestration capacity of forests (Bartholdson et al. 2012). The national economies and local communities of the Global South are expected to benefit. Their large areas of tropical forests represent one of the major carbon sinks on the planet. Yet, in spite the richness with natural resources, they have been stricken by poverty, climate change and intense deforestation. Deforestation in developing countries equals to release of 1.7 billion CO₂ annually, accounting for 20 per cent of global carbon emissions (Murdiyarso & Skutsch 2006). The idea of REDD is to pay forest owners for increased storage of carbon, avoiding deforestation.

The idea had emerged during UNFCCC (United Nations Convention on Climate Change) meeting in Bali 2007, where REDD was put on the climate change agenda as part of the post-Kyoto agreement. It further advanced into what is known today as REDD+ (Bartholdson et al. 2012). REDD+ goes beyond deforestation and forest degradation. Alongside the carbon

benefit, the concept also entails sustainable forest use and biodiversity protection. To secure rural livelihoods of those dependent on forest resources has also been emphasized (ibid.).

Since 2009 REDD+ has been piloted in sixty-four developing countries across the regions of Africa, Asia-Pacific, and Latin America and the Caribbean with a financial support from the western economies. REDD+ depends entirely on voluntary funds from donor countries. The Government of Norway has been the largest contributor since 2008. Other donors include the governments of the European Commission, Denmark, Japan, Luxembourg, Spain and as of 2016 also the government of Switzerland (UN-REDD 2016). More than \$4.5 billion have been invested to fund the initiative (Phelps et al. 2010; UNDP 2016). REDD+ has become the fastest growing intervention implemented throughout the Global South (Benjaminsen 2014).

Initially REDD+ seemed a win-win deal, thought to be a low-cost option to deliver large emission reductions globally, while safeguarding biodiversity and livelihoods of those affected (Angelsen et al. 2012). However, over time REDD+ developed to be more problematic to realize than initially expected; politically, financially and institutionally (Cisneros 2012). Establishing REDD+ is financially more demanding, politically more unclear and institutionally more uncertain. Among several obstacles are corruption, lack of government capacities, tenure conflicts, high opportunity costs and low carbon prices, enforcement failures and even local resistances to REDD+ (Lang 2016). How to govern the forests and address deforestation remains poorly understood. Numerous studies are now exploring local experiences with REDD+ by asking whether paying for carbon makes a difference for rural peoples' wellbeing and forest protection. Or are the opportunity costs of deforestation higher than leaving trees standing? What are the local experiences with REDD+ in Tanzania?

Tanzania is among the African countries with highest rate of deforestation and forest degradation. Country's CO₂ emissions reach up to 126,000.000 tons per year (Zahabu 2008) (see Table 1).

Table 1. Estimated emissions due to deforestation and forest degradation in Tanzania. Data 2008

Annual rate of deforestation (ha/year)	412,000
Annual CO ₂ emission due to deforestation (tons - t)	77,903,442
Net loss of biomass degradation (t)	26,447,996
Annual CO ₂ emission due to degradation (t)	48,492,401
Total annual CO ₂ emission from deforestation and forest degradation (t)	126,395,843

Source: Kweka et al. (2015)

Moreover, climate change has affected almost all Tanzania regions. Frequent droughts and floods commonly result in steady declines of agricultural productivity, water supplies and biodiversity. The outcomes disproportionately affect the poor, highly dependent on agriculture for survival and vulnerable to climatic variability (Kangalawe & Noe 2012). All these factors made Tanzania an attractive country for a national REDD+ programme, alongside a high deforestation rate, well-established systems for community forestry and stable socio-political situation. With support from the Norwegian government, Tanzania embarked on REDD+ in 2009 (Kajembe 2013). A year later the Royal Norwegian Embassy in Dar es Salaam have funded several locally based Civil Society Organizations (CSO)¹ to pilot REDD+ across various regions and ecosystems of Tanzania (Norwegian Embassy 2014).

Selection of pilot areas had been a careful process. It required CSOs to conduct numerous social, environmental and carbon assessments of various sites. Introduction of REDD+ followed after the local communities agreed to participation in accordance with the Free Prior and Informed Consent (FPIC) (NIRAS 2015). Setting up REDD+ in practice demanded to establish new governance structures, including new actors and institutions for managing forest resources. However, understanding what happens when REDD+ meets local realities, remains weak and demands in-depth analysis (Benjaminsen 2014; Mbwambo 2015). This master thesis contributes to this discussion by analyzing an empirical case from Tanzania.

I investigate REDD+ impacts on peoples' livelihoods and forest status in Kondoa district, central Tanzania. The REDD+ pilot in Kondoa had been managed by the African Wildlife Foundation (AWF) from 2010 to 2014. The project area is located around the Kolo Hills forest reserves, involves eighteen forest-adjacent villages and covers around 20,000 hectares of forestland.

1.1 Objective and problem justification

To make REDD+ work requires to change existing governance structures and establish the new ones, enabling to prevent deforestation on the ground. It demands a new set of institutions to

¹ Namely: TFCG (Tanzania Forest Conservation Group), Mpingo Conservation and Development Initiative, The Jane Goodall Institute, CARE International in Tanzania, World Wildlife Fund (WWF), Wildlife Conservation Society (WCST), African Wildlife Foundation (AWF), Tanzania Traditional Energy Development and Environment Organization (TaTEDO)

govern resource use and interaction between the actors. Following these changes, I aim to evaluate the effect of REDD+ on rural people's livelihoods and state of the forest.

Nevertheless, I do not look at REDD+ in isolation from the previous institutions, both formal or informal, that have guided resource use and management of the Kolo Hills forest reserves. Each forest landscape has a particular history, ecology, institutional setting, including property rights, power dynamics, livelihood practices, among many other contextual factors. The importance of these issues may greatly define local experiences with REDD+. Similarly, the level of collaboration between the actors at the initial stage of REDD+ may further define the consequences on people's lives and the environmental landscape. With that outlook, the thesis aims to describe institutional setting, the rural livelihoods condition and state of the forest before and after REDD+. In addition, I look at peoples' adaptation to changes. This way I hope to shade light on emerging conflicts at an individual and collective level due to introduction of REDD+.

1.2 Research questions

Through an illustrative and empirical example of REDD+ in Kondoa district, this master thesis asks the following questions:

RQ1: What changes in governance structures have followed from the introduction of REDD+?

RQ2: How did local people adapt to the changes?

RQ3: What impacts does the change in governance structures and adaptation to it have on people's livelihoods and forest status?

To answer research questions, I follow the output-outcome-impact analytical approach applied for evaluating environmental interventions such as REDD+. The approach, proposed by Underdal (2001) and inspired from Easton (1965) encompasses "three distinctive steps in a causal chain of events, where one serves as a starting point for analysing the subsequent changes" (Underdal 2001:6). The 'output' refers to formation of new governance structures. The 'outcome' is change in human behaviour. The 'impact' describes a long term consequence of behavioural change on the biophysical state of the environment and, hence, as well on people's livelihoods.

1.3 Research Scope and Limitations

The study examines experiences of three REDD+ villages in the pilot area of Kondoa district, visited during the fieldwork in November 2015. Baseline data collected in 2010 from the same villages are also used for this study.

I evaluate REDD+ impact on livelihoods describing households' total income and forest income before and after the introduction of REDD+. I will then evaluate if REDD+ has had any effect on the changes observed.

Impact on forest status is based on a comparison of deforestation drivers and their level of importance between 2010 and 2015. I then try to establish the knowledge if REDD+ may have reduced deforestation and forest degradation. The evaluation is based on perceptions and knowledge of the key resource persons and the community members involved in forest management. Hence, the data on forest status contain uncertainty.

1.4 Structure of the study

The study consists of eight main chapters beyond the *Introduction*. Chapter 2 *Forests for livelihoods* establishes a foundation for the study. I explain why and how rural people use forests, and what causes deforestation and forest degradation in rural locations. Chapter 3 *Tanzania and its forests: background and overview* subsequently provides a background information on Tanzania forests and their formal management from historical perspective to a current date and REDD+ development. Chapter 4 *Conceptual framework for analysis* presents a conceptual framework applied to analyse REDD+ impacts. Chapter 5 *Methods* defines methodological approach and the methods applied in study design, data collection and analysis. Chapter 6 *A case study in Tanzania* describes the study area and study villages. Chapter 7 *Results* highlights the output, outcome, impact of the REDD+ project. It involved six parts. The first two describe implementation of REDD+ and pre-REDD+ conditions regarding forest management. The next three parts present the results, following research questions. Chapter 8 *Discussion* gives an overview whether REDD+ institutionally has been successful, and what are the constraints to REDD+ development. Chapter 9 *Conclusion* outlines some key results, lessons learned and recommendations for the future.



A young woman carrying a firewood bundle (picture from the fieldwork 2015)

2 Forests for livelihoods

In the Global South, where poverty is still widespread, forests are critical for livelihoods of more than 90 per cent rural people (Wasiq & Ahmad 2004). This is not surprising as life in a rural setting poses a number of risks and vulnerabilities. Frequent droughts, infertile soils and limited agro-economic conditions for farming, poor infrastructure, high transaction costs, deprived market opportunities, including labour markets, and lack of access to credit are only some of the constraints distinguishing the rural setting. For many, especially those with minimum assets, to maintain a family's wellbeing is a daily struggle. In addition to material constraints, rural dwellers are typically disadvantaged by low levels of education, poor health and lack of adequate opportunities to participate in decision making that affect their lives (Mutamba 2008). Trapped in these conditions the rural households thrust to undertake a diverse livelihood portfolio and, most importantly, rely on forest resources to complement their varied income sources for subsistence and cash (Vedeld et al. 2004). This chapter gives a more detailed explanation into how rural people use the forest and why. I also look at the link between forests and poverty and inquire how forest use alters under various pressures, resulting in deforestation and forest degradation. Throughout the chapter I put in the centre a story of people dependent on forest for livelihoods.

2.1 Miombo and its use

In sub-Saharan Africa, rural communities access various forest resources mainly in woodland categorised as *miombo*. Miombo is the most extensive dry forest formation and tropical seasonal woodland in Africa (Campbell et al. 2007). It is a type of savannah, characterized by deciduous trees five to twenty meters in height, forming a light open canopy or a dense closed woodland (Nduwamungu & Malimbwi 1997).

The ways rural communities use forests vary across local conditions, cultures and markets. Nevertheless, richness of miombo offer benefits that in multiple ways contribute to livelihoods of millions rural people (see Table 2) (Monela & Abdallah 2007). Miombo provides access to land, pasture, energy sources, building materials, commercial timber as well as non-timber forest products (NTFP) like medicinal plants and foods. Some community members enter the

forest for rituals, as certain tree species are praised for their cultural and spiritual value. Moreover, forest regulates climate, hydrological cycle, erosion, provides shade or serves as a windbreak (Vedeld et al. 2004). These environmental services are also vital for the communities' wellbeing and livelihoods.

Table 2. Importance of different forest benefits to various forest users in miombo of sub-Saharan Africa. Data 2003

User groups	Type of benefits		
	Agricultural land	Non-timber products	Timber
Forest dwellers			
Shifting cultivators	Main benefit	Important supplement	
Farmers living adjacent to the forests			
Smallholders	Major "land reserve"	Supplementary	Supplementary benefit if transport access exists
Landless	Not important	Important supplement	
External users			
Neighbouring villagers ²	Major "land reserve"	Supplementary	Supplementary
Artisans, traders, small entrepreneurs	None	Supplementary	Main benefit

Source: Angelsen and Wunder (2003), with user group "hunter-gatherers" excluded considering they are too few in numbers, while "neighbouring villagers" added from the author (Vedeld et al. 2004)

Majority of forest dependent communities are farmers. The forest represents a major land reserve for agriculture. It's use, however, differs between forest dwellers and farmers living outside the forest. Forest dwellers like shifting cultivators depend directly on the forest for existence. Their farming system refers to a temporal and cyclical agricultural system, that involves land clearing using fire and phased into periods of cultivation and fallow (Thrupp et al. 1997). The fallow is a cultivated land left to regrow till soil fertility is restored. It can take up to ten - fifteen years before trees are cut again for cultivation. Most shifting cultivators complement agriculture with hunting, fishing, gathering, and other resource-uses (ibid.). Unlike the forest dwellers, the rural smallholder farmers living close to forest margin, clear

² Added by the author

miombo woodland to establish permanent agriculture plots. The land is especially preferred to cultivate cereal crops and various types of beans (Luoga et al. 2000). Smallholder farmers commonly combine cultivation for subsistence with commercial surplus-based produce for cash. Dependence on other forest resources is equally important. Rural people regularly access the woodland for fuelwood, poles, timber, thatch grass, fodder as well as various non-timber products like fruits, mushrooms, honey and medicinal plants.

More than 20 per cent rural people collect firewood for heating and cooking (Vedeld et al. 2004). Poles of variable size are collected for building houses, huts and other structures. Poles are sold also on local informal markets for a minor supplemental income. Timber harvesting and charcoal production are traditional commercial activities in miombo that constitute an important source of cash (ibid). In some cases, smallholders grow trees on own farms (woodlots) or manage remnant forests. This way individuals supply timber products for own use or commercial purposes. In rural areas close to the urban markets, involvement in timber and charcoal production is a lucrative business and a full-time income generating activity to many rural dwellers. Timber products in the forest also attract the outsiders from neighbouring villages and small-scale artisans and traders from the urban centres.

Furthermore, miombo is a favoured pasture for livestock owners and agro-pastoralists (Topp-Jørgensen et al. 2005). It provides luxuriant grasses rich in sugars and has many trees rich in protein. The growing behaviour of grasses and trees ensures the availability of fodder almost throughout a year. While the grass biomass is highest during the rainy season, young foliage of plants sprouting during the dry season equally well supply the required animal feed and fodder. However, the outrage of the tsetse fly, that carries deadly diseases to animals, can significantly limit livestock keeping (Nduwamungu & Malimbwi 1997).

Rural people may also rely on forest for food products. Rainfall and droughts in miombo are seasonal and food shortage is common, especially before the harvest. Those stricken by hunger use various forest fruits, roots, mushrooms or honey to supplement their diet. Similarly used are edible insects and animals as bush-meat (Abdallah & Monela 2007).

Medicinal plants collected in the forest are broadly used for the primary health care purposes, primarily in less developed rural settings, and at most collected by the local doctors or traditional healers (Augustino et al. 2011).

2.2 Poverty, livelihoods and role of forests

A link between forest resources and wellbeing of rural communities is tight. In poverty stricken conditions, when farming not always provides sufficient means of survival, households tend to depend on other activities and income sources to sustain household's wellbeing. Herein forests may play a role of a 'safety net' in times of crisis, a 'coping strategy' to maintain household's consumption or a pathway out of poverty (Vedeld et al., 2004).

Primarily, forest can play a significant role as safety net during the periods of hardship and unexpected shocks such as natural disaster, droughts, failed harvest, livestock loss, sudden illness or death of a family member, food or income shortfalls. Households vulnerable to these shocks have commonly no access to credit, employment or other income sources. In this case, forest constitutes a "natural insurance". Collecting and selling forest produce becomes a reasonable activity when there are no other means for earning a living. Income from forest resources can also help to accumulate capital for investment into other safety nets such as livestock, to secure further survival (ibid.).

In a daily routine forest serves also as a 'coping strategy' to maintain household's current consumption. Collection of firewood, fodder and fruits throughout a year cover basic subsistence needs and offer opportunities for low-return cash activities. This is especially advantageous for vulnerable groups or landless, given that majority of forest activities, apart from timber and charcoal harvesting, require little skill and no capital.

In certain contexts, forest may also play a pathway out of poverty. Although most of forest activities are for poverty prevention than reduction, certain forest produce given favourable market conditions can provide the means for socioeconomic advancement. This, however, is rare in sub-Saharan Africa where forest produce brings low cash returns, including timber and charcoal trade. People depend on the forest mostly because of the poverty stricken conditions they live in (Campbell et al. 2007; Sunderlin et al. 2005; Vedeld et al. 2004).

2.3 Deforestation and forest degradation of miombo

Deforestation and forest degradation in miombo is alarming. Besides the direct drivers, the issue is more complex due to interlinked underlying socio-economic, environmental and institutional dynamics. To mention a few are the pressures of poverty, overpopulation, inadequate agrarian policies, unequal land distribution, various institutional issues of unclear

property rights, open access, inefficient enforcement, poor governance and corruption (Kweka et al. 2015; Misana et al. 1996).

Under this study, deforestation refers to a decrease of forest area as a result of clearcutting, wildfires, felling or conversion of land to other uses such as permanent agriculture. Degradation, on the other hand, refers to loss of biomass and decrease in forest quality.



Deforestation nearby the village road (picture from the fieldwork 2015)

3 Tanzania and its forests: background and overview

The role of forests for people and economy of Tanzania is significant, but undervalued and at most not recorded. It is only after 1998 Forest Policy that forest is explicitly recognized as an asset for rural livelihoods and mainstreamed into national poverty reduction strategies (PROFOR). This chapter provides a background information on Tanzania, its forests and their formal management from a historical perspective to a current date, including REDD+.

3.1 Country profile

3.1.1 Forest cover

Tanzania's land area of 94.5 million ha consists of forestland, coastal plains and semi-desert. About 55 per cent of the main land is covered by forests – vital water catchments and habitats to country's unique ecosystems, wildlife and biological diversity. Forested area on 93 per cent is covered by miombo woodland and remaining 7 per cent are catchment forests, mangroves, coastal forests and government forest plantations (TFS ; Zahabu et al. 2005).

3.1.2 Rural Tanzania

Despite richness with natural resources, poverty in Tanzania is high. More than 38 per cent of the 49.9 million Tanzanians live below poverty line. This is expressly evident in a rural setting where almost 85 per cent are poverty stricken (Tanzania 2013). Social well-being, however, throughout a country is generally good. Tanzania enjoys peace, stability and unity since its independence in 1960s (PROFOR). The country employs various public programmes to address poverty and recognizes participatory approach in their planning and implementation.

For the last years the rural areas experience a trend of rapid modernization. It has been evident that more and more households own their assets for transport (bicycles, motorbikes) and communication (radios and mobile phones). These assets provide new opportunities for income, ways of information exchange, networking and enable mobile banking. Modern houses are recently built with the bricks, metal roof or iron sheet cover, indicating increase in

community wealth and education levels. Proportion of households owning mechanized agricultural equipment such as tractors is still very limited. However, almost all rural households (96 per cent) now own a hand hoe, compared to 88 per cent in 2007 (Tanzania 2013).

Agriculture remain Tanzania's lead economic sector. It provides livelihoods for more than 74 per cent Tanzanians. Of those 90 per cent are in rural areas. The sale of agricultural produce usually accounts for 60 per cent of total household income, and is a primer source for cash. The other 40 per cent earnings derive from economic dependence on forestry sector, fisheries, wildlife or tourism (PROFOR).

The rural communities survive largely from subsistence agriculture, with maize or cassava being a dominant crop. Food security however is frequently undermined by adverse weather conditions. Floods and droughts are common in Tanzania and affect especially the lowlands. In situations like this economic dependence on forests and other resources inflates.

3.1.3 Deforestation

Over 80 per cent of more than fifty million people in Tanzania rely on forest resources for their livelihoods. This however comes with a high cost of deforestation (Dulal et al. 2012). The National Environment Policy of Tanzania (NEP 1997) identifies deforestation as one of six major environmental problems requiring urgent attention (Kajembe et al. under review). Clearing miombo for agriculture alone has been historically recorded to account for more than 50 per cent forest loss (Abdallah & Monela 2007). The recent deforestation rate in the country estimated between 130,000 to 500,000 hectares of forest loss per year (Abdallah & Monela 2007; Blomley & Iddi 2009; Zahabu 2008).

3.2 Historical overview of forest cover change and management

Deforestation and formal management over Tanzania's forests are in constant dynamics since the period of colonization. Colonial and post-colonial times are the most significant in defining history of forest cover change and development of forest policies.

Formal protection of forests began during the German rule (1885-1920) when the first half million hectares of mountain chain area was protected for water catchment. The British rule (1920-1961) continued expanding forest conservation, bringing the total reserved area close to

1.3 million hectares. The problems around forest governance, however, emanate from this period. The authorities of German and British rule viewed local communities as a threat to the environment and omitted them any ownership rights to forests. Through relevant legal instruments forested lands became colonial properties. That enabled foreign authorities to clear forests for plantations of coffee, tea, sisal, rubber, tobacco and cotton and exploit villagers for labour. Local institutions to manage land and forests begun to fade and erode (Rija et al. 2014).

Since Tanzania independence (1961) forests came under custody of the state. Funds to protect the forests, however, were no longer available. Restrictions remained only on paper, and forests left with little or no enforcement, becoming de facto open access. Encroachment into reserved pristine forests, however, was little, given rural people predominant use of communal forests. Situation slipped out of control after the national “ujama”-villagisation programme. The programme was introduced by the state in 1967 as part of ‘modernization’ process, and lasted for several years. Rural populations were forced to resettle into community centres. A sudden wave of increased migration combined with growing population had put communal forests under excessive pressure, and forced rural people to look for new settlements and forest resources into more distant and intact forest reserves (Robinson & Kajembe 2009). Uncontrolled deforestation led to frequent land degradation incidences, mainly in central part of the country. In 1973 the government enforced two soil conservation projects - HADO and HASHI - to constrain the problem. The projects failed to involve local communities in decision-making and encountered local resistance, however managed to reduce erosion in the region.

State’s capacity and financial means to control national forests weakened even more in late 1970s and early 1980s. Economic crises, shortage of foreign funds, poor agricultural outputs due to villagisation process – played a role. Tanzania’s economy was further depleting due to break of the East-African Community (1977) and the 1978-79 war with Iddi Amini’s regime in Uganda. Drastic changes in policies and wrong choices of development strategies put a mark on domestic resources, the people and the environment (Abdallah & Monela 2007). Encroachment, deforestation and soil erosion have worsened. Rural communities, affected by the villagisation process and unemployment, indirectly increased their dependence on forests for income (Robinson & Kajembe 2009). By the 1990s the country experienced severe deforestation. To control the situation became particularly difficult (Rija et al. 2014). Neither central nor local governments had financial means nor human capacity to manage country’s forest resources.

3.2 Participatory forest management

3.2.1 Establishing participatory forest management

In early 1990s, failing to manage domestic resources alone, the government embarked to reform national forest governance. The reform coincided with the government's will to decentralize political functions to lower level stakeholders, and involve communities' support into management of forest resource (Abdallah & Monela 2007). A pioneering case refer to the Duru Haitemba events in Babati district. The government's decision to include Duru forest into national reserve was strongly opposed by the villagers and led the government to give rights over the forest to the community. The village government had successfully managed to reverse deforestation in the forest, and the case paved a way to similar pilots in the northern and western parts of the country (Blomley & Iddi 2009).

This decentralized approach is commonly referred to as Participatory Forest Management (PFM). PFM has become the most important strategy to forest management in Tanzania. It has been recognized as such in all relevant national policies, respectively in Forest Policy 1998, Forest Act 2002, Village Land Act 1999, Local Government Act 1982 and Forest Regulations 2004 (Abdallah & Monela 2007; MNRT 2007). The Forest Policy 1998 is a first output of initial experiences with PFM in 1990's, which was later enforced in Tanzania Forest Act 2002. The Act provides a legal basis for "communities, groups or individuals across Tanzania to own, manage or co-manage forests under various conditions" (Scheba & Mustalahti 2015:3).

The ultimate purpose of PFM is to: (a) improve forest quality through sustainable forest use, (b) improve livelihoods through secured supply of forest resources for subsistence and income and (c) improve forest governance through effective and accountable natural resource management at local levels (URT 1998; URT 2002; Zahabu 2008). Many studies suggest that putting Forest Policy (1998) and Forest Act (2002) in practice have decreased unregulated forest resource uses and illegal activities (Hamza & Kimwer 2007).

The approach entails two ways of forest governance: Community Based Forest Management (CBFM) and Joint Forest Management (JFM).

Before explaining these concepts, understanding the land tenure in Tanzania is fundamental. Tanzania distinguishes three land categories: village land, reserved land and general land. Village land constitute all land on the village area and villagers have full autonomy over its use. Reserved land refers to a land set aside by the government for protection or production

purposes. General land is a remaining land left out from the other two land categories (more on the land tenure in section 3.4.1.1) (Richards et al. 2009).

CBFM refers to forests on ‘village land’. To get a full autonomy over the forest, the village government should declare it as a Village Land Forest Reserve (VLFR)³ and register as such with the District Council (Scheba & Mustalahti 2015). The core intent of CBFM is to bring large areas of unprotected forests into community ownership, and allow villagers themselves to set and enforce the rules regulating resource use (Rija et al. 2014). If a village, however, fails to manage the forest, the central government has power to take it under own jurisdiction.

JFM refers to a co-management approach over forests on ‘reserved land’. The JFM is formalized through the signing of a joint management agreement between the village and the government on forest resource use, control and protection (Scheba & Mustalahti 2015).

Over \$20 million USD invested into PFM development in Tanzania since 1990’s (ibid.) with support of the governments of Norway, Finland, Denmark, Sweden and the World Bank (Blomley & Iddi 2009). By the end of 2000’s 13 per cent of forests were under PFM, involving more than 2000 villages (see Table 3) (URT 2013; Vatn et al. 2013). Despite that many villages embarked on PFM, not all have formalized their forest management. To formalize PFM is costly and time consuming. A single PFM may take up to four years and cost between \$50.000-100.000 USD to implement, depending on forest size and location (Abdallah & Monela 2007).

