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Towards a 'pro-poor' pathway?

An assessment of REDD+ institutions and their impacts on local people's livelihoods in Kilosa District, Tanzania.

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Declaration

I, Barre Daqane Ibrahim, 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.

Ås, 15th December 2016

Signature: _____

Barre Daqane Ibrahim.

Dedication

I dedicate this thesis to my beloved parents and family. Special dedication to my dear wife and our lovely children for their unceasing support, love and patience throughout the writing process and beyond.

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Writing a Master thesis is an exciting process through which we learn and create knowledge. The process demands the support and inspiration from different categories of people – ranging from experienced academicians, financial and moral supporters to willing informants. I am indebted to many people who helped me in going through this ‘journey’.

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AHSANTENI SANA.

Abstract

REDD+ aims to reduce deforestation and forest degradation in the developing countries. Forests and related resources are important sources of income for rural households. Kilosa district is one area in Tanzania where the REDD+ initiative was introduced. The pilot project started in 2010 and ended in 2014. This study aims at ‘taking stock’ of REDD+ in terms of discovering whether the intervention had any impact on local people’s livelihoods in Kilosa district. More specifically, the study evaluates changes in local institutions, people’s evaluation of these changes and the possible impacts of REDD+ on people’s livelihoods. The study is part of the ‘Man and Forests’ project which was funded by the Norwegian Research Council in 2014.

This study employed two theoretical frameworks, namely the environmental governance systems framework and the rural livelihoods framework. In terms of methodology, the study used BACI (before-after-control-impact) design whereby both qualitative and quantitative research methods were used. Following this methodology, field data from Kilosa district was collected from two pilot villages (Nyali and Lunenzi) and two control villages (Zombo and Lumango) in 2010 and 2015. Field data included household surveys and qualitative data. Additionally, the study used literature from secondary sources and archives.

Qualitative data was used to assess the changes in institutions and the local people’s evaluation of the changes. The results from these data showed a shift of property rights, from state property to common property, in the pilot villages. Moreover, there were changes in formal rules regarding use of forest and related resources in these two villages. Despite the existence of the formal rules, illegal timber logging and charcoal making were common activities in Nyali in both periods. Regarding control villages, there were no changes in property rights, as one would expect. Rules for use of resources have also not changed since 2010. However, it was observed that use of resources was *de facto* under open access in 2015 as was the case in 2010.

When it comes to local people’s evaluations of the institutional changes, it was discovered that majority of the informants in the pilot villages were satisfied with the REDD+ as well as the pre-REDD+ rules. The two main reasons for satisfaction with the pre-REDD+ rules in both villages were equal distribution of resource use and benefits and good accessibility to resources. However, it seems that people in Lunenzi were more positive to the pre-REDD+ compared to those in Nyali. Additionally, the results suggested weaker forest governance in Nyali compared to Lunenzi in 2010. In terms of REDD+ rules, the two main reasons for satisfaction were issues

such as clear boundaries and people's participation in making rules. Concerning variations across the villages, the results showed that people in Lunenzi were more positive than those in Nyali as was the case in 2010. In addition, forest governance was still better in Lunenzi in 2015 compared to Nyali. Nevertheless, it was noted that forest governance had improved in Nyali in 2015 compared to 2010.

The results from the surveys reveal severe reductions in gross total household incomes in both pilot and control villages between the two study periods. Moreover, there were reductions in most of the income categories. This is mainly because of drought that hit these villages in 2014. To test whether REDD+ has had a role to play in this respect, panel data analysis was done for gross total household incomes, total forest incomes and total farmed area. Results from the panel data analysis showed that REDD+ did not have significant effect on local people's gross total income and total farmed area. Interestingly, REDD+ had a positive impact on total forest income.

The thesis recommends national policies for poverty alleviation in Kilosa district and beyond. It further proposes an increase in alternative livelihoods and agricultural investments in the REDD+ pilot villages in order to reduce deforestation.

Key words:

REDD+, environmental governance framework, institutional change, rural livelihoods framework, impact, livelihoods, BACI, Kilosa district, Tanzania

List of abbreviations

BACI	Before–After/Control–Intervention
CBFM	Community Based Forest Management
CoP	Conference of Parties
CPR	Common Pool Resources
EGS	Environmental Governance Systems
FDGs	Focus Group Discussions

IPCC	Intergovernmental Panel on Climate Change
NGO	Non-Governmental Organization
NTFP	Non Timber Forest Products
PFM	Participatory Forest Management
PRA	Participatory Rural Appraisal
REDD	Reducing Emissions from Deforestation and forest Degradation
REDD+	Reducing Emissions from Deforestation and forest Degradation, <i>and enhancing forest carbon stocks</i>
RLA	Rural Livelihoods Analysis
UNFCCC	United Nations Framework Convention on Climate Change
UN-REDD	United Nations collaborative initiative on Reducing Emission from Deforestation and Forest Degradation
V.E.O	Village Executive Officer
VLFR	Village Land Forest Reserve
VNRC	Village Natural Resource Committee
W.E.O	Ward Executive Officer

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Photo 1: REDD+ initiative in Lunenzi village, Kilosa district Ω . Photo by author

Ω - Notice the forest that was managed under REDD+ regime at the background (★); and the village chairperson's office which was built with funds from REDD+ initiative (☀)

1. Introduction

“In the future, that battlefield is likely to be complex and hazardous. Climate change will help produce the kind of military challenges that are difficult for today’s conventional forces to handle: insurgencies, genocide, guerrilla attacks, gang warfare and global terrorism” (Homer-Dixon 2007)

We live in an era of climate change. Climate change is a global phenomenon defined as “any change in climate over time, whether due to natural variability or as a result of human activity” (IPCC 2007:30). In this report, IPCC¹ argues that the contemporary high rate of human activities on the planet is the main cause of climate change. Furthermore, climate change is caused by greenhouse gases – e.g., carbon dioxide (CO₂), methane (CH₄) and nitrous oxide (N₂O) – emitted into the atmosphere following human actions and/or natural processes. Accumulation of these gases in the atmosphere brings about a significant rise in global temperature (IPCC 2007; IPCC 2014).

Existing literature shows that increased global temperature (and thus change in climate) has detrimental effects on both humans and their environment. Such effects include droughts in some parts of the world and flooding in some other parts; sea level rise, hurricanes, storms, loss of biodiversity, socio-economic and health impacts etc. (IPCC 2007; Stern 2007). Although there are some climate change deniers, the majority of people around the globe – spearheaded by the scientific community – arguably, believe that climate change is a reality that poses multiple threats to humans and other living organisms (Homer-Dixon 2007; IPCC 2007; IPCC 2014; Klein et al. 2007; Legras 2013; Whitmarsh 2011).

Efforts to avert climate change gained momentum following the IPCC 1990s reports (Dyngeland & Eriksson 2011). For instance, as a response to the 1991 IPCC report and campaigns prior to this report, the United Nations Framework Convention for Climate Change (UNFCCC) was established. The convention’s main goal is to ensure “stabilization of greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system” (UNFCCC 1992:4). Achieving this

¹ “Intergovernmental Panel on Climate Change (IPCC) is the international body for assessing the science related to climate change”(IPCC 2013:1)

UNFCCC goal is important in order to realize resilient ecosystems, increase food supply and promote sustainable economic growth.

Two anthropogenic (human) activities that emit carbon dioxide into the atmosphere are deforestation and forest degradation. There is a consensus among researchers that deforestation and forest degradation are the second most important human activity (after combustion of fossil fuels) that contributes to atmospheric carbon dioxide; although there are disagreements on the exact figures (the range is 6-20%) (Baccini et al. 2012; Dyngeland & Eriksson 2011; Houghton 1991; IPCC 2014; Van der Werf et al. 2009). Moreover, it is documented that the highest CO₂ emissions through deforestation and forest degradation come from developing countries (Canadell et al. 2009; Houghton 1991).

A global REDD+ initiative ² was recently launched through negotiations by members of the United Nations (UN), with the intention of establishing “a financial value for the carbon stored in forests, offering incentives for developing countries to reduce emissions from forested lands and invest in low-carbon paths to sustainable development” (UN-REDD 2015). Through these incentives, that the REDD+ initiative is highly anticipated to help reduce the amount of greenhouse gases emitted to the atmosphere (i.e., mitigate climate change), and by so doing reduce global temperatures. Further, it is argued that the REDD+ initiative has the ability to generate other benefits – commonly referred to as co-benefits. These co-benefits include improving local people’s livelihoods; which by extension might imply poverty reduction (Angelsen 2008).

Tanzania is one of the developing countries with a high level of deforestation and forest degradation (Canadell et al. 2009; Vatn et al. 2009). Indeed, it is estimated that annual carbon dioxide emissions through deforestation and forest degradation to be “a total of 126 million tons CO₂ emissions per year” (Kajembe et al. 2015:1). Furthermore, Tanzania is the fourth highest annual CO₂ emitter from land use change and forestry in Africa (Canadell et al. 2009). Because of its high annual CO₂ emissions, REDD+ pilot projects were implemented in Tanzania in 2008. The Norwegian government was the key sponsor of the REDD+ pilot projects in Tanzania (Burgess et al. 2010; FBD 2000).

However, although the Tanzanian government has embarked upon national REDD+ programme, the new policy might have possible consequences on local people’s livelihoods and poverty level. This is because forest and forest-related resources contribute enormously to

² to be explained in details in the next chapter

many people's livelihoods in Tanzania, especially to the rural poor who depend mainly on forests for their livelihoods (Abdallah & Monela 2007; Kajembe et al. 2015). For the sake of delimitation, this research thesis focuses on institutional changes and their impact of REDD+ on local people's livelihood in **Kilosa District**, which is one of the areas in Tanzania where a REDD+ pilot project was introduced.

1.1. Problem statement and justification

Existing literature shows that deforestation and forest degradation in Tanzania contributes substantially to increased greenhouse gas emissions into the atmosphere. One way of reducing these emissions is through the REDD+ initiative. Besides its main goal of reducing emission of greenhouse gases, the REDD+ initiative has also the objective of livelihoods improvement and poverty alleviation (Angelsen et al. 2012; Kweka et al. 2015). This research focuses on livelihoods improvement.

Kilosa district is one area in Tanzania where the REDD+ initiative was introduced. The pilot project started in 2010 and ended in 2014. Doubtlessly, it is interesting to investigate the outcome of this pilot project, and discover whether the promise of livelihoods improvement has been achieved in Kilosa or not. In addition to the pilot villages, the study includes control villages³ in order to improve the validity of the research findings (Bamberger et al. 2010).

More importantly, the outcome of the pilot projects in different parts of the world – including the one in Kilosa – will determine the future of the global REDD+ initiative. It is my hope that this thesis shall be interesting to policy makers and other people who are closely following climate change discourses in general and the REDD+ initiative more specifically.

1.2. Research objective and questions

The **objective** of this research is to assess the changes in local institutions caused by REDD+ intervention and their impacts on people's livelihoods in the pilot villages.

In order to achieve the above objective, the thesis attempts to answer the following **research questions**:

³ i.e., villages having similar biophysical, demographic and socioeconomic characteristics as the pilot villages, but where REDD+ intervention was **not** introduced (Angelsen et al. 2009).

- I. What are the changes in local institutions regarding property and use rights in the study villages?
 - i. What changes in property and use rights have been made in pilot villages? To what extent do the situations in the control villages differ from those in the pilots?
 - ii. What are the changes in practice in relation to use of resources in the pilot villages? To what extent do the control villages differ in this respect?
- II. How do local people in the pilot villages evaluate the institutional changes?
- III. What are the impacts of REDD+ pilot project on local people's livelihoods, if any?

1.3. Thesis structure

Besides the introduction, the thesis includes nine chapters. Chapter 2 provides the background information about forests and forest governance (including the evolution of REDD+ regime) in Tanzania. In chapter 3, I present theoretical and conceptual frameworks necessary for my analysis. Chapter 4 describes the study villages, while chapter 5 presents research strategy, design and methods. Chapters 6, 7, and 8 present the research findings. Whilst chapter 6 explores the changes in institutions, chapter 7 investigates local people's evaluations of the institutional changes in the pilot villages. In chapter 8, I examine the impact of REDD+ on local people's livelihood. Discussion of the research findings is done in chapter 9. Lastly, chapter 10 concludes the thesis and offers recommendations based on the findings.

2. Background

In this chapter, I first present an overview of Tanzanian forests, followed by the forest management regimes in different periods. Thereafter, I present the REDD+ regime, a new forest management approach, practiced in some parts of Tanzania.

2.1. Description of Tanzanian forests – values and trends

Geographically, The United Republic of Tanzania (URT) lies in East Africa along the Indian Ocean; bordering Kenya, Uganda, Rwanda, Mozambique etc. (*see* the map below). To be more precise, Tanzania is located on a geographical position of 6 00 S, 35 00 E; with a total area of almost 950 000 km² (CIA 2014). Topographically, Tanzania has a plain landscape along the coastal areas, plateau in the central regions and highland terrains in its northern and southern regions (Lin et al. 2014).



Figure 1: Map of Tanzania showing study area.

Source: Adapted from (MapsofWorld 2014).

Further, the country has over 30 million hectares of forests and woodlands (Vatn et al. 2009), of which “up to 90% of its forestland is Miombo woodlands” (Kajembe et al. 2015:4).

The other forests include mangrove (along the ocean and the rivers) and montane forests (Kajembe et al. 2015; MNRT-FBD 2007). Perhaps, the country’s conducive tropical climatic condition, that range from warm and moist coastal areas to a relatively cooler highlands (CIA 2014; Makoi n.d.), has an important role to play in this regard. When it comes to population, Tanzania has a population of over 50 million (CIA 2014; WPR 2015). Further, over 50% of the country’s landmass is used for grazing animals. Additionally, forests and woodlands occupy nearly 40% of the country’s landmass (CIA 2014; FBD 2000). The table below shows how land is used in Tanzania.

Table 1: Land use categories in mainland Tanzania

Land use type	Area (1000 ha)	Percentage
Small holder cultivation	3,880	4.1
Large scale cultivation	585	0.6
Urban development	1,600	1.7
Inland water	5,900	6.3
Grazing land	48,740	51.7
Forest and woodlands	33,555	35.6

Source: Extracted from FBD (2000)

As shown above, forest and woodlands occupy over 30% of the total landmass. Moreover, although landmass for agricultural use is comparatively very small, agricultural practices and forest use are the main sources of local people’s livelihood, especially in rural Tanzania (Vatn et al. 2009). In fact, some authors insist that more than three-quarter of people of Tanzania depend on “land and forest as their main sources of livelihood” (Angelsen et al. 1999:313). On the other hand, over 50% of the landmass is used for grazing animals, which is another important source of livelihoods for rural communities. Forests and woodlands are of my interest here. Thus, in the following section, I first explain the general benefits of forests, and thereafter closely examine the benefits of the forest sector to the Tanzanian people, especially to the rural poor.

2.1.1. The forest is an important natural resource

“More than 70 percent of the population of Sub-Saharan Africa (SSA) is rural and depends on forests and woodlands for its livelihood. As much as one fifth of the daily livelihood needs for rural families comes directly or indirectly from forests, including 20 percent of the disposable income used by the landless and poor families to pay for school fees and meet other family needs”(Wasiq & Ahmad 2004:40).

Generally, forests are very important natural resources because they provide environmental and socio-economic benefits. If we consider environmental benefits, forests help in biodiversity conservation, sequestration of carbon dioxide from the atmosphere, improve water and air quality; and prevent soil erosion. Economically, forests have been sources of livelihoods ever since humans were hunters and gatherers. People go to the forest for hunting wild animals; collect fuelwood, timbers, poles, livestock fodder, medicinal plants, honey, wild fruits, mushrooms, rubber, dyes etc. (Kajembe et al. 2015; Vedeld et al. 2007; Willis et al. 2003). In terms of social importance, forests offer recreational opportunities such as hiking, sources of shade, provide fresh air as well as scenic view.

In Tanzania, forests provide almost all the services mentioned above. For example, in most of the rural areas and in some urban areas where there is no electricity, people depend wholly on fuelwood and charcoal for cooking (Abdallah & Monela 2007; Dyngeland & Eriksson 2011; Kajembe et al. 2015). Notably, Miombo woodland – the largest forestland in Tanzania – provides important goods and services to both rural and urban Tanzanians, for instance, “medicines, energy, food, fibers, and construction and craft materials. The services include cultural and spiritual values, climate regulations, erosion and hydrological control” (Abdallah & Monela 2007:12). Note here that although forest products are useful to all Tanzanians, rural communities depend more on these products compared to the urban dwellers, partly due to the short distance between their villages and the nearby forests.

In fact, similar to many rural areas in developing countries, forest incomes constitute a significant percentage of total income for the rural poor in Tanzania. Put differently, forest sector is one of the main source of income for livelihoods for many rural Tanzanians. In fact, according to Kilihama (2013), “in some parts of Tanzania such as the Southern Highlands areas especially in Iringa and Njombe Regions, contribution of forestry in household incomes could be ranked first to agriculture” (Kilihama 2013:6), which explains the important role played by this sector. Besides that, a meta-analysis of over 50 case studies whereby data was collected from rural areas of 17 different countries – including Tanzania – shows that forest income

accounts for over 20% of total earnings of the informants (Vedeld et al. 2007). Believably, the poor people in the villages who cannot grow crops or are engaged in other labour - demanding activities go to the forests to get forest products in order to meet their daily needs. As a coping strategy, Tanzanian rural dwellers go to the forests when their crop yields are reduced – especially in times of droughts – in order to gather wild fruits and other forest products. Moreover, beekeeping has been a tradition in Tanzania for many years (Dyngeland & Eriksson 2011; Kajembe et al. 2015).

Equally important to mention is the contribution of forests to the Tanzanian national economy. According to Dyngeland & Eriksson (2011), revenue from forestry sector is approximately “2.8% to the annual GDP” (p.5); which is a significant figure. Notwithstanding their importance to humans and the environment, forests in Tanzania are of late under a great threat due to increasing rate of deforestation and forest degradation.

2.1.2. Drivers of deforestation and forest degradation

We have just described many benefits of forests in the Tanzanian context. However, it is important to understand at this point that some human activities might as well have negative consequences for both humans and the forestland. Take for example forest clearing for the sake of increasing crop yield. While it is possible to increase crop output in this way, the process of expanding land emits CO₂ and other greenhouse gases to the atmosphere (FBD 2000). Agricultural expansion is an example of human activities that result in Land Use Changes (LUC) (IPCC 2014); and are common in Tanzania. See the Figure 2 below:

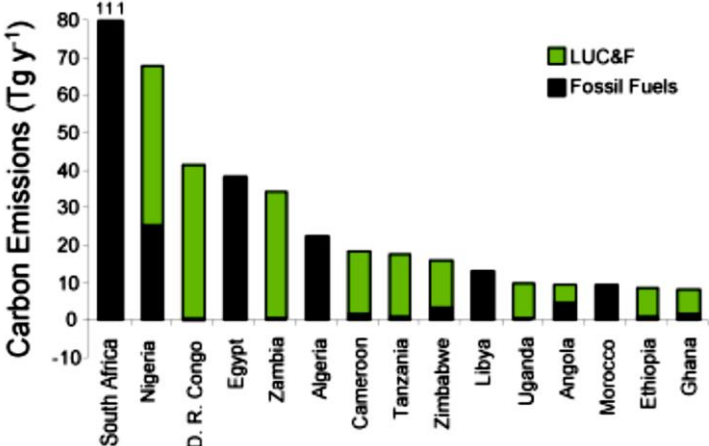


Figure 2: Amount of carbon released per year from burning of fossil fuels and Land Use Change and Forestry (LUC & F) by 15 African countries with most emissions.

Source: Canadell et al. (2009).

As already noted, deforestation and forest degradation is a huge problem in Tanzania (Salas 2014; Vatn et al. 2009). According to several authors, there are many causes of deforestation and forest degradation in this country. Broadly speaking, there are *direct* and *indirect* causes of deforestation and forest degradation as illustrated below:

Table 2: Common practices that cause deforestation and forest degradation in Tanzania

Causes	Examples	Deforestation	Forest degradation
Direct	Shifting cultivation due to economic inability, soil infertility, land availability	✓	
	Commercial farming, e.g., biofuel, tobacco, sisal, tea,	✓	
	Forest fires	✓	✓
	Overgrazing	✓	✓
	Mining, e.g., minerals, salts, sand	✓	✓
	Natural disasters – drought, floods	✓	✓
Indirect	Lack of land use plan	✓	✓
	Infrastructure development, e.g., road, power lines	✓	
	Energy for domestic and industrial use	✓	✓
	Refugees – civil wars	✓	✓
	Weak law enforcement	✓	✓
	Expansion of settlements	✓	✓

Source: Adapted from URT (2009)

Direct causes of deforestation and forestation degradation are due to human and/or animal's direct contact with the forest. These causes include expansion of agricultural land and urbanization, over-exploitation of forests in search of fuelwood, timbers (especially commercial logging), charcoal and fodder; and over-grazing of animals in the forests. Moreover, cultural wild fires and mining are other important direct causes of deforestation and forestation. Besides direct actions by humans, natural factors such as floods and drought have direct effects on forestland (Angelsen et al. 1999; CIA 2014; Salas 2014; URT 2009; Vatn et al. 2009).

On the other hand, indirect causes are factors that influence human decisions and actions in causing deforestation and forest degradation. These factors are mainly macro-level policies such as lack of /or reduced government subsidies (hence increased prices for agricultural inputs and outputs), policies that affect land use, and economic growth. Other factors that indirectly cause deforestation and forest degradation are increased population/or population density and creating or extending infrastructure such as roads, weak implementation of forest acts and by-

laws (Kweka et al. 2015; Salas 2014; URT 2009; Vatn et al. 2009). Additionally, some authors insist that weak property regimes and corruption at both national and local level are important underlying/indirect factors for causing forest deforestation and forest degradation (Dyngeland & Eriksson 2011). Indisputably, overcoming deforestation and forest degradation demands good forest management systems.

2.2. Forest management regimes in Tanzania

Historically, Tanzania was a colony of Germany followed by Britain. During the colonial era, land tenure was formalized (unlike the preceding clan - based land tenure systems) (Kilihama 2013). While the German administrators protected the forests in order to increase “government revenues possibly through promotion of an efficient timber industry” (Kilihama 2013:7), the British colonizers started renting out land to the indigenous communities & introduced forest licenses and fees in order to get revenue for their administration (Kilihama 2013). Kilihama (2013) further argues, “like the German rulers, the British forest administration’s primary goal was generation of revenues...” (p.9). Nevertheless, the Britons continued with the forest protection policy initiated by the Germans (with more focus on the forest catchment areas). Importantly, both the Germans and British management systems helped in the sustainable use of the forest resources (Abdallah & Monela 2007; Dyngeland & Eriksson 2011). When the colonial rulers left in 1961, the protection and management of the Tanzanian forest resources was taken over by the Tanzanian national government, i.e., from that time the Tanzanian forests are by law a state property (Kilihama 2013; URT 1997).