Table 3. Overview over PFM in Tanzania. Data from 2008

Summary	Coverage/Area
Area under CBFM	2,345,000 ha
Area under JFM	1,780,000 ha
Total area of forest cover by PFM	4,125,000 ha
Percentage of total forest area under PFM	12.8%
Number of districts with PFM	63
Number of villages involved in PFM	2328
Percentage of total villages involved in PFM	22%
Number of villages with formalized village forest or signed JMA	550

Source: URT (2013)

³ Establishing VLFR requires: i) demarcating village and forest boundaries (usually time consuming, technologically advanced and costly procedure); ii) developing a forest management plan; iii) electing a Village Natural Resource Committee or VNRC (a principal body overseeing village forest); iv) creating bylaws to support and enforce forest management plan. Forest management plan should contain maps and description about forest utilization, management and protection; and clarify how much of what forest resource is allowed to harvest from which forest areas. The draft has to be forwarded to the District Council and Director Forestry for review and comments prior being presented to the Village Assembly for an official approval (Scheba & Mustalahti 2015).

3.2.2 Constraints to participatory forest management

Understanding whether PFM significantly contributes to its core objectives is however unclear. Many studies show mixed results.

CBFM is considered to offer more gains than JFM regarding payments and resources (Vyamana 2009). Access to resources under CBFM could provide more livelihood benefits compared to strictly protected JFM forests. Yet, while JFM may not entail a better access, strict protection may result in a better forest quality and resource availability. With respect to benefit transfers, CBFM model brings higher revenues (Blomley & Ramadhani 2006). Village leaders have the power to set up permits and collect revenues from fines. This, however, is a zero-gain advantage, given that permits or fines are paid by individuals of the same local community. The gain lays in a better forest condition and resource availability. Scenario in JFM model is different. Any revenues collected must be shared between the government and the community according to the JFM agreement rules (Scheba & Mustalahti 2015). As some studies have shown, that results in lower income gains to the village (Blomley & Ramadhani 2006). In both cases, however, community income is low and at most invested to maintain forest management activities and VNRC meetings. A challenge remains how to balance a link between the enforcement and revenues gained. More enforcement may reduce illegal forest activities and result in less revenues from fines. This contradiction can demotivate the effort to protect the forest (Abdallah & Monela 2007).

Furthermore, in spite that PFM is about community participation, it insufficiently endorses inclusiveness of all interests. Given that communities are socially stratified and heterogeneous, PFM may benefit to some, while inadequately represent the others (Abdallah & Monela 2007). It is common that a majority vote in decision-making may exclude interests of most vulnerable or socially marginalized group. Elite capture in addition is common (Ngaga et al. 2013; Scheba & Mustalahti 2015; Vyamana 2009). This inequality jeopardizes PFM idea of equal benefit sharing and local empowerment (Lund & Treue 2008; Scheba & Mustalahti 2015).

With regard to conservation performance, PFM observed to improve forest condition (Blomley & Iddi 2009; Scheba & Mustalahti 2015). Some scholars, however, note that forest cover has a tendency to worsen with closer proximity to urban markets (Treue et al. 2014).

Besides being costly and time consuming process, it is not well understood if PFM provides sufficient value to stimulate local participation. Outcomes not always are worth of the effort and funds invested in PFM activities.

Moreover, rural areas currently undergo rapid social, economic, technological and political changes. Under pressure of expanding development and modernization, it is not clear how would communities keep up with sustainable forest management (Abdallah & Monela 2007). Would carbon payments make a difference?

3.3 REDD+

REDD+ could pave a new way to support sustainable forest management in Tanzania. REDD+ links up to both participatory forest management and payment for ecosystem services (PES) – in a form of compensation in exchange of enhanced carbon (Kijazi 2015). If all deforestation and degradation is discontinued, REDD+ estimates to benefit Tanzania with \$630 million USD. That equals to \$117 USD per rural household per year. Given the average cash income for a rural household is less than a dollar a day, REDD+ promises a substantial earning (Zahabu et al. 2008). With a support of REDD+ Tanzania clearly could make a significant progress to country's development agenda and mainstreaming environment into poverty reduction strategies. On this note REDD+ objectives strongly link to Tanzania's National Vision to development 2025 and the National Strategy for Growth and Reduction of Poverty (MKUKUTA)⁴ adopted in 2005 (URT 2013). Tanzania is well placed to benefit from REDD+ on these objectives thanks to its stable socio-political situation and advanced system of participatory approach in forest management (Dulal et al. 2012).

3.3.1 Current legal and institutional framework for REDD+

3.3.1.1 Land and Tree tenure

Land tenure is fundamental to the potential of REDD+ (Richards et al. 2009). Constitutionally all land in Tanzania, and thus also the forests, belong to the state. The President holds the land in trust for the people. All land tenure issues are administered by the Land Commissioner on behalf of the President. District council and Village council play a supportive role in managing land at the local level (PROFOR). According to the National Land Act 1999 and Village Land Act 1999 there are three land tenure categories: village land, reserved land and general land (as noted before in 3.3). Effectively, village and general land is hard to distinguish since villages spread across vast areas (Chiesa et al. 2009).

⁴ The Kiswahili Mkakati wa Kukuza Uchumi na Kuondoa Umaskini Tanzania (MKUKUTA).

‘Village land’ is registered as such after being surveyed following the Village Land Act provisions (Rija et al. 2014). All village land matters are handled by the Village Councils and Village Assemblies. The Village Council is required to divide village land into three sub-categories: ‘communal land’ reserved for grazing, pastures, forests and other natural resources; ‘occupied land’ for settlements, cultivation and small businesses; and ‘future land’, set aside for future use (PROFOR).

‘Reserved land’ covers the land reserved for protection or production (Vatn under review).

‘General land’ refers to all public land which is neither reserved nor village land and is not in use. There is however a discrepancy between ‘general land’ definition in the National Land Act and the Village Act. The National Land Act does not clarify ‘general land’ definition beyond stating it is not reserved or village land, and is not in use. Under this definition general land merges with a village land that is not formalized. Given that most villages in Tanzania are not registered, general land would constitute more than 50 per cent of the mainland. The matter is further complicated by the Village Act, which distinguishes village land also without its formal status. The Act provides mechanisms for village land demarcation and recognizes villagers’ customary rights to land. Under the Village Act definition, Tanzania has just 2 per cent of general land. As a result, tenure issue over general lands becomes unclear and blurred (Richards et al. 2009; Vatn under review).

Tree tenure is strongly linked with land tenure. Clarifying tree tenure is vital in a context of REDD+ since it corresponds closely to carbon property rights. Tree tenure system in Tanzania distinguishes forests into reserved forests and unreserved forests (see Table 4).

Reserved forests are located on ‘reserved land’ or may also occupy ‘village land’ if part of PFM model. Unreserved forests are located on ‘general land’ or ‘village land’ and are at most under deforestation pressure.

Reserved forests⁵ are owned by either the central government (state), local authority (district), a village or a private owner (Blomley & Iddi 2009). Reserved forests serve a purpose of protecting biodiversity or water catchment, or are reserved for production of timber and other

⁵ According to Zahabu (2008), country is comprised of 16 million hectares of reserved forests, 2 million hectares of forests in national parks and 16 million hectares or 47% forestland of unprotected forests on general land. Reserved land at most is covered by National Forest Reserves (12.3 million ha, out of which 1.6 million ha are water catchment forests), subsequent by Village Forest Reserves (3 million ha), Local Authority Forest Reserves (1.5 million ha) and private forest plantation (61.000 ha) (Zahabu 2008). These forest inventory data however are unreliable due to outdated information sources and present expansion of various management strategies in forested lands across Tanzania, affecting their tenure status.

natural resources. Reserved forests are sub-divided into National Forest Reserves (NFR) under central government authority; Local Authority Forest Reserves (LAFR) under authority of the district; the Village Land Forest Reserves (VLFR) under village government and private forest plantations owned by individual households with customary right to land or a corporate sector that obtained land title deeds from the government. With respect to the forests on village land, there can also be Community Forest Reserves managed by a certain group of individuals in a community, such as a group of charcoal producers or a women's group (PROFOR).

Unreserved forests have insecure tenure. Located on either a village land or general land they tend to be overexploited and degraded due to unregulated resource use, open access, widespread shifting cultivation and annual wildfires (Zahabu 2008).

While deforestation is especially alarming in unreserved forests, similarly diminishing are also reserved forests. Illegal activities, excessive logging and encroachments are common. Forestry services are often understaffed and have limited financial means to effectively manage widespread forest areas (Kajembe et al. under review).

3.3.1.2 Institutional arrangements

Forest management issues in the country has traditionally been overseen by the Forestry and Beekeeping Division (FBD) of the Ministry of Natural Resources and Tourism (MNRT). Since 2010 part of the FBD responsibilities to manage central government forests and retain forestry sector revenues had been transferred to a new agency Tanzania Forest Service (TFS). The FBD remain developing the forest policy, laws and regulations and supports enactment of Forest Policy (1998) and Forest Act (2002). While TFS is established to manage national forest reserves (natural and plantations), bee reserves as well as forests and bee resources on general lands. The ultimate responsibility of TFS is to record and capture financial value of the forest and beekeeping sector to the national GDP (TFS).

The forest sector in Tanzania has a potential for revenue collection from licenses and permits. A major part of these revenues however went uncontrolled due to high levels of corruption and poor supervision of government staff and control-points on public highways (PROFOR). TFS was established as a semiautonomous executive agency to take under control this problem. Besides supervising collection of forest revenues nationally, TFS also involves in mapping and demarcating forest reserves, providing protection capacity to local forest managers, issuing licenses and permits and increasing overall harvesting potential of forest products across the country (TFS).

Forest officers at the district level are responsible to manage the Local Authority Forest Reserves, and have an overall overview over districts forests. Forest officers also accountable to assist the district's villages with PFM activities if relevant.

The Village Council is in charge to supervise forest management issues at the village level. When a village is part of PFM and has established VLFR, a specially delegated Village Natural Resource Committee assists Village Council to control forest resource use, undertakes patrols and collects forest revenues (Rija et al. 2014).

Table 4. Summary of Forest tenure in Tanzania

Forest tenure	Category	Purpose	Owner	Manager	Relevant legislation
National Forest Reserves	Reserved forests	<ul style="list-style-type: none"> • NFR for protection (e.g. for water catchment) • NFR for production (e.g. mangrove/miombo woodland reserves) • Nature forest reserves 	Central Government	TFS	Forest Act 2002 National Forest Policy 1998 in case of JFM
Local Authority Forest Reserves	Reserved forests	<ul style="list-style-type: none"> • LAFRs for protection (catchment forests) • LAFRs for production (plantation and natural forests) 	Local government/ District Authority	District	Forest Act 2002 National Forest Policy 1998 in case of JFM
Village Land Forest Reserves	Reserved forests on village land	<ul style="list-style-type: none"> • VLFRs managed by the entire community • Community forest reserves (CFRs) managed by certain group in the community 	Local community	Village Council	Forest Act 2002 National Forest Policy 1998 in case of CBFM
Private Forests	Reserved forests on village land or general land	<ul style="list-style-type: none"> • Private forest plantations for resource harvesting 	Corporate sector, Individual household(s)		Forest Act 2002 National Forest Policy 1998 in case of CBFM
General land forests	Non-reserved forests	<ul style="list-style-type: none"> • Forests on village land but not reserved and managed by the village council 	Central Government	TFS	Forest Act 2002

3.3.2 Issues facing REDD+

Establishing REDD is technically, politically and institutionally challenging (Vatn under review). The process demands complex tasks at both national and local level such as measuring carbon stocks, clarifying property rights, and establishing mechanisms for a sustainable carbon credit system.

Upon embarking on REDD+ Tanzania lacked accurate baseline data on carbon stocks and deforestation, recorded in line with internationally approved methodologies (Mbwambo 2015). Given that REDD compensation is based on a difference between carbon saved “under REDD” and a baseline reference “without REDD intervention”, having accurate baseline on forest loss and standing carbon is critical. The process implied to undertake several technically complex stages (Zahabu et al. 2008). The national forest inventory has been completed and released only in 2015. The document, titled NAFORMA, stands for ‘National Forest Resources Monitoring and Assessment of Tanzania Mainland’ (NAFORMA 2015).

Similarly, accurate forest inventory at a local level is vital to provide evidence of enhanced carbon stock or reduced rate of deforestation. Frequent carbon measurement procedures are costly and time consuming. Civil society organizations, involved in piloting REDD+, addressed this challenge through participatory approach. They trained local villagers and district forest staff to independently carry out annual carbon stock assessments using reliable, easy and cheap tools. This decision has helped to scale up the inventory process and reduce associated transaction costs (Zahabu et al. 2008).

Other significant complexity touched the issue of carbon ownership rights (Mbwambo 2015). There is no specific legislation regarding tree tenure. Trees are regarded by the law as ‘fixtures’ on the land (Richards et al. 2009), and thus carbon ownership rights are tied to the land tenure. The issue becomes complex as most of the land and forests in tropical countries are under a legal pluralist condition: while villagers have customary rights to use the forest, the state is an official forest owner under formal declaration. Given that REDD pays forest owners and not users, in such a situation of contested rights, REDD+ objective is jeopardized (Vatn under review). On the other hand, REDD can also be an agent of change and facilitate transition of land tenure into hands of a local community. For example, enclosing open access forests on general lands into PFM model (Chiesa et al. 2009).

The other greatest challenge facing REDD+ in Tanzania is how to maintain system’s sustainability. Several insecurities are involved, especially on a financial and institutional basis.

Sustaining new governance system and related carbon credit mechanism demands a constant flow of funding. The situation however is unclear. Today funds are provided from a few donor countries with prominent support from Norway, yet there is no global structure of financing REDD+ in a long term. This certainly imposes a great financial risk especially when much has been already invested to build and stabilize REDD+ system (Vatn under review). Lack of funds to maintain institutional setting and enforcement on the ground may put at risk new system's legitimacy and lead to reversed patterns of community behavior and uncontrolled resource use.

3.3.3 Lessons on REDD+

It is still unclear what happens when REDD+ meets local realities and how local realities shape REDD+. It must be assessed in a broad contextual picture (Benjaminsen 2014).

As a concept, the REDD+ idea is a success story. Yet, in practical terms it is more complex. Contextual details are significant. For example, non-formal land tenure and unclear property rights in countries embarked on REDD+ may lead to an opposite effect - increase deforestation, potentially illegal logging, as well as shape social conflicts and unsustainable resource use. Moreover, taking certain theoretical lens, some researchers see REDD+ as a threat to already well established decentralised forest management in developing countries (Phelps et al. 2010) or a form of land grabbing in a name of "climate" (Beymer-Farris & Bassett 2012).

Scholars of various disciplines divide their views on REDD+. Some see REDD+ benefitting to community through water and soil conservation and enhanced livelihoods. Others, in contrast, argue REDD+ has no effect on people's wellbeing and may even harm. For example, some studies had shown that new institutional setting under REDD+ may undermine existing local institutions, facilitate social exclusion and evictions, disempower local decision making and disproportionately affect the poorest already in struggle for forest resources (Benjaminsen 2014; Beymer-Farris & Bassett 2012; Dahal et al. 2010; Dulal et al. 2012; Larson 2011). Furthermore, increase in biodiversity as a result of conservation, may not always lead to increase in wellbeing. Higher numbers of wildlife might advantage biodiversity goal, yet put at risk crops and livestock of local people (Lele et al. 2013).

Overall, evolution of REDD+ studies can be divided into 3 generations (Angelsen et al. 2012). The first generation deals with *REDD design* - initial stages of architecture and institutional set-up (Phelps et al. 2010; Ribot & Larson 2012; Vatn & Vedeld 2013). The second generation focuses on *REDD+ implementation* process, benefit sharing mechanisms, decision making,

land tenure and participation (Benjaminsen 2014). Finally, the third generation is about *assessing REDD+ impacts* – showcasing lessons, experiences, achievements, failures, trade-offs between livelihood benefits, biodiversity conservation and carbon storage (Kajembe et al. 2012; Leach & Scoones 2015; Mutabazi et al. 2014).

This thesis contributes to the third generation research. It is vital, however, to note that rather than looking at impacts of REDD+ as an ultimate focus, the main interest of this thesis is to evaluate whether management strategy under REDD+ worked or why did not to benefit communities and reduce deforestation. Herein, conducting impact analysis will help create this understanding.



A member of the forest patrol showing a high-value timber specie in Salanga, one of the Kolo Hills forest reserves (picture from the fieldwork 2015)

4 Conceptual framework for analysis

To make REDD+ work demands creating new actors and new forms of institutions. Specifically, establishing REDD+ demands building new governance structures to address deforestation drivers and manage forest resources (Vatn under review). Change in governance structure due to REDD+ is central to our analysis. It directly influences resource use and distribution of benefit streams, expecting to facilitate certain environmental outcomes such as improved forest quality. A key argument is that deforestation and forest degradation is attributed not only to underlying demographic and socioeconomic trends, but also to an institutional setting that either enables or constrains activities in the forest and interaction between actors. This chapter establishes a theoretical background for this study and develops a framework for REDD+ impact analysis after a change in the governance structure is introduced. I also explain more in detail all relevant concepts.

4.1 Building governance structure for REDD+

According to Vatn (2015), governance structures include two elements: the type of actors involved, and institutional structures guiding their interaction and resource use. Both actors and systems of interaction are institutionalized (Vatn 2005). In other words, they are described by formal rules, enforcement of rules, set of conventions and behavioural norms. Given the significant role institutions play in enabling human action, it is fundamental to first understand institutions and the concept of institutional change.

4.1.1 General perspective: change of institutions

There is no clear definition to describe the institutions. In this thesis I refer to institutions as “conventions, norms and formally sanctioned rules” (Vatn 2005: 60), that define relationship between people and between people and the environment. It is significant to distinguish a norm and a formal rule in order to understand institutions. A norm typically defines what one should do or not do as an appropriate action. There is no formal punishment involved for not following the norm. When norm is fully internalized, it becomes part of a repeated action what is

‘obvious’ to do. Formal rules, on the other hand, define what one ‘must’ or ‘must not do’ as a required or forbidden act. That is defined and governed by a third-party authority. Hence, a formal type of sanctioning is involved to coordinate action and, in case of violation, implies a formal punishment (Bromley 1989; Vatn 2005). This way institutions create an order in society and simplify interaction between people.

In fact, in the conditions of scarce and interlinked resources, institutions are critical. Environmental problems are to a large extent about human relationships. The way one person accumulates, uses or disposes environmental resources affects the opportunities for others. Competitiveness for resources fundamentally implies a *conflict* of interests. Lack of clarity over who gets what resource adds up to a conflict and rules are required to coordinate resource access, use and distribution. Similarly, a dispute may arise over the products derived from resource use: goods, services or side-effects (e.g. pollution, waste). Such conflicts motivate the formulation of community rules that facilitate collective action and remove free riding. To handle the issue of coordination and conflict in a way that responds to environmental problems and societal needs is, however, challenging. Interdependencies between resource characteristics, multiple uses, and people’s individual preferences, rights and capacities are in a constant and complex interaction (Vatn 2005). This interaction, however, can be coordinated with help of institutions as rules.

Institutions define who has access to what resource, and to what extent (Vatn 2005). They help coordinate action, protect certain interests and values. In other words, institutions are “social constructs that form and inform action” (Vatn 2015:75). Once formed, institutions have a considerable enduring power regardless how well they fit to the biophysical and socioeconomic conditions in which they operate (Petursson & Vedeld 2015; Young 2002). That is the nature of institutions, to be durable structures, easily reproduced (Vatn 2005). Nevertheless, institutions are also dynamic entities and subject to change and evolution.

Changing institutions is a complex task. It occurs within a process of changing conventions, norms and formal rules. Conventions and norms are dominantly reformed as a result of processes in civil society, while formal rules can only be changed by formalized structures, such as the state. New institutions can be introduced at a given point of time (Petursson & Vedeld 2015; Thelen 2003), and can be defined from above by external actors or influenced from below, civil society. Nevertheless, a change in formal rules and a normative change in behaviour do not commonly align in practice. Formal rules may remain on paper, while pre-

existing institutions continue to dominate on the ground. This can be exacerbated if new institutions conflict with the social capital of local society and do not cohere to existing practices. Such situations create so called ‘institutional bricolage’ (Cleaver 2012) and to some extent imply power imbalance strengthened when institutions favour the few against the many. Cleaver has defined it as a process by which people consciously or unconsciously draw on existing social or cultural practices in response to changing situations (ibid.). Institutional change cannot exist without people. People are the ones adhering to the change or facilitating it. Herein, we view people as actors, included by a governance structure and distinguished by their decision-making power, preferences and responsibilities, which are institutionally defined.

4.1.2 Actors

Regarding governance one may distinguish between three types of actors: economic actors, political actors and civil society. Their decision-making and interaction is influenced by such variables as rights and responsibilities, information, transaction costs and motivation. Rights and responsibilities vary for each type of actor according to their institutional basis. Either an actor has rights to formulate policies or rights to access economic resources. Information and transaction costs play equally important role. Actors’ interactions and decisions can change due to altered information quality, accessibility, transparency, way of production and distribution, as well as transaction costs involved. Finally, motives are vital to define actor’s willingness to cooperate or act strategically for self-interest (Vatn & Vedeld 2013). Their preferences and interaction ultimately influence environmental outcomes (Vatn & Vedeld 2013).

With respect to rights and responsibilities, the economic actors have a right to use resources under established property regime. Political actors have the power to allocate property rights and formulate rules. Civil society actors⁶ define a normative basis for political action and are crucial for its legitimization, at least in democracies. Political actors are ruled by political institutions, civil society by civil society institutions, and economic actors governed by economic institutions or, in other words, resource regimes. Resource regimes and economic

⁶ Civil society actors include a vast field from individuals to political parties, mass media, NGOs, research institutes and businesses.

actors are central in the governance structure (Vatn 2015). They are also central to impact analysis of REDD+.

Actors can trigger institutional change. Under REDD+ such change is introduced by political actors, whereas the new institutions influence economic actors in their use of resources. Herein, to look at economic actors and their response to changing situation is fundamental when analysing REDD+. Conceptually, economic actors are grouped as producers and consumers. However, both may refer to the same unit, for example, the household. Being engaged in various forest activities, economic actors both consume forest resources and produce products and side-effects from resource use. That includes deforestation and loss of standing carbon. Therefore, REDD+ influences the resource regimes, established to govern economic actors' activities and interaction.

4.1.3 Resource regimes

Two sets of institutions are key for resource regimes: that govern access to forest resources and interaction within and between the actors. Institutions that regulate access include property and use rights.

4.1.3.1 Property and use rights

Property and use rights define who has access to a resource and its benefit streams (Vatn 2015). Property can have a physical dimension if we refer to forest or land. Nevertheless, conceptually a property refers to a social relation. Specifically, it is a relationship “between the right holder and the rights regarding under a specific authority structure” (Vatn 2005:254). Authority here can be either a state or a traditional authority that guarantees a rights' holder to enjoy certain benefit streams from a resource. As Bromley (1991) had put it, property refers to a control over a benefit stream, while right is the capacity to call upon a third party. Property rights structures can be either private, common, state or open access. They are distinguished by the rights to access, withdrawal, management, exclusion and alienation. Right to *access* is a right to enter a physical property; *withdrawal* is a right to benefit streams; *management* right is about how resource use is regulated; *exclusion* determines who has and who does not have a right, while *alienation* allows to sell or lease the two abovementioned rights (Schlager & Ostrom 1992; Vatn 2015).

When discussing rights, it is important to note coexistence of formal and informal rights. It means that a common practice may not always comply with the legal rules. Similarly, different legal

systems may overlap and even compete. This typically refers to a legal pluralism, widespread in a rural setting. It occurs when property rights to resource belong to the state but user rights remain by custom with a community (Vatn 2015).

In a case of Tanzania, legal pluralism, insecure property rights and land conflicts are common. A number of underlying factors had contributed to the situation since the period of colonization, including inadequate development policies, exclusion of customary rights to land, privatization of collective commons, evictions, powerlessness of customary rules, poor governance among other. Clear property and use rights, however, are critical for REDD+. Property rights to land and forests directly define who is responsible to reduce deforestation and has a right to carbon benefit. Hence, legal pluralism or unclear property rights jeopardize the core idea of REDD+ and create disincentive for rural participation, empowerment, sustainable resource use or management.

Resource regimes are fundamental to guide behaviour of economic actors (Vatn 2007). In a situation when rules are introduced over existing institutions, to control human behaviour might be problematic. It is not sufficient to inform economic actors on new rules, rather fundamental is a question what tools to use to institutionalize them in practice. As discussed, legal pluralism and institutional bricolage is common. Legal rules in rural areas may have a customary power. Or, a certain norm can be accepted by society yet not practiced, becoming a non-conforming action. Monitoring and enforcement of formal use rights herein is crucial, yet much depend on transaction costs involved and a rights regarnder' financial means to cover them. It is equally crucial how authoritative and legitimate the monitoring system is perceived by economic actors, and how they interact between themselves within it. Interaction between the actors, hence, is another aspect resource regimes can influence.

4.1.3.2 Interaction between the actors

Interaction between actors demands the rules coordinating their actions. These rules apply to four type of interaction: market exchange, command, cooperative arrangement as well as interaction with no rule. While market exchange can be important for people producing products and selling them against a payment, the rules of command and cooperation are more relevant to institutionalizing REDD+. Interaction based on command is distinguished by hierarchical power. It executes when more powerful actors command over less powerful ones, and herein refers to third party authority. Various cooperative arrangements more refer to community rules oriented to strengthen relation between individuals and reciprocity (Vatn &

Vedeld 2013). In a situation with unclear property rights and undefined interaction rules conflicts and environmental losses are larger. This is not surprising as human-environment interaction demands coordination. If resource depletion continues, it indicates that resource regime does not fit well to the natural resource characteristics and the values and identities of economic actors involved.