2.2.1. Understanding the legal context: Tanzanian forest laws

Putting in place forest laws and policies is a prerequisite for promoting good forest governance/management. In Tanzania, issues pertaining to forest management are enshrined in the Tanzanian forest laws and are more specifically defined by the forest Acts. Such Acts include National Land Policy Act of 1997, the Land and Village Lands Act of 1999 and the Forest Act of 2002 (Akida & Blomley n.d.; Kweka et al. 2015; URT 1997; URT 2002). Many driving factors necessitated the drafting of these acts. For instance, the National Land Policy Act (1997) was developed in order to address issues such as population growth, need for pastureland for pastoralists, migration, urban development and increased land value/prices (URT 1997); while the main objectives of the drafting of the Forest Act (2002) is to advocate for sustainable use of forest resources (URT 2002). The diagram below illustrates an overview of the types and management organization of the Tanzanian forests.

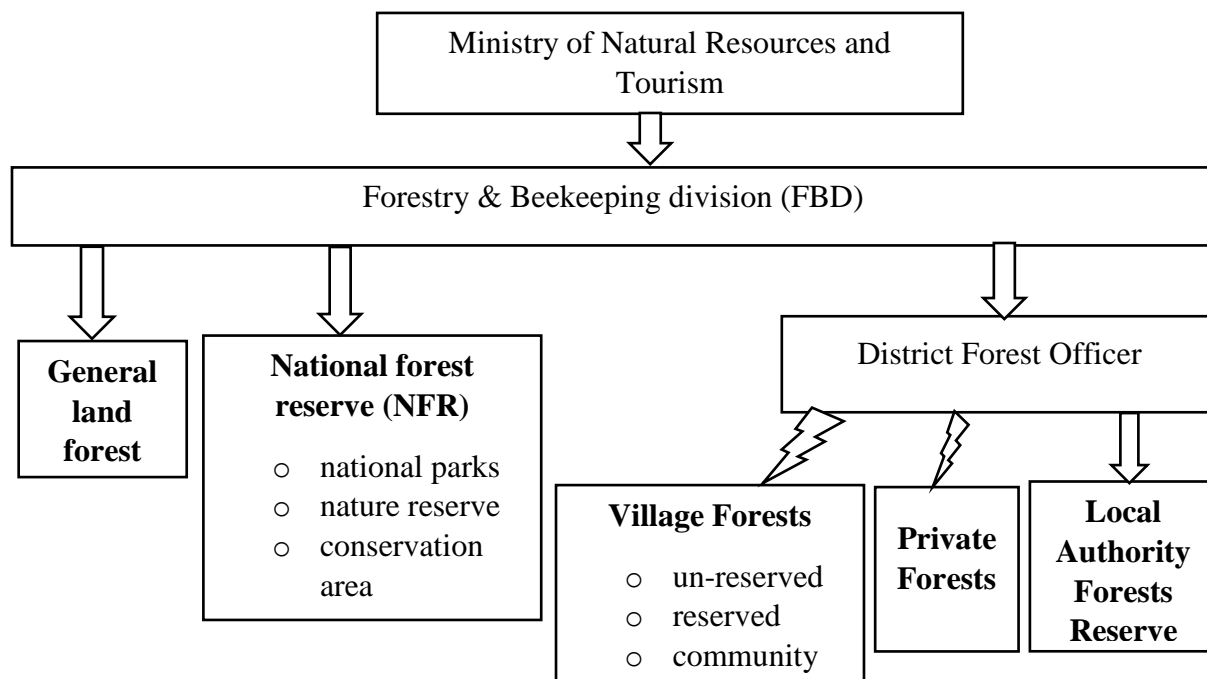


Figure 3: Types and management structure of forests in Tanzania^δ.

Source: Based on (Akida & Blomley n.d.; FBD 2000; Kilihama 2013; MNRT n.d.; URT 2002; URT 2013b).

δ – Arrows indicate flow of orders. The arrows linking village & private forests to district forest officer are different from the other arrows because the local government does *not* (always) directly manage these two forest types.

As shown above (in **bold** scripts), there are five categories of forests in Tanzania – namely forests on general land, national forests reserve, local authority forests reserve, village forests and private forests. Forests categorized as forests on general land and national forest reserves are owned and managed by the national/central government. Moreover, local authority forests reserve is owned and managed by the local governments – i.e., the district council. According to Kweka et al. 2015, the national government “holds the legal rights and management responsibilities to the central government FRs covering 92% (~11 million ha) of the reserved forests” (p.14), which means that the local authority forest reserve and forest reserves on village land is approximately 8% of the total reserve forests. In terms of use of the national and local forest reserves, one has to get legal permits and licenses from the concerned authorities (URT 2002). Of the state-owned forests, forests on general lands⁴ are de facto “under open access

⁴ Note here that there is also general land under local authority forests reserve (URT 2002), although not shown in figure 3.

regime” (Abdallah & Monela 2007:16) which implies that accessibility and use rights of these forest is, indeed, open to everyone. These de facto open access forests are commonly known as unreserved forest (Kweka et al. 2015). General land accounts for “57% of total forest area” (URT 2013b:25) in Tanzania.

Village forests include “village land forest reserves, community forest reserves created out of village forests, and forests which are not reserved which are on village land ” (URT 2002:13). In consistence with the Village Act of 1999, village land includes land labelled as village land according to the Village Settlements Act of 1965. Note again that what the statutory law defines as un-reserved village forests might be defined as a ‘customary’ forests by the local communities. Management and use of such forests is usually in accordance with the customary laws/rights, with or without the consent of the government. Moreover, general and local reserved land can become village land if they are adjacent to the village and upon decision by the village council and local authority officials. In fact, the opposite can also happened following directives from the central government and for the benefit of the public. In terms of management, village land (and village forests) falls under the jurisdiction of the village council. The village executive officer is the custodian the village land registry (URT 1999). Lastly, private forests are owned and managed by individuals or private entities.

Although the described laws and Acts are generally used in governing forests in Tanzania since its independence, there were change in forest management regimes in some parts of the country after the 1990s following public demand (Dyngeland & Eriksson 2011; Kilihama 2013). The management system is well known as participatory forest management regime.

2.2.2. Participatory forest management regime (PFM)

Forest management by the communities living adjacent to the forests is not a new forest management strategy in Tanzania. During the pre-colonial era, the indigenous communities managed their forests and grazing land under the command of their chiefs and clan elders. Besides herding and farming (where shifting cultivation was practiced); hunting and gathering were two common practices during that era (Kilihama 2013). As Kilihama (2013) insists the local communities “mostly depended on environmental resources for their livelihoods” (p.6); showing the importance of forest to local communities even during those times.

Similarly, the concept of participatory forest management is an old forest management strategy in other parts of the world, although it was recently introduced in Tanzania. For instance, PFM

has been practiced in Asia, for example in India and Nepal, for almost half of a century (Blomley & Iddi 2009). According to Lund (2015) PFM is “forest governance approaches that involve people living in and around forests in their management” (Lund 2015:1). Therefore, the central idea behind participatory forest management is to partially or wholly transfer the management responsibility of forests previously managed by the central government to the local communities. At local level where the projects are implemented, the existing local institutions might be changed or retained; while at the same time new local authorities and benefit distribution mechanism are put in place (Khatun et al. 2015; Lund & Saito-Jensen 2013).

Following the global trend and given its vast land of forests, Tanzania is one of the countries in the world that embarked on participatory forest management in the beginning of 1990s (Blomley et al. 2008; Blomley & Iddi 2009; Dyngeland & Eriksson 2011; Treue et al. 2014). Several areas were chosen by the central government as PFM pilot/ trial areas; and they include Manyara region (notably in Singida and Babati districts), Morogoro region; Tabora, Iringa, Mtwara, Tanga and Lindi regions. In these areas, a new land use plan was made whereby demarcation of the land was based on land’s productive capacity. The available forestland was divided into sub-areas, i.e. “crop use zone, grazing zone and a core protected area excluded from use”(Blomley & Iddi 2009:8). After fruitfully implementing the first PFM in Manyara region, the Tanzanian government decided to spread PFM to other parts of the country (Abdallah & Monela 2007; Blomley & Ramadhani 2006; MNRT-FBD 2008; Treue et al. 2014).

The main objective of PFM is “increase the area under conservation and to achieve sustainable forest management” (Kweka et al. 2015:17). However, note that although the Tanzanian government decided to devolved forest management, the national government still has the power to “re-centralize management of the forests, if village governments fail to conserve them” (Treue et al. 2014:25); meaning that the continuity of PFM in a given areas is subject to communities’ efforts to protect their forests. However, despite the uncertainty surrounding the future of PFM, Mbwambo et al. (2012) maintain that PFM is better compared to state managed forests which are de facto open access (i.e. general land forests) with respect to forest protection (Kajembe et al. 2015; Mbwambo et al. 2012).

Participatory forest management has three important benefits. Firstly, it strengthens forest governance vis-à-vis the traditional ways of managing the forests (Dyngeland & Eriksson 2011). *Secondly*, PFM enhances forest recovery and restoration (Abdallah & Monela 2007). And *thirdly*, PFM benefits the local people in terms of increasing their incomes from the forest

resources (Blomley & Iddi 2009; Treue et al. 2014). However, despite its benefits, PFM is **not** practiced in many parts of Tanzania (Kajembe et al. 2015; Khatun et al. 2015).

In line with this argument, some authors highlight several factors that hinder the spread of PFM in Tanzania (Kajembe et al. 2015; Khatun et al. 2015; Lund & Saito-Jensen 2013). For instance, Kajembe et al. (2015) list a number of factors; such as high expenses involved in the establishment of PFM, reduced forests income for both villagers and the village committee, underrepresentation of the voiceless (women, new-comers in the village etc.) at village meetings, and most important “elite capture” (p.7-8). Elite capture can be defined as “ a situation where elites manipulate the decision-making arena and agenda and obtain most of the benefits” (Wong 2010:3). Due to elite capture, some authors insist that the already poor villagers “receive minimal benefits from forest management and in some cases may end up negatively impacted” (Blomley & Iddi 2009:44) . Hence, they conclude that ultimate outcome of PFM projects is unequal benefit sharing and subsequently social stratification (Khatun et al. 2015; Lund 2015). Because of the given benefits and barriers, there are variations in local communities’ perceptions of participatory forest management system.

When it comes to funding of PFM projects, several Non-Governmental Organizations (NGOs) – both national and international NGOs – promote and finance the different participatory forest management regimes in Tanzania. Examples of international NGOs are Africare and WWF. While national NGOs include Tanzania Forest Conservation Group and Wildlife Conservation Society of Tanzania (MNRT-FBD 2008).

According to the Forest Act (2002), there are two main types of PFM regimes that are important to mention; namely Joint Forest Management (JFM) and Community Based Forest Management (CBFM) (Blomley et al. 2008; Khatun et al. 2015; Treue et al. 2014). Importantly, the two management regimes are quite distinct. According to MNRT-FBD (2008):

CBFM “takes place on village land – or private land, and the trees are owned and managed by either a village council (through a village natural resource committee), a registered group, or an individual. Most of the costs and benefits relating to management and utilization are carried by the owner. The role of central government is minimal – and districts only have a role in monitoring” while JFM “takes place on ‘reserved land’ – land that is owned and managed by either central or local government. Villagers typically enter into management agreements to share responsibilities for the management with the forest owner”(MNRT-FBD 2008:3).

This distinction is important to understand because it defines the ownership and management of forests, and benefits sharing among the different actors. In this same line of reasoning, it is

argued by some authors such as Kweka et al. (2015) that one of the challenges in implementing JFM is the issue of benefit sharing – i.e., the central and the local authorities do not agree on the modes of benefit sharing. Moreover, CBFM is the dominant PFM regimes – whereby over 50% of forests under PFM is managed through CBFM (Kweka et al. 2015).

Under PFM, forest management is done by either the local communities (in the case of CBFM) or through joint management by the local communities and the central government (in the case of JFM); and are guided by the forest Acts and by-laws⁵. The table below shows the owners and managers of forests under PFM.

Table 3: Ownership & management of forests under PFM

Common Name	Legal Description	Role of Community / Individual in Management
Community Based Forest Management	VLFRs (Village Land Forest Reserves) managed by the entire community	Owner and manager
Community Based Forest Management	Community Forest Reserves (CFR) managed by a particular designated group in the community, authorized by the Village Council	Owner and manager
Joint Forest Management	JMA (Joint Management Agreements) where management responsibility is shared between either central / local government and forest adjacent communities or transferred completely.	Co-manager
Joint Forest Management (although this form is rarely practiced)		Designated Manager

Source: Adapted from Blomley & Iddi (2009:11)

Kilosa district is one of the areas in Tanzania where community based forest management (CBFM) was introduced in the 1990s (Blomley & Iddi 2009; Kajembe et al. 2013; Kajembe et al. 2015); I will therefore explain CBFM in details.

Ever since CBFM was first introduced in Duru-Haitemba forest in Babati district in the beginning of 1990s, it gained popularity in many parts of Tanzania. Today, CBFM is practiced by nearly one thousand five hundred villages in Tanzania (Abdallah & Monela 2007; Lund & Saito-Jensen 2013), and thus protecting huge areas of forestland (MNRT-FBD 2008). Initially, the testing of CBFM was done in village land forest reserves (Lund & Saito-Jensen 2013) .

⁵ By-laws are the “local level forest rules vested with the Village Councils” (Treue et al. 2014:25)

With technical support from NGOs, a land survey and use plan was made. Moreover, new institutions were put in place (Blomley & Iddi 2009).

In CBFM, the national government fully devolves forests management to the local government. This implies that the management of the forest is now in the hands of the local communities. Vested in the village by-laws, the local authorities have been given the powers to decide on the villagers' rights to withdraw from - or exclude access to the forest resources. Moreover, the management rights under CBFM, as the name suggests, lies with the local community. This is in accordance with the Forest Act (2002). According to this Act, setting up CBFM entails mapping out the village land, establishing a Village Natural Resource Committee, making management strategies and village by-laws, and finally gazetting the forest as Village Land Forest Reserve (Kweka et al. 2015; URT 2002).

As indicated earlier, the village forest committee under the command of the village council has the main responsibility of overseeing the proper management of the village forest. The village council, on the other hand, is answerable to the district council. Notably, both the village and district councils are elected by the local communities (Lund & Saito-Jensen 2013; Rantala et al. 2012). Since the CBFM is a totally community-driven form of PFM, it is argued that this “results in increased incentives for sustainable forest management” (Rantala et al. 2012:777). When it comes to revenue generation, areas managing their forests through CBFM have “a potential to general sustainable flows of revenue” (Blomley & Iddi 2009:27) and for this reason, it has been anticipated by many pro-CBFM campaigners that the increased revenue would automatically translate to improved local people's livelihoods (Blomley & Iddi 2009). Table 4 show important organizational steps of CBFM.

Table 4: Six key steps undertaken when developing Community Based Forest Management

Stages	Description
1. Getting Started	This takes place at the district level, with the selection of villages and briefing of district staff, plus the formation of a team of staff with different skills to do the work. At the village level, you meet with Village Council and Assembly and facilitate the establishment and orientation of the Village Natural Resource Committee (VNRC).
2. Assessment and Management Planning	This is where together with members of the VNRC you identify and record the village land boundaries as well as the village forest boundaries. The forest is then measured or “assessed” and based on that a management plan is developed together with village by-laws.
3. Formalising and legalising	The management plan and by-laws are submitted by the VNRC to the Village Council and Village Assembly for approval and then finally forwarded to the District Council for registration. When this is done, the village can move to stage four and begin implementing their forest management plan.
4. Implementing	This is where the community puts the systems needed to manage the forest in place: appointing and training the Patrol team, starting record collection and making sure the rules are known, and so on. The district now takes up a role of monitoring and supporting by keeping an eye on progress and helping out with problem-solving.
5. Revising and gazetting	After three years, the community should review and revise their management plan based on what has been done so far. At this stage, the village may request Forestry and Beekeeping Division to officially gazette their forest, but this is an optional step.
6. Expanding to new areas	It is likely that other villages will start requesting CBFM in their villages. It is during this stage you plan and budget for expanding into new areas. Villagers already active in CBFM may wish to expand the area within their village boundary set aside for forestry so as to take advantage of improved forest management over a wider area.

Source: MNRT-FBD (2007:8)

Again, Tanzania introduced a new type of participatory forest management regime in 2009 – in some districts – following the contemporary global efforts to mitigation climate change. This new approach is popularly known as **REDD+ regime**. Before describing this regime in the Tanzanian context, I will first explain how the global REDD+ evolved.

2.3. The emergence of global REDD+: from an idea to action

Following the Kyoto protocol of 1997 which was ratified by many countries, the international policy makers allowed developed countries to finance projects that could help reduce emissions of greenhouse gases into the atmosphere (& thus mitigate climate change) through a mechanism known as the clean development mechanism (CDM) (Dyngeland & Eriksson 2011; Dyngeland et al. 2014). In this conference, some members proposed deforestation to be considered as a potential contributor to increased atmospheric greenhouse gases. However, their suggestions were rejected by the majority (Angelsen et al. 2012; URT 2010). In a post-Kyoto protocol conference (COP11) held in Montreal in 2005, the noble idea of **R**educing **E**missions from **D**eforestation (abbreviated as RED) in developing countries came up again. Moreover, still some policy makers argued that degradation of forests is a crucial factor that contributes to increased atmospheric greenhouse gases. Their arguments were supported by scientific reports from IPCC that blamed changes in land use in general as causes of greenhouse gas emissions (Angelsen et al. 2012).

During the Bonn's conference in 2006, deliberations on deforestation and forest degradation gained momentum. This conference was held by the Subsidiary Body for Scientific and Technological Advice (SBSTA) – a body of scientists who work closely with IPCC and whose mandate is to provide a “timely information and advice on scientific and technological matters as they relate to the Convention or its Kyoto Protocol”⁶. The main agenda of this conference was to promote climate change mitigation as the way forward in achieving the objective the Convention.

Finally, in a subsequent conference held in Bali in 2007, the concept of REDD (**R**educed **E**missions from **D**eforestation and forest **D**egradation) emerged. REDD is “a proposed financial mechanism which would provide developing countries with incentives to reduce forest sector emissions” (Angelsen 2008:31). Thus, many proponents of REDD argued that giving out ‘incentives’ could decrease the current rate of deforest & degradation in the developing countries; and hence mitigate climate change.

More recently, further modification of REDD brought about the REDD+ concept. In addition to reducing emissions from deforestation and forest degradation, the (+) sign was added. In this context the ‘plus’ means “enhancing forest carbon stocks” (Angelsen et al. 2009:1). REDD+

⁶ <http://unfccc.int/bodies/body/6399.php>

came into being in 2008 during a conference held in Poznan, Poland. The diagram below illustrates how REDD+ evolved.

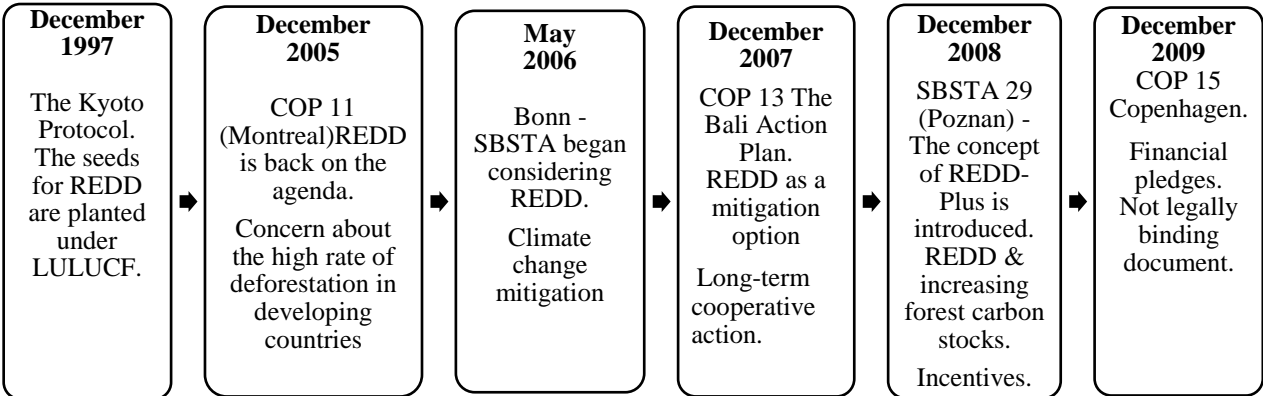


Figure 4: A flow diagram showing how the concept REDD+ emerged ¶.

Source: modified from (Holloway & Giandomenico 2009:4)

¶- LULUCF in the first box stands for “Land Use, Land-Use Change and Forestry” (IPCC 2014:356)

In addition to the objectives of REDD, REDD+ “incorporates the concepts of sustainable management, conservation and enhancement of forests” (Angelsen et al. 2012) at a comparatively low cost (Fisher et al. 2011). Because of its clear objectives, it is expected by supporters of the REDD+ initiative that the move can drastically reduce emissions of carbon into the atmosphere; and thus mitigate climate change while at the same time reduce poverty in the developing countries. This is also in line with the argument by Angelsen (2012) that REDD+ “seeks to reduce poverty and improve the lives of poor people by compensating them for reducing carbon emissions” (p. 43). Thus, poverty alleviation and improving local people’s livelihoods improvement are two important co-benefits⁷ of REDD+ (Angelsen et al. 2009). In totality, REDD+ has a **triple-win** objectives – reduce poverty, reduce emissions of greenhouse gases (hence mitigate climate change) and conserve biodiversity.

Taking the global ideas of REDD+ to the local level is not a systematic process. *Firstly*, it involves raising funds necessary for the project implementation. In order to get these funds several programmes, for instance “the World Banks’ Forest Carbon Partnership Facility (FCPF), the UN-REDD Programme, Norway’s International Forest Climate Initiative and the Interim REDD+ Partnership” (URT 2010:2) were formed. Thus, the creation of a financial

⁷ Co-benefits are “benefits arising from REDD+ in addition to climate mitigation benefits, such as enhancing biodiversity, enhancing adaptation to climate change, alleviating poverty, improving local livelihoods, improving forest governance and protecting rights” (Angelsen et al. 2009:312)

mechanism for REDD+ projects was the main agenda in the post-Poznan conferences – notably the Copenhagen Accord of 2009 (COP 15) and Cancun Agreements of 2010 (COP 16) (Dyngeland & Eriksson 2011; Fisher et al. 2011; Pirard & Belna 2012; URT 2010). One important thing to mention here is the politicization of these Accords. For instance, although there was a consensus among the attendees of the Copenhagen conference, some critics argue that this particular “[a]ccord is a political rather than a legal document” (Bodansky 2010:235); an argument which might affect some people’s expectations about REDD+.

Secondly, the process of implementing REDD+ entails several interconnected processes and actors, which happens at national and local levels. From the global arena, REDD+ goes to the national level whereby through interactions between different actors new pro-REDD+ policies are put in place. The changes in the policies affect the prevailing institutions, information flows, power dynamics, interests etc. This, in turn, brings a new paradigm of resource management at local level. A REDD+ project has three phases – notably REDD+ readiness phase, project implementation phase and the project evaluation phase (Angelsen et al. 2012). The readiness (initial) phase involves the establishment of national REDD+ policies and strategies, and capacity building. The implementation phase, on the other hand, is where the policies are put into practice/action. It involves possible adjustments of the policies and training of the stakeholder through learning-by-doing approach. Lastly, project evaluation phase entails monitoring, reporting and verification of the project results. Note that it is in this phase where “emissions and removals” are quantified and reported (Angelsen et al. 2012:290). Depending on the results, the financial incentives are distributed to the beneficiaries after the project is completed and evaluated.

2.4. The emergence of REDD+ in Tanzania

Establishing REDD+ is a costly undertaking (Blomley et al. 2016). For instance, the budget for the first phase i.e., the “readiness plan is estimated at USD 10.101 million” (FBD 2000:3). Consequently, the Tanzanian government got financial and other support from different sources in order to introduce and implement REDD+ programme. Besides the government of Finland, UN-REDD and the Clinton Climate Initiative (CCI), the Norwegian government sponsored the REDD+ programme in Tanzania (Embassy of Norway & URT 2016b; FBD 2000).

In 2008, the Tanzanian government signed a joint agreement regarding REDD+ with the Norwegian government (Kweka et al. 2015). Financed through the Norway’s International

Climate and Forest Initiative (NICFI), the Norwegian government made the commitment of giving NOK 500 Million for supporting research, education and development of pilot REDD+ projects to the Tanzanian government for a period of five years. In line with the bilateral agreement, the Norwegian government gave out funds for “‘REDD+ readiness’ in Tanzania, which includes nine pilot projects, with a maximum amount of 100 million NOK yearly for 5 years” (Resset 2012:v) the following year.

On the other hand, the government of Tanzania started establishing a National Strategy and Action Plan, which is a pre-condition for getting REDD+ financial support from donors. After receiving the funds, the Tanzanian government created Tanzania National REDD Task Force whose mandate is to oversee the implementation of all REDD+ projects in the country. The main responsibility of organizing and coordinating REDD+ project lies with the Department of Environment (DoE) which falls under the office of the Vice President. Moreover, forest resource assessments (i.e., monitoring, reporting and validation (MRV)) is carried out by the Ministry of Natural Resource and Tourism (MNRT) (Kweka et al. 2015; Mosi 2013). Additionally, in order to adopt REDD+ policies, there were changes in the existing institutions (notably acts and policies) as well as organizations. Table 5 illustrates systematic processes that were undertaken while adopting REDD+ policies at national level.

Table 5: Processes of adopting REDD+ policies at national level

Date: month/year	Policy event name (or short description)	Main policy decision/policy proposal related to the event
March 2008	Letter of Intent with Norwegian government regarding REDD+	Signing of letter of intent on REDD+ between Tanzania and Norway. Quick-start initiative defined, pilot projects, in-depth studies, national REDD+ strategy development
January 2009	Kibaha Conference	Stakeholders' workshop for the development of the National Framework for REDD+. National REDD+ Task Force appointed
June 2010	NAFORMA establishment at FBD	National Forest Resources Assessment started with support of Finland
November 2010	R-PP by the DoE VPO	Development of the Readiness Preparation Proposal, submitted in October 2010 and approved in November 2010
January 2011	Draft REDD+ Strategy by the REDD+ Task Force	Draft national REDD+ strategy made public in January 2011: comments solicited. Kibaha II conference
June 2012	2nd Draft REDD+ Strategy and Action Plan	
March 2013	National REDD+ Strategy and Action Plan	Strategy and Plan endorsed
March 2013/August 2014	National Carbon Monitoring Center	Initiation of the process to establish the center. Signing of the Memorandum of Understanding between the Vice President's Office and Sokoine University
End of 2014	NAFORMA	National Forest Inventory coming to an end.

Source: Kweka et al. (2015:30)

Besides the national strategy plan, the REDD+ initiative involved implementation of the pilot projects at local level. This process of adopting the new policies and thereafter implementing the pilot projects demands proper inter-sectoral coordination; “whereby Regional Administrative Secretariat will serve as a link to ministries and District council and in district municipal levels”(Mosi 2013:8). In other words, the work of programme coordination and the overall responsibility was in the hands of the Tanzanian government.

When it comes to implementation of the national REDD+ programme, several Non-Governmental organizations (NGOs) applied to the Royal Norwegian embassy in Dar-es-Salaam. At last, the Norwegian government gave the tasks of implementing all the *nine* pilot projects to *seven* Non-Governmental Organizations (NGOs). These NGOs are both national (e.g. Tanzania Forest Conservation Group (TFCG) and Tanzania Community Forest Conservation Network (MJUMITA)) as well as international NGOs (e.g., African Wildlife

Foundation (AWF), World Wildlife Fund (WWF) and Mpingo Conservation & Development Initiative (MCDI)) (Embassy of Norway & URT 2016b). Besides the NGOs, other actors directly or indirectly involved in the implementation of REDD+ are representatives from the national and local governments, private companies and researchers from Tanzanian universities – for instance Sokoine Agriculture University and IRA at the University of Dar es Salaam (Kweka et al. 2015; Mosi 2013; Ressel 2012). Moreover, in order to implement the REDD+ pilot projects, these actors were guided by “the final REDD strategy and Action Plan” (Mosi 2013:7).

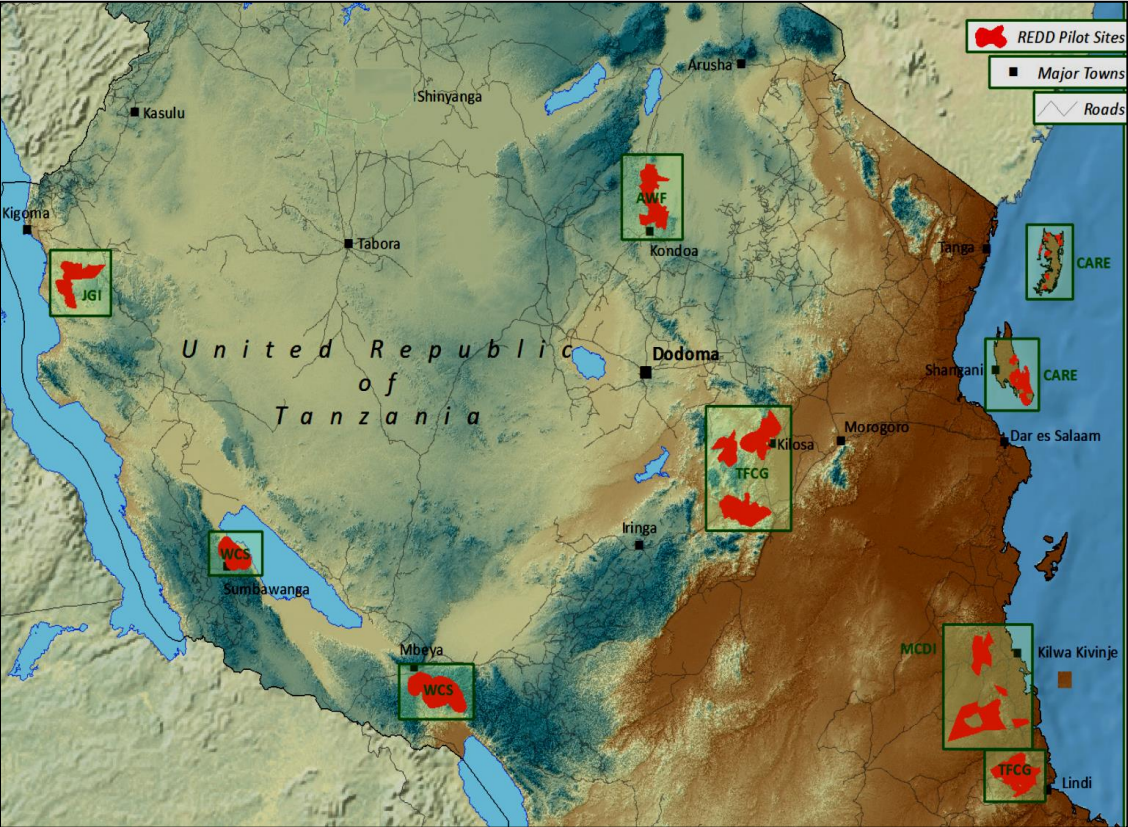


Figure 5: REDD+ pilot projects in Tanzania sponsored by the Norwegian government.

Source: Embassy of Norway & URT (2016b).

In Tanzania, REDD+ pilot projects had four crucial goals – “building local REDD+ readiness, policy testing, REDD+ results, supporting broad stakeholder involvement” (Embassy of Norway & URT 2016b). Moreover, introduction of REDD+ in the pilot areas involves changes in management strategy, launching new land use plan, strengthening forest laws and by-laws , providing alternative livelihood, and establishing benefit-sharing mechanisms (Ressel 2012).

Further, the changes in management/governance system entails adapting /or possibly designing new governance organizations & institutions (Mosi 2013).

In Kilosa district, the REDD+ implementation phase followed almost the same trend as in other areas⁸. It is worthwhile to comprehend at this point that even though Kilosa district introduced CBFM in some villages in the 1990s as noted earlier, the areas where REDD+ project was implemented in 2010 were previously de facto open access (Kajembe et al. 2015). Thus, the processes of introducing of REDD+ project comprised of acquiring of formal village forest reserves and undertaking institutional and organizational changes (Kajembe et al. 2015; Mosi 2013). Recent research confirms that the establishment of REDD+ project in Kilosa district “resulted in both institutional and organizational changes” (Mosi 2013: ix). In line with REDD+ policies, new REDD+ institutions are introduced, and they “took the form of new legal rules; these rules are the one now used for access to the forest” (ibid). Besides defining use rights of forest resources, these formal rules - common known as “by-laws”- give guidelines for good forest conservation practices (Kajembe et al. 2015). Similarly, new organizational structures were formed; and include:

“REDD+ facilitation team, the Village Natural Resource Committees (VNRCs), Income Generating Activities groups (IGA groups) and the REDD+ revenue sharing committee. The REDD+ facilitation team was the one responsible in visiting all villages selected by TFCG/MJUMITA to implement REDD+, the VNRCs is the responsible executing organizations at the villages level. The IGA-groups are the ones offering alternative livelihood strategies including chicken rearing, beekeeping, loans and savings, improved cooking stoves etc. and the REDD+ revenue sharing committee was the one responsible for dividing individual dividends”(Mosi 2013:ix).

Nevertheless, in accordance with Kajembe et al. (2015), it is important to note that some organizations such as VNRCs operated in Kilosa district prior to the establishment of REDD+ project. Furthermore, mechanisms of payments (benefit sharing) and MRV (Motoring, Reporting & Validation) were taken into account while implementing the REDD+ project (Kajembe et al. 2015). I will not delve into these organizations, as they are not within the scope of this thesis.

Remarkably, two local NGOs – namely Tanzania Forest Conservation Group (TFCG) and Tanzania Community Forest Conservation Network (MJUMITA) - had the overall responsibility of executing REDD+ project in Kilosa district after the Royal Norwegian

⁸ NB: Of the nine pilot projects funded by the Norwegian government in Tanzania “seven projects are in CBFM and two are in JFM areas”(Kweka et al. 2015:35). Kilosa district is one of these pilot areas – see *figure 5*.

Embassy accepted their project application of Making REDD work for people and forests in Tanzania in 2009 (Dyngeland & Eriksson 2011; Mosi 2013).

In addition to the main goal of increasing forest carbon stocks, the REDD+ project in Kilosa district had also the aim of enhancing forest biodiversity conservation and improving local people's livelihoods (Embassy of Norway & URT 2016a; Kajembe et al. 2015; Mosi 2013). Notably, according to Embassy of Norway & URT (2016a) improving local communities' livelihoods (while at the same time enhancing sustainable use of forest resource) in REDD+ projects in Tanzania can be achieved in the following four ways: -

Box 1: Four possible ways of improving local people's forest-based livelihoods

- Increasing the value of forests to local forest users. For example, by securing community forests, introducing sustainable forest management, helping negotiate fair prices for forest products such as valuable timber species, accessing legal charcoal markets, and combining such approaches with REDD+ credits, where feasible and viable.
- Developing plans so that poor households with high forest dependence, such as those engaging in charcoal production or timber harvesting, make a transition to livelihoods with lower impacts on deforestation and forest degradation.
- Screening project-promoted livelihood interventions to ensure that they are sustainable, appropriate and within reach of poor households. Activities with high levels of risk, or involving high levels of investment of capital or labour should be avoided. Pro-poor interventions include small animal livestock projects, savings and credit schemes and pro-poor food security based on crops such as cassava and sweet potatoes.
- Reducing (or removing) licensing fees for harvested forest products for poorest households, or considering staggered payments.

Source: Embassy of Norway & URT (2016a).

3. Theoretical and conceptual approaches

This chapter presents two theoretical frameworks that are useful in this research. Firstly, I present the environmental governance framework (Vatn 2015), followed by rural livelihoods analysis framework (Ellis 2000). Secondly, in the process of presenting the two frameworks, I define and discuss their core concepts while at the same time bringing in related literature. Lastly, I present a conceptual framework for the study.

3.1. Environmental governance systems framework

The environmental governance⁹ systems (EGS) framework (*see* Figure 6) was developed by Vatn (2015) and builds on institutional theories. These theories dwell on institutions and their role in shaping human actions and interactions in relation to environmental resources (Vatn 2011). The framework is inspired by the work of Ostrom (1990) and her Institutional Analysis and Development (IAD). It has its base in institutional and political economics and underscores the crucial role of institutions in environmental governance. Thus, the framework is important for the analyzes of institutional changes in Kilosa district – i.e., in responding to my first and second research questions.

While special attention is given to institutions and their role in environmental governance, I will introduce the whole framework in order to get a deeper understanding the relationships between institutions, resources and actors.

⁹ The concept *governance* is somewhat ambiguous and in most cases, some authors use it interchangeable with the term *government*. In this study, I follow the definition of Vatn (2011) who define governance as comprised of “processes that shape social priorities, how human coordination is facilitated and how conflicts are acknowledged and possibly resolved” (p.7). Moreover, *environmental governance* can be defined as the “use, management, and protection of environmental resources and processes” (Arild 2015:134).

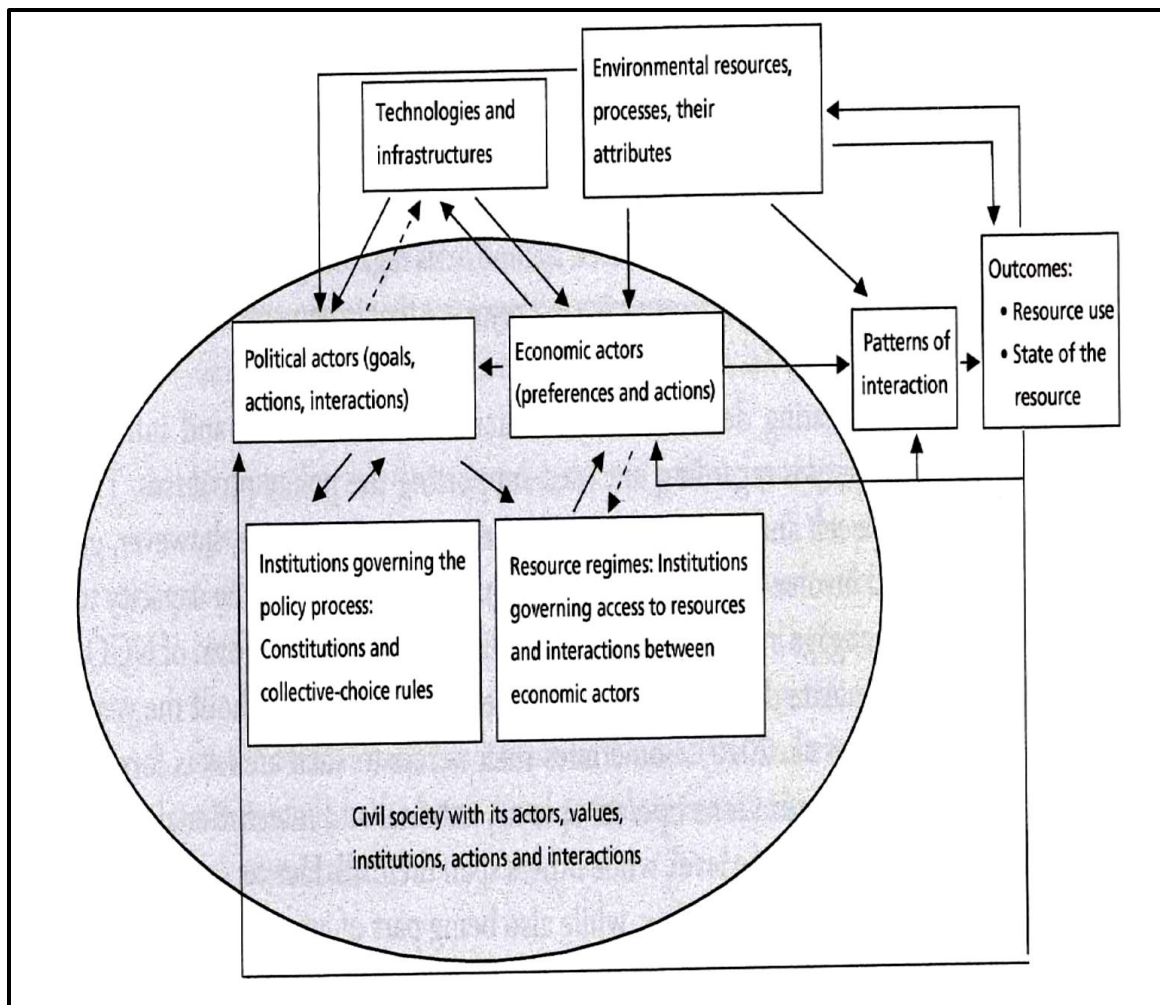


Figure 6: Environmental Governance Systems (EGS) framework.

Source: Vatn (2015:154)

The environmental governance system is made up of two components – ***governance structure*** (the *cycled* area in the Figure) and ***the factors/variables*** (concepts) *outside* the cycle. Although the concept of a ***resource regime*** is part of the governance structure, I will examine it in details given its importance to this study. The arrows in the framework shows the interlinkages between the various concepts that form the framework. The following sections explain these concepts in details, while at the same time linking them to the case study.

3.1.1. Governance structure

The concept of a governance structure is composed of two main concepts namely *actors* and *institutions*.

Actors include individuals, social groups and organizations involved in the use and management of resources (e.g., forests). The EGS framework groups actors into three different categories – namely economic actors, political actors and civil society actors. While the economic actors have the access and/or the right to utilize the productive resources (e.g. land, labour, capital & skills), the political actors have the powers to define the institution that regulate use of resources and interaction between the economic actors. Thus, political actors are responsible for setting up the resource regime. Civil societies, on the other hand, ensure legitimate political order. They are mainly composed of Non-Governmental Organizations and political parties (Vatn 2015). However, it is important to note that while the different categories of actors execute their respective responsibilities, they have their own individual or common interests (visible or hidden) and motives – be it politically or economically oriented (Kajembe et al. 2015).

A point worth mentioning in this regard is the link between the actors’ agency and their power relation. Power – gained through economic or political means – influences human agency (Cleaver & De Koning 2015). Because of this reason, many of these actors have the ultimate goal of acquiring more benefits from the resources for their own self-interested gains (Mosi 2013). Economic actors can be individual, household(s), firms, or community based. On the other hand, political actors can be individuals from within the villages, from other parts of the country or from the rest of the world (Vatn 2015). In the pilot areas of Kilosa district, examples of economic actors are agriculturalists, traders of forest products and herders while the political actors consist of village leaders and district authorities (Kajembe et al. 2015). Furthermore, TFCG/MJUMITA who are local NGOs and the project implementers are examples of civil society actors, although they can also be regarded economic actors.

Institutions are difficult to define because the concept is used differently across different disciplines (Vatn 2005; 2011). While a political scientist might use the term *institution* to mean organization¹⁰, an institutional economist might use the same term to mean mainly “rules” (Vatn 2011); and more specifically “working rules” (Ostrom 1990) . In fact, some authors give a clear distinction between the two terms – e.g., “institutions are the rules of the game, organizations are the players” (North 1993:3). In this study, I follow the definitions given by the institutional

¹⁰ North (1990), an institutional economist, defines organization as “groups of individuals bound by some common purpose to achieve objectives” (p.5). Examples are NGOs, private companies, associations etc.

economists, especially the one given by Vatn (2005). In *Box 1* below, see the definitions given by some of the prominent institutional economists.

Box 2: Definitions of institutions according to some institutional economists

Institutions are:

- “the **conventions, norms and formally sanctioned rules** of a society” (Vatn 2005:60)
- “a shared understanding that is **used by humans in repetitive situations** and **organized by norms and rules**” (Ostrom 1990) *cited in* (Pacheco et al. 2008:5)
- “the **rules of the game** in a society or, more formally, are the humanly devised constraints that **shape human interaction**” (North 1990:3)
- “**rules and conventions** of society that **facilitate coordination** among people regarding their behavior”(Bromley 1989:22) **[Emphasis added]**.

From the definitions given above, we can see that North (1990) views institutions as ‘something’ created by humans in order to regulate their actions. Contrary, some “classical institutional economists” (Arild 2011:3) – for instance, Bromley (1989) – do not see institution as a constraint but rather a ‘helper’ of human interactions. Thus, institutions are important “social constructions” (Kajembe et al. 2015:13) that prescribe what is right to do, what is wrong to do and how individuals should interact in their everyday activities (Arild 2011; Ostrom 1990). They affect our choice, values and interests (Arild 2011)¹¹. Moreover, because of their regulatory power institutions determine resource outcome for the economic actors.

According to Vatn (2005), there are three types of institutions – namely *conventions, norms* and *legal rules*. Conventions enhance communication and facilitate coordination between the different actors. Norms are the bedrocks of any society as they reflect communities’ values and morals, i.e., what we *ought* to do in a given setting for us to be accepted in our social units. They are informal institutions that we learn and adopt from the day we are born. They define the collective expectations and individual decisions in a society.

Furthermore, legal rules¹² play an important role in averting and resolving conflicts of interest between economic actors especially in times of scarce or restricted resources. Legal rules are written down by political actors (i.e., they are formal rules); and include the constitution and the collective-choice rules. Moreover, customary laws are also formal rules in the sense that

¹¹ Some authors, e.g., North (1990), argue that institutions are shaped by humans and not the opposite (Arild 2011)

¹² Or, *formally sanctioned* rules in accordance with Vatn 2005.

they are legally binding rules with respect to resource use. Legal rules are monitored and enforced by a third party, normally by the government authorities (in the case of formal legal rules) or by the community leaders (where customary law is in use). Thus, breaking these rules calls for sanctions, penalties and even imprisonment depending on the gravity of the violation. On the other hand, to be able to conform to legal rules you need to get a permit issued by the concerned authorities (Vatn 2005; 2011).

Specifically, when it comes to environmental governance of common pool resources¹³ – e.g., forests – different legal rules might exist and “include a combination of rights that are defined by statutory law (*de jure*) and rights that are defined locally, through *de facto* or customary institutions” (Larson 2010:30). Moreover, in the case of legal pluralism – defined as “the coexistence and interaction of multiple normative orders with different sources of legitimacy and authority” (Benjamin 2008:2255) – both formal and informal legal rules are used. The legal rules are the constitution-choice rules, collective choice rules and operational rules (Ostrom 1990). While constitutional-choice rules are based on the forest laws, the collective choice rules are “rules that are used by appropriators, their officials, or external authorities in making policies” (Ostrom 1990:52). Together, constitution-choice and collective choice rules govern the political process involved in formulating the operational rules. Operational rules, on the other hand, are the formal and/or informal rules working at the project site (Arild 2011; Ostrom 1990; Pacheco et al. 2008). These rules are also known as *resource regime*.