Understanding and analysing resource regimes and changes within its institutional structure is one of most crucial and initial aspects when analysing REDD+. Changes in rules regarding use and interaction between actors influence their actions and hence, their livelihoods. For example, areas cultivated in the forest may now embed under protection, and once easily accessible forest resources might come under stricter control in return of carbon benefits. To evaluate how institutional change under REDD+ alters household's livelihood strategies, I need also to conceptualize 'livelihoods'. I will now turn to that issue.

4.2 Understanding the concept of livelihoods

4.2.1 Diversified livelihoods for income

A livelihood refers to “a means of making a living” (Ellis 2000:7) and encompasses diverse portfolio of assets and activities required to secure the necessities of life. The main occupation of the rural people is predominantly agriculture. Yet, it rarely alone is able to cover all household's needs. Driven by circumstances, household members undertake various activities also beyond farming. In short, livelihoods are comprised of various 'on-farm', 'off-farm' and 'non-farm' activities that contribute to the survival strategies of rural households. Herein, livelihoods distinguished by whether they are used for subsistence or cash, and whether property rights or rules apply to perform the activities. On-farm activities refer to crop cultivation and livestock keeping for own consumption or sale. Income from on-farm activities thus cover both subsistence and cash income. Off-farm activities provide income from collection and trade of local environmental resources like firewood, charcoal, timber, mushrooms, honey, fish etc. The other possible income source from the off-farm activities is employment on other's farm as seasonal cheap labour. Non-farm income refers to non-agricultural income, obtained from small business, employment, remittances and other urban transfers, including pension payments.

4.2.2 Pressures affecting livelihoods and forest resource use

The ways rural people make a living and use forest resources in a context of poverty are defined and altered by a set of interlinked socio-economic, institutional and environmental dynamics. Change in one results into modifications in others, continually reshaping resource outcomes and people strategies to meet their needs.

People's dependency on forest resources perseveres with the levels of hardship. However also such households' socio-economic characteristics as size, age, education, ethnicity and gender can significantly determine dependency on forest use and extent of it. Commonly larger households demand more resources, especially land for agriculture and other basic subsistence needs. Similarly, younger households tend to clear more forest. They have a need to establish new settlements and start farming, and have a better physical strength for forest work compared to older ones. Landless or less educated tend to have higher dependency on forest given that access to other income opportunities is deprived (Vedeld et al. 2004). Rural women are especially vulnerable. They commonly have less opportunities to education, ability to read and write, compared to men (URT 2014). Thus, with respect to gender, female-headed households tend to be poorer, seeking more reliance on the forest resources to sustain a living. Ethnicity and traditions also define the range of forest use. Groups living in the forest have more interest in forest products than farmers living in the lowlands. Likewise societies whose wealth depend on livestock ownership may also be less dependent clearing the forests (Vedeld et al. 2004).

People's livelihoods and dependence on forest resources are shaped by additional socioeconomic forces and trends like population growth, migration, as well as technological advancement, market access and its characteristics. Lack of land or too little farms in densely populated areas pressure dispossessed rural dwellers to migrate into ecologically vulnerable locations on steep slopes and hillsides. Resultant environmental damage can be severe, causing soil erosion, landslides and changes in hydrological cycles. This further leads to failed harvests, demands clearing for new plots, and expands land degradation (Homer-Dixon 1994). Similarly, such shocks as loss of watershed protection, floods, droughts, overgrazing, erosion and poor agro-ecological conditions of the soil further intensify poverty experienced by vulnerable groups and change of strategies for survival (Ellis 2000). Technological advancement, infrastructure improvements and access to markets have made it easier for them to sell forest products, however can also open up new alternatives for other income (Vedeld et al. 2004).

Access to resources are strongly defined by institutions. In a context of forest use, institutions have a direct influence on people's livelihoods, given that they shape the opportunities in the forest. Nevertheless, institutions may break down under certain exogenous events, sudden changes or trends. These include a shift in property rights over forest, technological change, introduction of environmental policies or large scale development projects. These changes demand establishing new institutions and new patterns of behaviour at local levels. Some changes introduce conservation while other may accelerate resource extraction (Campbell et al. 2007). To secure sustainable livelihoods is not the same as to secure sustainable resource use. While for some communities conservation improves livelihoods, for others livelihoods are improved through forest use and clearing (Dahal et al. 2010).

Livelihood strategies are not static, they are in constant dynamics and respond accordingly to changing circumstances, pressures and opportunities (Ellis 2000). Livelihoods are altered also by the household's assets, that may stay fixed over years or change within time.

4.2.3 Livelihood assets

Livelihood assets are all elements of livelihoods that are owned by the household. These assets may be described as stocks of capital or resources available at the household level and directly influence its' wellbeing. Different households will have access to different type of assets. This diversity defines what kind of portfolio of livelihood strategies a household can undertake at any particular moment. Researchers have identified several categories of assets. In this study I refer to a set of 5 asset types that help to get a more complete picture of the household's status: specifically, the natural capital, human capital, physical capital, financial capital and social capital (Ellis 2000).

Natural capital comprises a wide-range of environmental resources accessible for a household's use. Among those are land, water, trees, fish and other biological resources critical for establishing and maintaining livelihoods. Natural capital however is not constant, nor is its utilization which fluctuates over time, depending on various pressures and the ways it is controlled and managed. Natural capital includes both renewable resources that are naturally restocked and non-renewable resources like minerals, oil, metals. In short, natural capital is a resource-based component of the livelihoods.

Physical capital includes assets that facilitate diversification of livelihood strategies. It predominantly refers to infrastructural assets regarding water services, electricity supply, roads, technology etc. that increase opportunities for welfare.

Human capital refers to the labour available in the household. It is defined by such variables as education, knowledge, skills and health of the household members. Human capital increases with level of experience and investments into education and training. The asset has a tendency to change over time particularly due to internal demographic reasons (like marriage, migration, births, deaths), unexpected events (such as divorce, illness) or external circumstances (e.g. lack of education opportunities, healthcare services, etc.).

Financial capital encompasses monetary stocks and savings belonging to the household, as well as remittances and access to credit. Apart from cash, financial capital can also take other forms. For example, keeping the livestock in Sub-Saharan Africa represents a safety-net in times of hardship and can signify wealth status.

Social capital is an asset with many aspects. It tries to capture the social side of the community, level of trust and unity. Social capital is depicted from various social activities and groups the household is part of, its engagement with other community members and level of inclusiveness into society as a whole. A significant part of social capital are networks the household has, including those of kin or organizations, and relationships between individuals. Social capital is difficult to describe since some parts of it may be hidden and emerge only during long term observations (Ellis 2000). Social capital, nevertheless, plays a significant role to enable and secure diversity of livelihoods activities. This social dimension refers to expanding and maintaining both social networks of kin and community (Ellis 2000).

A diversified rural livelihood platform is comprised of more than just assets. It encompasses also processes, context, activities and outcomes. A framework for sustainable livelihoods analysis developed by Ellis (2000) provides a more profound overview of these elements (see Figure 1). The framework also unfolds how many aspects define the rural livelihood. Under this study I look at livelihood in terms of income. Although income and livelihood are not the same, income is often used to measure livelihoods. Specifically, a total household income entails various types of incomes. Incomes may derive from both natural resource based activities and non-natural resource based activities, undertaken by the household's members. Hence, a total household income for the purpose of this study includes both subsistence and

cash component. Forest income is also part of the total income, derived from the natural resource use.

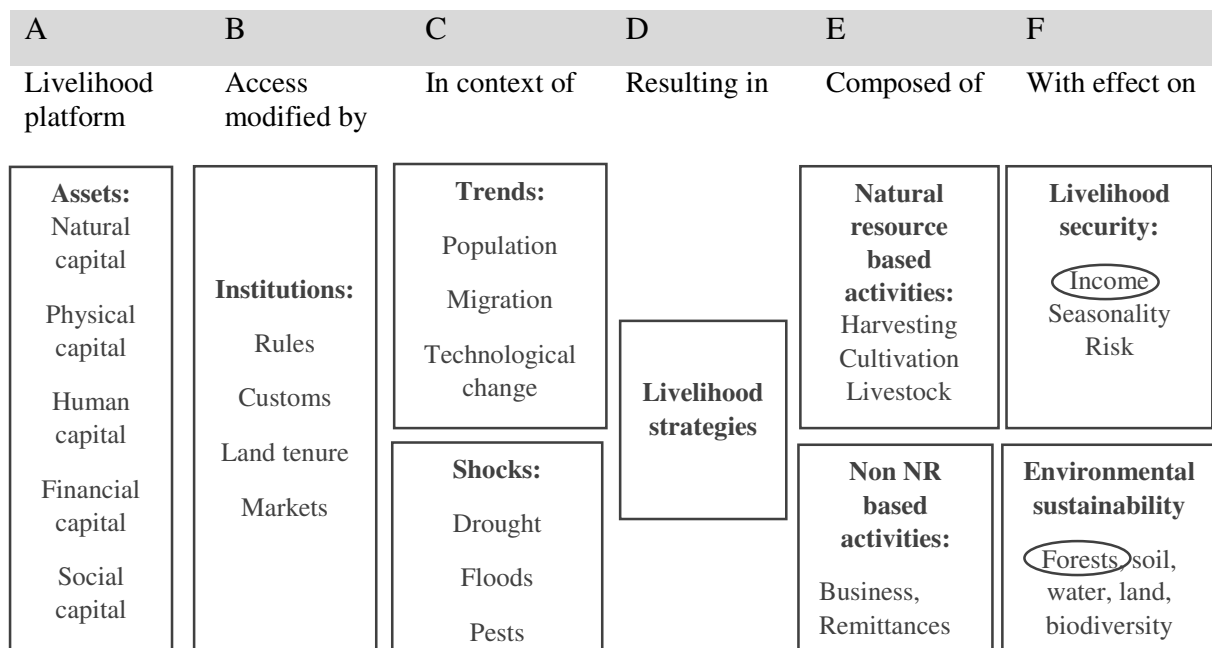


Figure 1. Framework for sustainable livelihoods analysis. Adapted from Ellis (2000)

The framework is essential for understanding what constitutes the household’s wealth and what variables may influence the income. This knowledge is vital when evaluating REDD+ impact on livelihoods.

4.3 Framework for the REDD+ impact analysis

REDD+ demands change in governance structures and resource regimes. That change alters economic actors’ rights to forest resources and patterns of interaction, that ultimately impacts livelihoods and change in forest status.

Changes in governance structures due to REDD+, however, only partially portray what happens when REDD+ meets grassroots level realities. There are additional elements that influence the economic actors, their interaction and resource use, and the impacts on livelihoods and forest status. These elements are environmental resource characteristics, technology and infrastructure, and the context involving shocks and trends.

Environmental resource characteristics directly influence the choice of the resource regime, as well as actions and interaction between the economic actors. Similarly, resource use and interaction between actors alters with advancement of technologies and infrastructure. Moreover, a great number of contextual factors should be acknowledged when evaluating impacts. Among important ones are trends and shocks. While trends refer to population growth, density or out-migration, shocks can be experienced due to such events as droughts, floods, pests or diseases. Combining all these elements together, I develop a final framework for REDD+ impact analysis (see Figure 2).

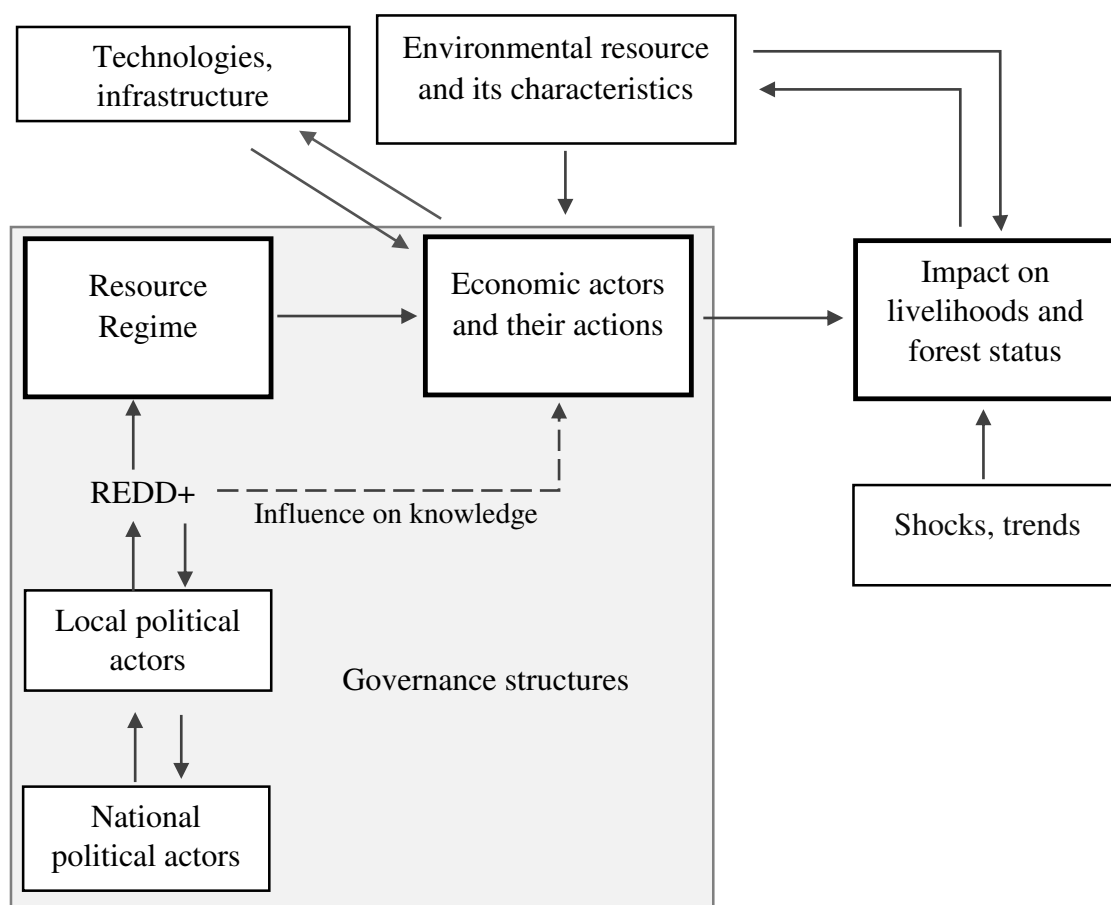


Figure 2. Framework for REDD+ impact analysis



Women outside the village office in Haubi waiting for the focus group discussion (picture from the fieldwork 2015)

5 Methods

This study is an impact evaluation of REDD+. In development studies, impact evaluations seek to investigate the impacts produced by an intervention and to learn what had worked or what did not and why to achieve expected results (Garcia 2011; Westthorp 2014). This chapter describes the methodological approach, data collection procedures as well the methods used when analysing the data. I will also reflect on research limitations and ethics.

5.1 The overall methodology

The study is designed using the Before-After-Control-Impact (BACI) methodology. It involves comparing data from the site with an intervention (the pilot) against a randomized control site without an intervention (the control). BACI allows to estimate the impacts looking at net-difference between the changes in pilot against those in the control (Jagger et al. 2010). The pilot is the main focus of this thesis and refers to the study area involved in REDD+. Data from the control represent a counterfactual, needed to measure the impact of REDD+ (Figure 3).

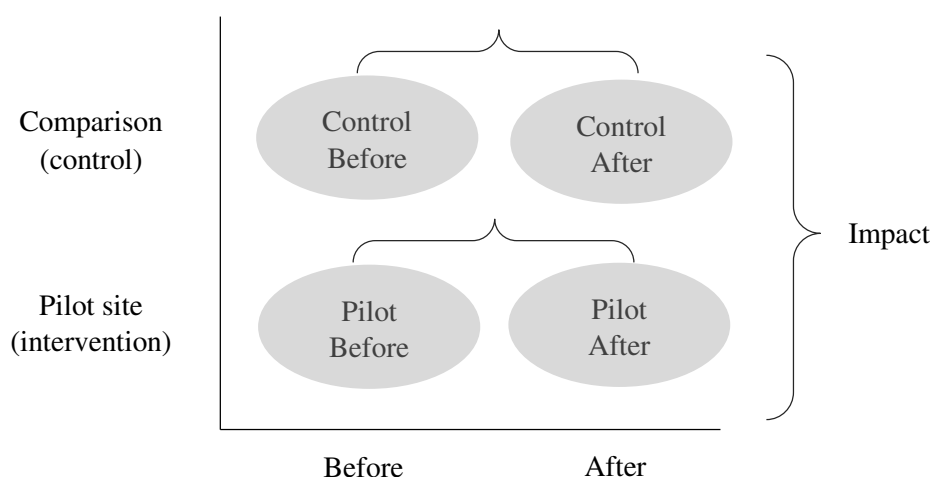


Figure 3. BACI method. Source: adapted from Angelsen et al. (2012)

In BACI, the quality of analysis is better when the control is nearly similar to the pilot. In practice, however, the control sites identical to pilots are non-existent (Jagger et al. 2010). Such factors play a role as the heterogeneity of communities involved and dynamic conditions they

live in. The control sites under this study were selected randomly, prior introduction of REDD+ and assuming that dependence of communities on forest resources is similar to a situation in the pilot sites. Similarity on several other key variables were vital to consider for selection of controls such as land cover, tenure and property rights, number of households, income situation, economic conditions, deforestation drivers and forest status, and policy framework.

This study includes five villages for an impact evaluation, three of which are pilots and the other two controls.

Given the impact evaluation is only relevant to RQ3 of this study, BACI approach is a key to mainly analyse the change in livelihood security in terms of income. Especially, I investigate whether REDD+ had effect on income. The RQ3 impact on the forest status is looked at using 'before' and 'after' sub-methodology of BACI. Similarly, the data 'before' and 'after' are used for RQ1 and RQ2 to describe changes in governance structures, changes in technologies and infrastructure, as well as contextual factors in both the pilot and the control.

5.2 Data collection

Two types of primary data are used to synthesize the analysis – data from 2010 and data from the fieldwork in 2015. The primary data under this study are collected combining both quantitative and qualitative research methods to establish a comprehensive overview on changes at the household and the village level and strengthen the impact evaluation.

This study employs three research instruments: a key resource person interview, a household questionnaire and a focus group discussion. While the household questionnaire is designed to gather data at the household's level, the other two instruments are designed to collect village specific information. Combined, the data from the three instruments are expected to provide a basis for the REDD+ impact evaluation.

5.2.1 The research instruments

5.2.1.1 Key resource person interview

The key resource person interview is designed to get a general overview on REDD+ as well as the situation in the area, including markets for agricultural and forest products, and gather village level facts on demographics, major trends and conditions in the village for the last five

years, changes in property and use rights and forest status. The key informants are the village leaders, AWF field representatives and the district officials (see Figure 4). They are primary local political actors influencing REDD+ locally.

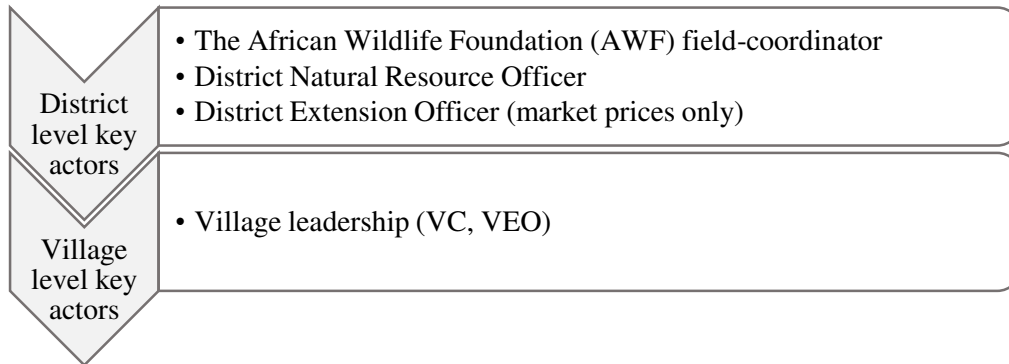


Figure 4. Key informants during the fieldwork to Kondoa district, November 2015

Together eight key informant interviews were conducted during the fieldwork. A structural interview guide (see Appendix 1) is used to lead the interviews, however a sequence and sum of questions varied depending on the key resource person’s role, competence and experience. For example, the Kondoa District Extension Officer was only inquired on district market prices for forest produce, livestock, land and agricultural products, following the same data collection method as in 2010. The interviews with the district natural resource officer or AFW representative took more form of an informal dialogue. Firmly structural interviews followed with the village leaders to cover utmost equivalent village specific information across both the pilot and the control villages.

Time and setting of the interviews varied. Most of the interviews were conducted in corresponding district or village offices and lasted in average one and a half hours, depending on respondent’s time availability, number of questions and length of responses. All interviews with the village leadership required a translation from Kiswahili, which added time. Direct translation, nevertheless, includes a risk of information’s misinterpretation either from the translator’s or respondent’s side, and required careful attention. Similarly, during the interviews I evaluated data trustworthiness. Some information obtained from the village leaders could reflect the assumptions rather than facts. That required to consult other sources. Likewise, evaluating the level of transparency was important when discussing sensitive

information on, for example, illicit activities or corruption. Village leaders might be part of such events.

During key resource person interviews I also collected the copies of the relevant village level documents such as the village maps, land use plans, forest management plans or JFM agreement (if available at the village office). Similarly, relevant project maps, reports or mid-term reports are collected for a review at the AWF office in Kondoa.

5.2.1.2 Household Questionnaire

The aim of the household questionnaire is to outline changes and map out household characteristics, assets, livelihood activities and strategies, use of land and resource access, property and use rights, social relations and attitudes to village governance, forest protection and enforcement, including change of norms. Given the same households are questioned as in 2010, the questionnaire covers the matching variables to the baseline for both pilots and controls, and encompasses close and open ended questions (see Appendix 2). Some additional questions are inquired in the pilot to capture attitudes and people's perceptions after REDD+ is implemented.

Following a list of respondents surveyed in 2010, village and sub-village leaders helped to find the same households and people. In case a respondent was absent or had died, the interview was conducted with the present household head or a household member. If the household had moved, it was omitted from the list. The number of responses in 2010 was 200, and included 120 households in the pilot and 80 in the control sites. In 2015 we were able to conduct one 158 interviews due to several cases of household's move. Moreover, logistical difficulties were more time consuming than expected and often the respondents were not present home. Hence, it was decided to conduct the majority of interviews nearby the village offices as the most convenient strategy. While the village leader mobilized the people, our research team interviewed available respondents at the different spots outside the village office, to ensure a privacy of the setting. Each interview was conducted with a translation in Swahili, and lasted in average one and a half hours covering more than fifty questions. All respondents were financially compensated for their participation.

5.2.1.3 Focus Group Discussion

Focus group discussion served as an additional source of information. The importance was to capture villagers' perceptions on changes in access, use and management of forest resources

and discuss the implications on social and political dynamics at the village level. A checklist was used to guide the interaction (see Appendix 3). Together fifteen focus group discussions were conducted: three groups in each of the five villages. We separately involved men, women and members of the Natural Resource Committee (VNRC). Gender division between men and women was advised in order to ensure integrity of the information and a comprehensive overview on gender-specific views, attitudes and perceptions. Also, women in a rural setting are more open to express their views without a presence of men. Focus group discussion with VNRC involved both men and women, given its purpose to inquire changes in forest status since the introduction of REDD+.

5.2.2 Sampling

Random sampling was applied to select the respondents for the household questionnaire, while the purposive sampling was used for the resource person interviews. The importance of the random sampling is to ensure a representativeness of the population. Key informants were selected purposefully, considering their roles and familiarity with the village facts and REDD+.

Focus group participants were selected combining random and purposive sampling. We purposefully conducted separate discussions with men and women, and tried to ensure that a random sampling is achieved. In practice, however, random selection was difficult. Given that condition, the sampling was based on a convenience and coordinated by the village chairperson. Convenience sampling refers to a situation when respondents are selected based on “availability, who is close at hands or easily accessible” (Bruce & Berg 2001:32). A significant limitation is that those living far from the village center might not be included in the discussion. Moreover, there is a risk that only wealthier or those in a good affiliation with the village government are selected for a better impression, thus restraining variation across participants.

5.2.3 Secondary data

Throughout the research process, I continuously reviewed various secondary sources of information such as the academic publications, the government documents, reports and websites relevant to fill the information gaps and support the background of this thesis.

5.3 Data analysis

The data were subject to both content and statistical analyses.

I apply content analysis to analyse qualitative data, collected from the key resource person interviews and focus group discussions. Specifically, recorded interviews were transcribed and organized into smaller units of information, themes and categories for data coding. This method helped to build up relevant categories for observations and outline dominant trends and narratives.

Data from the household questionnaire were analysed with excel and descriptive statistics using STATA. The household questionnaires of 2010 and 2015 were merged into a panel dataset, used to analyse the effect of REDD+ on income: total income and forest income. Panel data refer to “observations on the same units in different time periods” (Kennedy 2008:281). The sample is divided into four groups: the pilot before the change, the pilot after the change, the control before the change and the control after the change.

To estimate how REDD+ and other included variables affected the income over time, I used the following generic equation:

$$y_{it} = \beta_0 + \beta_1 area_{it} + \beta_2 t + \beta_3 area \cdot t_{it} + \beta_4 age_{it} + \beta_5 gender_{it} + \dots \beta_k distance_{it} + a_i + u_{it}$$

where y is the dependent outcome variable (income), β_0 is a constant, $\beta_1 area$ refers to pilot or control, $\beta_2 t$ is a possible time trend, $\beta_3 area \cdot t$ captures REDD+ effect, followed by a number of other explanatory variables that could affect the income, like individual's age, gender, education, marital status, assets of the household (wealth), distance to the forest among other. The $\beta_0, \beta_1, \beta_2 \dots$ are the parameters of the model that describe directions and strengths of the relationship between income and the factors affecting it.