3.1.2. Resource regime

Resource regime can be defined as “*institutional structures established to regulate resource use*” (Vatn 2005:253). Two key rules regulate resource use – i.e. *access* and *interaction* rules (Arild 2011; Kajembe et al. 2015). According to Vatn (2011), access rules are property rights that are defined by the existing formal laws while interaction rules are rules that regulate the economic actors with regards to transfer of goods and services in their daily transactions. As emphasized by Ostrom (1990), resource use rules

“directly affect the day-to-day decisions made by appropriators concerning when, where, and how to withdraw resource units, who should monitor the actions of others and how, what information must be

¹³ Defined as resources that are highly “subtractable” (i.e., if one withdraws much of a given resource, the availability of the same resource to another person is reduced); and difficult to exclude individuals in terms of accessing the resource (Ostrom et al. 1994:7)

exchanged or withheld, and what rewards or sanctions will be assigned to different combinations of actions and outcomes” (p.52).

Thus, resource use rules are important in environmental governance as they regulate economic actor’s actions and interactions.

3.1.2.1. Property rights

A property is a physical capital – be it forest, lake, land, mobile phone etc. – of which the owner has control over its stream of benefits (Bromley 1991). On the other hand, a ‘right’, can be defined as “the capacity to call upon the collective to stand behind one’s claim to a benefit stream” (Bromley 1991:15); and is *only* justified when approved by the other people/authority. Let us take a concrete example here – forest resource. If a certain community claims the ownership of a nearby forest, they have property rights to the forest only if a third party (e.g., the local government or the state) recognizes their claim.

According to Vatn (2005), property rights – also known as tenure rights (Larson 2010; Pacheco et al. 2008) – should *not* be viewed as the right between the claimer (individual) and physical thing (property), but rather as “a relationship between the *rights holder* and the *rights regards* under *a specific authority structure*” (p.254); thus emphasizing on the social aspect. Moreover, some authors underscore the importance of authority and power in a resource regime (see Bromley 1989; Sikor & Lund 2009). Property rights govern the “use and protection of the environmental resources” (Arild 2015:134). In other words, it comprises of the use, ownership and management of a resource.

Note also that in some cases an individual might use a property but might not own it – e.g., if you rent a piece of land for a growing season. In such a case the person has use right but not property right. However, if the person owns the land, then he/she has property right (which implies that he/she has also use right). Property rights – commonly referred to as a bundles of rights (see e.g., Pacheco et al. 2008) – include five core rights – namely access, withdrawal, management, exclusion and alienation (Schlager & Ostrom 1992). These concepts are defined in table 6.

Table 6: Bundle of rights related to resource use

Concept	Definition
Access	the right to enter a defined physical property
Withdrawal	the right to obtain the ‘products’ of a resource (e.g., catch fish, appropriate water, etc.)
Management	The right to regulate internal use patterns and transform the resource by making improvements
Exclusion	The right to determine who will have an access right, and how that right may be transferred
Alienation	The right to sell or lease either or both of the above rights

Source: Adapted from Schlager & Ostrom (1992:251)

As indicated above, *access* and *withdraw* means the right to go into the resource site and getting ‘something’ out of it respectively. For instance, the right to go into a nearby forestland and collect firewood from it. Note that some authors use the terms *withdrawal* and *use* rights interchangeably (e.g., Larson 2010). In this thesis, I use the concept ‘use’ right to include both access and withdrawal rights. Use rights are mainly reserved for economic actors.

In the other three concepts – i.e., management, exclusion and alienation – some elements of decision-making/ authority is involved (Larson 2010). For example, management rights include the right to plant trees in your farmland and the right to reserve part of the forest for timber production. In the given examples, one has to have the autonomy to decide on how best to increase his/her resource output. On the other hand, while exclusion rights define who can use (or not) the resource, alienation rights define who can ‘lease’ or ‘sell’ a property and/or who can transfer ownership of a given property (e.g., a piece of forestland) (Larson 2010).

Notably, property rights structures and their associated duties function under a *property regime* (or resource management regime) (Bromley 1991). Bromley (1989a, 1991) classifies property regime into four categories based on the social rights and responsibilities in relation to a given property.

Table 7: Four categories of property regimes

State property	Individuals have <i>duty</i> to observe use/access rules determined by controlling/managing agency. Agencies have <i>right</i> to determine use/access rules
Private property	Individuals have <i>right</i> to undertake socially acceptable uses, and have <i>duty</i> to refrain from socially unacceptable uses. Others (called “non-owners”) have <i>duty</i> to refrain from preventing socially acceptable uses, and have a <i>right</i> to expect that only acceptable uses will occur
Common property	The management group (the “owners”) has <i>right</i> to exclude nonmembers, and nonmembers have <i>duty</i> to abide by exclusion. Individual members of the management group (the “co-owners”) have both <i>rights</i> and <i>duties</i> with respect to use rates and maintenance of the thing owned
Nonproperty	No defined group of users or “owners” and benefit stream is available to anyone. Individuals have both <i>privilege</i> and <i>no right</i> with respect to use rates and maintenance of the asset. The asset is an “open access resource”

Source: Bromley (1989a:872).

A State property is a property whose “ownership and control over use rest in the hands of the state. Individuals and groups may be able to make use of the resources, but only at the forbearance of the state” (Bromley 1991:23). Tanzanian national forest reserves fall under this category. Local communities (user groups) are allowed to collect some forest products such as firewood but the ownership and management remains with central government. On the other hand, a private property is one that is owned by an individual or a corporate; and common property is a private property for a group of people (co-owners). Examples of these two categories of property rights in Tanzania are private and community forests respectively. In *nonproperty regime* – also known as *open access* regime – everybody can use the resource without restrictions (Bromley 1991); because there are *no* defined property rights that regulate use of the resource. As Bromley (1991) asserts, “everybody’s access is nobody’s property” (p.30). A piece of grazing land that has de facto become an open access resource can be a good example here. Basically, one thing is common to the first three property regimes (i.e., excluding *Nonproperty*), that there is decision making involved in all the three (Bromley 1991). Defining property rights is important for REDD+ forest management regime because it determines who (user groups) gets what (which forest products) from the forest resource.

3.1.2.2. Interaction rules

Humans interact almost every day. We communicate, compete, or more positively cooperate when we meet, for instance, when buying and selling goods and services in market places. To

avoid conflict of interests and thus ensure smooth running of the market activities, economic actors require rules that can regulate their day-to-day operations in the market. These rules are commonly referred to as interaction rules i.e., rules for trading. Apart from giving instructions about *how* to interact, interaction rules can also define *who* decides over whom in the market.

Interaction rules are distinguished into four categories i.e., *market exchange* rules where there is no hierarchical power involved, *community-defined* rules for interaction that is based on reciprocity and *command* interaction rules where power is a central factor. In other words, while the first two interaction rules function “horizontally”, the command interaction rules work “vertically” (Arild 2011:9). Moreover, we also have *no rules* interaction in market. An example will suffice to illustrate the point here. Suppose person X sells a sack of charcoal to person Y, there exists, in many cases, interaction rules that regulate their trade. However, the process of making the sack of charcoal inevitably pollutes the air (i.e., produce side effects), which might affect the health status of person Z. In most cases, there are *no* rules in the markets that capture these side effects notwithstanding the possible negative effects to the third person (Arild 2011; 2015). Notably, any of the four interaction rules can operate in the market where traders exchange their goods (e.g., timbers) and services. Furthermore, interactions of economic actors can take place at local or international markets.

3.1.3. Other factors/variables (concepts) in the framework

As can be seen from the EGS framework, the remaining core concepts are *environmental resources & processes*, *technologies & infrastructures*, *patterns of interaction* and *outcomes*. When designing a robust environmental governance system it is important to consider the *characteristics of the resource* in terms of its biophysical properties, size and demarcation (Agrawal 2003; Ostrom 1990). Naturally, resource have different properties, some are restricted in one location (e.g., a water well and forests), while others are dynamic in nature (e.g., fish). Importantly, Young (2008) describes the “Fit” concept where he argues that if there is **no** congruence between the existing institutions and the attributes of the natural resources, the resource regime will most likely fail (Arild 2011; Vatn & Vedeld 2012; Young 2008).

In other words, the narrower the gap between the institutions and the resource characteristics, the higher the probability of the institutions functioning well for a longer period (Young 2002). Because of mismatch, institutions drafted in several international agreements fail to accomplish their aims because they fail to take into account the resource attributes. A good example here is fisheries. Fishes in the open oceans migrate across international boundaries. In order to create

international institutions to govern this type of resource, it is important to consider the dynamic behaviour of fishes. If this is not done, the institutions will probably fail and possibly conflict might arise (Vatn 2011). Further, the interests of the actors depend on the attributes of the resource. Going back to the case study, if the forest produces good quality timbers, this will certainly affect the interests of the timber traders.

Moreover, introduction of new *technologies* (e.g., telecommunication) and improving *infrastructures* (e.g., roads) are two important factors that can help in strengthening (or weaken) governance structure and by extension increase (or decrease) the resource outcome, because they “influence choices among both categories of actors” (Arild 2011:15). Moreover, the efficiency of the resource regime depends on the condition and choice of the technology. For instance, if in a common property regime of forest co-owners are allowed to buy crosscut saws (in this case, the *technology*) in order to increase their timber production, the forest resource might collapse at least in the long run (Arild 2011; Young 2002). Introduction of technology, on the other hand, might bring positive results. For example, the introduction of energy saving stoves or electricity in an area might reduce the use of firewood for cooking.

When it comes to *Pattern of interaction*, the concept is reserved for the interaction between the actors, the attributes and condition of the resource. This form of interaction should not be confused with the interactions explained under the resource regime section – which covers only the interaction between the economic actors in the markets. Furthermore, *outcome* is the current state of the resource and resource use; and is shaped by the pattern of interactions and the characteristic of the resource. Note that expected outcome might also affect actors’ decisions and actions at the policy-making level. For instance, an economic-cum-political actor who is not satisfied with the expected outcomes might affect the process of making the collective choice rules, and or tweak it a bit, so that it fits with his/her own interest. Regarding the REDD+ regime, assessing outcome is an important undertaking because through such assessment we can find out whether the anticipated objectives of the project have been achieved or not.

3.2. Rural livelihoods analysis framework

The EGS framework presented in the previous section is not ideal for analyzing livelihoods as it shallowly describes resource outcomes. I therefore decided to use another framework – i.e., rural livelihoods analysis framework – for this purpose. Similar to the environmental governance framework, the rural livelihoods analysis (**RLA**) framework (*see* Figure 7 below) draws on earlier theories and models such as the work of Chambers and Conway (1992),

Scoones (1992) and Carney (1998) etc. The framework is useful in assessing livelihoods in a rural setting, and thus making it relevant in analyzing changes in livelihoods in Kilosa district. The framework focuses mainly on the assets of the poor households, factors that affect use of the assets, and the activities undertaken by the household members in order to survive (Ellis 2000).

Although livelihood is *not* a new concept, it became trendy from the mid-1980s following the critic by Chambers (1983) in relation to what he calls “outsiders’ unavoidable paternalism” (Chambers 1983:140). Chambers (1983) argues that strategies for rural development should begin with the priorities and desires of the rural poor as expressed by themselves, and not as preferred by the project proposers. In other words, the strategy should include the poor men and women in the villages in the decision-making process, so that they get a sense of ownership and control over benefits of the development project. Besides Chambers (1983), the Institute of Development Studies at the University of Sussex played an important role in promoting the new ‘down-top’ approach to development (Chambers 1983; Schafer 2002). As the concept of livelihoods gained popularity across academic disciplines and in the NGOs world in the early 1990s, another concept, *sustainable development*, came into development discourses. Further, the evolution of the sustainable development concept brought about a third concept – i.e., *sustainable livelihoods* which was coined by putting the concepts livelihoods and sustainable development together (Schafer 2002).

While the livelihoods approach focused on current livelihoods of the poor individuals and how to eradicate poverty, the sustainable livelihoods approach gives attention to “the extent to which individual livelihoods and livelihoods in the aggregate affect the ability of other people to achieve their own livelihoods, both now and in the future”(Schafer 2002:15). Indeed, some authors go ahead and include issues such as ‘capabilities’ and ‘equity’ in sustainable livelihoods lexicon (e.g., Chambers & Conway 1992). However, almost all livelihoods frameworks focus on *two main* dimensions – namely social and environmental dimensions. In other words, the focus is poverty reduction and overcoming environmental degradation (Dyngeland & Eriksson 2011; Ellis 2000; Schafer 2002). Before presenting the framework, we need to define two core concepts in this chapter – i.e., *livelihood* and *household* – because different authors define these terms differently. This study uses the definitions given by Ellis (2000). Thus,

“A livelihood comprises the assets (natural, physical, human, financial and social capital), the activities, and the access to these (mediated by institutions and social relations) that together determine the living gained by the individual or household” (p.10). A **household** is a “social group which resides in the same

place, shares the same meals, and makes joint or coordinated decisions over resource allocation and income pooling” (p.18).

In other words, livelihood involves interaction of internal (e.g. assets) and external factors (e.g. institutions) which together shape an individual or a household’s way of living while a household is a set of individuals who live under the same roof, eat from the same pot and who share ideas and earnings. The RLA framework is composed of three main components i.e., *assets, mediating processes and activities*. Figure 8 below illustrate the RLA framework.

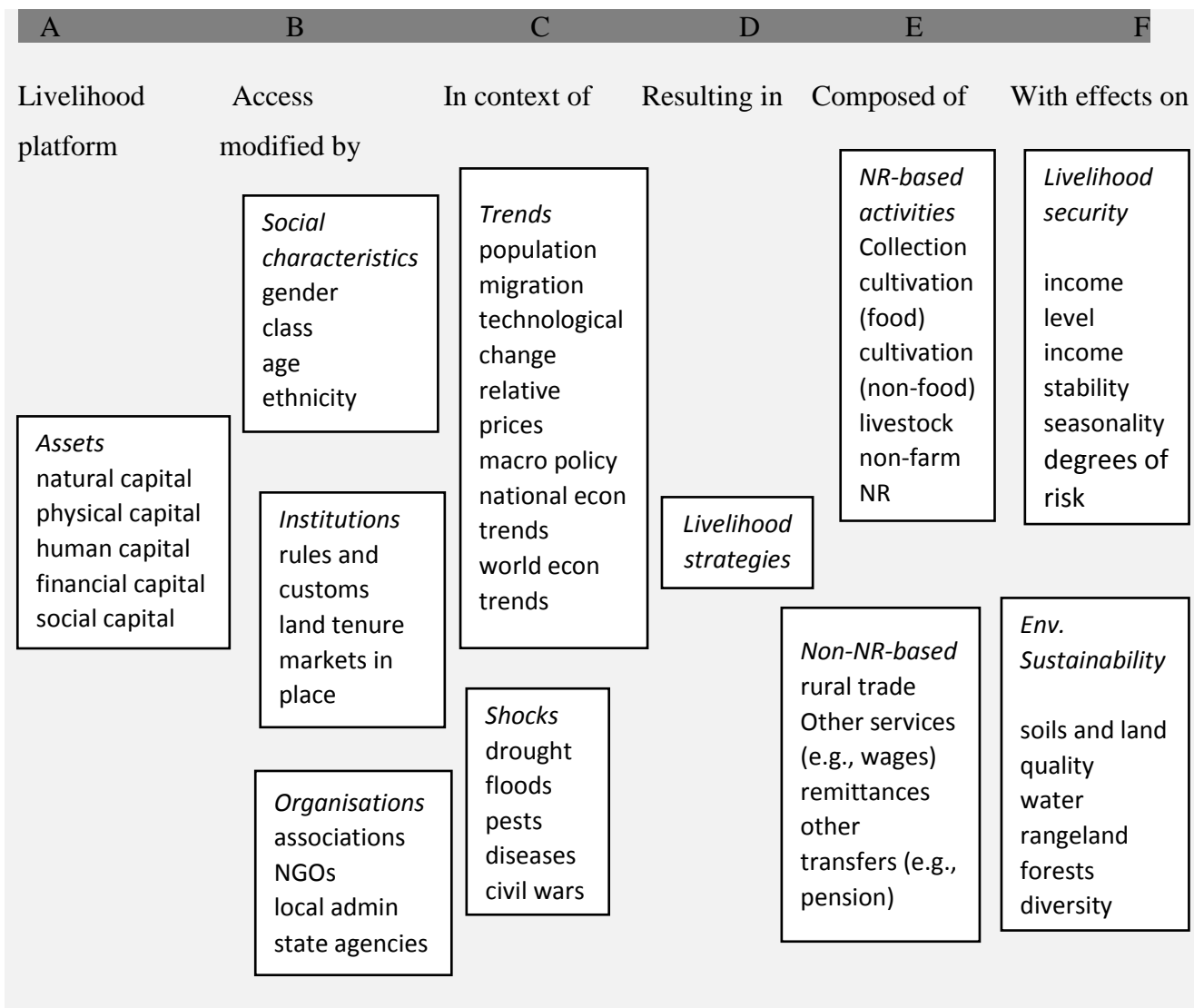


Figure 7: Rural livelihoods analysis framework

Source: Adapted from Ellis (2000: 30), based on Scoones (1998) and Carney (1998)

3.2.1 Assets

Assets, also known as *resources* or *capital*, are what is “owned, controlled, claimed, or in some other means accessed by the household” (Ellis 2000:31). They are important to the household because they shape its ability to participate in social arena and economic activities (Ellis 2000). Indeed, assets are the main determinants of the household’s livelihood, though facilitated by other factors. By combining the different types of assets (or through substituting each other where possible), the household can achieve a stable outcome assuming other factors constant. There are five types of household assets (Carney 1998; Ellis 2000; Scoones 1998) as shown in Box 3 below:

Box 3: Five types of household assets

Definitions according to Scoones (1998: 7- 8):

- **Natural capital** – the natural resource stocks (soil, water, air, genetic resources etc.) and environmental services (hydrological cycle, pollution sinks etc) from which resource flows and services useful for livelihoods are derived.
- **Financial capital** – the capital base (cash, credit/debt, savings, and other economic assets, including basic infrastructure and production equipment and technologies) which are essential for the pursuit of any livelihood strategy.
- **Human capital** – the skills, knowledge, ability to labour and good health and physical capability important for the successful pursuit of different livelihood strategies.
- **Social capital** – the social resources (networks, social claims, social relations, affiliations, associations) upon which people draw when pursuing different livelihood strategies requiring coordinated actions.

Physical capital is defined by Ellis (2000:32) as:

- **Physical capital** – the capital created by economic production processes (e.g., buildings, roads, tools, buildings, agricultural fields, irrigation canals and machines)

[Emphasis added].

Broadly, assets can be categorized into two main types – i.e., tangible and intangible assets (Krantz 2001). Tangible assets are “stores and resources” (Krantz 2001:16), and include natural and economic/financial capital, while intangible assets are “claims and access” (*ibid*). A good example of intangible assets is social asset.

3.2.2 Mediating processes

Three *mediating factors* that affect use of the available resources/assets are the existing institutions, social characteristics and operating organizations. The role of institutions in shaping livelihoods outcome has already been explained under the EGS framework. Social

characteristics, on the other hand, range from what one would consider as the base for social discrimination (e.g., gender, caste, class) to ‘normal’ factors such as age, religion and ethnic group. I will explain in details the role of socio-economic characteristics in relation to forest resource use in section 3.2.5 of this chapter. Furthermore, organizations include association, NGOs and government authorities that operate in the area. All the three mediating factors affect livelihoods outcome because they either “inhibit or facilitate the exercise of capabilities and choices by individuals or households” (Ellis 2000:39). Note also that our interests influence our decisions and choice.

3.2.3 Activities and livelihood strategies

Besides the mediating factors, *shocks* and *trends* influence the availability and access of the assets, which in turn affect household’s livelihood. Shocks are mostly natural factors and include drought, floods diseases etc., while trends are mostly a product of human choice. Examples of trends are population, migration, technological changes and economic trends (be it micro-, macro- or international economic trends). In order to adapt to the changes in their livelihoods – caused by the access-mediating and contextual factors – the rural household has look for ways to survive, i.e., *livelihood strategies*. According to Scoones (1998), the rural household has three options, namely agricultural intensification or extensification, livelihood diversification, and to migrate somewhere else. While agricultural intensification means increasing agricultural output from the normally cultivated piece of land, extensification in this context means increasing agricultural output through using the unused (reserve) piece of land or by looking for a virgin piece of land. Any of the three options given by Scoones (1998) might help the rural household come out of the ‘crises’.

On the other hand, as can be seen in column E of the RLA framework, Ellis (2000) gives two options – natural resource and non-natural resource based activities. The natural resource based activities include looking for forest products (e.g., collecting firewood, wild fruits and timbers), increasing agricultural output (cf Scoones 1998), and rearing livestock. Non-natural resource based activities include both economic and social dimensions. These activities include small businesses, services (e.g., wages), remittances (from close relatives or friends) and transfers (e.g., pension).

Ellis (2000) stresses on the need to diversify livelihoods in rural settings. He defines rural livelihood diversification as “the process by which rural households construct an increasingly diverse portfolio of activities and assets in order to survive and to improve their standard of

living” (p.15). Put differently, it is important for the households in rural areas to engage in various activities; and not only depend on one source of income in order to survive. For instance, some sources of income such as crops and livestock can fail to sustain the household due to shocks and trends. As a coping strategy (alternative livelihood strategy), forest income is very crucial for the rural household. Besides, forest income is an important supplement for low agricultural and livestock output even in the absence of external pressures.

3.2.4 Livelihood security

The RLA framework shows two outcomes (column F). Of interest to this study is the *livelihood security* part. Although the concepts ‘livelihood’ and ‘income’ are not synonymous, income is usually used as an indicator for livelihoods. Thus, any policy that increases people’s income (be it daily, monthly, or yearly) is considered as having improved people’s livelihoods; and vice versa. Rural household income takes two forms – cash income and subsistence income. While cash income comprises of what we earn through wages, sales, transfers and wages, subsistence income is what the members of the household consume at home, e.g., maize that we eat at home, firewood for cooking etc. Generally, rural household income can come from different sources; and based on these sources we have categorized rural household’s total income into three main categories as shown in *Box 4* below.

Box 4: Three main categories of rural household income.

- **Farm income** – refers to total income from agricultural activities. Includes subsistence and cash income from crops and livestock production.
- **Off-farm income** – refers to wages and exchange labour – both in cash and in kind – on other people’s farm. It also includes forest income (also known as environmental income) i.e., income from charcoal trade, timber trade, selling fuelwood, and building materials from the forest area.
- **Non-farm income** – refers to income from non-agricultural sources, e.g., salaries and wages from non-farm sources and non-farm own business income. It also includes remittances from urban areas – from friends and family members living within or outside the country. Moreover, non-farm income includes pension payments and rental income from own assets (e.g., buildings and land)

Adapted from Ellis (2000:11-12).

[Emphasis added].

Moreover, **Seasonality** is the periodic (be it daily, quarterly or yearly) fluctuation of household income caused by external factors such as changes in weather, price fluctuations, drought, floods etc. Seasonality is a common phenomenon that affect livelihoods in rural areas. On the other hand, reduction of the **degree of risk** through income diversification ensures secure livelihood.

3.2.5 Socio-economic characteristics of rural households and their forest income

The socio-economic characteristics of the community at large and more specific that of the household affect the level of the household's forest income (Agrawal 2003; Ellis 2000; Vedeld et al. 2004). At community level, these characteristics include the community's ethnicity group and "different types of heterogeneity, power relations among sub-groups, and past experience" (Agrawal 2003:248) of the members of the community. At household level, Vedeld et al. (2004) identify five crucial household's socio-economic characteristics that affect its forest income:

- *Education* – the more educated a household is, the higher the likelihood of getting more income from source other than forest i.e., they are less forest dependent. However, in some case better-educated household can engage themselves in selling valuable forest products e.g., timber and charcoal in order to accumulate higher profit.
- *Age of the household* – households with many young and energetic members will certainly get more income from the forest compared to those with old or sick household members.
- *Sex of the household leader* – Usually, household headed by men get more forest income compared to those headed by females. This is partly because if the husband dies or if his workplace is far, the family will have less labour force to cultivate the land or gather forest products for them, which in turn affects their total income.
- *Household size* – the more the number of *productive* household members, the higher the chance of the household getting more total income (including forest income). A household characterized by old person or children will have less income compared to one with many energetic adults.
- *Ethnic belonging* – if the household belongs to an ethnic group that is native to the area, it might have more opportunities compared to a migrant from less known ethnic group. This argument is supported by the fact that the native has the necessary knowledge, skills and social network that mediates use of the forest resource.

Other factors that influence a household's forest income are household members' social positions (e.g., village leaders and elites, membership in an organization and association etc.), the distance between the village and the nearest market and forest, and the number of people living in the village (Vedeld et al. 2004). Notably, the study by Vedeld et al. (2004) shows that "increasing forest environmental income was found to imply greater distance to markets" (p. 30), because people cannot look for other sources of income (e.g., wages) in the far market.

Furthermore, short distances to the nearby forest and low population density in the village might arguably have a positively effect on household’s income; or vice versa (Vedeld et al. 2004).

3.3. A conceptual framework: Integrating the EGS & RLA frameworks

In order to analyze the impact of the forest management reform on the local people’s livelihoods in Kilosa district, I have developed a conceptual framework for this study (see Figure 8 below) based on the two theoretical frameworks presented above. Since I have already explained most of the concepts, I will here concentrate on the link between two key concepts i.e., institutional change and impact on livelihoods.

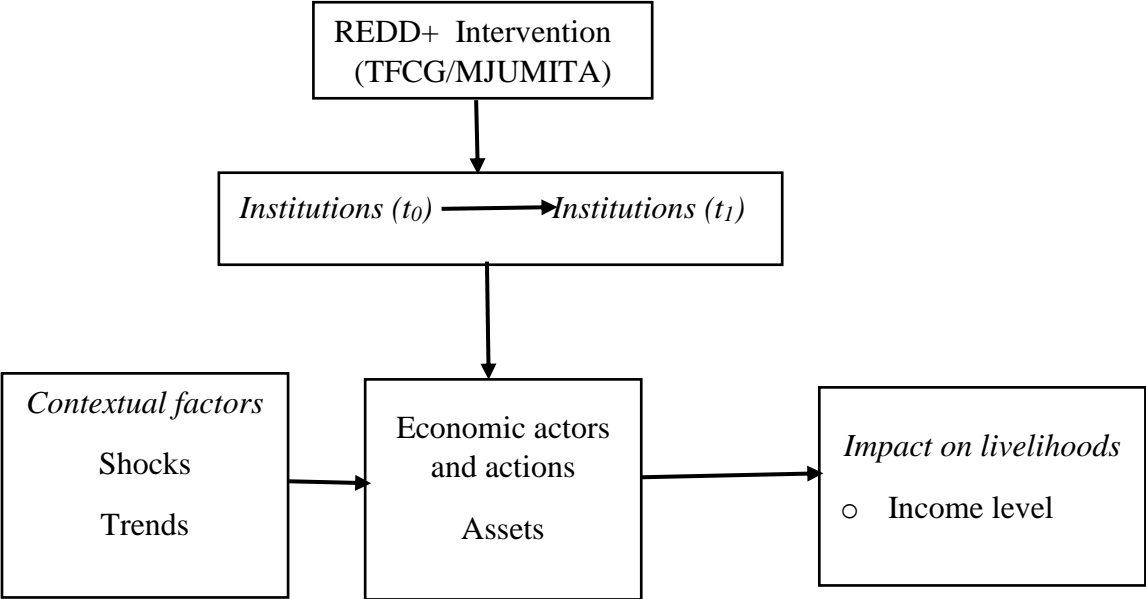


Figure 8: A conceptual framework for analyzing the impact of REDD+ institutions on local people’s livelihoods.

Source: adapted from Vatn (2015:154) and Ellis (2000:30)

3.3.1 Institutional change – from institution t0 to institution t1

Introducing REDD+ in Kilosa implies institutional changes – from pre-REDD+ institutions (denoted as institution t0) to the current REDD+ institutions (denoted as institution t1). When studying institutional changes, we usually focus on two issues, i.e., the processes involved in designing the institutions and how the designed institutions are currently working (Vatn 2011). Due to its delimitation, this study looks mainly into the second issue. The study assesses the changes in property rights in the study villages (if any); and specifically emphasizing current

use rules vis-à-vis the pre-REDD use rules. It further explores the local people's evaluation of changes in the property rights rules; and specifically, local people's evaluation of changes in use of forest resources.

3.3.2 Economic actors and actions

Economic actors, as explained under the EGS framework, have by definition the right to use the available natural resources/assets in many cases. However, use of these resources depends on the existing institutions, mediating factors and not least economic actor's decisions and priorities. In the times of unfavorable conditions – e.g., following the introduction of strict institutions or due to shock and trends – the household assets might be affected negatively. In such cases, the economic actors might be forced to take *actions* - e.g., coping strategies that do not follow the institutions. Put simply, the economic actors adjust their strategies in order to improve their livelihoods by stretching the rules.

3.3.3 Impact on livelihoods

As indicated before, this study investigates possible changes in local people's livelihoods in the study villages since 2010. In order to do so, the study briefly examines possible changes in household's welfare in general. Thereafter, it measures households' total (including forest) income in 2010 and 2015. A household has a secure livelihood if it gets a stable or reliable income over a long period. Furthermore, an increase in income level results in increased affordability of foodstuffs and improved livelihoods (which implies reduced poverty); followed by a change in social position, and vice versa (*see* Jackson 2009). One way to increase total income over time is through sustainable use of the natural resources. Sustainable use of resources enhances local people's resilience to future shocks, trends and disasters (i.e., reduces the degree of risk); while unsustainable use of resources might bring about vulnerability to unfavorable conditions (i.e., increases the degree of risk) (Scoones 1998).

Certainly, the livelihood impacts of the REDD+ pilot project in Kilosa depend mainly on the robustness of the REDD+ operational rules. Moreover, when assessing the impact of the pilot project on the local people's livelihoods, it is important to take into account the total impacts¹⁴

¹⁴ *Impact* can be defined as “positive or negative changes produced by a development intervention—directly or indirectly, intended or unintended—in the context of its environment, as it interacts with the multiple factors affecting development change. Impact occurs at multiple levels and timeframes—there can be short-term, intermediate and long-term changes resulting from an intervention” (AusAID 2012:2).

of the project – i.e., impacts as per the end of the project and the foreseeable long-term impact. Notably, this thesis concentrates mainly on the end-of-project livelihoods impact.

4. Description of the study area

This chapter describes the characteristics of the study area – Kilosa district. After presenting the area's physical location, I describe its physical environment (topography, soil, vegetation and climatic condition), population, migration and conflict. Lastly, I explain the area's land use distribution and economic activities.

4.1. Why and where in Kilosa district?

Kilosa district is one of the nine areas in Tanzania where REDD+ was introduced in 2010. For this reason, I chose to do my study in this district. Specifically, this study was carried out in four study villages in Kilosa district – i.e., Lunenzi, Nyali, Zombo and Lumango (*see* Figure 10 below). Lunenzi, Nyali and Zombo are located to the west of Kilosa town while Lumango village (in Kidodi ward) lies to the far south of Kilosa town bordering Mikumi National Park (Kajembe et al. 2013). While Lunenzi and Nyali were chosen from the 14 villages in Kilosa district where TFCG/MJUMITA implemented REDD+ intervention (Mugasha & Katani 2016), Zombo and Lumango were used in the study as *control* villages.

4.2. Physical location of the study area

Kilosa district is situated in Morogoro region in Tanzania; and is one of the seven districts of this region. The other districts in the region are Ulanga, Malinyi, Morogoro rural, Gairo, Mvomero and Kilombero (KDC 2016). Kilosa district has an administrative border with Mvomero district (to the East), Manyara region (to the North), Mpwapwa district in Dodoma region (to the West) and Kilombero district (to the South). To be more precise, Kilosa district lies on geographical coordinates of between 6° and 8°S, and 36°30' and 38°E. Administratively, Kilosa town is the district headquarter. With a total area of 14,245 km², Kilosa district is estimated to be 300 kilometers inland from Dar es Salaam (Kajembe et al. 2013; Kajembe et al. 2015; KDC 2016; Mutabazi et al. 2014).

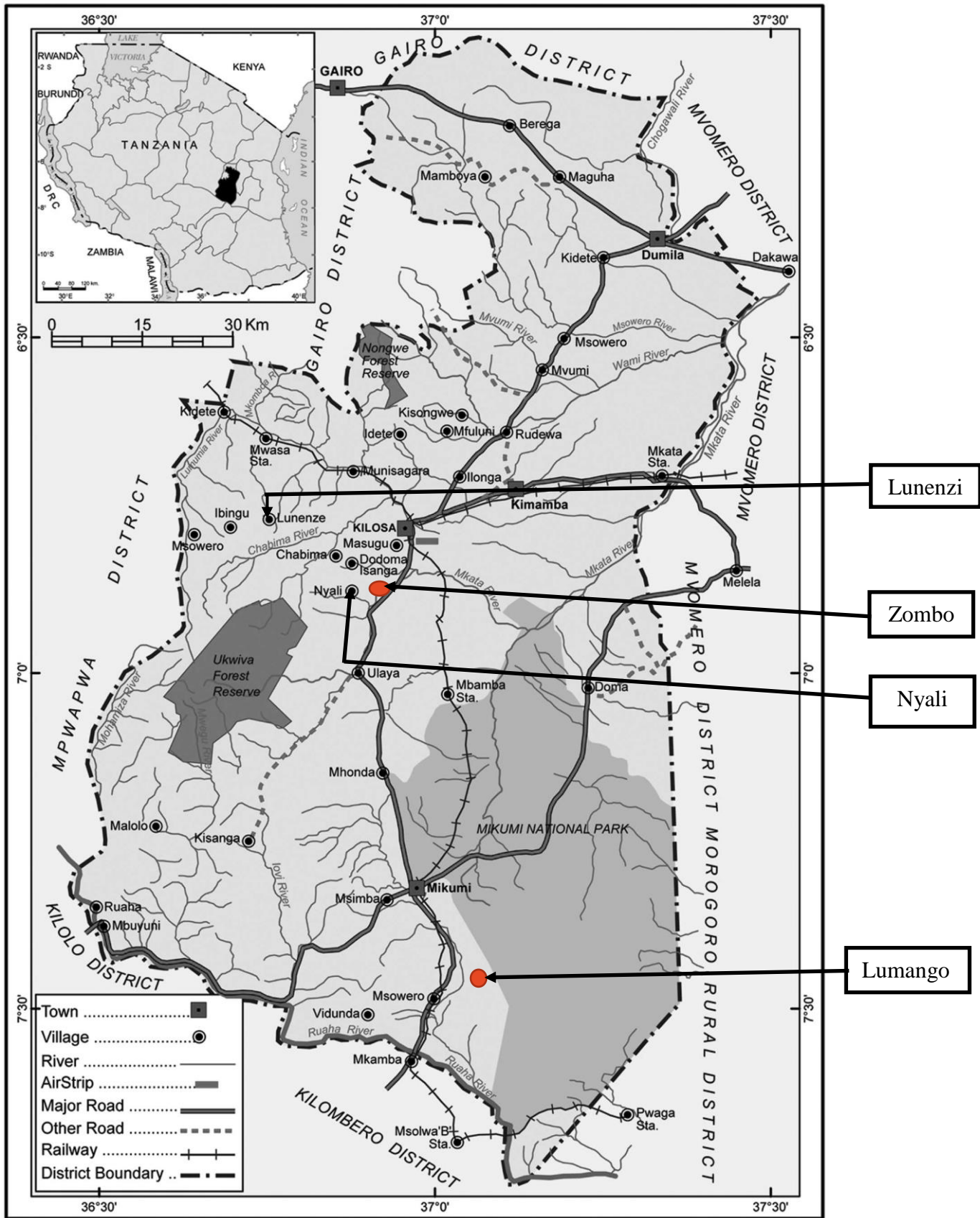


Figure 9: The map of Kilosa district showing study villages.

Source: Adapted from Dyngeland et al. (2014:5)¹⁵

4.3. Physical environment: Topography, soil, vegetation and climatic condition

Kilosa district has a varied landscape, which can be grouped into floodplains, plateau and highlands. The topography of the western side of the district is floodplains – a flat plain with an altitude of 550 m (Dyngeland & Eriksson 2011). The floodplains have several rivers of which Ruaha and Wami are the most prominent ones. Notably, the district's topography is mainly *Mkata* plains – a flat landscape that covers the entire eastern side of the district.

Further, the landscape of the northern part of the district is a plateau – a landscape with an altitude of approximately 1,100 m – typified by hills and plains. For instance, Nyali village is located in a plateau zone – *see* appendix 5, photo 3. Here, the soil type is sandy soil but quite fertile in nature. And lastly, from the North to South of the district are highlands. Lunenzi village is located in the highlands – *see* appendix 5, photo 2. The highland zones have an altitude of approximately 2,200 m and form part of the Eastern Arc Mountain ranges that originates from Kenya and running through Tanzania. In Kilosa district, three mountains – i.e., Ukaguru, Rubeho and Vidunda – are part of this Arc (Dyngeland & Eriksson 2011; Dyngeland et al. 2014; Kajembe et al. 2013).

When it comes to vegetation, Miombo woodland with shrubs and grass covers a significant part of the district. Notably, the western part of the district has most of the forests in the district. Generally, Kilosa district has both tropical and Mediterranean types of vegetation depending on the altitude of the location; most of which are species that are endemic to the area. In terms of climatic condition, Kilosa district has a bi-annual rainfall profile – i.e., short rainy season (between October and January) and long rainy season (between February and May) – with an average annual precipitation that falls between 800 and 1400 mm. Furthermore, Kilosa district has an average annual temperature of approximately 25°C (Dyngeland & Eriksson 2011; Kajembe et al. 2013).

4.4. Population, migration and conflict

According to the 2012 national census, Kilosa district has a population of 438,175 (URT 2013a). The district has been experiencing population increase since the 2002 census – a positive trend that is partly attributed to the migration dynamics in the area. Indisputably, the

¹⁵ *original source:* Tanzania Surveys and Mapping Division, 2013.

increased population has caused competition for natural resources in the area. For this reason, Kilosa district has had historical conflicts over land use especially between farmers and pastoralists (Dyngeland & Eriksson 2011; Kajembe et al. 2013; Kajembe et al. 2015; Mugasha & Katani 2016; Mutabazi et al. 2014).

4.5. Land use distribution and economic activities

Communities in Kilosa district use their land for different purposes depending on the fertility of the piece of land in their possession. Land use in this area can be categorized into agricultural land, land for human settlement, grazing land, forestland, land with water resources and parks. The area covered by each of these categories are shown below.

Table 8: Land use distribution in Kilosa district

Land use category	Area (in ha.)	Percentage of the total area
Agricultural land	536,590 ha.	37.33 %
Natural pasture	483,390 ha.	33.62 %
Mikumi National Park	323,000 ha.	22.47 %
Forestry	80,150 ha.	5.58 %
Urban areas, water and swamps	14,420 ha.	1.00 %

Source: adapted from KDC (2016)

Given its fertile land, agriculture is the main source of livelihoods in Kilosa district. The farmers grow both subsistence as well as cash crops. Shifting cultivation is common practice in some parts of the district. Besides agriculture, pastoralism is another important livelihoods activity in this area. The pastoral communities in this area, e.g., Maasai and Sukuma, are found in the central part of the district (Kajembe et al. 2013; Mugasha & Katani 2016). Moreover, forest use has been a tradition in Kilosa district since pre-colonial periods. The district has community forests as well as forest reserves.

Like many rural settings in sub-Saharan Africa, communities in Kilosa district depend directly on the nearby forests for firewood and non-timber forest products (NTFPs) – e.g., wild fruits, poles and mushroom. Notably, timber and charcoal trade are two common activities in this area (Dokken et al. 2014; Kajembe et al. 2013; Movik et al. 2012). Deforestation and forest degradation have been a threat to forests, especially Miombo woodlands, in Kilosa district since the 1950s. During the colonial times, forests have been exploited for commercial agribusiness such as large-scale sisal plantations (Kajembe et al. 2013). After the colonial period, deforestation in Kilosa district has been mainly due to agricultural expansion and firewood

collection (Mutabazi et al. 2014). Other causes of deforestation and forest degradation are charcoal making, timber logging, wildfires and overgrazing (Kajembe et al. 2013; Lusambo et al. 2008; Mugasha & Katani 2016). Thus, Kilosa was selected as a REDD+ pilot site in 2010 because the district had a history of deforestation and forest degradation (Mutabazi et al. 2014).

5. Research strategy, design and methods

I begin this chapter by explaining the philosophy of science in relation to environmental governance. Thereafter, I put forward the research strategy and design used; followed by data sampling techniques and data collection methods. Next is the data quality assessment whereby I evaluate the validity and reliability of the study, challenges and limitation and ethical issues. Additionally, before the data storage & disposal section, I explain in details how the data was analyzed.

5.1. Philosophy of science and environmental governance

“It is the theory which decides what can be observed”

(Albert Einstein)¹⁶

The choice of our research strategy and methodology is shaped by our philosophical positions (i.e., ontology and epistemology) and theoretical perspectives (Bryman 2012; Gray 2013). The philosophy of ontology is the study of “the nature of existence and what constitutes reality” (Gray 2013:19), while epistemology is the study of nature and scope of knowledge¹⁷, or, in relation to social sciences it is “what is regarded as appropriate knowledge about the social world” (Bryman 2012:19). Different ontological and epistemological positions exist in the social world.

A common, and perhaps the oldest, philosophical position is the one found in natural sciences – i.e., *objectivism/empiricism*. Objectivism is the ontological assumption that the social world exists independently outside human cognition. According to objectivists, knowledge is made through experience and empirical observations (i.e., *positivism*). In terms of theoretical perspective¹⁸, objectivists begin with a theory, gather empirical data and then thoroughly test the theory against empirical observations – i.e., *deductive* theory. According to Bryman (2012), deductive theory is normally linked to quantitative research strategy.

In social sciences and humanities, there are different ontological positions – e.g., *constructivism/constructionism*, *hermeneutics* and *postmodernism* (Bryman 2012; Gray 2013;

¹⁶ https://en.wikiquote.org/wiki/Albert_Einstein

¹⁷ <http://www.iep.utm.edu/epistemo/>

¹⁸ A theory can be defined as “an explanation of observed regularities” (Bryman 2012:21)

Young & Collin 2004). For instance, constructivism, which is at the ‘opposite end’ of objectivism, argues that “[t]ruth and meaning do not exist in some external world, but are created by the subject’s interactions with the world” (Gray 2013:20). The epistemological perspective where knowledge is created through subjectively assessing perceptions and actions in order to interpret and understand the social world is known as *interpretivism*. Interpretivism is thus opposed to positivist stance and is closely connected to the ontology of constructivism. Interpretivism is an epistemological orientation in qualitative research. As Bryman (2012) explains, in qualitative research, the researcher formulates a theory based on his/finding (an *inductive* theory) or test a theory. Therefore, as Bryman (2012) insists, there is *no clear* distinction between quantitative and qualitative research with regards to theoretical perspectives and philosophical positions. This lack of clarity has led to emergence of other schools of philosophy of science.

For instance, in-between objectivism/positivism and constructivism/interpretivism philosophical positions is a post-objectivism/positivist approach known as *realism* (Clark 2008). Realists acknowledge the fact that external reality/social world exists; and that knowledge can be made by consciously integrating qualitative and quantitative research especially in the process of data collection and analysis. There are two sub-categories of realism, namely *empirical* and *critical realism*. Whilst empirical realism simplifies external reality as ‘something’ that can easily be comprehended, critical realism – a philosophical stance that influenced my approach to this research – views the social world as, implicitly and explicitly, a complex entity (Bryman 2012; Clark 2008). Unlike single disciplines e.g., natural sciences and social sciences, interdisciplinary fields such as environmental governance are more complex in nature; and thus demand a ‘complex’ philosophical approach.

5.1.1. Seeing through the critical realist’s lens: Impact evaluation in environmental governance

Environmental governance, as discussed in chapter 3, involves humans, their actions and interactions, their relation to the physical environment and institutions at different levels. This implies the need to understand both social and ecological dimensions (e.g., the different interests, power dynamics, equities and equalities, winners and losers and not least environmental consequences). Critical realism is a philosophy of science through which we can

comprehend *observables* and *hidden* elements in such a kind of complex social world. Bhaskar (1975; 1989)¹⁹ who is among the early scholar associated with critical realism states:

“we will only be able to understand – and so change – the social world if we identify the structures at work that generate those events and discourses... These structures are not spontaneously apparent in the observable pattern of events; they can only be identified through the practical and theoretical work of the social sciences” (Bhaskar 1989) *cited in* (Bryman 2012:29).

Critical realism differentiates between three realms of the social world – ‘the actual’, ‘the real’ and ‘the empirical’ which are explained as follows:

“The *actual* domain refers to events and outcomes that occur in the world. The *real* domain refers to underlying relations, structures, and tendencies that have the power to cause changes in the actual realm. The *empirical* dimension refers to human perspectives on the world (i.e., of the actual and real domains)” (Clark 2008:167)

Whereas ‘the real’ are the *forces, mechanisms or potentials* that exist in the reality, ‘the empirical’ are what we *perceive and/or observe*. ‘The actual’, on the other hand, are the *happenings and processes* that take place, usually, in patterns. If we take the example of an apple that is placed on top of a table, the apple can fall from or remain on the table due to *forces* that exist in reality – e.g., gravity is a force that can cause the apple to fall. If the force to remain on the table is weakened due to, for instance, moving the apple closer to the edge of the table, the apple *falls* down – may be slowly, faster, vertically or at an angle – in a *pattern* that we might be able to predict. Lastly, ‘the empirical’ in this case is our *observation and/or perceptions* of the falling apple. Since the ‘falling’ apple (the social world, in this case) is complex in nature, as depicted by the three realms of reality, it is important to understand it in a holistic way (i.e., by taking into account the three realms) and not in parts (e.g., considering only what we observe).