A problem in studying developments over time is that there are variables we cannot observe. These unobserved variables can stay constant or change over time. The variable a_i captures unobserved variables that do not change over time. It is commonly referred to as unobserved time-invariant effect (Wooldridge 2009). For example, this might include certain demographic

features of the population, historical or institutional factors or unobserved heterogeneity between individuals.

The u_{it} is a time-varying error (t signifies time and i refers to the individual entity). It represents unobserved factors that change over time and affect y .

Fixed effects and random effects models assist to control for unobserved time-invariant effect a_i , however neither of the models can control for the error term u_{it} .

The fixed effects model is used, when we assume there is a correlation between the independent variables and the unobserved time-invariant effect a_i . To avoid the bias, a_i is omitted by subtracting average values for each individual (i.e., $y_{it} - \bar{y}_i$) and regressing on these differentials. The random effect model assumes that unobserved time-invariant effect a_i is uncorrelated with explanatory variables in all time periods. That means that variables affect each other randomly, and do not correlate.

In a nutshell, if a_i is uncorrelated with the x (variables as area, time, age, gender etc.), we better use random effects model. But if it is correlated, we use fixed effects. To statistically evaluate which method corresponds best to the data, I ran a Hausman test. If the Hausman test's chi-square (indicating if the null hypothesis is true) is higher than > 0.05 , I use the random effects.

5.3.1 Defining the household

A household is one of the main entities in the data analysis as it directly describes the economic actors affected by REDD+. The household refers to a group of individuals, including family members, who share the same dwelling, kitchen and rely on their various skills and assets to build the best possible livelihoods for the household's wellbeing over long period of time (Ellis 2000). Family members having an independent livelihood or working away from home are not considered part of this study, and their contribution to the household is treated rather as 'remittances'.

5.3.2 Income calculation

For the purpose of this study, income is looked at as the annual gross income of the household. Total income is calculated as a sum of gross earnings from various activities undertaken by the household in the previous year (2014). Both cash and subsistence income are treated as income. Agricultural outputs, livestock products and forest products used or sold by the household in

the past year, were valued according to the district level prices converted from the local currency Tanzanian Shillings into the US dollars (1000 Tsh = 0.46 USD).

Forest income calculation combines the household's gross income from collected or sold timber forest products and NTFPs.

5.4 Research limitations

For a number of reasons impact evaluations may fail. First, the project settings may be very complex and include series of economic, political, demographic or other changes, difficult to capture. It requires careful attention how well these changes are depicted through the research methods applied in data collection, analysis and interpretation. Second, BACI demands to use the same measurement instruments throughout the evaluation. This makes it difficult to be flexible in data collection and adapt research instruments to changing conditions and contextual factors that might affect the results. This raises a potential issue concerning the reliability of the data collection procedures - how accurately they represent the situation being described. Third, aspect of quality is critical (Bamberger & White 2007; White 2014). Primary quantitative data collected in 2015 should be consistent (including units and measurements) with the baseline data 2010. With respect to qualitative data, information should be carefully treated, given some information may have been exaggerated by the informant and some remained latent.

There were some issues involved in research practicalities during the fieldwork. For example, in the list of interviewees, names were sometimes placed in the wrong sub-village. Apart from the time constraint and unforeseen logistical issues for data collection, we were challenged finding the right respondents along with a fact that a time of our fieldwork collided with cultivation season. In addition, when visiting a village on Friday, we at times faced a problem with respondents departing to the village mosque for prayers (Islam is a dominative religion in Kondo District). Moreover, the interaction with the villagers required knowledge of the local language, Swahili. Given that a direct translation was used, there was a risk to miss some details or, besides, miscommunicate or misinterpret the information. For example, after the first day of interviews we realized that some questions were wrongly interpreted by the translators. To avoid the errors and ensure data validity, the wrong parts of these questionnaires were annulated.

It was also observed, that during the household questionnaire interviews some people were reluctant to give judgement to questions that regarded evaluations. For example, especially females often responded “I don’t know” to questions about satisfaction with rules.

5.5 Ethical considerations

One of the basic principles in research ethics is “do no harm”. This particularly relates to the power relation researcher establishes with the informant, and how that affects the interview conduct. More typically, ethics in academic research are the aspects of informed consent, anonymity and confidentiality (Rwegoshora 2016). Before every interview, I ensured that participants were informed about the research topic, intent and agreed to participate. Respondents consent was also obtained whenever a digital voice recorded was used during the interview. I also emphasized that all data collected would be treated anonymously. To respect local traditions and ethics of the rural communities, attention was paid to my dress code. Hence, during the visits to the villages, I mostly wore Tanzanian kanga, also covering my head. This gesture could play a role to establish initially critical trust with the respondents.



Eroded area in Kondo (picture from the fieldwork 2015)

6 A case study in Kolo Hills

This chapter presents a general overview of the study area, its socio-environmental background and the villages, involved in the study as the pilots and the controls. The villages are described based on the primary information collection from the key resource person interviews.

6.1 Study area

The study is based at Kolo-Hills forest reserves, located in Kondoa district of central Tanzania. Kondoa district is characterized by sub-humid and semiarid agro-ecological conditions, and is known for severe incidents of soil erosion. The driest period lasts from June to October (Makatta et al. 2015). The district's population according to census 2012 is 269,704 people (URT 2012). Two major ethnic groups in the district are Rangi and Sandawe, native to Kondoa. The other common tribes are Waasi, Burungi, Gorowa, Nyaturu and Barabaig. The dominant group Rangi are agro-pastoralists, practicing both farming and livestock keeping. Livestock in their society have always represented a status of wealth and insurance in times of hardship (Matilya 2012). The Rangi are predominantly Muslim and have adapted Islam since the 19th century, when the first Arab settlers came to Kondoa town. Islam is a dominant religion in Kondoa. That have facilitated a steady trend of population growth. In Muslim communities, men may have up to four wives, and each wife in average two children. The long term impact of increasing population is a pressure on the land and forest resources of the district (Lubova, pers. comm.).

There are several forest reserves in the area. They include two game reserves Swagaswaga and Mkungunero, and five government reserves named Kome, Salanga, Isabe, Chemche and Irangi Escarpment (Kasisi, pers. comm.). The Kolo Hills are part of the Irangi Escarpment area, which divides in Upper Irangi and Lower Irangi zones (Wasiwasi, pers. comm.). Elevation of the highlands ranges between 1650 and 2000 m (Makatta et al. 2015). The lowlands are more dry and receive a mean annual rainfall 675 mm. In contrast, the highlands are commonly moist with a frequent rainfall, up to 860 mm (Kikula & Mwalyosi 2004). Difference in precipitation patterns also affects forests' quality. The highland forests are predominantly shady miombo, while other areas are covered mainly by dry scattered scrub and dense 3-7 meters high bushland with emergent trees, reaching up to twenty meters (Kikula & Mwalyosi 2004).

The forests in the area play an important role for local people's livelihoods and have been traditionally accessed for timber products, farmland and livestock grazing (Bartholdson et al. 2012).

The Kolo Hills entail two continuous government forest reserves: Salanga and Isabe, located around 30 km from Kondoa town (Makatta et al. 2015). Salanga (8338 ha) is a central government forest reserve located in the highlands, and gazetted for the water catchment since 1941. To the South, where is the lowlands, it is contiguous with the local authority forest reserve Isabe (4249 ha), gazetted for the water catchment in 1954 (Kasisi, pers. comm.). The reserves are surrounded by villages in the upper and lower catchment areas (Bartholdson et al. 2012). Hence, some parts the forests outside the government reserves are found within the village boundaries.

6.2 Study villages

The Kolo Hills forest reserves and their contiguous parts on the village lands constitute the area under this study's interest. Particularly, three villages adjacent to the Kolo Hills are studied, namely Mnenia, Bereko and Kikore (see picture 1). They refer to the pilots. For the purpose of this study, two other villages Haubi and Gwandi are studied as the controls.

6.2.1 Pilots

6.2.1.1 Mnenia

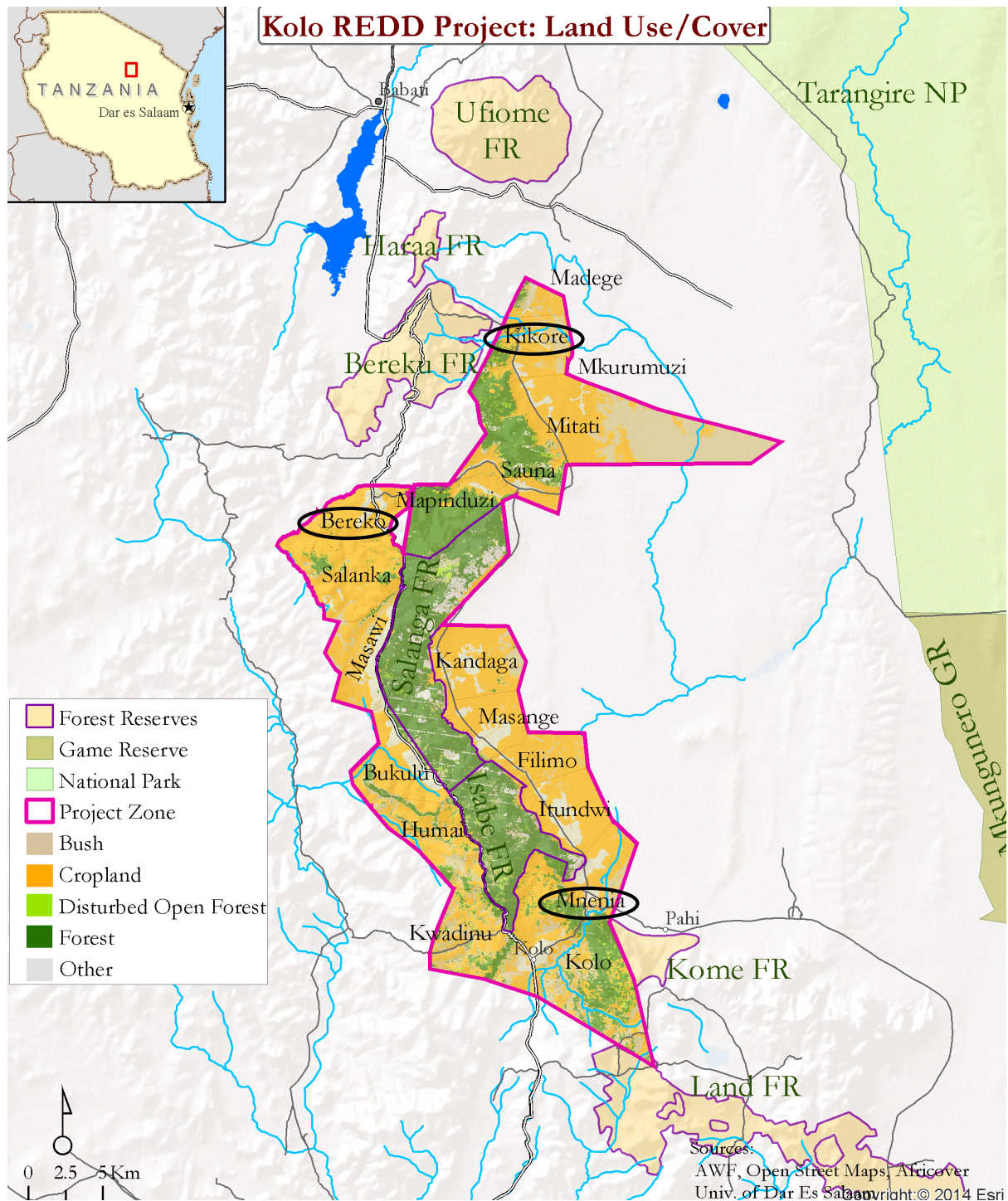
Mnenia is located 34 km from Kondoa town and borders with the Isabe local government forest reserve. There is also a part of community forest under protection, reserved for a later use. The village has a total population of 3328 people (URT 2012), and all represent the Rangi ethnic group. Given little land and high population, the village experiences land scarcity. The average household owns three to four acres of land and two to three oxen. One household can have up to ten children. The village is very actively engaged in social development projects and has more than twenty groups for community members to join, for example, a beekeeping, poultry group, credit union group, among others (Muru, pers. comm.).

6.2.1.2 Bereko

Bereko village is located 65 km from Kondoa town (and 40 km from Babati town in a neighbouring district) and borders with the Salanga central government forest reserve. The total

population are 4810 people (URT 2012). The tribes present in the village are Rangi, Wagaroa and Wasi. Water supply is commonly good, providing favourable conditions for agriculture and livestock keeping. Around 90 per cent of the land is crop land, nevertheless due to population growth the villager suffers from land scarcity. More than 25 per cent of villagers own livestock, in average five-ten oxen per household (Kaiti, pers. comm.).

Picture 1. Study area of the Kolo Hills forest reserves and pilot villages under this study



Source: AWF, 2015

6.2.2.3 Kikore

Kikore is located 91 km from Kondo town, and 8 km from the closest external market in Galapo. Kikore has a continuous village forest. The village has about 2650 inhabitants (URT 2012), and the most ethnically diverse community with the Rangi, Wagogo, Wamakua, Wairaque, Wasandawe and Wangindo tribes. All are farmers, yet Range and Wagogo also own livestock. There is frequent in-migration to the village thanks to the secure water access. Kikore has a water irrigation system canal built in 1984, advantageous for a stable food security. Village has sufficient land and also good soil fertility (Mpolela, pers. comm.).

6.2.2 Controls

Two control villages that complement the study are Haubi and Gwandi. Haubi village is geographically close to Mnesia, while Gwandi is found in the neighbouring Chemba district. Figure 5 shows approximate locations of the controls in relation to the pilots.

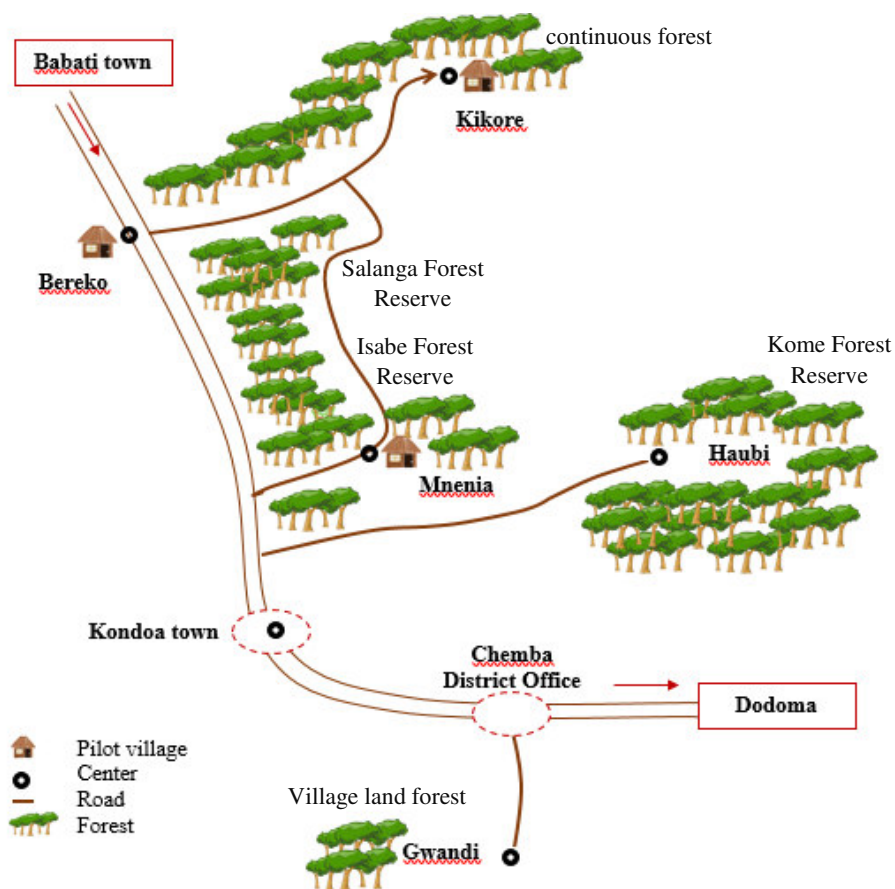


Figure 5. Location of controls and pilots in the study area. Source: The map was sketched by the District Forest Officer Ramadhani Hamisi during the fieldwork in November 2015.

6.2.2.1 Haubi - control

Haubi is located 30 km from Kondoa town and has a total population of about 6400 people, predominantly Rangi (URT 2012). Due to large population and a lot of livestock, land scarcity is an issue. Water availability is good thanks to the Haubi lake in the ward. The village is located in the Irangi Escarpment area and borders with the Kome central government catchment reserve. Haubi has also a village forest (Lubova, pers. comm.).

6.2.2.2 Gwandi - control

Gwandi is located in the Chemba district, 130 km from Dodoma. The village has 1740 inhabitants, representing several ethnic groups: Burunge, Gogo, Sandawe, Rangi, Maasai and Barabaigs. Barabaigs and Maasai are pastoralists. There is no land scarcity in the village, however land is commonly dry and do not bring much yields. Gwandi has an open access forest, and a village forest for limited use (Pamba, pers. comm.).

6.3 Ecological and social background of the study area

The forests of Kondoa and its environmental conditions have been under a constant change. During the British rule, the Lower Irangi area was severely deforested in an effort to eradicate the tsetse fly (Matilya 2012). From 1927 to 1954 over 469 km² of bush was lost. Households from highlands were displaced to the lowlands, leaving the area overstock with livestock. Signs of erosion already emerged in 1935. By 1968 the situation became serious and Kondoa District Council proposed the by-laws prohibiting grazing, digging water irrigation canals and cutting trees within eroded areas without a permit. The by-laws, however, were never implemented (Kikula & Mwalyosi 2004). In 1973 the Tanzanian government had introduced a harsh top-down project HADO to rehabilitate the area. The effort was put on afforestation and displacing people and livestock from eroded sites (Christiansson et al., 1993). The chaos of evictions, livestock losses due to thefts, droughts and overgrazing had impoverished the well-off households. Lack of manure had moreover distressed the agriculture, increasing poverty. More than 50 per cent of population relied on forest income, especially from charcoal, timber, bee-keeping. Deforestation, illegal grazing, deliberate bushfires were common and signalled also a protest to HADO rules. Court cases against such activities increased threefold in 1979 (Kikula & Mwalyosi 2004). The HADO went dormant since donor withdrawal in 1996 (Ligonja & Shrestha 2015). While erosion was reduced, HADO left devastating social consequences. A widespread scepticism to development projects have remained to date among many villagers.



Despite a zero-grazing policy, communities continue to practice animal grazing in the forest, which implies encroaching (picture from the fieldwork 2015, Haubi village)

7 Results

The REDD+ project “Advancing REDD+ in the Kolo Hills Forests (ARKFor)” was launched by the African Wildlife Foundation (AWF) in 2010. While most REDD+ projects in Tanzania focus on the village land forest areas, the AWF project in Kondoa targets government forest reserves and continuous⁷ village forests. AWF had been engaged to protect the catchment forest reserves of Salanga, Isabe, Kome and Irangi Escarpment since 2006 (Charnley & Overton 2006). The aim has been to secure the water supply for the Tarangire River, the only reliable water source for the wildlife in the Tarangire National Park (Matilya 2012). Protection of the Kolo Hills catchment reserves is of interest also to the central government, given that Tarangire National Park is a significant revenue provider thanks to tourism. Establishing protection under REDD+ demanded numerous changes. That included changes in the management of land and forests, education and training of the villagers, developing alternative livelihood groups, securing REDD+ payments, among other. This chapter outlines some issues of REDD+ implementation in practice, and describes pre-REDD+ conditions in both pilot and control villages. The chapter further presents the results of the study highlighting the output, outcome and impact of the REDD+ project. I divide this chapter in six parts. The first two debrief on REDD+ implementation process and pre-REDD+ conditions in the pilot and the control villages regarding forest management. The next four parts present the results, following research questions.

7.1 Implementation of REDD+ in the Kolo Hills

AWF planned to include all 21 villages surrounding the Kolo Hills reserves in the project. In the end 19 agreed to participation and one was excluded due to noncompliance with the REDD+ criteria for payments. There was actually strong resistance to join REDD+ in five villages, three of which still agreed to join REDD+. The other two resisted due to political reasons, grounded on scepticism to conservation and poor understanding of the REDD+ idea. For example, one village refused to participate believing restrictions under REDD+ could be similar to those in the national parks, enforced by TANAPA (Tanzania National Park

⁷ Continuous parts of the government forests on the village land

Authority). Violent enforcement in the national parks is common, and encroaching livestock may also be killed. Villagers feared that restrictions under REDD+ could be the same. In the other village people believed, that accepting REDD+ money is giving away their forest to the government (Kasisi, pers. comm.). During the outset of the project some village leaders did not feel free to accept REDD+, distressed of being neglected from any future development support from the district (Makatta et al. 2015). Other studies criticise AWF for taking-off the project without sufficient participation of local communities in decision-making (Bartholdson et al. 2012). In spite that AWF held regular meetings with the village councils and village assemblies, they had not been able to fully engage the communities. To facilitate the process, AWF started to pay villagers for attending the meetings about REDD+. There were further some issues during REDD+ implementation. Most notable is that restrictions under REDD+ came in force prior to commencement of the alternative livelihood groups. Solutions how villagers would sustain livelihoods without the forest, including cattle grazing, were not clear. Similarly, the process of compensation was also not clear. Villagers were promised to be paid, nevertheless, it was not defined when the money could reach the communities. Moreover, villages were warned, in case of leakage⁸ they would not be compensated. Since no alternatives were established timely, a leakage would most probably occur (ibid.).

7.2 Pre-REDD+ conditions regarding forest management

7.2.1 The situation in pilot villages

The local communities surrounding the Kolo Hills have for long been under the rules of command regarding use of their natural resources. Various political actors have historically imposed the rules under different policy interventions, the HADO being remembered as one of the most distressed. Such policies at most considered conservation and neglected the views of the communities. The villagers were pressured to change their traditional practices of farming and livestock feeding in the forests. For example, the Kondoa District Council (further referred as the district) had prohibited shifting cultivation in the area in order to prevent bushfires and erosion due to slash and burn practice. The rule has been respected for more than 20 years (Wasiwasi, pers. comm.). Among the three pilots under this study, few shifting cultivators

⁸ Leakage occurs when the villagers would start to use and extract the forest products from the nearby forests after having restricted access to their local forest.

remain only in Bereko village (Kaiti, pers. comm.). Similarly, traditional free grazing has been constrained and limited for protection of forests and land. A zero-grazing policy was introduced since HADO times and is in force until today as an alternative to grazing. The policy demands feeding livestock on the household's territory, and forbids to own more than four oxen per household (Kasisi, pers. comm.). However, it has not been respected in practice, including in Mnenia, Kikore and Bereko. Since the gazetting of the forest reserves, activities in the Kolo Hills are restricted. With much livestock, but little grazing land, the District Council developed an exceptional by-law (according to provision of the Forest Act 2002) to favour the communities and allow oxen grazing in the forests during the dry season from December to April. No other animals allowed, including goats, donkeys or cows except the limited number of oxens. Nevertheless, encroachments to forests for grazing, as well as other activities were common (Kasisi, pers. comm.). While the Kolo Hills reserves have been under formal supervision by either the district or the central government staff, the village leaders of Kikore and Mnenia explained, their continuous village forests had no rules set for forest use, nor were monitored by anyone. Villagers freely accessed forest resources for timber, charcoal, grazing and farmland.

From 2004 to 2011 the management of the government reserves and continuous village forests underwent three significant changes: the vacuum in enforcement of rules in the government reserves, initiation of CBFM, and introduction of TFS as a new owner and manager of state forest resources (more on TFS in 3.3.1.2 section).

In 2004, scarcity of funds from the central government to support conservation work led to redundancy of several district's employees involved in forest issues. Without the formal supervision, the government's catchment reserves became *de facto* open access (Wasiwasi, pers. comm.). It is, however, uncertain how well the forests were controlled before the redundancy in order to understand the impact of change on deforestation. Nevertheless, a period between 2004 to 2009 is described by the Kondoa District Natural Resource officer as uncontrolled deforestation. Continuous forests on the village lands⁹ were also a subject to increasing degradation. To control forest use in both local authority forests and national forest reserves in accordance with the provisions of the Tanzania Forest Act 2002 was assigned to the district. Shortage of human resources, funds and working tools to oversee the forests

⁹ Forests are on the village land, given that all villages around the Kolo Hills reserves have Village Land Certificates since 2007 (Kasisi, pers.comm.). Hence the continuous village forests are under authority of village council, but are not managed.

resulted in forest monitoring once in few months. Grazing, cultivation and charcoal making were the most frequently observed violations (Kasisi, pers. comm.).

Between 2007 and 2009, AWF initiated the first PFM activities in the district. By the end of 2009, four villages got formalized the Village Land Forest Reserves under CBFM. Among those was Mnenia village (Wasiwasi, pers. comm.). Introduction of PFM was the ground-breaking step to recognize local villagers as the managers and the right-holders to their village forests.

The further change was introduced in 2011 with the establishment of a new central government agency for supervising state's natural resources – TFS. With the primer duty of revenue collection and enforcement, presence of the TFS in Kondoa have signalled that the central government regained control over its national reserves in the area.

7.2.2 The situation in control villages

The community of Haubi has been affected by the same changes regarding forest management as the pilots. Shifting cultivation is no longer practiced and zero grazing policy in force since HADO times. Similar to pilots zero grazing remains only on paper and people traditionally prefer livestock grazing in the forests. Haubi was part of the HADO afforestation programme and many timber trees were planted on the village land. Wealthier households were also given seedlings for their farms. Majority of rules were followed during HADO, yet since the end of 1990s deforestation had intensified. The village has been traditionally involved in timber trade with the outsiders from Kondoa which led to extinction of few timber species in the forest. The village continue the activity relying on the woodlots planted twenty years ago. Cutting a tree, however, requires a paid permission from the district (Lubova, pers. comm.).