When doing impact assessment in environmental governance, a critical realist evaluation is, understandably, a reasonable choice to make because “realist evaluation asks not ‘what works?’ but ‘how or why does this work, for whom, in what circumstances?’” (Westhorp 2014:1). In other words, for a realist, processes and context are two important factors to consider when analyzing project outcomes. Moreover, it is important to assess ‘*in whose interest*’ the project has worked.

¹⁹ His initial work which became influential in the intellectual circles came out in 1975. See (Bhaskar 1975).

Context (or, circumstance) is important here because we can capture mechanisms/forces/potentials – which are invisible in nature (inner workings) – only if we provide the right circumstance. Going back to the ‘falling apple’, we are almost sure that the mechanisms/forces that make it to fall exist when we provide the right circumstance.

According to Westthorp (2014), realist evaluation of a project includes three key things: context - mechanism - outcome (CMO). The author argues that outcome is similar to, but broader than, impact; and that:

“[t]he only difference between the terms ‘impact’ ...and ‘outcome’ (as used in realist evaluation) is that ‘impact’ implies changes “for people and their lives”; whereas ‘outcome’ includes change for people and their lives but can also include other kinds of changes (for organisations, workers, governments and so on)” (Westthorp 2014:3)

Furthermore, other scholars insist that the main distinction between impact and outcome is that impact takes into account the *long-term* consequences unlike outcome (*see* White 2009)²⁰; an argument dismissed by Westthorp (2014). Indeed, some authors use the two terms interchangeably (e.g., Angelsen et al. 2009). For the sake of consistency, *impact* as used in this study means the immediate effect (‘outcome’) of the REDD+ intervention in the pilot villages.

In accordance with the perspective of critical realist’s approach of science, this study employed the following: 1) a mixed-method research strategy 2) BACI design whereby mixed methods was used in data collection and analysis.

5.2. Research strategy: A mixed-methods approach

“...the best way to learn from projects is to use a mixed-methods approach that employs the most rigorous impact evaluation methods to quantify impacts and interprets those impacts in light of a theory of change” (Jagger et al. 2010:vii)

Bryman (2012) defines research strategy as the “general orientation to the conduct of social research” (p.715). Put simply, a research strategy is the direction we take in the process of conducting our research. Moreover, Bryman (2012) distinguishes between two main research strategies – i.e., qualitative and quantitative. However, as Bryman (2012) further explains, it has been difficult for researchers to draw a clear line between these two strategies when doing research; making it a bond of contention among social scientists. Going by my critical realist

²⁰ for the definition of *impact*, refer to section 3.3.2 of this paper.

position and my research objective, this study employs a mixed methods research strategy – i.e., combining qualitative and quantitative research methodologies.

Whilst the qualitative strategy was mainly used in assessing local people's evaluation of REDD+ institutions, a quantitative approach was mainly employed when assessing impacts of the REDD+ institutions on local people's livelihoods. Because both quantitative and qualitative methodologies have several weaknesses (Gray 2013; Johnson & Onwuegbuzie 2004), a mixed methods approach is a very reasonable strategy to assess REDD+ projects and their impacts on the local people's livelihoods (and the forest ecosystem). Bamberger (2012) proposes mixed methods approach for project evaluation because "there is rarely a single evaluation methodology that can fully capture all of the complexities of how programs operate in the real world" (p.3).

Mixed methods research has three main advantages. *Firstly*, we pull together the merits of the qualitative and quantitative strategies (i.e., synergy effect). *Secondly*, by using different methods we ensure triangulation – thus strengthening validity of our results. *Thirdly*, since the two strategies complement each other we might be able to do a thorough and useful research. Nonetheless, mixed methods research has been criticized for being time consuming; and resource and skills demanding. Another argument against mixed methods research is the possible *mismatch* between the qualitative and quantitative paradigms (Bryman 2012; Kuhn 1996); an argument dismissed by the critical realists.

In the mixed methods approach, the researcher can use qualitative and quantitative methods concurrently (i.e., doing the two methods at the same time) or sequentially (i.e., where one method follows the other) whereby he/she can make qualitative method the predominant method (and less of quantitative method) or vice versa. Moreover, the researcher can have equal proportions of the two methods (Bamberger 2012; Bryman 2012; Johnson & Onwuegbuzie 2004). For instance, one can "use QUAL methods to study the project implementation process and the influence of contextual variables on project performance in some of the communities where a QUANT survey of project participants is being conducted" (Bamberger 2012:15)²¹. Quantitative research was the predominant method in the analysis of possible changes in livelihoods. Data collection for the study was concurrently done.

²¹ QUAL stands for qualitative while QUANT stands for quantitative.

5.3. Research design: BACI approach

Research design can be defined as the “framework for the collection and analysis of data” (Bryman 2012:715). Put differently, the research design helps the researcher in planning for the research process – i.e., in the process of choosing a suitable data collection method (s) and in analyzing the raw data. Furthermore, it is important to have the research questions in mind while designing the study because they guide us throughout the research process (Berg & Lune 2012; Bryman 2012).

With respect to project impact assessments, as in this study, several study designs can be used depending on the “project timing, human and financial resources and influence of the evaluation team” (Jagger et al. 2010:vii); and not least our research questions. Jagger et al. (2010) present several of these designs, namely randomisation, before-after-control-intervention (BACI), before-after (BA) + projected counterfactual, matched control-intervention (CI) and reflexive or retrospective (ibid). From these possible design options, this study employed the BACI design.

BACI (*before–after/control–intervention*) design is a quasi-experimental method that is preferred for the assessment of socio-economical changes in a *matched* control and intervention sites over a given time period. The term ‘matched’ is a key concept here; and is the process of looking for sites that can be compared to the project site while considering possible confounding factors. Confounding factors are factors that can affect project outcomes; and include drought, floods, and government macro-policies. It is important to have in mind confounding factors as they can hide the impacts of project intervention (Jagger et al. 2010). The BACI design was chosen for assessing the impacts of REDD+ regime because:

“changes in outcomes can then be compared across these matched sites, effectively removing the influence of different starting conditions (because we consider only changes since the start of the project) and of external changes contemporaneous with the project, such as new national policies or weather anomalies (because these would affect both intervention and control sites)” (Jagger et al. 2010:viii).

The BACI approach implies collecting data before (*ex-ante*) and after the project intervention is over (*ex-post*), both in the *control* and project (in my case, the *pilot*) villages (Angelsen et al. 2009; Angelsen et al. 2012).

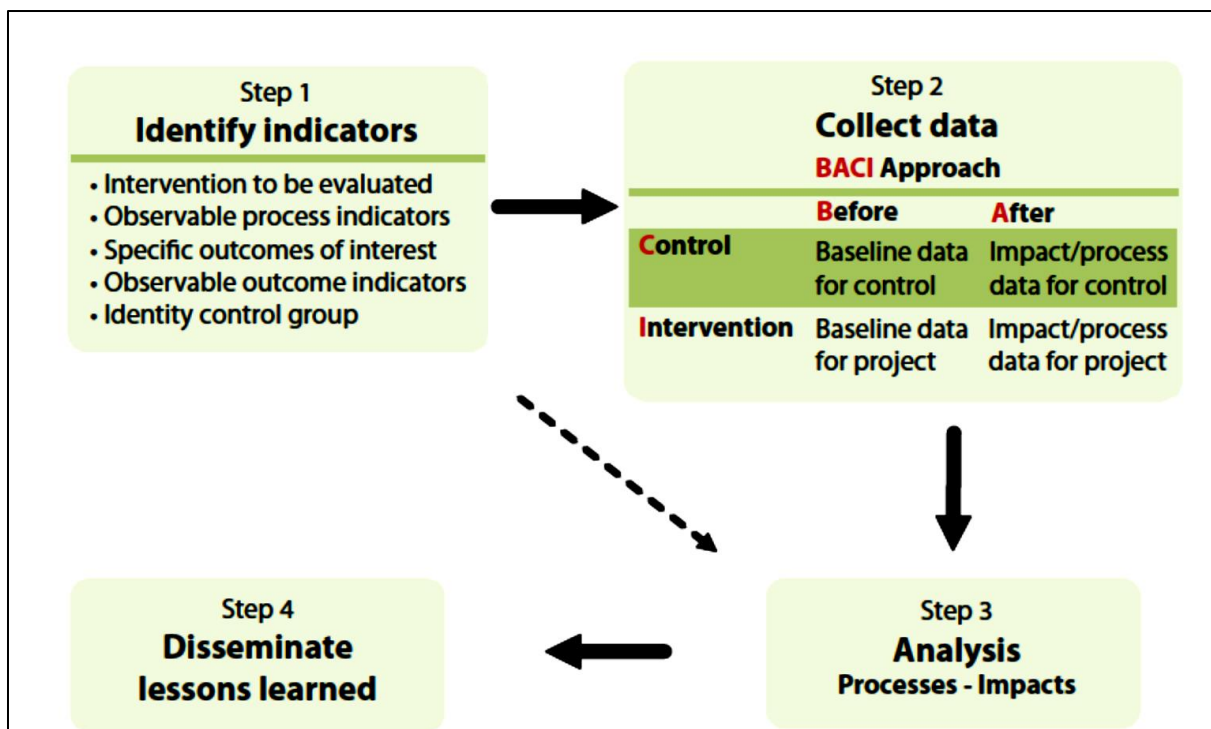


Figure 10: The BACI approach for evaluating the impacts of REDD+ project

Source: Angelsen (2009:287).

In the case of the REDD+ intervention in Kilosa district, the *ex-ante* data (or baseline data) was collected and analyzed in 2010 by the POVSUS- REDD project team²² while the *ex-post* data was collected in 2015 by the ‘Man and Forests’ project team.

BACI approach has several limitations. Here I mention some of its weaknesses and how we tried to overcome these weaknesses. *Firstly*, given the long procedure involved in assessing the impacts of the project, BACI has been criticized for being a time consuming and resource demanding procedure (Jagger et al. 2010). *Secondly*, while conducting data collection for the ‘after’ phase, the researcher has to go back to the same households as the ‘before’ phase. This is challenging because it is not always easy to find the same respondents when you go back to their homes, perhaps due to death, sickness, migration or work. To overcome these two

²² Subsequent to the 2008 pro-REDD bilateral agreement between Norway and Tanzania, two research projects were conducted by different research partners. The first project, funded by the Norwegian Agency for Development Cooperation (NORAD), was named as ‘POVSUS-REDD’. The project started in July 2009 and ended in December 2013. The main goal of this project was to deepen our understanding of how REDD+ strategies can accomplish its goals. The second project – dubbed as ‘Man and Forests’ – was funded by the Norwegian research council. The project started in January 2014; and evaluated the changes in the existing institutions, possible changes in local people’s livelihoods and changes in forest biodiversity and carbon stocks since the introduction of REDD+ projects. With the help of funds from ‘Man and forests’ project and in close cooperation with **teams** from the Norwegian University of Life Sciences (NMBU) and Sokoine University of Agriculture (SUA) in Tanzania, I collected the data for this study from Kilosa district.

limitations is not easy; we therefore had to do our best within the available time and resource, and look for the same respondents by all means.

Thirdly, it is difficult to capture and analyze all the variables that might affect project outcome. Indeed, “BACI plus matching can also control for unobservables that remain constant over time—but not any unobservable characteristics that affect selection and outcomes and that do change over time” (Jagger et al. 2010:57). Additionally, the researcher might even not be able to explain some of the obvious variables when using this design (Angelsen et al. 2009). Angelsen et al. (2009) suggest that one way of solving this problem – i.e., handling cause and effects which are invisible or visible but difficult to explain – is through triangulation in order to understand hidden mechanisms and context. In this study, we have ensured triangulation by collecting qualitative data in addition to the quantitative dataset.

5.4. Data sampling techniques

As indicated in the previous chapter, this study was done in *four* villages in Kilosa district – i.e., two pilot villages (Nyali and Lunenzi) and two control villages (Zombo and Lumango) – which were part of the villages selected as study sites in 2010. Thus, the *population* – i.e., the unit from which the samples have been selected – is the local people in the four study villages, while the *household* is the unit of analysis in this study. When it comes to sampling technique in relation to the quantitative research, we *did not* do sampling in 2015. As this study followed the 2010 study, we interviewed the same households as in 2010. Similarly, selection of resource persons and members of the focus group discussions was done through a purposive sampling technique as in 2010.

Generally, while selecting samples for the study, the researcher has to remember two important things i.e., *sample size* and *representativeness* of the sample. Representative sample means a sample that has similar features of the population from which it was selected. In terms of sample size, the bigger the sample size the more the chances are that sample represent the population. More importantly, it is possible to generalize the results if we use large and representative samples (Bryman 2012; Walliman 2006).

5.5. Data collection methods

This study used both primary and secondary data. The 2010 primary data was obtained from the data collected by ‘POVSUS-REDD’ team in 2010; while the 2015 primary data was collected from the field / study villages by the ‘Man and Forests’ team between 2nd November

and 4th December 2015. Whilst gathering the primary data, four methods were used: a household questionnaire, semi-structured interviews with key informants, focus group discussions (FGDs) and participant observation. Prior to the fieldwork, we (the team from Norwegian University of Life sciences) developed research instruments – i.e., household questionnaires, interview guide for local resource persons (key informants) and interview guide for focus group discussions. We therefore carried with us the research instruments and a manual that elaborated their contents while we were travelling to the study areas.

The preparation of these instruments was based on Participatory Rural Appraisal (PRA). PRA is “a growing family of approaches and methods to enable local (rural or urban) people to express, enhance, share and analyze their knowledge of life and conditions, to plan and to act” (Chambers 1994:1253). This methodological approach emerged in the 1990s, and has been widely used in many countries since its development. As Chambers (1994) argues, PRA has few biases compared to non-participatory methods (e.g., Rapid Rural Appraisal (RRA)) that was used before 1990s.

Unlike RRA, in PRA the local people are actively involved in the data collection and analyses process; and at the same time share information among them, thus, empowering the local people. Furthermore, PRA has been applied in different fields – for instance, natural resource management (e.g., in forest management), agricultural research, health sector and other programs (Chambers 1994). Since PRA has been used in forest management – and because our study of REDD+ is all about forest management – it makes sense to use PRA as the basis for our three research instruments.

5.5.1. Structured household survey

Household survey is considered to be the “main entry point for getting socio-economic data in the BACI approach” (Sunderlin et al. 2010:44); and thus an important instrument for assessing changes in household livelihoods over time. We therefore conducted household survey (structured interviews) in order to learn how the REDD+ rules affected the households with respect to their livelihoods.

The questionnaires for the household survey had both closed- and open-ended questions; and the respondents were mainly household heads (who are, in many cases, males). The household questionnaire used for collecting data in the pilot villages in 2015 is attached as *appendix 1*. Notably, the questionnaires for the pilot and control sites were slightly different; as the one for

the pilot sites had some extra questions about REDD+. Moreover, the questionnaire for the 2010 (baseline) data collection had *almost* the same structure as the ones in 2015, but had a *pre-REDD analysis* section (i.e., section E).

The sample size from the 2010 study was 240 households. Of these samples, some households were dissolved or were not at their homes when we visited in the 2015 round. We, therefore, managed to interview 147 households. Most of the interviews were conducted at the respondents' households with the help of interpreters (who interpreted from English to Swahili language). However, in some cases where we were *not* able to go to the homes due to, for instance, poor organization and difficult terrain. In such cases, we interviewed the household heads at the villages' offices.

5.5.2. Key informant interviews

Key informant interview – also known as resource person interview – is a type of qualitative interviews that involve face to face interview with a key individual in the community (Bryman 2012). In this study, key informant interviews played a crucial role because it was mainly through these interviews that we understood REDD+ rules (village by-laws), at least 'in theory'. Moreover, the interviews provided a comprehensive knowledge about the situation in the village, market, livelihoods, state of the forest condition as well as benefit sharing mechanisms.

The resource persons interviewed included the village chairpersons, ward executive officer (W.E.O), deputy ward executive and village executive officer (V.E.O). Note here that whereas the village members elect a village chairperson, W.E.O, deputy ward executive and V.E.O are government employees.

While conducting key informant interviews, the researcher uses semi-structured questions. Compared to structured interviews (e.g., the household survey) which had standardized set of questions (and which are, in most cases, close-ended questions), semi-structured interviews are more flexible in the sense that the questions are mainly open-ended allowing the interviewer to ask probing and follow up questions.

During the semi-structured interviews, we used *interview guides*, which were already designed by the "Man and Forest" team. The pilot and control interview guides for the resource persons were different in the sense that the ones for the pilot areas had extra questions about REDD+. We recorded communications and also wrote down personal notes as back-up tools and for the sake of triangulation.

5.5.3. Focus Group Discussions (FGDs)

Focus group discussion is another type of qualitative semi-structured interview. Walliman (2006) defines FGDs as:

“A type of group interview which concentrates in-depth on a particular theme or topic with an element of interaction. The group is often made up of people who have particular experience or knowledge about the subject of the research, or those who have a particular interest in it” (p. 207).

In this study, we conducted three FGDs in each study village – one group with men, another with women and the third with Village Natural Resource Committee (VNRC)²³. Appendix 3, *photo 4* shows an example of how FGDs (with men) was conducted. FGDs for the different categories were separately done; and each group comprised of approximately 8-12 informants. These interviews provided a better understanding of the formal rules and the day-to-day use of these rules (rules in practice). FGDs with men and women complemented the household survey with regards to perceptions of the rules (i.e., for the purpose of triangulation). Moreover, through FGDs we were able to understand better livelihood changes in the villages. On the other hand, VNRC gave information about forest patrols, forest conservation; and fine & permits with respect to forest use.

Unlike in household surveys where informants do not interact, in FGDs we are able to see, follow and assess informants’ feelings and actions as they responded to each other in the process of discussion. Thus, we do not only rely on the informants’ responses in order to assess the data from FGDs. Similar to the questionnaires and interview guides for the key informants, the pilot and control interview guides for the FGDs were different as the one for the pilot areas have questions addressing REDD+.

5.5.4. Participant observations and archives

Participant observation, as the name suggests, is a method of data collection whereby the researcher records what he/she *sees* (in his /her research log) rather than what the respondents tell him/her. Thus, a participant observation technique complements the focus group discussions, structured and semi-structured interviews in the sense that it gives the researcher a further understanding of the study area in terms of its people, culture and topography (Bryman 2012; Walliman 2006). Moreover, as Bryman (2012) puts it we can learn “deviant and hidden activities” (p.494) – i.e., “areas that the insiders are likely to be reluctant to talk about in an

²³ NB: we *did not* interview VNRC in Lunenzi because of time constraint.

interview context alone” (p.494) through participant observation. In studies related to REDD+ pilot projects e.g., this study, participant observation is important as it gives the researcher a contextual insight of the ongoing activities in the area (both legal and illegal), especially if one stays for a long time. Such activities could be illegal timber and charcoal trade.

Furthermore, this study used primary data from REDD+ documents. These documents comprise of project reports by TFCG/MJUMITA and other NGOs. Further, data from archives kept by resource persons in Kilosa district were also used.

5.5.5. Literature review

Besides the primary data, this study reviewed secondary data. In this study, I reviewed publications and reports from scholarly sources. Literature review is crucial because it is the basic foundation for building our own research because through it we can know what other researchers wrote on the topic on hand (REDD+ in this case), research methodologies and theories used; and research gap and controversies that currently exist (Bryman 2012; Walliman 2006). Thus, literature review was an important step in this study in order to get a broader understanding of REDD+ in Tanzania, and more specific in Kilosa district.

5.6. Data quality assessment

In order to ensure that our study is of good quality, we should evaluate the following issues before and after the data collection phase: *validity and reliability* of data, possible source of *challenges and limitations*, and not least issues of *ethics*.

5.6.1. Validity & reliability

Validity can be defined as the extent to which the study really measures what it claims to measure; and reliability is the degree to which the study can produce the same results if repeated by other researchers (Bryman 2012; Field et al. 2012; Walliman 2006). According to Bryman (2012), we can distinguish between four types of validity – *measurement, internal, external and ecological* validity – as defined below:

- Measurement validity (also known as *construct* validity) is “the question of whether a measure that is devised of a concept really does reflect the concept that it is supposed to be denoting” (p.47). ‘Measure’ in this case can mean the questions on the questionnaire and a ‘concept’ in our case can mean the concept of income. So, in considering

measurement validity we asked ourselves the following question while we prepared our household questionnaire: Does *income* really measure livelihoods?

- Internal validity is “the question of whether a conclusion that incorporates a causal relationship between two or more variables holds water” (p.47). Put differently, it is the degree to which the study conclusion supports the causal statement that was hypothesized by the researcher. In our case, we might raise the question: Can we, with certainty, conclude that REDD+ really *does* have an impact on the local people’s livelihoods in Kilosa district?
- External validity is “the question of whether the results of a study can be generalized beyond the specific research context” (p.47). In other words, we have asking ourselves all along the research process: Can our findings about the impacts of REDD+ be generalized beyond our informants?
- Ecological validity is “the question of whether social scientific findings are applicable to people’s every day, natural social settings” (p.48). Considering ecological validity, we might ask this question in our case: Do our research instruments really capture local people’s perceptions and attitudes in the same way as we could get those perceptions and attitudes in a ‘non-interview’ setting?

Validity and reliability are two crucial factors that we need to have in mind when doing our research – for the sake of increasing the quality and trustworthiness our research findings. Measurement errors that might affect validity and reliability can originate from the sampling procedure (sampling error), from the data collection process or from the way we frame our survey questions (Fowler 2009). Below are some of the challenges and limitation that might affect the validity and reliability of the outcome of this study.

5.6.2. Challenges and limitations

Challenges and limitations are encountered in most fieldwork. Usually researchers complain of time and resource constraints; something that we also experienced. Besides these ‘usual’ constraints, we had a few other challenges and limitations. *Firstly*, we had some problems with the respondents’ list in Zombo village. In this village, we noticed some ghost names, and mismatch between the respondent’s name/age/sub-village name on the list and the real respondent’s name/age/sub-village name. In such cases, we interviewed only those we thought were genuine respondents.

Secondly, some respondents complained that the questionnaire was too long (especially the questionnaires for the pilot villages). Moreover, since some of the questions asked the respondents about what they did/or what happened over the last year, it was difficult for them, especially the elderly persons, to remember and give us precise responses (i.e., recall problem).

Thirdly, there was lack of proper organization and coordination in some villages. In Nyali, the meetings were well organized and coordinated by the village leaders. However, although the village leaders in Lunenzi village were informed in advance that the research team was planning to meet the respondents, the meetings in this village were poorly organized in the first day. Thus, we spent a lot of time in searching for the respondents, but in vain. Because of its topography, it was difficult for us to reach Lunenzi village by vehicle and therefore the only option we had was to walk up the mountains for 2 hours from the neighboring Ibingu village. Nevertheless, even after walking for 2 hours, we were informed that most of the potential respondents went to their farms. We therefore requested the village chairperson to organize for another meeting the following day at the neighboring Ibingu village – a plan that worked quite well. Moreover, in Zombo and Lumango village we had some challenges in organization of the meetings, although not to the same level as in Lunenzi. Poor organization in Lumango was partly caused by delays in Lunenzi; as we had little time to conduct our data collection in Lumango village²⁴.

Notwithstanding the above-mentioned challenges and limitations, I feel that the data collected for this thesis are of high quality for the following reasons: *Firstly*, the team had been gathering every evening after the day's work to make corrections and suggestions under the supervision of an experienced team leader in an effort to improve the quality of the data collected. *Secondly*, we did not have language barrier as we had interpreters from Sokoine University who spoke with the respondents in Swahili language. Although there can be risks of misinterpretation by the interpreter in any interpretation between languages, from my observation the probability of misinterpretation was very low as the interpreters spoke fluent Swahili and moreover the answers we got were sensible. *Thirdly*, we made sure to ask the respondent follow-up and probing questions where we thought the response was not clear. *Fourthly*, we tested the household questionnaires and adjusted it a week before we started the fieldwork. Similarly, we did the same to the other research instruments. *Lastly*, triangulation (crosschecking) was used

²⁴ note that Lumango was the last village we visited.

in verifying the data gathered and data sources in order to increase the level of credibility and validity of my findings.

5.6.3. Ethical consideration

“How can we believe in the results of a research project if we doubt the honesty of the researchers and the integrity of the research methods used?” (Walliman 2006:147).

As Walliman (2006) rightly asks, it is difficult to accept the findings of any research if the researcher(s) is/are known to be dishonest or if the quality of their methods is apparently low. Ethical principles, for instance honesty and openness, are core issues in any research; and have therefore been an integral part of this study. To ensure ethically sound research, Bryman (2012) insists that the researcher should ensure that **(i)** he/she should avoid harming the respondents **(ii)** there should be prior and informed consent, **(iii)** respect respondents’ private life **(iv)** we should not deceive the respondents.

Doing harm to respondents can occur directly or indirectly, in the research process or even many years after the research was done. Whereas direct harm includes physical injuries to the respondents, indirect harm includes psychological injuries (e.g., stress). Additionally, failure to observe confidentiality and lack of proper data storage and disposal can bring about future harm to the respondents. In this study, we did *no harm* to anyone involved in the research process, or affected by it or its results.

Besides avoiding harm, it is crucial to respect respondents’ private life. Respect for privacy includes two core issues i.e., anonymity and confidentiality. Notably, we guaranteed a complete anonymity and confidentiality while in the study area and after the fieldwork. For instance, in the case of the household survey, we ensured anonymity through using questionnaire numbers. Additionally, we used respondent numbers while inserting the data in the MS Access instead of respondents’ names.

Concerning prior and informed consent, we informed the respondent about ourselves and the purpose of the data collected. The village leaders introduced us to the informants prior to the interviews; and we also informed the respondents of who we were, the purpose of our visit and their right to accept or refuse to be interviewed at the beginning of every interview session – be it focus group discussion, local resource person interview, or structured (household) interview. We tried our best to uphold the ethics of respect, honesty and privacy throughout this research.

5.7. Data analysis

Data analysis involves “management, analysis and interpretation” (Bryman 2012:14) of the collected data. What we look for while analyzing our data depends on our research objective(s) (Berg & Lune 2012). In line with its objective, this study analyzed REDD+ institutions and their possible impacts on the local people’s livelihoods. Analyzing REDD+ institutions included evaluating people’s perceptions of rules (e.g., rules concerning ownership, use and management of forest and forest products) in 2015 vis-à-vis 2010, while assessing impacts on the local people’s livelihoods entailed comparing the household incomes for 2010 with the ones in 2015. Additionally, possibilities of ‘hidden activities’ such as corruption and illegal trade of forest products were investigated. Because of employing a mixed research methods approach, data analysis comprised of qualitative and quantitative analysis.

5.7.1. Qualitative data analysis

Qualitative data, as used in this study, means data collected through FGDs, participant observation and resource persons’ interviews. After the data collection stage, the next step for the qualitative data analysis was the transcription (whereby the recorded interviews are written down) of the data from the FGDs and the resource persons’ interviews. This stage was then followed by the coding phase. In the coding phase, we unpacked the data, looked for concepts, patterns, meanings and biases; and then regrouped the concepts into categories and themes that were relevant to the objective of the study. In other words, we carried out an evaluation of the themes in the interview transcripts (Berg & Lune 2012; Bryman 2012). Through qualitative analysis, we were able to understand the institutional changes, discover local people’s perceptions about existing formal institutions (e.g., REDD+ rules) and moreover get some ideas about the impact of these rules on the local people’s livelihoods.

5.7.2. Quantitative data analysis

Quantitative data are collected through the household survey. Quantitative analysis refers to counts and measures of data (Berg & Lune 2012; Bryman 2012). The quantitative analysis was mainly useful in answering my research questions 3. Given the bulkiness of the raw quantitative data, data processing started in December 2015 and ended in mid-March 2016. In other words, data processing was the most time-consuming procedure in this study. We had to use a lot of time in the data entry phase to ensure that we entered the data properly and carefully. Further, even though coding in the questionnaires was done prior to the data collection phase (*see*

appendix 1), we still had to make sure that the coding systems for 2015 and those for 2010 were consistent. Besides, we used a lot of time to rename, re-code and label variables in order to merge the 2015 and 2010 datasets.

Data entry for the 2015 followed the same procedure as in 2010. Like in 2010, the quantitative raw data for 2015 pilot & control sites was first entered in *MS Access*. Thereafter, we transferred the 2015 dataset to *Stata* software. Using *Stata*, we renamed, re-coded and labelled the variables in the 2015 dataset to the 2010 dataset; in order to be able to merge the two datasets. Prior to the analysis, the 2010 and 2015 datasets were pooled for the sake of getting a more exact result. Additionally, *Stata* software was used in analyzing both descriptive statistics as well as inferential statistics. Chi-square (X^2) was used to test relationships between variables, when appropriate. This study used a level of significance of $p = 0.05$ (i.e., the statistical significance was set at a confidence level of 95%). This means that the results generated by all the tests in this study are significant if the p-value is less than 0.05.

To analyze the impact of REDD+ on local people's livelihoods, this study used panel data analysis in accordance with the BACI approach. I performed multivariate regressions using panel data to test the impact of REDD+ on the gross household incomes (total household income and total forest income) and agricultural area.

One important characteristic of a panel data is the fact that we follow up the same respondents across time period (Schmidheiny 2011; Torres-Reyna 2007; Wooldridge 2009). Indeed, as Torres-Reyna (2007) explains panel data “allows you to control for variables you cannot observe or measure like cultural factors or difference in business practices across companies; or variables that change over time” (p.3). Based on Schmidheiny (2011), the general formula for panel data regression is given as follows:

$$Y_{it} = \beta_0 + \beta_1 X_{it} + \beta_2 Z_i + \alpha_i + u_{it}$$

Where:

Y= dependent variable

i = households (observations)

t = changes over time period

β_0 = Regression constant (the y intercept)

X= independent variable that vary over time

Z = independent variable that does not change over time.

β_1 & β_2 = Regression coefficients for X and Z respectively

α_i = constant error term (individual-specific effect)

u_{it} = an error term that changes over time (idiosyncratic error term)

In panel data analysis, it is important to remember that variables that are observed variables (independent variables/regressors) in the analysis might be correlated with the unobserved variable (individual-specific effect) (Schmidheiny 2011). The reason for keeping this in mind is that if there is a correlation between the observed and unobserved variable, the coefficient estimates will be biased. There are different types of panel data regressions, e.g., random effects (R.E.) and fixed effects (F.E.) regressions.

In the random-effects model, it is assumed that the unobserved variable (α_i) is *not* correlated with our independent variables i.e., assumes that $\text{Cov}(X_{it}, \alpha_i) = 0$ and $\text{Cov}(Z_i, \alpha_i) = 0$ (Schmidheiny 2011). Moreover, the unobserved variable is regarded as a random variable. However, if the above assumptions do not hold, the results from R.E. will be inconsistent.

In such cases, F.E. regression can be used. In F.E, the individual specific effect is treated as a fixed variable and is therefore estimated. The assumption in fixed-effects model is that the individual-specific effect is correlated with the independent variables i.e., $\text{Cov}(X_{it}, \alpha_i) \neq 0$. Comparatively, the standard errors (S.E.) generated in F.E are greater than those given by R.E. It implies that R.E. is a more efficient model compared to F.E. On the same note, random-effects regression keeps both time-invariant and time variant independent variables whereas F.E. omits time-invariant independent variables (Torres-Reyna 2007).

In addition to the regressions, I did Hausman test. The rationale for doing this test was to see which of the two regressions was appropriate to use in this study. The null and alternative hypotheses for Hausman test were as follows:

H_0 = R.E. regression offers consistent estimates (R.E. is appropriate to use)

H_1 = R.E. regression does not offer consistent estimates (F.E. is appropriate to use)

If the p-value is smaller than 0.05, we reject the null hypothesis and use the F.E. However, if the p-value > 0.05 , we retained the null hypothesis – i.e., R.E. is a better option.

Furthermore, it is important to mention that ideally one should have combined panel data with path analysis to be fully in line with the structure of the conceptual framework. This is, however, very demanding and has not been pursued.

Measuring gross total household incomes and social assets indices:

We calculated gross total household incomes and social assets indices for both 2010 and 2015 using *MS Excel*. Gross total household income²⁵ is the sum of household subsistence (own use) and cash revenues from farm production and revenues from wages and salaries, businesses, and transfers (remittances, pension etc). Note also that subsistence is calculated as total output minus what has been sold.

Firstly, we calculated the gross total household incomes from crops (both sold and consumed), livestock (both sold and consumed), forest products (both sold and used). Secondly, we calculated total income from other source (remittances, government support, small businesses etc.). When it comes to calculating income from livestock products, our estimation for eggs and milk was based on the number of live animals owned while in the case of meat; it was based on the number of livestock slaughtered. In order to estimate the livestock numbers, we used a common unit – i.e., tropical livestock unit (TLU) – for all livestock owned (Chilonda & Otte 2006)²⁶. Land was another asset we took into consideration. We calculated total farmed areas by adding up areas (in hectares) owned and/or rented by the household in 2010 and 2015.

Moreover, we used STATA software to calculate social assets indices. The social assets that we calculated corresponded to question A21 of the household questionnaire (*see* appendix 1). For each household head, we gave 1 if he/she is a member of a certain organization (*see* footnote for question A21). Then, we added up all the 1's to determine the social asset index of the respondent. For example, if household head A was a member of 5 organizations in 2015, his/her social capital for 2015 is 5.

Thus, *Social assets index*_{hh} = f (member farm group+ member village committee + member local NGOs + member traditional council etc.) where _{hh} stands for household while 'f' stands for function.

5.8. Data storage and disposal

Data storage entailed filing the data manually or electronically so that it remains inaccessible to unauthorized person. In our case, we opted for manual data storage. Besides storage, data should be disposed properly after the completion of the research work or in future. Similar to storage, proper disposal is necessary in order to avoid information leakages to unauthorized person (Berg & Lune 2012; Bryman 2012). In other words, proper data storage and disposal is

²⁵ E.g., total income from crop x = total yield/output (in kg) * price (in US \$/ per kg).

²⁶ Conversion factors, according to these authors, are: cattle = 0.7, goat = 0.1, sheep = 0.1, pig = 0.2, chicken = 0.01.

important for ethical reasons. Data storage and disposal was done in accordance with the rules and regulations set by the Norwegian Centre for Research Data (NSD).

6. Changes in local institutions for forest management in the study villages

This chapter presents the results related to my first research questions. The concept local institution is used in this chapter to mean property rights rules and norms. Note that although use rights are elements of property rights as illustrated in section 3.1.2.1, I treat them separately in this chapter given their importance to this study. The chapter first examines the changes in the formal rules, and thereafter investigates the possible changes in practice (the informal rules) in the study villages.

6.1. Changes in property rights

Even though there are five bundles of property rights, this thesis concentrates mainly on use and management rights. The changes in the former rights will be covered in section 6.2. In the following sub-sections, I will explain the changes in the property regimes and management rights that occurred in 2010.

6.1.1. Changes in pilot villages

6.1.1.1. Status before 2010

Before 2010, the forests in the pilot villages were un-reserved village forests; and were owned by the central government according to the statutory laws. The management of the forests was under the jurisdiction of the local government (i.e., the district council); and regulated by the forest Act of 2002 and other forest laws. However, as explained in chapter 2, it is important to note that the local communities view forests on general land as ‘their’ customary forests in terms of property rights. This was the case in the pilot villages before 2010.

6.1.1.2. Status in 2015

In 2010, a PFM regime was introduced in the pilot villages as part of establishing REDD+. After the introduction of REDD+, ownership of the village forests was officially transferred to the local communities in accordance with the statutory law. In terms of management, the forest is now under the village council (*see* appendix 2). As can be seen in appendix 2, the village council is composed of both government and public representatives – i.e., joint forest management. Moreover, the village council elected VNRC who were then approved by the public. As pointed out in chapter 5, We did not interview the VNRC in Lunenzi. In Nyali, the

VNRC told us that there was no VNRC in Nyali before REDD+. They said that first committee was elected in 2011; whereas the current committee – which is composed of 9 men and 3 women – was elected in August 2015 after the term of the first committee had elapsed (a term in this case is 3 years according to law). The members of the VNRC told us that they have the followings functions illustrated in *Box 5* below.

Box 5: The functions of Nyali VNRC

- Ensure that the forests are conserved.
- To do random patrol of the forest, one day in the week (4 times a month).
- Charge fines to offenders and confiscate illegal production.
- Issuing permits for forest products

– VNRC, Nyali village, 27.11.2015

Further, since the formal process involved in establishing a REDD+ regime is similar to that of CBFM, the representatives from the district council, TFCG/MJUMITA and village council formed the forest management authority (i.e., VNRC). The VNRC prepared a forest resource management plan and drafted village by-laws – as in CBFM²⁷. Then, the VNRC took the documents to the village council and assembly who called for public hearing. After the documents had passed through this stage, they were further sent to the district council for approval and formalization.

Of the steps mentioned, the formal acceptance by the central authorities (formalization process) is the most time-demanding procedure. Because of the delays associated with this procedure, TFCG/MJUMITA decided to implement the project. All in all, the official gazetting of the protected forests in the pilot villages was done in 2014. In other words, the pilot villages have undergone institutional changes in 2014. In line with the Forest Act (2002), the legal status of the pilot villages forest has changed from un-reserved village forest to village land forest reserve.

6.1.2. The situation in control villages

In terms of property rights, Zombo has had un-reserved village forest under the ownership of the central government before and after 2010. As explained earlier, the management of this type

²⁷ See table 4 for details of the processes undertaken while implementing CBFM.

of forest falls under the jurisdiction of the local government. Lumango, on the other hand, has had a community forest under CBFM since 2007; implying that the forest is owned and managed by the local people. In other words, there were no changes in the control villages between 2010 and 2015 with respect to property regime and management rights. The table below summarizes the changes highlighted above.

Table 9: Changes in property regime and management rights in the study villages, Kilosa district.

Elements of forest governance	Study villages	Status in 2010	Status in 2015
Property regime & management rights	Pilot villages	State property (un-reserved village forest); management rights devolved to the district council Villages claimed customary ownership	Common property; joint management
	Control villages	<i>Zombo</i> – same as pilot villages before the introduction of REDD+ <i>Lumango</i> – common property (from 2007); under CBFM	<i>Zombo</i> – no changes in property regime and rights <i>Lumango</i> – no changes in property regime and rights

6.2. Changes in use rights

Use rights are important institutions in environmental governance since they are the main determinants of how much the economic actors can ‘extract’ from the natural resource base (e.g., forests). These rights are defined by the existing forest regime.

6.2.1. Changes in pilot villages

6.2.1.1. Status in 2010

As indicated earlier, use of resources in the pilot villages was regulated by customary laws in 2010, even though these forests were under the jurisdiction of the district council. However,

even these laws were weak and thus use of resources in these villages in 2010 were *de facto* under open access.

Before the introduction of REDD+, use of forest resources in both Nyali and Lunenzi was governed by the statutory forest laws. In this case, the villagers have no statutory rights to use of resources. In line with the statutory forest laws, use of some forest products such as fuelwood, poles and non-timber forest products, *except* bushmeat, were allowed, while other products such as timber and charcoal were *not* allowed unless one had a permit. Also, agricultural expansion required a permit. However, according to the informants these rules were not followed in most cases because there were no forest patrols to enforce the rules.

6.2.1.2. Status in 2015

A change in the property regime in the pilot areas implies a change in the bundle of rights. As explained earlier, REDD+ was introduced in the pilot villages in 2010. This change in property regime brought about changes in rules concerning use of the forest resources. In accordance with the REDD+ regime, land use plan (LUP) and REDD+ by-laws.

REDD+ land use plan:

The designing and drafting of the land use plan for the pilot villages was done in 2010 onwards. The LUP included demarcating boundaries for the different land use purposes (e.g., land for forestry, land for agriculture, land for settlement etc.) in these villages. The exercise also included creating clear boundaries with the neighboring villages.

In Nyali, the LUP was made in 2011; whereby the village land was divided into different zones with different sizes. The demarcated zones include forest area, agricultural area, residential area, areas for pastures, land for other purposes (school, mosque, church, cemetery) etc. In terms of zone sizes, the village forest is the largest zone covering 60.6% of the village total area. Figure 11 shows the land use plan for Nyali. However, only the main zones are given in the legend to the Figure.

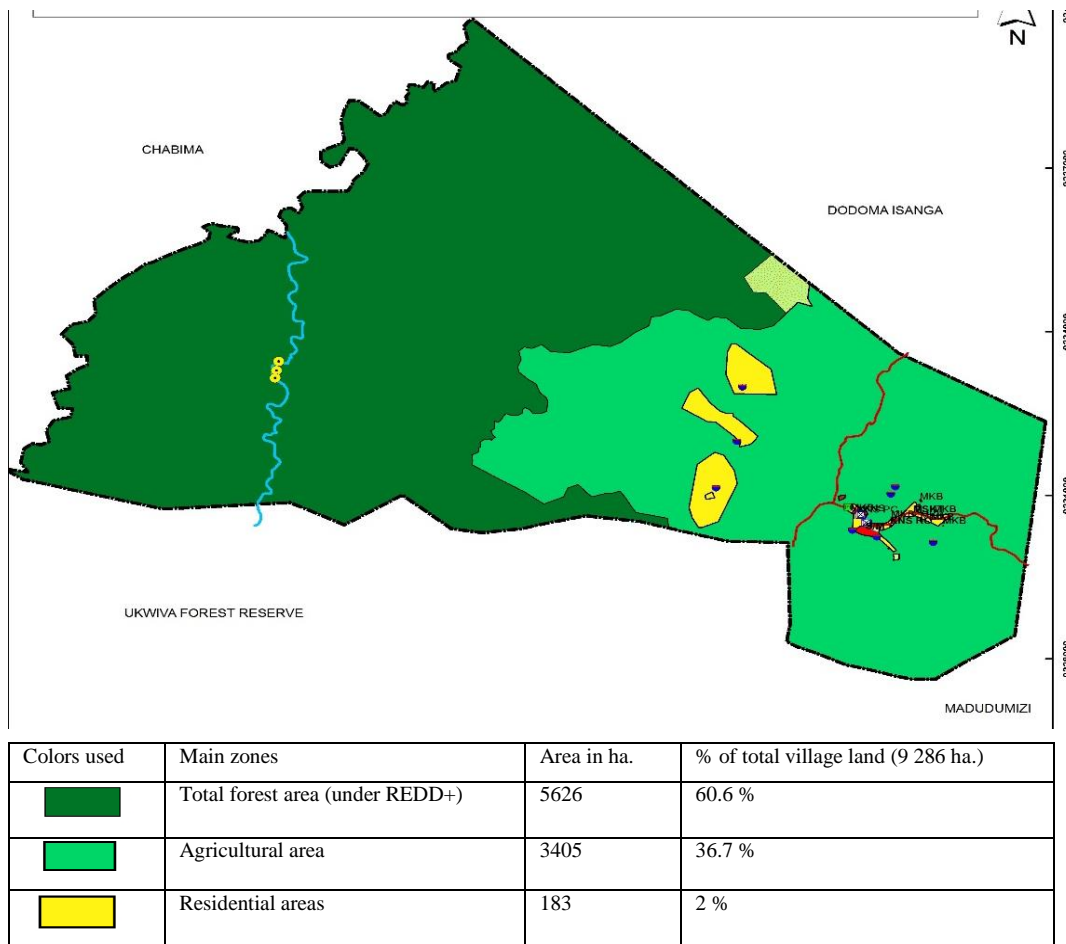


Figure 11: Land use plan for Nyali village

Source: Modified from KDC (2010:29)

Further, the LUP for Lunenzi village was made in 2012. According to the plan, the village land was divided into different demarcated zones as in Nyali. These zones include forest area, agricultural cum residential area, high density residential area, area for the village church, reserved area for future use (e.g., in case of immigrants) etc. According to the key informants (the village chairperson, the deputy ward executive and the ward executive officer), the area reserved for future use is approximately 360 hectares. The exact sizes of the main zones are shown in the legend to Figure 12.

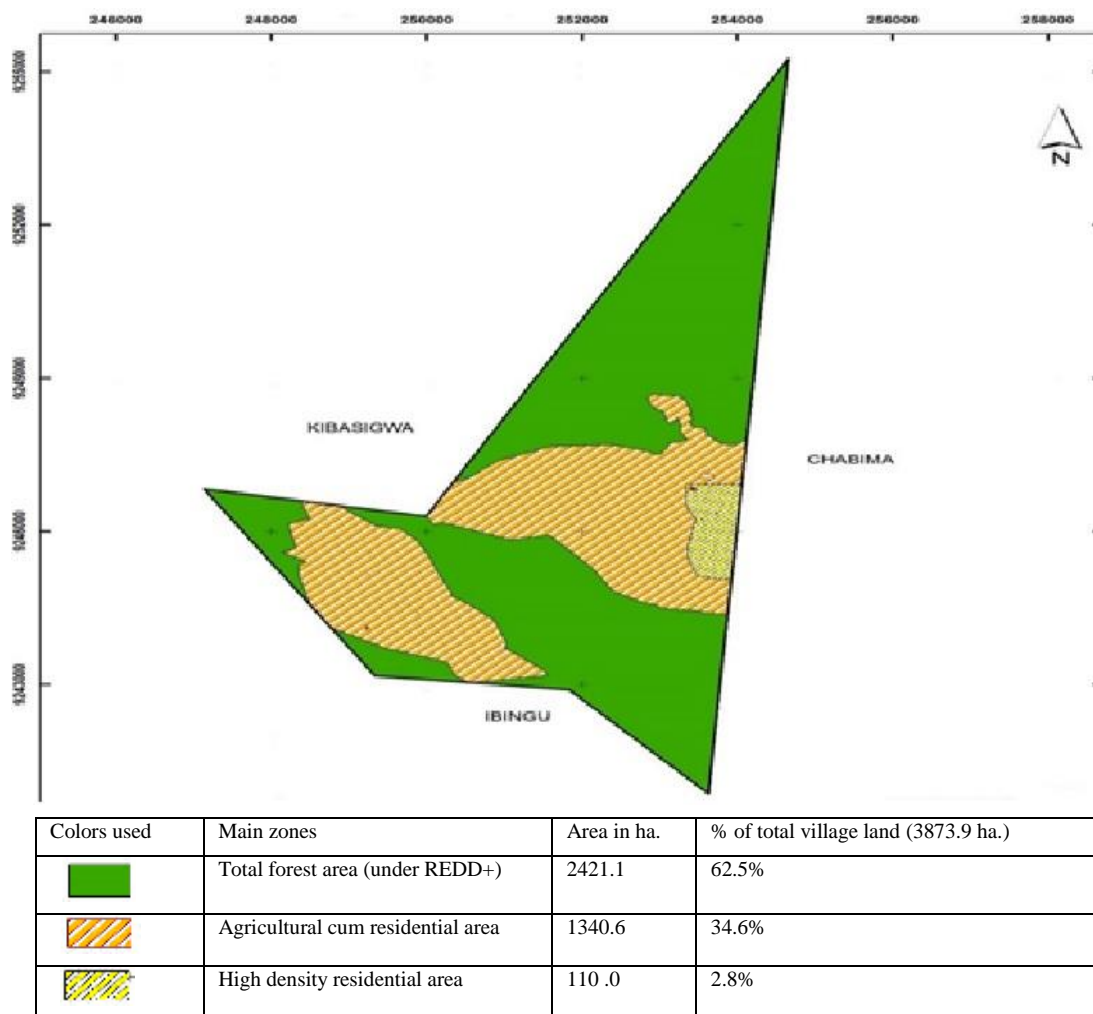


Figure 12: Land use plan for Lunenzi village

Source: Modified from KDC (2012:27)

For instance, as shown in the legend, the forest area covers approximately 62.5% of the total area in Lunenzi village (KDC 2012). Comparatively, Lunenzi is smaller than Nyali village in terms of village size; and has therefore fewer and smaller zones – e.g., the sizes of the forest zones in Lunenzi and Nyali are 2421.1 ha. and 5626 ha. respectively.