In Gwandi, villagers have always freely accessed forest resources from their village forest, including for the livestock grazing. According to the village chairman the forest has been very rich with timber species and biodiversity, some used for bush meat. There is also a space in the forest used for spiritual purposes. In 2009 Gwandi have embarked on PFM, and in 2010 have formalized a Village Land Forest Reserve under CBFM. Some part of the forest, closer to the village centre, remained *de facto* open access (Pamba 2015).

7.3 REDD+ governance structures

After several years of uncontrolled forest use around the Kolo Hills, “REDD+ came to put responsibility of forest management on the community’s shoulder”, the AWF field coordinator explained in an interview (Wasiwasi, pers. comm.). The strategy was to build REDD+ on PFM, in order to ensure that it followed formal requirements for communities’ participation in the forest management. While most REDD+ projects in Tanzania target unreserved forests on general land, the REDD+ project in the Kolo Hills aims to strengthen protection of the government forests through JFM. Some villages with continuous forests have also embarked on CBFM, hence, the project combines emphasis on both JFM and CBFM. Given that, the approach is novel to forest management in Tanzania. In practice it implied introducing the new type of actors and forming new institutions.

7.3.1 New actors in pilot villages

Two types of actors were introduced as part of establishing CBFM and JFM: the autonomous Village Natural Resource Committees (in both JFM and CBFM) and a joint inter-village organization for overseeing the Kolo Hills reserves - a partner to the JFM agreement.

Together the REDD+ project includes eighteen villages, thirteen of which are adjacent to Salanga or Isabe, and five with continuous forests on their village lands. In accordance with the PFM guidelines, each village has to elect an autonomous Village Natural Resource Committee or VNRC responsible to draft the by-laws for forest resource use and ensure their enforcement. VNRC involves community members (six to twelve), both men and women.

Establishing the JFM agreement demanded to form a community level partner-organization – JUHIBEKO. JUHIBEKO is an inter-village forest management group working on behalf of the thirteen villages adjacent to Isabe and Salanga reserves (Kondoa District Council 2015). The group involves 39 members - three VNRC members per village, elected by the majority vote. As a partner in JFM agreement, JUHIBEKO represents a voice of the forest-adjacent communities. As such it is also a new forest manager on behalf of village governments to supervise and protect the Kolo Hills reserves (Kondoa District Council 2015).

7.3.2 New resource regime institutions in pilot villages

What makes this study especially interesting is that initial forest governance around the Kolo Hills forest reserves fall under different regimes according to the property rights structures.

Respectively: (i) the Central Government /National Forest Reserve Salanga under authority of the Tanzania Forest Service, (ii) the Local Authority Forest Reserve Isabe under authority of the Kondo District Council, and (iii) continuous village forests under authority of the village councils. Introduction of REDD+ has influenced these types of resource regimes and created the new ones (see Table 5).

Table 5. Change of resource regimes

Pilot	Adjacent forest	Resource regimes/forest tenure	Resource regimes under REDD+
Mnemia	Isabe	Local Authority Forest Reserve	JFM with REDD+
Bereko	Salanga	National Forest Reserve	JFM with REDD+
Kikore	Continuous village forest	Unmanaged village forest	CBFM with REDD+

New resource regimes indicate a shift in property and use rights to forest resources. This is essential in regards to REDD+, given that clear property rights are the foundation for making REDD+ work on the ground.

7.3.2.1 Property and use rights

With respect to the property structures under JFM with REDD+, the state and the local government remained the forest owners. Under the agreement, however, the forest adjacent communities were granted the rights to access certain benefit streams. Such rights were granted to incentivise community's involvement in forest protection and sustainable use. The healthy forests are of the equal importance to the villagers as to the state.

Under JFM agreement, communities were primarily granted the rights to the carbon benefits as part of REDD+ arrangement. Moreover, the agreement clarifies authorized resource uses and community's rights of withdrawal, management and exclusion. Withdrawal rights define that access to such resources as firewood, honey, fodder, medicinal plants and non-timber forest products are allocated to the users under conditions that would not jeopardize the forest health (Kondo District Council 2015). Hence, the forest users also become the forest managers and onlookers, responsible for sustainable forest use. The management right predominantly is represented by the JUHIBEKO, responsible to control forest activities and enforce the formal rules. The right of exclusion determines that only communities adjacent to the forest reserves of Isabe and Salanga have the right to access the reserves and benefit from the authorized uses in accordance with the JFM agreement (see Table 6).

Table 6. Change of rights to forest resources in JFM under REDD

Rights	Before REDD+ (on paper)	Before REDD+ (in practice)	After REDD+ (on paper)
Access	Limited	Free access	Limited
Withdrawal	Right to limited resources	Right to all benefits	Right to limited resources; right to carbon benefit
Management	No management rights. Forests are managed by the central and local governments	No management rights. Forests are managed by the local government (district)	Community has forest management rights
Exclusion	Villagers do not have formal rights to resources	Villagers had informal rights to resources	Villagers have formal rights to resources, but under JFM conditions

Regarding the continuous forests on the village land, that had been unmanaged, the change in the governance structures resulted in a shift of the property rights: from *de facto* open access to a common property under CBFM. Under such change the village council became an authorized forest owner, and community granted the common use rights to forest resources. The change has a similar implication on community's rights to access, withdrawal, management and exclusion as under JFM (in Table 6 referring only to the two last columns). A notable difference between the two regards, however, the right of access and withdrawal for grazing. Under JFM agreement grazing is seen to reduce forest quality and biomass. Hence, rights to grazing remain confined. Such a condition has been instituted to regulate a side-effect that grazing may impose on opportunities for other forest users (e.g. benefits from carbon). Under CBFM the livestock grazing is allowed upon a paid permit. Hence, the village council has more autonomy over community's needs compared to JFM, where the bigger 'share' to define the conditions for forest use remain with the owner – the government. It is important to note, that grazing in the forest remains to be a strong informal institution in Kondoa and a norm practiced by the majority. More on villagers' adaptation 'after REDD+ in practice' I will discuss in section 7.4.

7.3.2.2 Forest utilization

Managing resources under new resource regimes demands new formal rules, based on a system of permits. Under the JFM, any forest use that imply deforestation is prohibited. Prohibited as well is bush meat hunting to protect biodiversity. Forest use for grazing, inferring degradation, is strictly confined. Furthermore, no person is allowed to access the forest without permission

(see Table 7). The rules are formal, individually claimed and all permissions are issued at the village office. The forest adjacent communities are informed about the rules during the general assembly. Everyone is allowed to express their concerns, however no follow up is expected. “When the rules come from the top, the village does not have power to change them”, clarified Bereko village chairman (Kaiti, pers. comm.).

To organize collective user rights under CBFM have similarly required a system of permits. In contrast to JFM, villagers are freely allowed to access the forest for fuelwood, medicinal plants and other non-timber forest products (NTFPs), except the bush meat. Authorized permit for other activities (see Table 7) is issued at the village office (Mpolela, pers. comm.).

Table 7. Forest utilization under JFM and CBFM regimes

Permit	JFM with REDD+	CBFM with REDD+
Forbidden	Settlements, farming, fire, bushmeat hunting, timber harvesting, grazing of animals except oxen, charcoal making, collection of medicinal plants, traditional beekeeping; to carry axes or any other weapons	Settlements, farming, fire, bushmeat hunting, timber harvesting
Paid permission required	Firewood (only dry wood allowed to collect on Saturday and Sunday =1000 Tsh/bundle), fodder (=500 Tsh/bundle), NTFPs (=1000 Tsh/year) Grazing of oxen between October 1 to February 28 (500 Tsh per head per day)	Poles collection Grazing without a limit on livestock number (200 Tsh per head per day)
No permission required	Rituals	Firewood (but only in designated forest area), charcoal making (charcoal should be from the group and packed in a labelled bag), NTFPs and collection of medicinal plants

As shows Table 7, local communities of Bereko and Mnenia have more prohibited activities than residents in Kikore. In JFM every activity allowed requires permission, including collection of firewood, poles, mushrooms, wild fruits, fodder or grazing (during dry season). Farming, settlements, collection of medicinal plants, bush meat hunting, traditional beekeeping, charcoal and timber harvesting or setting fire are forbidden activities in the forest. Kikore residents have much easier access to resources. No permission required for firewood, medicinal plants, NTFPs and charcoal production. Firewood collection, however, is allowed only in a designated area for use. Production of charcoal is permitted only under sustainable

charcoal group guidelines (the group is part of the alternative livelihood groups under REDD+). Paid permission required for collection of poles as well as livestock grazing. No certain limit has been imposed on animal number (Mpolela, pers. comm.).

The system of permits has, however, not yet been functioning well in all villages under JFM. It seems to be working in Mnenia, where the majority of villagers follow the rules, according to the forest scouts. An implication of payment for firewood, however, burdens the rural women. They commonly have limited income. In Bereko, nobody yet has requested permission. The village chairman mentioned several reasons. First of all, people are not accustomed to do it. Secondly, a distance to the village office seem to play a role. Third, the JFM agreement came first into force in 2015 (Kaiti, pers.comm.). Moreover, many prefer to engage in illicit activities during the night, rather than paying permission. This has been also observed for the livestock grazing (Mpeneka, pers. comm.). Furthermore, during the fieldwork it was revealed, that many in Bereko remain confused regarding grazing rules. While under the old rules grazing was limited for a period from December to April, the new rules mention a period from October to end of February. There were several livestock keepers in Bereko confident no grazing is allowed since 2015. This information also had been confirmed by the Bereko scouts during the focus group discussion. Such conditions had led to an ongoing conflict between the livestock keepers and the forest scouts, and left many frustrated. One villager from Bereko explains: “There is still grazing in the forest, because we need it. We have too much cattle and too little land. No enough fodder either. My cattle die of hunger. Forest rules have worsened my livelihood and my cattle’s. Compensation maybe is a good idea, but money cannot help to establish grazing land”. Another Bereko villager explained that even if he would protest the rule during the general assembly, nobody would listen to him.

With respect to enforcement of rules, JUHIBEKO patrols the forest several times a month, and at least once a week. In case of capturing a person a penalty implies either a warning, a small fine or an arrest. For example, for cutting a tree, the scouts give an arrest, confiscate the tools and report an issue to TFS. TFS fines according to severity of the issue. The common fine for tree cutting is 100.000 Tsh, for cutting mseseva species the fine is threefold (300.000 Tsh). For grazing - the fine is 30.000 Tsh per one cattle head (Kaisi, pers. comm.). For minor offences the fine can be 10.000 Tsh. During the interview, Bereko scouts informed, that clarifying property and use rights under JFM have helped them a lot. Before REDD+, the villagers did not know how to deal with those destroying the forest. They feel empowered and better educated now, being part of JUHIBEKO. Similarly, the community members are observed to

be more empowered and active in reporting violators. It was not common before, explained the scouts.

Enforcement of the rules in CBFM forest is under the VNRC responsibility. Two or three VNRC members patrol the forest two times a week. For every arrest a penalty is 50.000 Tsh. The most severe case in Kikore was an arrest resulting to person's 6 months' imprisonment due to immense illegal charcoal production. A villager was not willing to join the sustainable charcoal group and was punished for continuing illicit production autonomously (Mpolela, pers. comm.).

7.3.2.3. Benefit sharing system

The novel part of REDD+ to the JFM is concluding on a benefit-sharing model: an 80-20 rule. It permits the forest adjacent villages (as the forest managers) to receive 80 per cent gains from the fines retained in the Kolo Hills committed offences, while 20 per cent goes to the TFS or the district council respectively as a forest owner. Further, the community share of 80 per cent is divided into two parts: 60 per cent to JUHIBEKO and 20 per cent to the village councils. 100 per cent of the revenues from all fines and permits in case of CBFM goes to the village council, of which some part is invested into community development and some to maintain VNRC and forest management activities (Kasisi, pers. comm.).

7.3.2.4 Problems policing the rules

There are several weaknesses to highlight with respect to policing the rules in practice. Foremost, JUHIBEKO performs the duty voluntary. Forest scouts depend entirely on fines they collect in the forest. Sometimes it is only sufficient to cover transportation and food. Sometimes, if nobody is caught, they spent personal costs. It could mean that some fines remain unreported. Such enforcement is allowable to maintain scout's motivation, according to the District Natural Resource Officer (Kasisi, pers. comm.). The JFM guidelines are incomplete also with respect to court cases. If scouts have to come to the court as witnesses against an offender, the costs at most are covered from their personal budget. Spending of JUHIBEKO money from an account otherwise require agreement involving all village council members, which is impractical. Other challenges mentioned, for example, with respect to the actual work. Information leakage is observed to be a problem. The villagers often themselves overlook when patrol is coming and report it to others via mobile phones. The information spreads quickly because of technology, and offenders may escape the forest before the patrol even

reaches the place. Hence, work of patrol becomes ineffective (Kaiti, pers. comm.). Encroachments and illegal activities also happen during the night, and cannot be controlled. Moreover, not in every village JUHIBEKO authority is respected. It was reported in Bereko, that wealthier forest encroachers often neglect or ignore their commands. To have more influence, patrol sometimes uses violence. One villager from Bereko explained “Patrol mistreat people and cattle grazing in the forest. They grab and hit the livestock and even kick the villagers, or pull them by the hair”. JUHIBEKO scouts from Bereko clarified, that using minimal violence is important for strengthening their authority. Conflicts are usually resolved via the court.

Similarly, there are advantages JUHIBEKO portrays. For example, when VNRC patrols the village land forest reserve, like in case of Kikore, members of the patrol and those violating the rules come from the same village. An offender can easily be a neighbour, a friend or a member of kin. Everybody knows each other. It leaves either a space for corruption, neglecting offence or develop a conflict between the community members. AWF field coordinator explained, JUHIBEKO mixes representatives from different villages for a reason to avoid such risk (Wasiwasi, pers. comm.).

In addition, during the interview with the District Natural Resource Officer it was revealed, that both JUHIBEKO and the district feel demotivated working with TFS. TFS portrays only an interest in collecting revenues, expecting JUHIBEKO to perform the work and catch violators. Moreover, TFS are employed on a salary basis, compared to JUHIBEKO scouts. Similarly, the district feels financially marginalized by unequal benefit sharing with TFS. They perform common monitoring of the central government reserves, which by authority are not under district’s jurisdiction (e.g. Kome catchment reserve), however the benefit sharing from penalties follows a rule 95:5. It implies that the district receives 5 per cent of the gain, while TFS keeps remaining 95 per cent of the revenue. Such system discourages the district to maintain forest protection, monitoring or policing (Kasisi, pers. comm.).

7.3.3 Governance structures for forest management in control villages

In the period of piloting REDD+, between 2010 to 2015, in both control villages have also happened some attempts to control deforestation.

7.3.3.1 Haubi

In 2012 Haubi was included in the Tarangire Water Conservation Project. It targeted to strengthen protection of the central government Kome reserve, which Haubi community had been encroaching for several years (access to the catchment reserve is forbidden). The project involved the district, TFS and 4 villages – Haubi, Mafai, Ntomoko and Busi. Funded by the Tanzania Forest Fund, the project planned to establish a JFM agreement. However, it was not finalized due to withdrawal of the funder the next year. The Natural Resource Officer clarified, that the district council was employed in development of JFM and forest demarcation, however had inadequately spent the project funds, which enabled the funder to freeze the project development (Kasisi, pers. comm.). In 2013 the district assisted Haubi to independently form the VNRC and to develop forest management by-laws in order to control the use of a degrading village forest (Lubuva, pers. comm.). Authority of the VNRC was to supervise activities in the village forest, while the district with the TFS continued patrolling the Kome forest reserve, following provisions of the Forest Act 2002.

The village by-laws forbid any activity in the village forest, except the firewood collection (without a permit). In other cases, offenders are fined 5.000-10.000 Tsh. Grazing is restricted to enable “zero grazing” policy. Poles and timber harvesting allowed only on the general lands or from the private woodlots with a paid permission to TFS. The village chairman clarified, that selling timber in Kondoa town without a permit may result in a fine from 500.000 Tsh to 1 million Tsh.

In spite the institutional changes, the village fails to control deforestation in the village forest. The rules are not respected, including grazing, and deforestation intensifies with the population growth. According to the village chairman “by-laws are not working, neither effective are VNRC patrols”. Illicit timber harvesting and encroachments for grazing and farming are the most common activities in the forests (Lubova, pers. comm.).

7.3.3.2 Gwandi

In Gwandi, the village has embarked on CBFM in 2010. Moreover, *de facto* open access forest located nearby the village center developed into a hybrid between the general land and a managed village forest. Part is regulated by TFS and part under the village council. This is example of a situation where the National Land Act 1999 and Village Land Act 1999 are conflicting (issue discussed in 3.3.1.1).

The rules apply to both CBFM forest and the village forest *de facto* open access. CBFM forest is located far from the village center, and hence, is used only for firewood collection (in high quantities) and charcoal making upon paid permit. Bush meat hunting, livestock grazing once freely allowed before, under CBFM became forbidden. Activities on the general land forest similarly require paid permit. Allowed activities are timber harvesting (permit paid to TFS), livestock grazing and charcoal making (permit paid to village council). Given low agricultural productivity in the village, there is also an exceptional by-law permitting agricultural expansion in the open access forest upon a paid permit. Firewood for household use is at most collected from the private woodlots. There is a lot of livestock in the village, nevertheless a change in rules have not caused any conflicts, according to the forest scouts. Pastoralists, living in the village, may own up to 250 livestock per household.

Commercial firewood and charcoal making seems to be an important income sources to the village. For example, firewood collection requires a permit worth of 20.000 Tsh per seven tons truck for villagers and 60.000 Tsh for the outsiders, with a maximum one permit per month to regulate the use. Charcoal making involves two payments, depending on number of trees cut and the size of the bags used for the output. Charcoal making have been a traditional income generating activity for the village, and many outsiders come to the village for charcoal.

Rules are enforced by VNRC patrolling the forests twice a month. Also outsiders encroach the forest, and community members cooperate with VNRC to report the offender. The revenues from fines and permits are shared between the village leadership and the VNRC applying a 30-70 rule, where 30 per cent goes to the village and 70 per cent to the VNRC to maintain control over resource use (Pamba, pers .comm.). To obtain data on revenues has not been part of my study, however in case of Gwandi, the village chairman reported that in 2014 the total income from the permits and fines was close to 1 million Tsh (1000 Tsh = 0.46 USD).

7.3.3.3 Overview

Governance structures for forest management in the controls are different, yet their effectiveness on forest cover might be the same. The strategy in Haubi is focused to forbid activities inside the forest, while Gwandi controls forest use through a system of permits (see Table 8). The study results suggest that in Haubi the formal rules remain only ‘on paper, are not well respected by the villagers, nor are effectively enforced on the ground by the VNRC. Encroachments continue also into the Kome catchment reserve. In Gwandi regulations seem working, given revenues collected, however the effect on forest cover is not clear, given variety

of permitted activities. Neither is clear if the rules are respected by the community and how effective in the enforcement.

Table 8. Forest use regulations in the control villages

Permit	Haubi village forest, not formalized under CBFM	Gwandi CBFM forest and open access forest
Forbidden	Settlements, farming, fire, bushmeat hunting, grazing (only zero grazing allowed), charcoal making	
Paid permission required	Timber harvesting (from woodlots or general land =2000 Tsh/tree) Poles (from woodlots or general land)	Poles and timber harvesting (from woodlots or general land/open access) Charcoal making Firewood collection (20.000 Tsh/7 tons) Grazing during the dry season from June to November (500 Tsh per head per month) Agricultural expansion (1200 Tsh/ acre)
No permission required	Firewood collection only from the village forest, NTFPs	

7.4 Local people adaptation to changes under REDD+

To look at changes in the governance structures or the rules on paper is insufficient in order to define the effect of REDD+. Most importantly is to understand what happens when REDD+ meets realities on the ground. I will further discuss how local villagers adapted to changes and the new conditions after the introduction of REDD+.

7.4.1 In the pilots

The changes in the governance structures have been introduced in all REDD+ villages at the same time. There had been little preparation time between accepting REDD+ and adapting to changes. Decisions were mostly taken by the village governments and informed to people in a general assembly. Everyone was affected, from the charcoal makers to livestock keepers and farmers. The research findings reveal that change of behaviour has been a slow process, especially in Bereko and Kikore. It took several years before restrictions were somewhat accepted and followed – at least to some degree. In Mnenia the local villagers seem to have adhered to the rules earlier. Findings suggest that there was willingness to join REDD+ and integrity in the community’s decision-making. The village chairperson clarified, that conversation issues in Mnenia are taken seriously (Muru, pers. comm.).

While restrictions in the Salanga and Isabe forest government reserves were known to the villagers before, adapting to the institutional change over continuous forests under CBFM have not been easy, according to the Kikore village agricultural officer (VAO). A quick shift from open access to a regulated resource use left many villagers frustrated. Especially the charcoal makers and livestock keepers. It is not surprising, given access to the forest before REDD+ was free and grazing allowed without restrictions. Under REDD+ “what was once freely allowed, now became illegal”, explained the VAO. Adjusting the situation required a lot of effort put on education and awareness raising (Mpolela, pers. comm.).

Furthermore, changes of institutions in the pilots have simultaneously occurred with other rapid changes at the village level, requiring the adaptation and influencing people’s livelihoods. The villages are in the constant dynamics, driven by modernization, population growth, climate shocks, changes in markets/ economy, technological and infrastructural advancements, among other.

7.4.1.1 AWF alternative livelihood groups

Adaptation demanded changes in norms regarding forest use, embedded in the society’s practices for long. Moreover, those involved in trade of forest products have lost access to many livelihoods due to the restrictions. The pressure of new rules has come in force before the villagers were able to adjust. AWF’s promised alternative livelihood groups were neither so far functional.

Five different initiatives under AWF offered alternative incomes to communities or a substitute to resources collected from the forest: i) improved agriculture – provides the villagers techniques how to produce higher yields without expanding land for agriculture; ii) sustainable charcoal group - aims at reducing deforestation by using trees from private woodlots and does not apply burning hay compared to traditional charcoal production; iii) brick making group - compared to traditional practice, does not involve use of clay and firewood to reduce deforestation and erosion (mining for clay damages the soil); iv) tree nursery – enables villagers to plant own woodlots for firewood and other uses; v) improved stoves – for cooking and heating using less firewood (Wasiwasi, pers. comm.). In spite such a variety of activities that villagers could join, it was not without the complications. Nevertheless, being part of the group signifies some level of enhancement in villager’s social capital and opportunities for income.

Improved agriculture

Smart agriculture has been adapted in all REDD+ villages, including Mnenia, Bereko and Kikore. Delimitation of the group, however, was its limited capacity to involve only 12 members per village. The village council was responsible to randomly select the participants (who then should be approved at the village assembly) and allocate them plots from village land to run the demonstration. This, however, entailed some conflicts. For example, in Kikore, only the wealthy farmers were selected to join the group. Each member received 1 acre of land from the village council to plant maize, cowpeas and sunflower. Kikore Agricultural Officer, also the leader of the group ('shamba darasa' in Kiswahili) explained, successful farmers expect to bring more development to the village, and hence, they were prioritized. In practice, the group seem to significantly marginalize the society. While the yields are reported to double or threefold (from 5 bags of maize to 15) thanks to use of fertilizers and modern seeds, the benefits gained remain only within the group. The first three years all inputs (fertilizers, improved seeds) were paid by AWF. However, thanks to revenues from trade of crops, the group is now self-sufficient. They have built a union (called 'mtandao') with the other improved agriculture groups and cooperate especially with two neighbouring REDD+ villages to collectively invest the income from crop sales into purchase of fertilizers and seeds from Arusha. The importance of the group is also to share the knowledge with the others, who are outside the group. It, however, did not happen. Villagers, who are not part of the group, have explained, even if they were to receive the training, to apply improved agriculture would be too costly for them. Fertilizers and certified seeds are very expensive to purchase, and they are traded only in the markets of Arusha or Dar es Salaam (Mpolela, pers. comm.).

Similarly, in Bereko, the group is reported to be doing well and the agricultural outputs have doubled. The new village chairperson, elected last year, expressed, however, a frustration over the 'shamba darasa' group and called it 'land grabbers'. The land is scarce in the village, yet the previous leadership, according to the village chairperson, allocated several acres of land (around 15-20 acres) for a purpose of the group. He believes that participants were not selected randomly and suspects some kind of bribery may had been involved (Kaiti, pers. comm.).

In Mnenia, the improved agriculture group is working well, and no conflict had been observed. The village chairperson clarified, in spite of smart agriculture techniques, majority accustomed to use animal manure in agriculture. Purchasing fertilizers is too costly, and there had been also a risk reported to be cheated in trade for improved seeds (now using mobile phones it is easier

to control the issue and buy certified seedlings). During the focus group discussion with men, it was discovered, that the group has not transferred any knowledge to the rest of the community. Yet villagers themselves prefer to use manure instead of fertilizers. The study results from Mnenia showed that manure value in the village has increased for the last 5 years. Before 2010 manure was free, but now it has to be purchased (20.000 Tsh per 1 cart). The demand for manure is high as the soil in the village is losing fertility and suffers from frequent droughts.

During the interview with the AWF, it was revealed that intent of smart agriculture was to transfer the knowledge from the 12 selected members to the rest of the community, which does not seem to have been accomplished. The ‘mtandao’ unit of all REDD+ smart agriculture groups (204 members in 18 villages) was established to allow villages to share experiences and maintain the knowledge, according to the AWF fieldwork coordinated. It, however, may rather have expanded the gap between those better off and worse off in the community. From the interviews with village leaders and the community members it seemed, that agricultural wealth concentrates in hands of fewer, marginalizing the poorer ones. Such a situation can significantly alter relationship between the various social groups and affect social integrity within of the community.

Sustainable charcoal

A sustainable charcoal group was introduced as an alternative livelihoods group, however not many who were participating in charcoal production before are part of the group today. It rather opened opportunities also for women to be involved in charcoal production. The group is established in Mnenia and in Kikore. AWF provided training and explained that only woodlots and branches from farmlands are allowed to be used for charcoal production. Using trees from the forest is prohibited. It is, however, unclear, how well this rule is followed (Mpolela, pers. comm). There is little information on the group in Mnenia, however two challenges had been identified to constrain the work of the group in Kikore. The group members revealed that first, they cannot produce a lot of output. The group produces 10 bags per week, but it is too little to supply the demand for charcoal within the village and also from the outside. Second, the group do not have sufficient knowledge regarding how to expand a market, given that sustainable charcoal (packed in a labelled bag) is more expensive to sell than traditional ones. The village chairperson informed, that before REDD+, charcoal trade in the village was active and attract many outsiders. Less people are involved now in this economic activity due to restrictions and,

moreover, given such little output and a high price for the sustainable charcoal, the outsiders switched for a better market in the neighbouring villages without REDD+. The same is the case for the timber. Such a change had affected the village development (Mpolela, pers. comm.).

Brick making

Brick making groups have been established in Kikore. However, it is in a dormant state and not functioning well. The main reason is lack of market for the bricks. Sustainable brick production is more expensive compared to a traditional practice and there is not market to sell them. The price for one brick is 300 Tsh, which is six times more expensive compared to a traditional one made from clay (50 Tsh). Moreover, there is no demand, given many households accustomed to a traditional ways of brick making and produce them themselves (Mpolela, pers. comm.).

Woodlots

Woodlots are planted in all villages, and tree planting is commonly practiced since HADO times. While in the past afforestation was mostly a collective activity, now they are planted more individually.

Tree nursery under AWF are most effectively adapted in Mnenia. The group was established in 2012, and is largely a women's initiative (11 women and 2 men involved, some are also members of the VNRC). The group produces seedlings and sells for 500 Tsh, of which 400 Tsh are subsidized by AWF (hence a price for the villagers is only 100 Tsh). The villagers are actively engaged to support the initiative. Moreover, the village leadership has also planted a small public woodlot, and encourages tree planting near the village schools and the hospital (Muru, pers. comm.).

In Bereko tree planting is common, however people did not accept the tree nursery well. The village leader clarified that in Bereko many villagers are frustrated with AWF and associate them with the strict rules. Hence, villagers prefer to purchase seedlings from a well renowned Bereko villager, who owns his own tree nursery for many years. His business is doing better than the AWF established group (Kaiti, pers. comm.). One villager from Bereko also was frustrated he lost his beekeeping in the forest, and was commanded to plant woodlots and keep beehives at home. "Today permission is needed for everything. I did my beekeeping in the forest before, but now they restrict me. And if patrol catches you in the forest, they beat you. There is no fine – they just beat you and let you go", explained the villager.

In Kikore, tree planting seems had been a command, as some villagers revealed during the household questionnaire. Wealthier households plant large areas of woodlots for later use, such as timber or charcoal making. One villager also informed “I do not have space to plant woodlots. My farm is too little, and I have livestock. My seedlings are constantly eaten by goats, and I do not know what to do”.

Improved stoves

Improved stoves had only been adapted in Mnenia. According to the village leader, more than 80 per cent women bought the stoves for their households (Muru, pers. comm.). At the same time the use of the stoves decreased dramatically with the years. Women during the focus group discussion described being frustrated with the low capacity of stoves to produce and store heat and prefer to use firewood.

7.4.1.2 Alterations in livelihoods after the introduction of REDD+

Livelihoods of the charcoal makers and timber harvesters were especially constrained by the restrictions. Results suggest that a majority have switched to farming, some looked for other employment and few have moved out. None have joined the sustainable charcoal group to continue the activity. In Kikore during the focus group discussion with women, it was revealed that some timber traders and charcoal makers are worse off after the restrictions. They are being hired to work on the other people’s farm. But their income now is significantly lower, given that such work is only seasonal and low paid.

Agriculture in all villages had been identified as the most stable and profitable income generating activity. It also secures availability of food for the household. With the restrictions, some villagers in Bereko have been reported to lose their farmlands after forest demarcation – around 20 shifting cultivators. Affected were also agro-pastoralists, who generally expand the farms inside the forest and, most importantly, access the forest to graze their livestock, but are now restricted. To cope with such circumstances, many have sold their animals, in some severe cases animals died from hunger, while in other instances, families had to migrate. During the focus group discussions in Bereko, it was discovered that people are willing to accept the rules, but with exceptional allowance to let them graze. When animals decline, their agriculture suffers, leaving the villagers very frustrated. Only in Kikore, in the forest under CBFM, an area has been demarcated for grazing. To many villagers around the Kolo Hills, it became a source of solution.

Due to restrictions, the cropland area per household has reduced. Hence it remains unclear, how the villages handled an issue of charcoal makers and timber harvesters switching to the agriculture. With land scarcity, people are not willing to sell their lands in fears to lose access to food. As a coping strategy in times of hardship, many rather prefer to work as cheap labour in other people's farm. With many children in a family, it became also more difficult to inherit the land or buy the land, while new land to settle is insufficient in the villages. Younger generation often left without their needs being properly addressed.

Dependence on firewood in all villages is very high. Constraint to pay a permit for access to firewood in JFM forests especially affected the women. Such an observation had been obvious in Mnenia, where the rule is already in force, compared to Bereko, where women explained that the JFM agreement is still in progress and they do not know what the rules agreed on are. Women in Mnenia were burdened by the payment, given that it is completely their responsibility to collect firewood and pay for themselves, not the men. As a coping strategy, many adapted improved stoves, but were left frustrated with its performance. Today a majority of women get firewood from woodlots of the farms of others and actively plant also own woodlots. Some older women prefer to buy firewood instead of paying the permit and walking to the forest. In times of hardship, however, it can leave the household more impoverished. In Kikore under CBFM, access to firewood is free while allowed only in a demarcated area.

Generally, accessibility to forest resources has reduced and prices have increased significantly - four to five times - after the introduction of REDD+ for charcoal and timber. As a coping strategy, men in Kikore mentioned going for forest products to a neighbouring Mitati village, that refused to join REDD+ and has an open access village forest, also for the use of the outsiders.

7.4.1.3 Illegal activities and encroachments

Several illegal activities observed to happen in JFM and CBFM forests. The most dominant is grazing, and clearing forest for agriculture.

Illegal activities in Isabe and Salanga forest have been reported to somewhat reduce after enforcement became more frequent. However, more arrests are for grazing. It is not surprising. There are 7,048 households in all villages participating in the joint management plan which has 13,600 oxen. Isabe has 5,000 households with 6,800 oxen, while Salanga has 2,048 households with 6,800 oxen (Kondoa District Council 2015). There is no land for grazing, except the forests. Kondoa area is surrounded by the government forests used as game reserves,

national parks or catchment reserves, bounding villagers to a number of strict regulations controlled by TFS or TANAPA. The situation is not favouring the livestock keepers in Kondoa since with stricter and more effective control there is nowhere to graze. Zero grazing neither had been working in practice, and remains only on paper. The village chairperson in Kikore explained that “zero-grazing policy might work to protect the forest but it is a nightmare in a community mind-set” (Mpolela, pers. comm.). Hence, forests continue to be destructed, because no areas set aside for grazing. It is neither possible, due to lack of land. As a coping strategy, many graze during the night, as in case of Bereko. Others, caught in the forest, prefer to pay a fine rather than put at risk the health of oxen and other livestock. It becomes rational given the prices drops threefold with decrease in cattle’s health.

In Kikore, one of the coping strategies had been to rely on CBFM forests, where by-laws are different from the restrictions in JFM with regards to grazing (e.g. with respect to livestock number). As a Figure 7 shows, livestock ownership has also increased in Kikore, compared to the other villages. It is, however, unclear, if it is due to lesser restrictions or other factors.

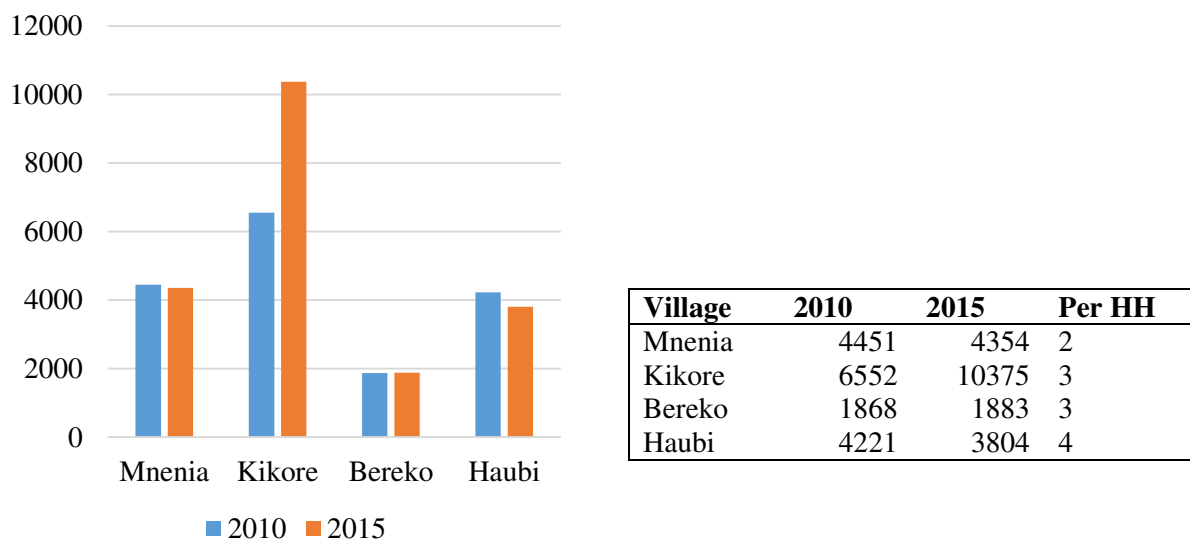


Figure 7. Livestock numbers in the REDD+ villages and one control (Haubi). Source: the Kondoa District Council

Especially frustrated with the grazing rules were villagers in Bereko. During the general assembly with AWF, when accepting REDD+, many Bereko residents pleaded AWF to not forbid grazing and firewood collection. They were promised their concerns will be delivered

to the district, but no feedback had been ever since. Such a situation led to a conflict between the agro-pastoralists and the JUHIBEKO and TFS, patrolling the forest. The conflicts sometimes get violent, and the conflict is at most solved with an arrest. In Bereko, the chairperson clarified, that from January 2015 grazing will be forbidden¹⁰. Previous grazing rule with an exceptional by-law from the district to graze for 6 months was attached to the Forest Act Law No 14, which lost power under REDD+ requirements where priority is carbon. The village chairperson in Bereko believes that if livestock keepers would be allowed to graze again, there will be less conflicts in the village. Conflicts significantly affected integrity of the community and not least social relations with other villages, who are part of JUHIBEKO.

One villager expressed his frustration that it is even harmful to the forest to restrict the grazing. According to the villager, soil fertility in the forest has been always good thanks to animal manure. Moreover, frequent grazing reduces a risk of fire because the livestock grazes on the dry fallen leaves and bush, that is now only growing tall. AWF coordinator clarified, that impact of grazing on ecosystems health is severe if grazing is allowed in the forest (Wasiwasi, pers. comm.).

Encroachments to the forests for farming have been observed also in Bereko and Kikore. In Bereko, two groups of people are involved (i) villagers, usually the young generation, looking for a land to settle, because due to land scarcity and population growth many struggle to find a place to settle; (ii) wealthy villagers looking for opportunities to expand their agricultural land in the forest. This group of villagers, according to the chairperson, are especially non cooperative. They use the forest for farming and refuse commands of patrol. For a conflict resolution the issue had been forwarded to the court several times. However, remained unsolved due to corruption between the offenders and the court.

Younger generation encroaching the forest also in Kikore village, according to the community members. New families have settled in the area demarcated for firewood collection. The village government, according to the villagers, allowed the settlements, given there is less demand for firewood in the village.

¹⁰ There seems to be consistency of information in Bereko that grazing under new JFM agreement is forbidden, while according to the District Natural Resource Officer, grazing is allowed during dry season upon a paid permit, and limited for 4 oxen as before.

7.4.1.5 Factors affecting illegal activities and encroaching

To influence people's behaviour and stimulate the change of norms, AWF raised awareness among the villagers on role of forest protection. The study results from the household questionnaire show that communities have higher awareness now than before (Figure 6).

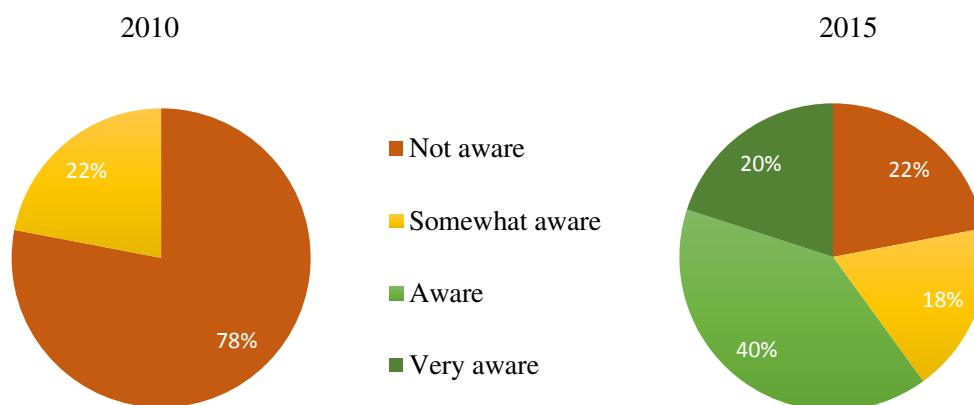


Figure 6. REDD+ influence on awareness about deforestation causing droughts. Comparison of data 2010 and 2015

It is, however, not clear if this had resulted in less encroachments to the forest. Nevertheless, it affected a change of attitude to conservation. For example, a villager in Mnenia during an interview indicated that “protecting forest brings us more benefits than deforesting it. If we do not follow the rules, agriculture will suffer”.

Several factors have been identified to affect resource use and maintain people's dependency on forests. Among them is population growth, land scarcity, low soil fertility, droughts, modernization of the villages, not least the village governance.

The Kolo Hills area experiences increasing population, which significantly adds on to pressure on land and forest resources. Families in the villages can have up to ten children. If a family owns little land, and it is not sufficient to divide for the children when they grow up, the young generation tend to settle in the forest or establish farming land. Moreover, land scarcity led to higher prices for land. With a little land, high population growth and increasing land price it becomes challenging to address the situation by imposing the rules in the forest. The village chairperson of Bereko is concerned that rules fail to prioritize the needs of the younger generation.

Informal institutions dominate especially for grazing and farming in the forest. But the situation is driven also by the circumstances. People are left to scramble for resources. Modernization

and access to mobile phones have made it easier for the communities to avoid patrol, which jeopardize effectiveness of the patrolling and allows communities to continue deforestation or encroachments.

Governance had been problematic in all villages. Only in Mnenia coherence and transparency between the government and the community has been observed. This also shows from the fact, that for the REDD+ trial payment, Mnenia received the largest amount (7.937.201 Tsh) among all villages adjacent to the government forest reserves, given its commitment to REDD+ activities. The money was invested to improve village infrastructure and forest management, and during the focus group discussions it was clear that villagers were actively involved in a decision making where to spend the money. The situation, however is different in Kikore. Kikore received only 982.858 Tsh for the REDD+ trial payment according to their village forest size (41.5 ha) and other requirements. Only 3 people from the focus group discussion with men knew about the payment, nevertheless were not certain if the village received 900.000 or 9 million Tsh. The women in the focus group discussion were not at all aware of the payment nor how it was used. It is unclear if it is due to poor attendance to the general assembly or other reasons. Nonetheless, there was a general assembly for everyone to decide, where to invest the money, explained the 3 members in the men focus group. Proposition of the villagers was poorly considered, however. Villagers proposed to improve the water canal, but it was not on the agenda of the village government and so far villagers are only informed that a village school has been renovated. Misuse of the money caused a conflict at a higher level. 2 of the village council members blamed the village chairman and other 7 members involved in cheating and forwarded an issue to the court. All 7 members have apparently resigned in fears of imprisonment.

In Bereko, similarly, during the focus group discussion was revealed that previous village leadership was not trustful, nor transparent. This could also be referred to the case of 'shamba darasa' in the village. With respect to REDD+ payments, Bereko has received 6.979.121 Tsh for the trial payment, which had been invested in community development (water pump and school improvement) and forest protection. However, the current village chairperson also explained that no receipts were kept to prove how the money were spent (Kaiti 2015). Corruption issues in Bereko are also common between the villagers and the patrol. Many arrests are left unreported, and bribery is common.

7.4.2 In the controls

7.4.2.1 Haubi

There is little respect for the rules in Haubi community, and people continue deforestation regardless the rules. Moreover, the enforcement is weak and villagers expect illegal activities to increase. One villager explained: “People here do not fear forest degradation, the fines or the patrol. Moreover, those involved in deforestation are well known to the village leaders, but nothing is done, because they are corrupt”. No arrests seem to have been recorded or court cases since the introduction of the rules. People are also pressured by population growth and severe land scarcity. A household in average owns less than 1 acre. Some do not have place to keep their livestock and had to sell it. With little cattle, the soil quality is worse and that drives people to move to the forest, according to the village chairman. It is not allowed, but also no alternative exists. In addition, land scarcity is a source of internal conflicts. Disputes over land are common, and sometimes people become enemies. Some households even have moved to the other villages (Lubova, pers. comm.). The young generation is especially affected and ends up encroaching into the village forest for agriculture or settlements. Moreover, the young generation do not seem to take environmental committee seriously and times even harm them, explained the villagers. Illegal charcoal making during the night is also common, and much in times of hardship and food insecurity.

According to the village chairman, several factors play a role that people are driven to not follow the rules. Among them population growth, lack of grazing land, land scarcity, droughts, lesser soil fertility and increased prices for food products. The situation is very similar to the pilots. Haubi village chairperson explained, that he believes reminding and educating people about the importance of conservation could help the situation, and expressed willingness to join REDD+ (Lubova, pers. comm.).

7.4.2.2 Gwandi

There was inconsistency in facts with respect to forest use after enforcement of restrictions in Gwandi. According to the village leader, the system of fines and permits brings to the village more revenues, and people adhere to the rules (Pamba, pers. comm.). Similarly, VNRC scouts have informed during the focus group discussion that people follow the rules. In contrast, according to the local villagers from the focus group discussion, nothing in the village has changed with respect to forest use and deforestation continues. While CBFM forest is far, most of the illicit activities happen in the *de facto* open access forest. Almost all community members

in one or another way do activities against the rules. Penalties, however, imposed only on the poorer community members, while illicit activities by the wealthier ones are ignored. Villagers suspect some level of corruption between the village leadership and the better-off households. Moreover, it was revealed that patrols do not keep good records of penalties. And forest issues are usually never discussed during the assembly meetings and villagers feel lack of transparency from the village government and VNRC. Furthermore, women during the focus group discussion told they are not aware of any rules controlling use of their village forests. They, however explained, that the open access forest is badly deforested. There is little availability of timber species, or trees for charcoal production left, neither bush-meat exists anymore compared to the past. The community is encouraged to plant woodlots, but the government does nothing to supply them with seedlings.

7.4.2.3 Overview

The rules in Haubi do not seem to address the root causes of the deforestation problems, while in Gwandi, poor governance, ineffective patrolling and lack of transparency may play a role why the majority do not adhere the rules or neither are aware of them.

7.5 Impacts from REDD+ on livelihoods

In this section I will describe the development in incomes in the pilot and control areas. I will then evaluate if REDD+ has had any effect on the changes observed.

7.5.1 Developments in income

To observe the developments in income, I have measured income in the households and calculated gross total income and gross forest income for both 2010 and 2015. The average total income per household is calculated combining subsistence and cash income from various on-farm, off-farm and non-farm activities for the 12 months before the time of data collection. Specifically, it captures the household's gross income from agricultural and livestock produce, collected or sold forest products and income from paid work, business or remittances. Payments of penalties or other relevant expenditure were not included. Income are measured in USD with an exchange rate of 1000 Tsh for 0.46 USD. The result of the average gross income per household is shown in the Figure 7. It is evident, that the households in both pilot and control villages have experienced substantial reductions in incomes.

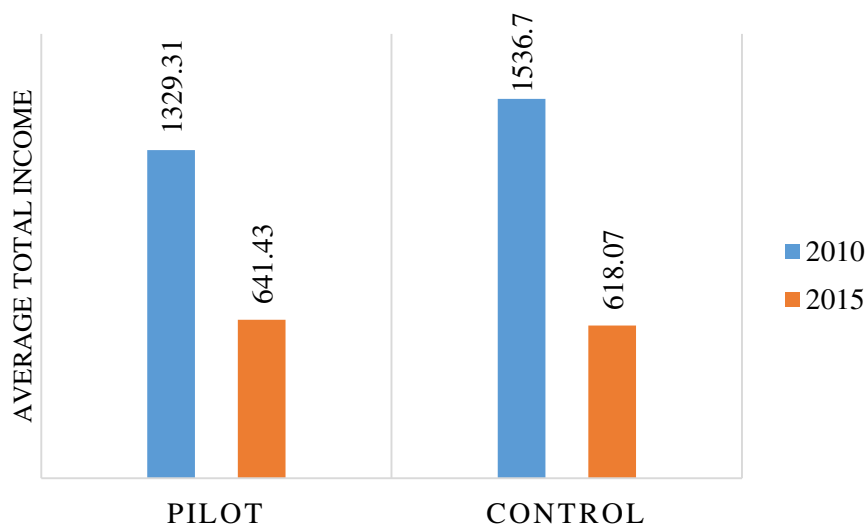


Figure 7. Average gross total income (in USD) per household in 2010 and 2015 in pilot and control villages

Turning to forest income, it includes gross income from wooden forest products – like charcoal, poles, firewood and timber – and non-timber forest products (NTFPs) like mushrooms, wild fruits, fodder, bushmeat, medicinal plants. The value of grazing is not included as it is difficult to measure and is rather represented in the value of animal products. The result of the average gross forest income per household is shown in the Figure 8. Similar to total income, communities have experienced substantial reductions in forest income, especially in the controls.

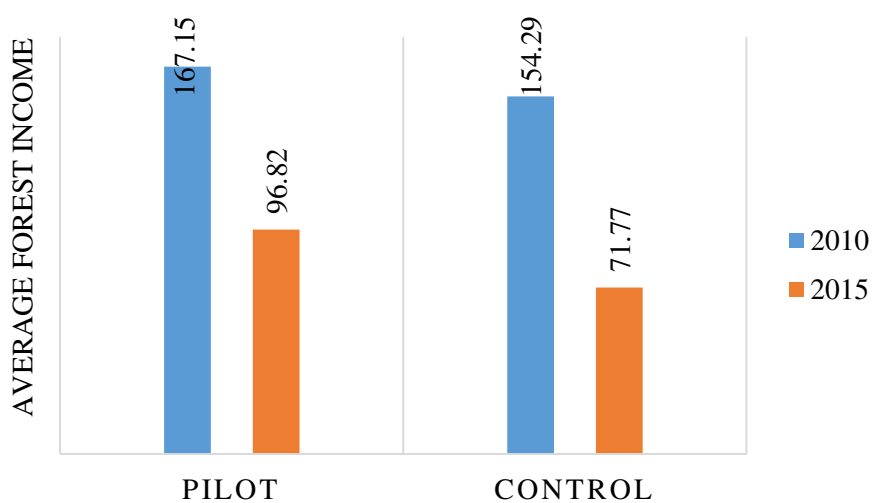


Figure 8. Average gross forest income (in USD) per household in 2010 and 2015 in pilot and control villages

It is important to note, that Kondo area was stricken by the drought in 2014, extending also into 2015. As the village chairperson of Mnenia indicated, the droughts were as severe as the last time in 1972 (Muru, pers. comm.). The outputs in agriculture were low also in the highlands, where rainfall is typically more frequent. Also the livestock suffered from the poor health due to the droughts and unavailability of fodder. Crop failure and overall situation in Mnenia, Bereko and Kikore were similar to droughts stricken Haubi and Gwandi.

While from above is evident, that the drought had a substantial effect on the income reduction, REDD+ may also have played a role to influence the situation. I turn now to analyse that issue.

7.5.2 Did REDD+ influence incomes?

To study potential effect of REDD+ on incomes, I ran multivariate regressions using panel data and controlling for various variables at the household (HH) level. These refer to characteristics of the HH head (such as age, gender and education), household's size, total agricultural area, livestock owned, forest area cleared, wealth, social capital, distance to the forest, distance to the market and the major income shortfalls experienced the previous year. Variables vary from categorical and binary to continuous. The variable 'wealth' is an index based on ownership of various household assets (Moser & Felton 2007). Similarly, ownership of livestock is captured as TLU (the tropical livestock unit) – an index where livestock of different types are converted into a common unit (Jahnke & Jahnke 1982). The social capital index captures household's membership in the community organization(s). Tables 8 and Table 9 present the means for these variables in the pilots and the controls respectively.

Table 8. Average values for the explanatory variables in the pilots

PILOTS Explanatory variables	2010		2015		Codes/units explanation
	Mean	Standard Deviation	Mean	Standard Deviation	
Age of HH head	48.610	16.079	55.911	14.416	years
Gender of HH head	1.368	0.484	1.189	0.393	1 = male
Education of HH head	1.913	0.433	1.867	0.523	2 = primary
Household size	6.105	2.473	6.010	2.415	members
Total agricultural area	2.43	0.642	1.705	0.269	acres
Forest area cleared	0.000	0.000	0.0109	0.104	ha
TLU	1.745	2.852	1.264	1.7	index
Wealth (assets)	-0.514	1.307	-0.49	1.32	index
Social capital	1.663	1.285	0.681	0.801	index
Major income shortfalls	0.624	0.487	0.91	0.288	0 = no; 1= yes
Distance to the forest	46.728	49.519	43.851	36.908	minutes
Distance to the market	64.926	39.535	64.461	39.241	km

Table 9. Averages of the explanatory variables in the controls

CONTROLS Explanatory variables	2010		2015		Codes/units explanation
	Mean	Standard Deviation	Mean	Standard Deviation	
Age of HH head	51.122	16.514	56.333	15.135	years
Gender of HH head	1.276	0.451	1.158	0.367	1 = male
Education of HH head	1.93	0.529	1.964	0.538	2 = primary
Household size	5.258	2.461	6.14	2.754	members
Total agricultural area	3.347	0.921	2.847	0.875	acres
Forest area cleared	1.198	3.637	0.474	1.803	ha
TLU	1.387	1.904	1.402	1.974	index
Wealth (assets)	0.021	1.695	0.044	1.727	index
Social capital	1.551	1.142	0.701	0.731	index
Major income shortfalls	0.413	0.497	0.86	0.35	0 = no; 1= yes
Distance to the forest	37.32	40.361	43.375	46.183	minutes
Distance to the market	86.897	49.954	87.894	49.811	km

Looking first at the data for 2010, similarities are observed for the HH heads gender and education. Majority are men, with primary education. Moreover, the average household size in both areas is around 6 members. There are few important differences also to note between the areas. In the pilots, no forest areas were cleared, while the average for controls was 1.2 ha per HH. Controls also have larger agricultural area per HH, while they have somewhat longer distance to the market. For the other variables, differences are rather small. While it is important for the BACI, that the pilots and the controls are as similar as possible, including the above variables, the panel data analysis controls for these variations.

Looking at changes over time, is clear that the age of HH heads has increased. Especially in the pilot the difference is 7 years instead of 5, as it is in the control. This could be explained by the fact that fewer households were interviewed in 2015. Total agricultural area has decreased in both areas, corresponding to the findings from the interviews. In Mnenia, Kikore, Bereko the household's average cropland has reduced from 2.4 acres to 1.7 acres for the last five years, while in Gwandi and Haubi from 3.3 acres to 2.8 acres. Dependence on forest for agriculture seem to be reduced, especially in the controls. It is assumed to decrease also in the pilots, however the data for 2010 are deficient or incomplete. Average amount of livestock per household has reduced in the pilots, while increased in the controls. Similarly, the wealth has decreased in the pilots, while increased in the controls. Average distance to the forest is less in Mnenia, Bereko and Kikore, however increased in the case of Haubi and Gwandi. Major income shortfalls clearly experienced in 2015 and can be attributed to the droughts already

mentioned, but also internal events, for example, loss of a family member, divorce, illness among others.

To establish if REDD+ affected income or other explanatory variables, I ran multivariate regression using fixed effects or random effects models. If the Hausman test's chi-square (indicating if the null hypothesis is true or not) is higher than > 0.05 , I use the random effects. In the analysis I have not only controlled for the variables listed in Tables 7 and 8. I have also controlled for time trend (a year dummy), area (being in the pilot or control area) and village level inequality (Gini coefficient). The results regarding the impacts of REDD+ (time x area) and other variables on log total income are found in Table 10. Using log income implies that the coefficient multiplied by 100 can be interpreted as per cent change following from a unit change in the variable.

Table 10. Determinants of total gross income – random effects model

Dependent variable: log total income (n)=232			
Independent variables	Coefficients	P-value	Standard error
time	-.9899654	0.003***	.3283097
area	.1760336	0.507	.2653895
REDD+ (time x area)	.1337178	0.633	.2797345
Age of HH head	-.0030788	0.593	.0057609
Gender of HH head	.1591048	0.292	.1510517
Education of HH head	.1632249	0.246	.1406336
Distance to the market	-.0032894	0.351	.0035286
Household size	-.035196	0.353	.0378625
Total agricultural area	0.453175	0.096*	.02721
Major income shortfalls	-.3114131	0.016**	.1296599
Wealth (assets)	0.868946	0.112	.0546037
Social capital	0.981714	0.146	0.675665
TLU	.1663418	0.001***	.0481165
Forest area cleared	0.146957	0.641	.0315146
Distance to the forest	.0003201	0.817	.001384
Gini	1.292238	0.678	3.116851

Hausman test $\chi^2 = 0.3228$ (If χ^2 is > 0.05 , then random effects is used)

*** level of significance under 0.01

** level of significance under 0.05

* level of significance under 0.1

The results show that REDD+ has had no effect on rural livelihoods. The total income loss is attributed to the time trend variable, which is statistically significant and has a strong positive effect. Using log income implies that the coefficient multiplied by 100 can be interpreted as per cent change following from a unit change in the variable. Time trend is both pilots and

control villages is attributed to severe droughts experienced. To cope with such circumstances, women typically were involved selling mango (drought resistant fruit), while men selling off the livestock. Hence, the total income drop significantly correlates with decrease in livestock numbers. This especially relates to the pilots if we follow the trend from Table 8. Also total agricultural area and major income shortfalls have to some extent a positive effect on log total income. This could be explained by increased land scarcity due to population growth and hence decreased production, combine with crop failure and shortfalls due to other internal reasons.

The results regarding log forest income are showed in Table 11. The forest income is observed to be affected by wealth, with a negative effect of about 14 per cent. This is not surprising, given more vulnerable and poorer households tend to rely on forest products or NTFPs.

Table 11. Determinants of total forest income – random effects model

Dependent variable: log total forest income (n)=176			
Independent Variables	Coefficient	P-value	Standard error
time	19.98262	0.786	.5802526
area	73.94325	0.315	.4519234
REDD+	-84.9208	0.293	.4487442
Age of HH head	1.100383	0.316	.0068102
Gender of HH head	16.91837	0.754	.2769706
Education of HH head	37.88213	0.247	.2139894
Distance to the market	.9294065	0.234	.004839
Household size	.0707547	0.185	.053326
Total agricultural area	.0072553	0.875	.0461699
Major income shortfalls	.4469902	0.102	.273565
Wealth	-0.1458076	0.031**	.0677787
Social capital	.1244293	0.249	.1079933
TLU	-.0128037	0.840	.0632178
Forest area cleared	.0321542	0.652	.0712447
Distance to the forest	-.0022824	0.415	.002799
Gini	-2.882176	0.577	5.163013

Hausman test chi2 = 0.2192 (If chi2 is > 0.05, then random effects is used)

*** level of significance under 0.01

** level of significance under 0.05

* level of significance under 0.1

Drop in forest income can be attributed to the restrictions due to REDD+ or some level of forest management in the controls such as in Gwandi. Nevertheless, it can also be attributed to decrease of resource availability due to overuse and deforestation.

It is important to note, that in Kondoa not only the poorer depend on forest, but also the wealthier households. The quantitative analysis cannot capture such observation, given there

is no estimation variable for grazing. But drawing from the interviews with villagers and a context of Kondoa, many households are equally reliant on forest for livestock grazing rather than forest produce or NTFPs.

The situation in the pilots and the controls have not developed much differently. REDD+ has not played a major role to affect the household’s total gross income, nor forest income. Hence, the project neither contributed nor jeopardized the livelihoods.

7.6 REDD+ impact on forest status

In this section, I will evaluate the change in forest status in the pilots and the controls. The assessment is based on a comparison of deforestation drivers and their level of importance between 2010 and 2015. I will then try to establish the knowledge if REDD+ may have reduced deforestation and forest degradation. The evaluation is based on perceptions and knowledge of the key resource persons and the community members involved in forest management. Hence, such an assessment may contain some level of uncertainty.

7.6.1 Development of forest status in pilots

The status of forests under JFM is reported to be somewhat better than before, however deforestation continues. Deforestation drivers ‘before’ and ‘after’ REDD+ were reported to be the same, however with a different intensity. The Figure 9 shows the drivers descend according to their impact on the forest. The details on intensity were doubtful, given too little information presented during the data collection.

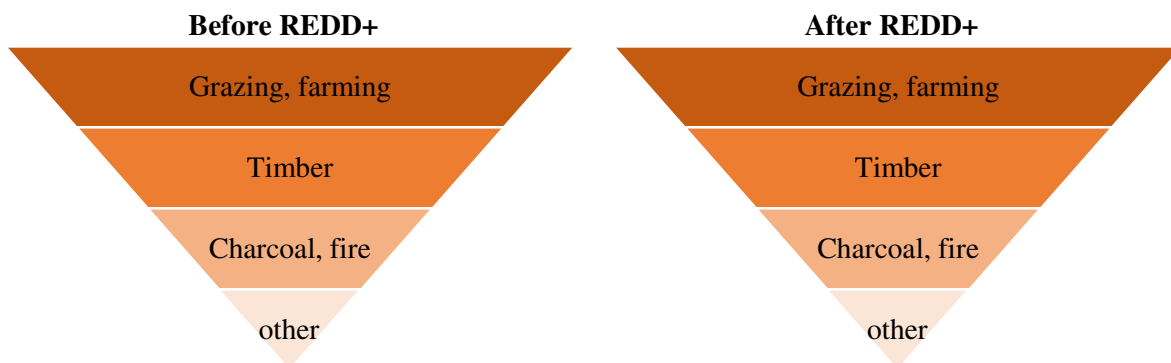


Figure 9. Deforestation drivers before and after REDD+ in JFM reserves: Salanga and Isabe (descending to the least important)

The pressure of human activities, in contrast, has been to some extent reducing in the CBFM forest. While grazing is more intense than before, there is no deforestation for timber and charcoal production after REDD+. The details, however, on intensity of the activities are uncertain, similarly as in JFM forests, given too little information and lack of direct observation for empirical evidence.

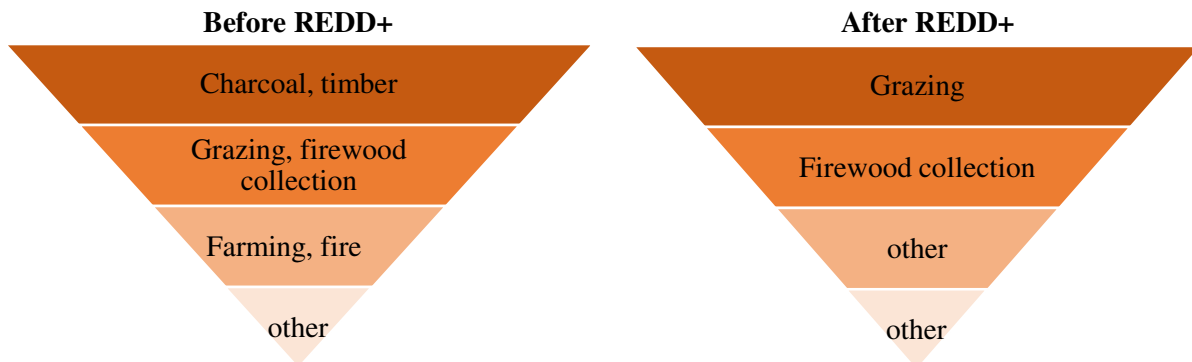


Figure 10. Deforestation drivers before and after REDD+ in CBFM continuous village forest (descending to the least important)

From the results we still can conclude that deforestation in the JFM reserve is driven by the same factors as before REDD+, while there is a shift of activities in the CBFM forest. Fire in both cases had reduced and is associated with restriction on the bushmeat hunting. Grazing, however, increased in CBFM forest, compared to 2010, bringing a pressure on the forest quality.

Whether the forests get worse or improve in the future, depend on many factors. REDD+ has completed its work in the area without a clear strategy for the future. TFS will continue to enforce the rules and collect revenues, nevertheless it could frustrate the communities even more and spark a resistance. Unless the community's needs are met to some extent, the future of the Kolo Hills is left uncertain.

7.6.2 Development of forest status in the controls

Both Haubi and Gwandi continue to experience degradation of forests and their biomass. In Haubi neither restrictions nor by-laws are properly working, and combined with population growth leads to uncontrolled forest use. Environmental conditions, according to the village

chairperson are worse than before (Lubuva, pers. comm.). Deforestation is high, and the village chairperson expects it to worsen in the future.

In Gwandi the village leaders reported that forest quality is better compared to the past. In contrast, during the focus group discussions it was revealed that availability of forest products is almost non-existent and deforestation continues due to poor governance and ineffective policing. The most frequent forest degradation drivers reported are timber extraction and charcoal making. Given these activities are allowed with a permission, this is not surprising.

7.6.3 Did REDD+ influence forest status?

At this stage it is difficult to conclude if REDD+ played a role to reduce deforestation and effect resource availability. In spite that in CBFM forest reduction of timber harvesting and charcoal production may have improved forest status to some extent, it will equally open new opportunities for harvesting in the future in case of a policy gap, weaker enforcement or poor village governance. At this point, the situation in the controls and in the pilots have minor differences. I note that in this respect, the case of Mnenia as part of the assessment on JFM was excluded due to lack of sufficient information. Planting woodlots may improve the situation in the future, and might reduce the pressure on such resources as firewood and timber.

Overall, it is too early to draw an adequate conclusion if REDD+ had any effect on forest status. Much information at this stage should be considered uncertain and incomplete.



Miombo woodland in the rainy season (picture from the fieldwork, 2015)

8 Discussion

This thesis aimed to investigate REDD+ impacts on livelihoods and forest status, following the ‘output-outcome-impact’ analytical approach applied for evaluating environmental interventions. The study had examined experiences of three REDD+ villages in the pilot area. Two control villages were also studied for a purpose of defining a counterfactual. The analysis has focused to understand what changes ‘on paper’ have followed after the introduction of REDD+, what happened in practice, and to what impacts on livelihoods and forest status such changes had led.

The results have shown that changes in the governance structures have introduced the new type of actors and formed new institutions for managing forest resources. It implied change in property rights, as well as in rules over forest resource use. There are, however, issue identified with the policing of the rules, leaving the work of the new actors ineffective. Adaptation to the rules have been a demanding process. While in case of JFM the rules were more or less familiar to the communities, in case of CBFM transition from *de facto* open access to the regulated forest use had been problematic and required a lot of efforts to raise awareness. Moreover, adjustment to the rules have been affected by simultaneously ongoing trends of population growth, land scarcity, declining soil fertility, droughts and an issue with livestock grazing, that only increased the villagers’ scramble for forest resources. The alternative livelihood groups have neither succeeded to benefit the communities. Rather, a group of smart agriculture may have widened a gap for corruption, marginalized the society and to some extent jeopardized social integrity between the villagers.

Despite institutional changes introduced to make REDD+ work on the ground, I find little evidence that REDD+ in Kondoa has had a significant effect on rural livelihoods or improved forest status. Household’s total income goes down substantially from 2010 till 2015, and such reduction is mainly explained by a severe drought in 2014. Agriculture is the most important and profitable activity in the region, thus situation of droughts had put majority in disadvantageous circumstances. Livestock selling is common in time of hardship; however, the prices drop threefold for the cattle with poor health. Restrictions to graze in the forests, hence, had added onto adversity to cope with the situation. Grazing remains a strong informal

institution, and most villagers question whether grazing is really harmful to the forest. They believe livestock fertilizes the forest and feeds on shrubs, reducing risk of fire.

With respect to change in forest income, it is observed to correlate rather with wealth than REDD+. It is inevitable that more vulnerable and poorer households tend to rely on forest products or non-timber forest products. Nevertheless, in the case of Kondoa, those are also the wealthier households that rely on forest for livestock grazing.

Hence, encroachments to the Kolo Hills reserves continue. Moreover, it leaves a tension in the relationship between the villagers and those patrolling the forest, either JUHIBEKO or TFS. Communities are highly aware of importance to protect their forests, however, changes in the governance structures has not addressed the core problems communities face, leaving villagers despaired.

Given the overall results, there is little incentive to apply REDD+ for JFM. People living around the Kolo Hills are very conscious about the benefits of forests, they need them and rely on them. Yet sustainability of the REDD+ project to benefit communities and forest has not shown tangible results. Moreover, if enforcement of TFS in the government reserves will continue, people eventually may get tired. Transactions costs to maintain the patrol are too high and only 20 per cent goes to the villages' benefit. It can become too costly for the communities to be engaged in such arrangement. Moreover, to institutionalize REDD+ in JFM is more complex compared to CBFM, where community has more autonomy and responsibility to keep the forest protection. CBFM is also more sensitive to community's needs. The by-laws in Kikore with respect to grazing is one of such examples.

Ultimately, such underlying factor as good governance could be a stressor for success for the institutional change under REDD+. In case of Kolo Hills, each village is unique and experiences REDD+ differently. While in case of Mnenia, REDD+ brought a great investment into the forest protection, in case of Bereko, it jeopardized people's livelihood. What happens when REDD+ meets realities on the ground also depend on the core foundation of a good governance in the villages it is built on.



Traditional beehives, Kondoa district (picture from the fieldwork, 2015)

9 Conclusion

Making REDD+ work in practice implied various changes from change in the governance structures for forest management, to changes in people's behaviour and ultimately change in livelihoods.

With respect to changes in the governance structures, REDD+ led to formation of new resource regimes and two types of actors – VNRCs and the JUHIBEKO. Such institutional change gave communities the management rights over the government forests and their continuous parts on the village lands. Novel also was the JFM agreement that clarified community's use rights to resources and allowed the villagers to access new benefit streams. However, experience on the ground have shown that various policing related challenges constrained effective enforcement. There has been some level of the institutional change also in controls during 2010-2015, that could have made it difficult to conclude on the potential effects of REDD+. Such problem was reduced by little functionality of the formal rules in practice.

Regarding how local communities adapted to the changes in governance structures under REDD+, we observe that changes in behaviour has been a slow process. It took several years before restrictions were somewhat accepted and followed – at least to some degree. In Mnenia the local villagers seem to have adhered to the rules earlier. Findings suggest that there was willingness to join REDD+ and integrity in the community's decision-making.

The alternative livelihood groups to support the transition have not proven to fit well to the local context, or had benefitted only few members of the community, resulting to unequal distribution of resources and opportunities. Furthermore, all groups of the society are equally dependent on the forest. The poorer ones depend especially on wood and NTFPs, plus land for agriculture. The wealthier ones with more cattle depend also on the forest for grazing. To ensure that wealth is sustained, they need to follow their traditions and customs and bring livestock to graze in the forest. Population growth, droughts, land scarcity, moreover, have left villagers to scramble for resources.

I further looked if REDD+ had impact on the livelihoods and forest status. The study results show that REDD+ in Kondoa has had no significant effect on rural livelihoods nor on forest status. While income goes down quite substantially from 2010 till 2015 due to a severe drought

in 2014, to draw adequate conclusion if REDD+ had any effect on forest status is too early. Much information at this stage should be considered uncertain and incomplete.

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Appendix

Appendix 1 KEY RESOURCE PERSON INTERVIEW GUIDE

Note: questions on REDD+ asked only at the pilot villages

A Demographics and general livelihood conditions in the village

This section focuses on providing general information at the level of the village, important changes over the last 5 years regarding general livelihood conditions of local people.

- *Demography and demographic changes*
- *Technological changes*
- *Changes in economic frame conditions (input and output prices)*
- *Shocks (climate, drought, floods, pests, diseases, civil unrest, war)*
- *Livelihood outcome changes (income, food security, health, education)*

A1a. Name of the village

A2. What are the population and number of households in the village today and 5 years ago?

A3. What are dominant in- and out-migration trends of the village area today? Are there any major changes in this pattern over the last 5 years?

A4. Has the village experienced any particular innovations of importance for livelihood outcomes over the last 5 years?

A5. Describe – if any – major shocks (drought, floods, cyclones, pests, diseases, wild fires, civil unrest, etc.) that have occurred in the village in the last 5 years. How have these affected the livelihood conditions for the people living in the area (income/livelihoods and food security)?

A6. Describe briefly the general livelihood conditions (income (remember forest resources), food security, health, education and social infrastructures) of the households in the village today. Note the main changes over the last 5 years.

A6a) (for pilot only) Has REDD+ played a role for changes as noted in A6? How serious is the loss of access to forest resources been? Have any groups been specifically more hurt than others. Have any activities for expanded/new livelihoods been established to compensate for losses – individually or collectively? If so, what types of livelihoods? Who has benefitted?

A7. Detailed list of input and output prices.

A7b. What is the distance from the village to the nearest main marketplace beyond that of the village itself?

A7c. Are there any buyers of forest products (poles, timber, charcoal) that come to the village to collect it? Is this delivery a regular opportunity? Has there been any changes in this over the last 5 years? Has REDD+ had any effect on production and trading of forest products (poles, timber, charcoal)?

A7d. Is there any illegal production of forest products (poles, timber, charcoal) in the village? Has this activity changed over the last 5 years. Has REDD+ had any influence on the level of illegal making of forest products (poles, timber, charcoal)?

A7e. To the extent production of forest products (poles, timber, charcoal) has been reduced due to REDD+, has this resulted in increased activities of this kind in neighboring non-REDD+ villages?

A9. Are there any changes in input and output prices over the last 5 years? How has this affected people's livelihood conditions (income, food security)? Has REDD+ in anyway influenced price developments.

A10. Has there been any change in relative profitability between agriculture, livestock, forest and off-farm opportunities over the last 5 years? Which of these activities has become relatively more profitable? Has REDD+ in anyway influenced this change?

A11. Describe the present job market (off-farm jobs) situation and 5 years ago. Has REDD+ in anyway influenced this change?

A12. Describe the poverty situation of the village. Are there more or less poor people today than 5 years ago? Has REDD+ in any way influenced this development?

A13. What has the amount of REDD+ payments been so far in the village? How has it been distributed?

A13a. Are there any woodlots established as a result of REDD+? If so, how has it been organized - are trees planted individually on farm or it is mixed/collective action. On what land are woodlots planted? Who owns the trees?

A14. How well do payments cover opportunity costs – loss of forest livelihoods following from the introduction of REDD+? Are there any internal winners and losers?

B Property rights, rules and forest status

The issues here include:

- *Ownership classification of land and forest*
- *Rules concerning use*
- *Level of degradation of forests*

B4. Categorize the **use rights** to resources in **state owned forests**.

B5. Categorize the **use rights** to resources in **village forests (common property)**.

B6. Describe **the rules** concerning how much is allowed to harvest, when and by whom in **state owned forests** in the village. Distinguish between timber, wood charcoal and NTFPs.

B7. Describe **the rules** concerning how much is allowed to harvest, when and by whom in **village forests (common property)** in the village. Distinguish between timber, wood charcoal and NTFPs.

B7a. Describe **the rules** concerning how much is allowed to harvest, when and by whom in **General land** in the village. Distinguish between timber, wood charcoal and NTFPs.

B8. How are the rules enforced (monitored and controlled) in **state owned** forests and what are the associated sanctions if broken?

B8a. How are the rules enforced (monitored and controlled) in **village (common property)** forests and what are the associated sanctions if broken?

B8b. How are the rules enforced (monitored and controlled) in forests on **general land** and what are the associated sanctions if broken? Specify changes in these rules over the last 5 years.

B9. What are the impacts of the rules on the general livelihood conditions (income (remember forest products), food security) in the village?

B10. How would you characterize the status of the forests in the different forest ownership categories in your village?

B10a. Have there been any noteworthy changes in the forest status over the last 5 years?

B11. In your opinion, which of the following do you think is the most important source of forest degradation in the different forest ownership types: overuse of forest products, clearing for agriculture, encroachment, timber extraction, wild fires?

B12. How would you expect the status of the different forest types in your village to be in 5 years from now compared to to-days status concerning degradation?

B13. How is land typically distributed across households in the village? Does the distributional pattern have any major impact on the general livelihood conditions (income/livelihoods, food security) of the village and different groups of people?

B13a. Is there any effect of REDD+ on the distribution of land between the households in the village?

C Markets for land

The issues here include:

- *Land prices and changes over time*
- *Cost of establishing a title deed or a permit to land and property*
- *Land acquisition by external agents*
- *Alienation rules for different types of property rights*

C4. Have there been any important changes in the price of any land category over the last 5 years. How have these changes affected the livelihood conditions (income and food security) in the village? Has REDD+ in any way influenced these pieces?

C7. Is there available land for the establishment of new households in the village? Has this availability changed over the last 5 years? Is the amount of such land covering expected needs for the future? Clarify to what extent REDD+ influence changes and expected availability.

D The present status of the REDD+ pilot

D1. Is the REDD+ pilot still continuing?

D2. Describe the main activities that are ongoing now and describe if there has been any shifts since the pilot was established.

D3. Clarify if the REDD+ institutions – especially land use plans, forest bylaws and monitoring/control activities are continued despite the fact that the NGO has reduced its REDD+ activities.

HOUSEHOLD QUESTIONNAIRE

Note: questions on REDD+ asked only at the pilot villages

01. Country:	04. Questionnaire number:		
02. Village:	05. Name of respondent:		
03. Pilot/study area:	05a. Are you the same respondent as in 2010?	1. Yes	2. No
	06. Street address of respondent:		
	06a. GPS coordinates		
	Latitude (North)		
	Longitude (South)		
	07. Name of interviewer:		
	Date:		
Starting time:		Finishing time:	

SECTION A: Household structure and livelihood assessment

The aim of this section is to map out household characteristics, assets and ownership.

I. HOUSEHOLD CHARACTERISTICS AND COMPOSITION

		A1 ¹⁾	A2 ²⁾	A3	A4a ³⁾	A4b ⁴⁾	A5 ⁵⁾	A6
ID	Position in HH	Sex	Marital status	Age (yrs.)	Education	Other skills	Main occupation	How long have you lived here
1	Head of HH							
2	Spouse							

1) Codes: 1=male; 2=female

2) Codes: 1= single; 2=married; 3=divorced; 4=separated; 5=widowed; 6=cohabiting

3) Codes: 1= no formal education; 2=primary; 3=secondary; 4=higher education (college, university or similar)

4) Codes: 1=agricultural management skills; 2=forest management skills; 3=other

5) Codes: 1=agriculture; 2=forestry/forest use (NTFPs); 3=hunting; 4=fishing; 5=other

A7. Please indicate the number of permanent household members in each group:

	Sex	Age group			
		0 to 15	16 to 45	46 to 60	Above 60
1	Male				
2	Female				

A8. What ethnic group or tribe do you belong to? _____

A9. What religion do you practice? _____

Code: 1= Christian; 2=Muslim; 3=Buddhist; 4=Traditional animism; 5= other (specify); 6= No religion

II. LAND

A10. Please indicate the size of farmland (in hectares) that currently has been in **use** (last 12 months). If type of ownership, rental status and land conversion is the same for all land, please treat as one 'parcel'. If there are different tenure arrangements for different part of the farmland, please specify accordingly.

	Area used (ha)	Ownership (tenure) ¹⁾	Rented ²⁾	Land conversion type ³⁾
'Parcel 1'				
'Parcel 2'				
'Parcel 3'				
'Parcel 4'				
'Parcel 5'				
'Parcel 6'				
Total				

1) Codes: 1= private; 2= state (ordinary); 3= state (JFM); 4= state (CBFM); 5= state (individual); 6=common property;7= open access

2) Codes:1=not rented; 2= rented from state; 3=rented from non-state, e.g. community or individuals,

3) Codes: 1= permanent agriculture land (cleared more than 10 years ago); 2= land cleared in shifting cultivation areas; 3= cleared forest last 10 years to become permanent agricultural land; 4= other.

III. ENERGY SOURCES

A16	What is the most important source(s) of energy for cooking? ¹⁾ Please rank your answer in the order of importance ²⁾	Rank 1 ²⁾	Rank 2	Rank 3

1) Code: 1=electricity; 2=gas; 3=kerosene; 4=charcoal; 5=bought fuelwood; 6=fuelwood collected REDD pilot forest; 7=fuelwood collected from other forested landscapes; 8= other

2) Please rank (1, 2,...) if more than one type of energy is used. (If 'fuelwood collected from REDD forest' is most important, write '6' in the column for 'Rank 1'. If 'bought fuel wood' is the second most important, write '5' in the column for 'Rank 2' etc.).

IV. SOCIAL ASSETS

A18. Do you consider your village/community a good place to live?

Code: 1=Yes; 2=It is OK; 3=No

A19. What is your level of trust in people in your village/community?

1 Very low	2 Low	3 Fair	4 High	5 Very high

A20. How do you rate your household's relationship with the following?

No		1 Very bad	2 Bad	3 Fair	4 Good	5 Very good
1	Neighbors					
2	People from other communities					
3	NGO workers					
4	Village council					
5	Local government officials					

A21. Does any member of your household belong to the following groups?

No	Groups	Member ¹⁾	Function in the group ²⁾	Is this a REDD+ group? ³⁾
1	Farm groups			
2	Village committee			
3	Local NGOs			
4	Traditional council			
5	Local political group			
6	Religious group			
7	Credit union			
8.	Savings group			
9	Other			

1) Code: 1=belong; 2=do not belong; 9=does not exist

2) Code: 1= leader; 2=ordinary member

3) Code 1=Yes; 2=No

V. VULNERABILITY AND COPING STRATEGIES

A22. Has the household's income over the past 12 months been sufficient to cover what you consider to be the needs of your household?

Codes: 1=yes; 2=reasonably; 3=no

A23. How well-off is your household compared to other households in the village/community

Codes: 1=worse-off; 2=about average; 3=better-off

A24. How well-off is your household today compared to the situation at the past interview in 2010?

Codes: 1=less well-off now; 2=about the same; 3=better off now

A25. Has your household faced any major income shortfalls or unexpectedly large expenditures during the past 12 months?

Codes: 1=Yes; 2=No (If 'NO', GO TO Section B)

A25a. If 'yes', please complete the table

No	Serious event	How severe ¹⁾ ?	How did you cope with the income loss or costs?
1	Serious crop failure		
2	Death/serious illness in family (productive age-group/adult)		
3	Loss of land		
4	Major livestock loss (drought, disease)		
5	Loss of waged employment		
6	Climate/drought/floods		
7	Price changes on products and consumer goods		
8	Protected area establishment		

Codes: 1=somewhat severe; 2= severe; 3= very severe; 9= not relevant

A25b. Is the protected area you refer to in 8 above a REDD+ forest?

Codes: 1=Yes it is a REDD+ forest; 2=No it is another type of protected area

If 'NO' GO TO A25c, otherwise move to the next section B

A25c. Please specify the kind of protected area you referred to?

SECTION B: Resource use, income and constraints

The main aim of this section is to map out the livelihood activities and strategies of the household. The household's use of land resources includes both forests and agriculture. This data will form the basis for assessing the local livelihood outcomes and offer information for the opportunity cost analysis of forest land in the different pilot areas.

I. AGRICULTURAL PRODUCTION FOR THE PAST 12 MONTHS

B1. List the most important crops that your household has produced, consumed and/or sold the **last 12 months**.

No	Crop type ¹⁾	Area (ha)	Labour ²⁾	Total output (kg) ³⁾	Sold (kg) ³⁾
1					
2					
3					

1) Codes: The local team must define and code the main crop types in the pilot areas.

2) Codes: 1= household; 2= hired; 3=both. Please use the number for the dominant category. If one category clearly dominates, do not use 'both'.

3) Please convert local units (e.g. bushels of corn, sacks of potatoes, etc.) into kg when entering data to database.

B1a. What has been the major trend in your agricultural production since the last interview in 2010?

Codes: 1= Decrease 2=Stable 3=Increase

B1b. Do you think REDD+ had any effect in causing this outcome in your production?

Codes: 1=Yes; 2 =No

B1c. Please explain your answer

B2. Do you have any other problem(s) that limit your agricultural production?

Codes: 1=Yes; 2 =No (If 'NO', GO TO B2c)

B2a. If 'yes', what do you consider to be the most important problem limiting your agricultural production? _____

B2c. Do you have any factor(s) that boost your agricultural production?

Codes: 1=Yes; 2 =No (If 'NO', GO TO B3)

B2d. If 'yes', what do you consider to be the most important factor boosting your agricultural production? _____

B3. If you were to expand your agricultural production, how dependent would you be on clearing forests?

1. Not dependent at all	2. A bit dependent	3. Quite dependent	4. Very dependent

B4. Is it easier to get new land for agriculture today than at the time of the past interview in 2010?

1. By inheritance	2. By buying	3. By renting	4. By clearing forest

Codes: 1=easier; 2=as before; 3=more difficult

If you have marked 'more difficult' (3) in any of the above categories GO TO B4a

If you have marked 'easier' (1) and 'as before' (2) GO TO B5

B4a. Why is it more difficult? Please state the most important reason:

B4b. To what extent does REDD+ contribute to making it 'more difficult' to get new land for agriculture?

1. Not at all	2. A little	3. Much	4. Very much

B5. Have you had any conflicts over access to land for agriculture in the last five years?

Codes: 1=Yes; 2=No (If 'NO', GO TO B6)

B5a. If 'yes', how would you describe the seriousness of these conflicts?

1 Very low	2 Low	3 Intermediate	4 High	5 Very high

B5b. To what extent has REDD+ led to these conflicts?

1. Not at all	2. A little	3. Much	4. Very much

B5b. Please explain your answer

II. LIVESTOCK PRODUCTION FOR THE PAST 12 MONTHS

B6. What is the number of livestock and livestock products that your household has sold, bought, slaughtered or lost during **the last 12 months**? What is the present number of livestock?

No	Livestock	No	Product produced	Sold (incl. barter) ¹⁾	For own use	Total number owned
1	Cattle	1	Live animal (no)			
		2	Meat (kg)			
		3	Milk (liters)			
		4	Dung (kg)			
		5	Hide (kg)			

3	Goat	10	Live animal (no)			
		11	Meat (kg)			
		12	Milk (liters)			
4	Sheep	13	Live animal (no)			
		14	Meat (kg)			
		15	Milk (liters)			
5	Pig	16	Live animal (no)			
		17	Meat (kg)			
6	Poultry	18	Live animal (no)			
		19	Egg (kg)			
		20	Meat (kg)			

1) Please indicate sold live animals in numbers and sold meat from slaughtered animals in kg – please convert local measuring units into kilos and liters as appropriate when entering into database.

B6a. What has been the major trend in your livestock production since the last interview in 2010?

Codes: 1= Decrease 2=Stable 3=Increase

B6b. Do you think REDD+ had any effect in causing this outcome in your production?

Codes: 1=Yes; 2 =No

B6c. Please explain your answer

B7. Do you have any other problem(s) that limit your livestock production?

Codes: 1=Yes; 2=No (If 'NO', GO TO B8)

B7a. If 'yes', what do you consider to be the most important problem limiting your livestock production? _____

B8. Do you have any factor(s) that boost your livestock production?

Codes: 1=Yes; 2 =No (If 'NO', GO TO B9)

B8a. If 'yes', what do you consider to be the most important factor boosting your livestock production? _____

B9. How do you feed your livestock¹⁾?

No	Type of animals	A. Forest land (grazing and/or collected fodder)	B. Non-forest land (grazing and/or collected fodder)	C. Using crop residues	D. Other (specify)
1	Cattle				
3	Goat				
4	Sheep				
5	Pig				
6	Poultry				
7	Other animal Specify type:				

8	Other animal Specify type:				
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1) Please rank (1, 2, 3, ...) if more than one type is used for any of the animal categories. (So if 'crop residues' is most important for feeding e.g., cattle, write '1' in the column for 'using crop residues' and '2' in the column for 'forest land' if that is the second most important etc.).

III. FOREST RESOURCE USE

B10. How far is it in minutes (walking) from your house to the edge of the nearest forest that you often use?

B11. What is the importance of the following forest products that the members of your household have collected from the forest both for own use and sale over the last month? Where and how is it collected?

	Main forest products	Collected where		Collected by whom		Own use (kg)	For sale (kg)
		Forest type ¹⁾	Ownership ²⁾	Labour ³⁾	Sex/age group ⁴⁾		
1	Fuelwood						
2	Poles						
3	Charcoal						
4	Timber						

When coding, use the number for the dominant category. Hence, if one category clearly dominates, do not use 'mix'/'both'.

1) Codes: 1= primary forest; 2= secondary forest; 3= mix

2) Codes: 1= state forest ordinary; 2= state forest JFM (with REDD+); 3= state forest JFM (without REDD+); 4= community forest (with REDD+); 5=community forest (without REDD+) 6= 'defacto' open access (including general land) 7= mix

3) Codes: 1= household; 2= hired; 3= both

4) Codes: 1= men; 2= women; 3= children; 4= mix

B12. How would you rate your access to and use of forest products (fuelwood, poles & timber, charcoal) today compared to five years ago (before 2010)?

1 Much reduced	2 Reduced	3 The same	4 Increased	5 Much increased

B12a. If 'much reduced' or 'reduced', what do you consider to be the most important factor(s) limiting your access to and use of these forest products today? If more than one, please rank up to the three most important factors.

1	
2	
3	

B12b. If 'increased' or 'much increased', what do you consider the most important factor(s) for increasing your access to and use of these forest products today? If more than one, please rank up to the three most important factors.

1	
2	
3	

B13. How important are the other forest products, i. e. non-timber forest products (NTPF) that the members of your household collect from the forest both for own use and sale?

No	Other forest products	1 Do not collect	2 Somewhat important	3 Important	4 Very important
1	Fodder				
4	Medicinal plants				
5	Wild fruits and leaves				
6	Nuts				
7	Bush meat				
8	Mushroom				

B14. If you sell any of the above products (question B13), how much income does your household make on average in a month (in \$): _____

B15. How satisfied are you with how the forests of your community are managed?

1 Very dissatisfied	2 Somewhat dissatisfied	4 Somewhat satisfied	4 Very satisfied

B15a. If very dissatisfied or somewhat dissatisfied, why?

B15b. If satisfied or somewhat satisfied, why?

B16. How would you rank your current relationship with other forest users in terms of access to and use of forest resources (fuelwood, poles & timber, charcoal)?

1 Very bad	2 Bad	3 Fair	4 Good	5 Very good

If 'Fair', 'Good' or 'Very good, GO TO B16c

B16a. If 'bad' or 'very bad', why is it so? Please rank

No	Response	1 Disagree	2 Disagree somewhat	3 Agree somewhat	4 Agree
1	No cooperation				
2	Poor communication and dialogue				
3	Ethnic conflicts				
4	Unequal distribution of rights				
4a	Restricted access to forest products				
5	Others (specify)				

B16b. Are the bad relationships you describe above among forest users from within the village or outside?

Codes: 1=From within my village; 2=From outside my village; 3=Both

B16c. How has REDD+ affected the relationships among forest users in your village in terms of access to and use of forest resources (fuelwood, poles & timber, charcoal)?

1 Worse	2 No effect	3 Better

B16d. If 'worse' or 'better' please explain your answer

B16e. How has REDD+ affected the relationships between forest users in your village and those in neighboring villages in terms of access to and use of forest resources (fuelwood, poles & timber, charcoal)?

1 Worse	2 No effect	3 Better

B16f. If 'worse' or 'better' please explain your answer

B17. Has your household planted any woodlots or trees on the farm since the last interview in 2010?

Codes: 1=Yes; 2=No (If 'NO', GO TO B18)

B17a. If 'yes', what are the main purpose(s) of the trees planted? You may emphasize more than one purpose

	Purpose	Ranking ¹⁾
1	For own use	
2	For commercial use	
3	Carbon sequestration	
4	Other environmental services If 'other', please specify here:	

1) Indicate importance by ranking the purpose(s): 1,2,3...

B17b. How was the planting of these trees done?

1 Individually	2 Communally	3 Mix ¹⁾

1) Only use mix if there is no clear dominant category

B17c. Did REDD+ influence the decision to plant woodlots?

Codes: 1=Yes; 2=No

B17d. If yes, please explain how REDD+ influenced this decision?

B18. Did your household clear any forest during the past five years?

Codes: 1=Yes; 2=No (If 'NO', GO TO B19)

B18a. If 'yes' to B18, how much forest was cleared on average per year: _____ (ha)

B18b. If 'yes' to B18, answer also the following questions concerning cleared forests over the last five years

		Rank 1 ¹⁾	Rank 2	Rank 3
1	What was the cleared forest (land) used for? Codes: 1=cropping; 2=tree plantation; 3=pasture; 4=other			
2	What type of forest did you clear? Codes: 1= primary forest; 2=secondary forest; 3=mix			
3	What was the ownership status of the forest cleared			

<i>Codes: 1= state forest ordinary; 2= state forest JFM (with REDD+); 3= state forest JFM (without REDD+); 4= community forest (with REDD+); 5=community forest (without REDD+) 6='defacto' open access including general land); 7= mix</i>			
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1) Ranking using row 1 as example: If e.g., 'pasture' is the most important use of cleared forests, write '3' in the column 'Rank 1'. Similarly, if 'cropping' is the second most important use of cleared forests, write '1' in column 'Rank 2', etc. Do similar for rows 2 and 3

B19. How much land used by your household has been abandoned on average over the last 5 years?

B21. Has the household received any cash or in kind payment or compensation related to the following forest services over the past 12 months?

No	Principal purpose	Received ¹⁾	If 'yes', please indicate the amount received (\$)
1	Tourism		
2a	Carbon projects other than REDD+		
2b	REDD+ carbon projects		
3	Water catchment projects		
4	Tree planting		
5	Benefits from logging companies		
6	Other, please specify here:		

1) Code: 1=Yes; 2=No

B22. What is the average income from paid work that the household members together receive in a month (in \$): _____

B23. Are you or any other member(s) of the household involved in any type of business, and if so, what is the **net income** related to that business **per month**?

	Business 1	Business 2	Business 3
1. What is your type of business? ¹⁾			
2. Net income (in \$)			

1) Codes: 1=shop/trade; 2=agricultural processing; 3=handicraft; 4=carpentry; 5=other forest based; 6=transport (car, boat,...); 7=lodging/restaurant; 8=brewing; 9=brick making; 10=landlord/real estate; 11=herbalist/traditional healer; 12=quarrying; 13=fishing outside of the forest; 14: Other

B24. What is the average income received from income transfers (state support; remittances etc.) the household members together receive in a month (in \$): _____ *NOTE: Must not overlap any income already covered in questions B21-B23.*

Appendix 3 FOCUS GROUP DISCUSSION CHECKLIST

Note: Questions on REDD+ asked only at pilots

A Livelihoods

Nr	Topic	Subcategories/question
A1	Livelihoods	Income, food security, access to forest resources, social infrastructure (health, education, road, electricity)
A2	Change in livelihood condition since 2010	How have your “livelihood” (<i>ask each category individually, e.g. income, food security etc</i>) condition worsened, improved, remained the same? What did you do to cope with this? How REDD contributed to this change?
A3	New technology	What new technology introduced in the last 5 years in the village and how they affected livelihoods? Have new technology made your life easier/complicated? Are these changes due to REDD? <i>Examples (according to an area): mobile phones, improved stoves, improved agriculture etc.</i>
A4	Shocks	Has your village experienced floods, droughts, crop failure, pests, increase in wildlife that jeopardize livelihoods (baboons invading crops), etc. How your community coped/survived this? (specify the type of “shock” according to the answer) <i>Try to grasp also presence of conflicts e.g. violence with maasai, or any kind of political demonstrations, oppositions against village leadership</i>
A5	Changes in product prices	Change in product prices for <ul style="list-style-type: none"> - agricultural output: product - agricultural input: hoes, axes, collars etc. - forest products: charcoal, timber, etc. - labour - land
A6	Market condition	Where and how do you sell your products in local community/ external market? <i>Find out if internal exchange also occurs when someone lacks money to purchase product (barter system)</i> Credit arrangement: saving groups. How are they organized? Has REDD facilitated saving groups? <i>REDD can bring a credit scheme and such changes as access to bank account. If so, how has it changed their lives?</i>
A7	Gender	Find out what activities women do in the forest vs men. Has REDD widened the gap/added new roles to gender responsibilities (e.g. women involved in forest patrol) Has REDD stopped some gender defined activity? Has REDD influenced division of labour between genders?

A7a	Gender	<p>Are there activities that women / men do now that they did not do before? Are there activities that they are not permitted to do?</p> <p>Are there any changes in women / men activities due to the introduction of REDD+ in the village? Are you happy with these changes?</p> <p>What problems you face as a result? <i>E.g. If patrol happens at evenings, does it has implications on women marriage (especially in a Muslim community)</i></p>
A7b	Social groups	<p>Has access to and use of resources changed for any social group in your village / around your village.</p> <p>Has REDD affected this change? What group is especially unsatisfied / happy with this change?</p>
A8	Climate change	<p>Changes in climate conditions: change in rainfall, agricultural calendar etc. in the last 5 years. How has it affected the livelihoods? Any link to REDD?</p>

B Actors, power, institutions

Nr	Topic/question	Subcategories
B1	Village leadership	<p>Who are most important authorities in the village involved in decision making?</p> <p>Who is involved in land allocation and decision about forest management? How decisions about forest/land use are made?</p>
B2	Transparency Accountability Corruption	<p>Are you aware how village leaders decide on:</p> <ul style="list-style-type: none"> - distribution of payments - land allocation - forest management <p>Is village leadership transparent about decisions it makes?</p> <p>Are decisions openly and frequently communicated? Can villagers oppose/ contest these decisions? Are they able to re-elect/ remove the leadership? Are there external actors that can influence in any other way decision making?</p>
B3	Changes in leadership	<p>Have there been any changes in village leadership (new institutional structures)? If so, what are new actors and what are their roles?</p> <p>What new decision-making rules introduced?</p> <ul style="list-style-type: none"> - decision making rules (changes in constitution) - operational rules (by-laws) <p>Has NGO introduced changes? REDD project? If REDD project, what are the changes introduced regarding decisions on:</p> <ul style="list-style-type: none"> - payment distribution - land allocation - forest management <p>Does community has a right to oppose decision-making rules?</p>

B4	Interaction	<p><i>Two side accountability: relationships and interaction between village leadership and the villagers.</i></p> <p>Does village leadership involves community in decision making (asks about consent, their interests, needs)?</p> <p>Does leadership favours to protect interests of a particular group (ethnic/clan) in a village?</p> <p>Are villagers active to engage with the leadership in decision making? Do they oppose when leadership does wrongdoing?</p> <p>Has REDD in any way influenced the interaction and relationships? How?</p>
B5	Decisions and social groups	<p>To what extent various social groups (ethnic, religious, occupational, wealth, opposition) were involved/excluded in decision making process concerning:</p> <ul style="list-style-type: none"> - payment distribution - land allocation - forest management <p><i>E.g. to what extent women participated / were excluded? Maasai?</i></p> <p>Local opposition group: how powerful are they to create opposition to new rules?</p>
B5a	REDD and decision making process	<p>Has REDD changed the level of engagement of a particular social (vulnerable) group in decision-making process concerning:</p> <ul style="list-style-type: none"> - payment distribution - land allocation - forest management <p><i>E.g. are women more empowered to participate?</i></p>
B6	Equal payment	<p>Are there people or groups particularly favoured / disadvantaged by decision making rules concerning:</p> <ul style="list-style-type: none"> - payment distribution - land allocation - forest management <p>Has introduction of REDD influence that?</p>
B7	Conflict	<p>Has there been conflict in decision-making process for:</p> <ul style="list-style-type: none"> - payment distribution - land allocation - forest management <p>How severe?</p>
B8	External actors and village	<p>How external actors (district officials, NGO) engage in management of REDD in the village.</p> <p>How do they interact with:</p> <ul style="list-style-type: none"> - Villagers - Village leadership <p>What NGO does in community and if they changed way of acting?</p> <p>Has REDD influenced change in relationships and interaction?</p>

C Rules, restrictions, resource management

Four forest types: In state forests, In state forests with REDD, In community forests, In community forests without REDD

Nr	Topic/question	Subcategories
C1	Rules	What are the rules regarding converting forest land to agriculture. What are the rules regarding productive activities in the forest. Who, when, how much allowed to harvest: <ul style="list-style-type: none"> - timber - fuelwood - charcoal - NTFP
C1a	REDD and change of rules	To what extent has the introduction of REDD changed these rules? Is this change good or bad? Do the rules introduced work? What rules are working in practice, which are not?
C2	Monitoring	How access to forest and use monitored? Has REDD changed monitoring? Is this change good or bad?
C3	Enforcement	What are sanctions if rules are broken? <ul style="list-style-type: none"> - In state forests - In state forests with REDD - In community forests - In community forests without REDD Has REDD changed sanction rules?
C4	People and rules	Commitment to rules. Do people feel bound by the rules?
C5	Forest management unit	What are the main activities of forest management unit? Has REDD changed their activities in the forest? Are changes good or bad?
C6	Relations between forest management unit and people	What are the relationship between community and forest management unit? Has REDD affected these relationship?
C7	Resource use and management	Who is favoured when the rules are enforced? Is any particular group disadvantaged?
C8	Conflict resolution	Are there conflicts over forest resources (both internal and external)? How are they resolved? Do conflict resolution rules exist? <i>e.g. In state forest: would government involve police etc to enforce rules/ conflict resolution?</i> Has REDD changed it?
C9	New conflicts	Has REDD added new conflicts? <i>REDD restricts people to do something. Look what conflicts were before and which occurred as result of REDD</i>

D – Post REDD analysis

Nr	Topic/question	Subcategories
D1	Compensation	What compensation from REDD did community receive? Where they invested it? Is community happy with the compensation? Why? If not, how would they distribute the payment differently today?
D2	Opportunity costs	Has compensation covered their loss of access to the forest resource? Is there anyone in a community not happy with the compensation, why?

D3	Illegal activities	<p>If illegal activity in the forest would occur, which activity and who would be engaged in the activity (internal and external groups)?</p> <ul style="list-style-type: none"> - Farming - Charcoal - Grazing - Timber <p>If some group involved in illegal activity today, try to find out if it is because they were unhappy with the compensation received (if received at all)?</p>
D4	Payment scheme/trust	<p>Who distributed the payments?</p> <ul style="list-style-type: none"> - local leadership - local government official (VEO) - NGO - external actors <p>What was the level of trust by community to a payment distributor? Was trust high or low? In whom community would feel more trust in payment distribution?</p>
D5	Payment scheme/management	<p>Any issue/conflict/problem occurred with payment distribution? <i>Try to capture:</i></p> <ul style="list-style-type: none"> - <i>security of payment</i> - <i>ability to deliver</i> - <i>corruption</i> - <i>misuse</i>
D6	Elite capture	<p>Does everyone received compensation equally? Has any institutional structure affected the way payment was distributed? <i>Try to capture:</i></p> <ul style="list-style-type: none"> - <i>elite capture</i> - <i>corruption</i> - <i>unequal distribution</i> - <i>How did the process go with payment</i>
D7	Value of the forest to community	<p>Are people motivated to protect the forest? Does REDD has changed the way community values the forest? Do people have enough land for agriculture now/ in the future?</p>
D8	Community knowledge and REDD	<p>Has REDD helped community to learn more about value of their forest? Has REDD helped to appreciate the forest more and protect it for the future?</p>
D9	Future restrictions on livelihood	<p>Now when REDD is terminated, has this changed access to the forest (access to forest under REDD vs access now)? Whether community thinks there might be future restrictions to access the forest? How should this be resolved in the future?</p>



Norges miljø- og biovitenskapelig universitet
Noregs miljø- og biovitenskapelige universitet
Norwegian University of Life Sciences

Postboks 5003
NO-1432 Ås
Norway