REDD+ village by-laws:

Besides making LUP, the project implementers designed and introduced REDD+ by-laws²⁸. The by-laws included formulating rules concerning use of the forest resources – e.g., who, where and when to access to the forest, what and how much to ‘withdraw’ from the forest. According to the REDD+ by-laws, the village forest is divided into protected area and area for

²⁸ An example of REDD+ village by-laws – see Kajembe et al. (2015:15).

communal use – hereafter referred to as *protected area* and *use area*²⁹. As a general rule, it is *not* allowed to cut a tree or even a branch of tree from **both areas** without a permit, expand agricultural land, hunt for bushmeat or make settlements in either of these forest areas. Furthermore, ‘outsider’ are *not* allowed to enter the forest without the consent of the village council.

Additionally, people are *not* also allowed to graze livestock, carry out mining, or do beekeeping in the protected area. It is, however, allowed to collect dead wood as fuelwood, gather NTFP (e.g., medicinal plants, fruits, mushroom) for domestic use, harvest poles and grass for communal buildings in this area. Moreover, people are allowed to perform cultural practices, that does *not* cause harm to the trees, in this area. Activities such as timber logging, charcoal making, pole harvesting by ‘outsiders’ demand permits which are issued by the village council. Further, the following activities are also allowed in this area upon acquiring and paying for permits to the council; namely, collecting medicinal plants for trade, research and tourism.

In the ‘use area’, people are allowed to collect most of the forest products – e.g., fuelwood, timber, poles and charcoal – but *only* for domestic use. Collecting fuelwood, harvesting poles, doing cultural practices, collecting fruits and medicinal plants for home use are allowed in this area after getting a permit, which *do not* demand payment. Nevertheless, one has to pay for the permits for timber logging and charcoal making. For instance, if someone requires timber for home use, he/she has to apply for a permit. If the permit is approved, the applicant gets instructions concerning the type and number of trees to cut. According to the village chairperson and VNRC in Nyali, charcoal making is done in this area by “sustainable” charcoal making group that was started in the village in 2014. In Lunenzi, we were told by the key informants that honey production is mainly done in the ‘use’ area by a bee keeping group. They further elaborated that someone is also allowed to produce honey at individual level, but only if he/she has a training from MJUMITA on forest friendly bee keeping technique.

6.2.2. The situation in control villages

As explained in section 6.1.2, there were no changes in property rights in the control villages. This implies that the formal rules regarding use of forest resources have not changed since 2010.

²⁹ This further demarcation is not shown in the maps for LUP. Note that the whole forest zone is reserved.

In this section, I will explain what the formal rules state – i.e., what is allowed or *not* allowed to be harvested from the forest in accordance with the forest laws.

Zombo village:

Generally, the situation in Zombo is the same as that of the pilot villages in 2010. Based on the information from the V.E.O, forest rules in Zombo were weakly enforced in 2010 compared to 2015. According to the V.E.O., the situation has really changed in 2015. He argued that following the introduction of REDD+ in the neighboring village (Nyali), the forest rules are stricter now compared to five years ago³⁰. Indeed, the V.E.O stated firmly that “*the rules are working [now]*” (Kadewele, person.comm), as he compared 2015 to 2010. To justify his argument, the V.E.O added that “*there are forest patrols [in the village]*” and that “*they [district council] have also their own people who do forest patrol*”. Note that the villagers in Zombo have *no* statutory rights to use of the forest resources as was the case in the pilot villages in 2010.

When it comes to use of forest resources, the informant told us that the residents are not allowed to get most of the forest products from the forest without a permit. However, data from women in FGDs shows that there are no rules that restrict collection of fuelwood. Moreover, according to the V.E.O and women in FGDs, someone is required to have a permit from the district council in order to get charcoal and timber. Data from the men in FGDs show that the local villagers are not required to apply for permits for making charcoal, but ‘outsiders’ must do so. These informants told us that agricultural expansion is not allowed, unless one has a permit.

Regarding non-timber forest products (NTFP), the V.E.O informed us that the local people are not allowed to get bushmeat and medicinal plants in the forest. However, they can collect fodders and wild fruits from the forest; while mushrooms can only be collected *around* the forest.

Lumango village:

As indicated earlier, Lumango village introduced CBFM in 2007. In accordance with the CBFM rules, the forest of Lumango was divided into protected and use areas.

³⁰ We haven’t seen the forest rules in Zombo. Thus, the information written here is what we were told by the V.E.O.

In the protected area, people are not allowed to do agricultural expansion, timber logging and charcoal making according to the village chairperson. Use of NTFP, *except* bushmeat, is allowed in the protected area. The residents are allowed to do activities such as fishing, collecting mushroom and beekeeping in the forest. It is believed that these activities enhance the forest productivity, hence allowed. Although the rules allow fishing in the protected forest, nobody goes for fishing in the forest. Tree planting in the forest is also allowed but only after getting a permit from the village committee. It is not allowed to cut trees for fuelwood or poles in this area without permission.

In the areas for communal use, the people are allowed to collect all the forest products, including timber, but with restrictions. However, in the case of timber and charcoal, one has to get a permit. Furthermore, expansion of agricultural land is *not* allowed. Activities such as fuelwood collection, pole harvesting, mushroom gathering are allowed in this area upon seeking permission. Note that although the villagers can get most of the forest products in the ‘use’ area with limited restrictions, they are *not* allowed to sell these products.

In the tables below, I will give summaries of the changes in formal rules in relation to use of forest resources in the study village. Whilst table 10 depicts changes in the general rules, table 11 shows the changes in rules for the main forest resources in the pilot villages.

Table 10: Changes in formal rules regarding use of forest resources in general; study villages

Element of forest governance	Study villages	Status in 2010	Status in 2015
Use rights	Pilot villages	Villages had no statutory rights Use of forest resources was by <i>de facto</i> open access	Villages have statutory rights Use of forest resources is regulated by REDD+ by-laws
	Control villages	<i>Zombo</i> – had no statutory rights; use of forest resources was by <i>de facto</i> open access <i>Lumango</i> – had statutory rights; use of forest resources was by <i>de facto</i> open access	<i>Zombo</i> – no changes in use rights <i>Lumango</i> – no changes in use rights

Table 11: Changes in formal rules regarding use of the main forest resources; study villages

Study villages	Year	Fuelwood	Charcoal	Timber	Poles	Agricultural expansion
Pilot (un-reserved forest)	2010	allowed	Permit Required (payment)	Permit required (payment)	allowed	Permit required
Pilot (protected area)	2015	Only dead wood can be collected with permission	Not allowed	Not allowed	Permit required (communal use)	Not allowed
Pilot (‘Use’ area)	2015	Permit required (no payment)	Permit required (payment)	Permit required (payment)	Permit required (no payment)	Not allowed
Zombo (un-reserved forest)	Since 2010	Allowed	Permit required (payment)	Permit required (payment)	allowed	Permit required
Lumango (protected area)	Since 2010	Not allowed to cut trees	Not allowed	Not allowed	Permit required	Not allowed
Lumango (‘Use’ area)	Since 2010	Permission required	Permit required (payment)	Permit required (payment)	Permission required	Not allowed

6.3. Changes in practice in relation to use of resources

Based on the data from the informants, this study shows that there is a *mismatch* between the use of the resources as reflected in the village by-laws and forest laws (i.e., rules ‘on paper’) and what was/is practiced (rules ‘in practice’) in the study villages. As we have already seen

what the rules ‘on paper’ state, here I will investigate the changes in rules ‘in practice’ since 2010.

6.3.1. Changes in pilot villages

6.3.1.1. Status in 2010

Nyali village:

In Nyali, agricultural expansion and wildfires were the two main problems that contributed to deforestation in 2010, according to the village chairperson. Moreover, in the FGDs with women we were informed that charcoal making and timber logging (mostly by outsiders) were also common activities in the forest in that period. In terms of the other forest products, the women in the FGDs said that nobody was getting fuelwood from the forest even before the introduction of REDD+; and that they used to collect them from their own farms and nearby bushes. Additionally, they told us that people used to collect poles and medicinal plants from the forest.

In Lunenzi, data obtained from the women in FGDs and the key informants shows that people used to collect fuelwood without restrictions from the forest before the introduction of REDD+. However, they were allowed to pick *only* dead wood from this forest in line with the information obtained from the key informants. Further, the informants said that there was *no* charcoal making in Lunenzi even in 2010 because of lack of knowledge regarding this practice. As explained by the women in FGDs, people from outside their village used to get timber from their forest and sell outside Lunenzi village.

The informants gave two reasons as to why the local people were not involved in timber logging. *Firstly*, the local people lacked both the expertise and tools to log timber. *Secondly*, the forest was protected by the village leadership even in 2010; adding that even the outsiders could only access it after getting a permit from forest managers. When it comes to poles and agricultural expansion, the informant said that they used to harvest poles from the forest and expand agricultural land in 2010.

6.3.1.2. Status in 2015

Nyali village:

According to the village chairperson, illegal timber logging and charcoal making are the two main problem currently affecting the forest in Nyali. He, further, added that agricultural

expansion is no longer a problem in the village. Although timber logging is illegal in Nyali as explained earlier, the village chairperson told us that middlemen from Kilosa town, Morogoro and as far as Dar es Salam usually come and carry out illegal timber logging in Nyali. When we asked him the reason why the economic actors prefer coming to Nyali, the informant gave the response that forest in Nyali has a lot of valuable timber species; and that *‘the thieves do not ask for a permit and they are corrupt’* (Machupa, person.comm.).

In order to justify his claim, the informant gave us an example where he witnessed a case of illegal timber logging. This case concerned a corrupt ward executive officer (a government employee) whom he caught having a deal with the illegal timber traders³¹. We, then, eagerly asked him about his reaction to what he witnessed. The informant said that he reported the case to the district natural resource committee; who demoted the ward executive officer; and thanked him for reporting the case.

Further, when we questioned him of the possible solution to the problem of illegal timber logging, the village chairperson said that he asked TFCG to assist him in preparing a sustainable timber harvesting plan, but had not yet gotten a response from the NGO. In fact, he insisted that *“the village has no plan”* (Machupa, person.comm.) referring to a proper plan for use of timber. He further said that *“this [timber logging] is really disturbing us”* (Machupa, person.comm.). Indeed, from his physical appearance it was easy to judge that the informant was unhappy with rules regarding use of timber. However, when we asked him about the local people’s general satisfaction with the rules, he quickly responded that people are generally happy with rules.

Furthermore, it was stated in the FGDs that the local community get timber from the ‘use’ area of the forest. However, we were told that *not* many people are logging timber in this area because one has to get a permit from the district. Instead, many people are now planting trees so that they can get timber from their own woodlots in the future.

When it comes to charcoal, we learned from the FGDs with men that more people are making charcoal in the sustainable charcoal making group. However, although villagers are allowed to make charcoal in the ‘use’ area of the forest under the sustainable charcoal making scheme, the village chairperson said that the local people are involved in illegal charcoal trade; adding that the rules are not followed. When we asked him about the other forest products, he said that the

³¹ Here, we could easily sense the power dynamics in the ward as we keenly listened to him.

local people get most of them from their private woodlots. Woodlots, he said, provide fuelwood, timber and poles. According to the women in the FGDs, the local people mostly get fuelwood from planted trees and “bushes” around their home since the area demarcated for it is far from the village. They insisted that the largest parts of the village have bushes near their homes; and those without bushes get their fuelwood from the nearby sub-villages. From the way they talked, I got the impression that their explanation concerning fuelwood collection might not be true.

Lunenzi village:

After the introduction of REDD+, the people in Lunenzi collect fuelwood collectively once a week, i.e., on Fridays – according to data from the FGDs. The women in FGDs said that they collect fuelwood only for domestic use; not for sale. The informants added that use of fuelwood has reduced because people are allowed to collect only tree branches from a small area in the protected forest. In terms of charcoal, the informants said that the people in Lunenzi do not make charcoal; neither do they log timber. Moreover, they said that even the outsiders do not do timber logging now. Men in the FGDs said that there is very little demand for poles now compared to 2010 because people now use bricks and mud to build their houses. In other words, poles are rarely used. The table below summarizes the practices in the pilot villages regarding use of the forest resources before and after the introduction of REDD+.

Table 12: Use of main resources from the forests in the pilot villages; rules ‘in practice’ since 2010.

Pilot villages	Year	Fuelwood	Charcoal	Timber	Poles	Agricultural expansion
Nyali (un-reserved forest)	2010	<i>No</i> , collected from farm/bushes	<i>Yes</i> , mainly by outsiders	<i>Yes</i> , mainly by outsiders	<i>Yes</i> . Used to collect poles	<i>Yes</i> , it was a common practice
Nyali (protected area)	2015	<i>No</i> , not collected	<i>No</i> , not made	<i>Yes</i> , by outsiders.	<i>No</i> , not harvested	<i>No</i> , there is no agri. expansion
Nyali (‘Use’ area)	2015	The area is far. Collect from woodlots/bushes.	<i>Yes</i> , through sustainable charcoal making	<i>Yes</i> , but rarely	<i>No</i> , from woodlots	No, instead people rent land

Lunenzi (un-reserved forest)	2010	<i>Yes</i> , collected	<i>No</i> , lack of expertise	<i>Yes</i> , by outsiders.	<i>Yes</i> , harvested	<i>Yes</i> , if there was need.
Lunenzi (protected area)	2015	<i>No</i> , not collected	<i>No</i> , lack of expertise	<i>No</i> , lack of expertise	<i>No</i> , not harvested.	<i>No</i> , there is no agri. expansion
Lunenzi (‘use’ area)	2015	<i>Yes</i> , once a week	<i>No</i> , lack of expertise	<i>No</i> , lack of expertise	<i>Rarely</i> , use of mud & bricks	<i>No</i> , there is no agri. expansion

6.3.2. The situation in control villages

Although there were *no* formal institutional changes in the control villages in 2010, this study shows that there are some changes in the informal rules, notably the norms in the village.

Zombo village:

As explained by the V.E.O, the main drivers of deforestation in this village in 2010 were agricultural expansion, charcoal making and timber logging – in the order of the most to the least important driver. According to the informant, “*you could cut any tree*” (Kadewele, person.comm) in 2010. This information was, in fact, supported by the data from the FGDs where we were told that the local people in Zombo used to harvest all forest resources and expand their agricultural area without restrictions in 2010.

When we asked the V.E.O about the main drivers of deforestation in 2015, he said that fires (during land preparation), charcoal making and agricultural expansion are the main problems now. The difference between the two periods is that agricultural expansion is ranked number 3 in 2015, and number 1 in 2010.

However, as explained by the men and women in the FGDs, agricultural expansion is still common in Zombo. The informants said that people are required to get a permit in order to expand their agricultural land, but they do not do so. According to the women in the FGDs, people do not apply for agricultural expansion permits, partly because of the costs involved.

They told us that the application fee is Tsh. 40,000 per acre³² regardless of whether your application is finally accepted or not. Instead, people clear the forest first and if caught by the leaders, they pay a small fee. Men in the FGDs, argued that people do illegal agricultural expansion because of population increase in the village.

On use of charcoal, the informants said that the permit for charcoal making is open to everyone – both the local people and those from outside the village. People, however, do not apply for permits. They stated that the local people in Zombo make and sell their charcoal to REDD+ villages in e.g., Nyali. The informants concluded that charcoal making has caused deforestation in Zombo. Nevertheless, according to the V.E.O, people use their own trees/woodlots to make charcoal and timber. In this case, “*you cut and plant*” (Kadewele, person.comm) a tree; he added.

When it comes to timber logging and pole harvesting, the informants in the FGDs reported that both activities are common in the village; and that most of the people do not apply for a permit. According to the women in FGDs, the people from the neighboring REDD+ village come to their village and illegally harvest forest products e.g., charcoal, timber, poles. When we asked them why the ‘outsiders’ are allowed to do illegal activities in their village, they responded that it is because some of their leaders accept bribes. Furthermore, men in the FGDs insisted that the rule restricting use of timber and poles are not always followed because the economic actors have to pay for the permit, and yet their application for the permit might be rejected by the district council. The informant said that, because of this reason, people are involved in illegal timber logging and pole harvesting in Zombo.

Concerning fuelwood, the women in the FGDs told us that they collect fuelwood from their own farmland. When we asked them whether they also go to the forest to collect fuelwood they responded that the forest is far due to agricultural expansions; and that “*it takes about 4 hours*” (women in FGDs, Zombo village, 29.11.2015) to go and come back from the forest.

Lumango village:

In Lumango village, use of the forests resources has been *de facto* open access despite the establishment of CBFM in 2007; especially in the case of the communal use area.

According to the village chairperson and women in the FGDs, the biggest driver of deforestation is illegal expansion of agricultural land and shifting cultivation. The chairperson

³² Equivalent of 18.4 US dollars in 2015 (exchange rate was 1000 Tsh = 0.46 US\$)

said that shifting cultivation is common in Lumango because some crops require fertile land after a given period of time. For instance, he said that in the case of simsim, the farmer has to cultivate new land after 2 years.

Besides, information emerging from the VNRC shows that the local community gets fuelwood from the protected area. Nevertheless, women in the FGDs argued that the local people have been collecting fuelwood from their own farms since the 1970s; and that there has been no big change in the last 5 years. The latter informants insisted that what they collect from their farms is sufficient for their daily needs³³. Additionally, they said that the local people are also planting trees on their farms through their own initiatives in order to increase fuelwood output.

Notably, although the forest in Lumango has been under CBFM, data from all informants showed that the CBFM rules have not been followed because of several reasons. For instance, the VNRC and women in the FGDs maintained that most of the people in the village depend on forest products – adding that fuelwood and charcoal is a source for income generation for the poor people. They argued that some village dwellers turn to illegal charcoal making as an alternative option if they do not make enough income from agricultural production.

Moreover, the information gathered from these groups shows that people from within and outside Lumango are involved in illegal activities in the protected area. For instance, the data show that the village dwellers do illegal charcoal making. In terms of timber, we found that illegal timber logging is done mainly by economic actors, both from within and outside the village. When we asked the VNRC to explain this point further, they replied, “*most of the people from Kilombero come, cut and process the timber during the day and transport at night*” (VNRC, Lumango, December 2015).

Additionally, the VNRC told us that the economic actors log timber and sell to a sugar factory at Ruaha. Besides, they also pointed out that the permit application fees for collecting some of the products (e.g., fuelwood) from the protected forest is expensive for the “poor” people. Admittedly, they concluded that deforestation is very high especially in the communal use area; and that illegal activities, and corruption are common in Lumango. However, information obtained from the village chairperson shows that members of the VNRC – whose mandate is to patrol the forest – are themselves involved in the illegal activities. Below is a summary table

³³ NB: it is mainly the responsibility of the women to collect fuelwood for the household.

showing the practices in the control villages regarding use of the forest resources before and after 2010.

Table 13: Use of main resources from the forests in the control villages; rules ‘in practice’ since 2010

Control village	Year	Fuelwood	Charcoal	Timber	Poles	Agricultural expansion
Zombo (un-reserved forest)	Since 2010	No, Forest is far	Yes, people make	Yes, people log	Yes, people harvest	Yes, people do
Lumango (protected area)	Since 2010	No, not collected	Yes, people make	Yes, mostly outsiders	No, not harvested	No agricultural expansion
Lumango (‘Use’ area)	Since 2010	No, collected from farms & woodlots	Yes, people make	Yes, mostly by outsiders	Yes, people harvest	Yes, expansion & shifting cultivation are common

Rules ‘on paper’ and rules ‘in practice’ regarding use of forest resources – a brief

Summary:

In the sections 6.2. and 6.3. above, we have seen that the local people in study villages (and ‘outsiders’) have, to a great extent, *not* be following the rules ‘on paper’ regarding use of forest resources since 2010. In 2010, we can see that *all* forest resources in the study villages (including Lumango) were under de facto open access. Indeed, activities such as agricultural expansion, timber logging and charcoal making were common in these villages despite the prohibition or permit requirement.

In 2015, it is *not* allowed to ‘withdraw’ forest products according to the rules ‘on paper’ in the protected areas in the pilot villages and in Lumango. However, as illustrated above, the timber logging is common in Nyali and Lumango. Moreover, people still make charcoal in Lumango. Going by what the informants told us, people in Lunenzi seems to be following the rules compared to the other villages. When it comes to the ‘use’ area, it looks like the people in the pilot village in general are following the rules; while in Lumango the rules are *not* followed. Use of forest resources in Lumango is by de facto open access, in accordance with the VNRC.

In Zombo, the situation did not change since 2010 as claimed by the V.E.O. We can see that people still expand their agricultural land, log timber, make charcoal etc. in 2015 as was the case in 2010.

7. Local people’s evaluation of the institutional changes in the pilot villages

In this chapter, I will present the relevant findings to my second research question. The chapter examines how people in the pilot areas evaluated (in terms of satisfaction) the pre-REDD+ and REDD+ rules for management of forests and related resources. Further, I will present the reasons they gave to support their responses.

7.1. Satisfaction with the pre-REDD+ rules

This study found that most of the informants in the pilot villages were quite satisfied with the pre-REDD+ rules. The results in Figure 13 shows that 22 out of the 30 informants (i.e., 73% of informants) who responded to this question in Nyali in 2010 were either ‘somewhat’ or ‘very satisfied’ with the pre-REDD+ rules. In Lunenzi, the percentage is even higher. As can be seen in the Figure 13, 23 out of 25 (92%) of the informants who responded to this question were ‘somewhat’ or ‘very satisfied’ with the rules. If we look at the total informants in the pilot villages, we observe that most of the informants were ‘somewhat’ or ‘very satisfied’ with the pre-REDD+ rules.

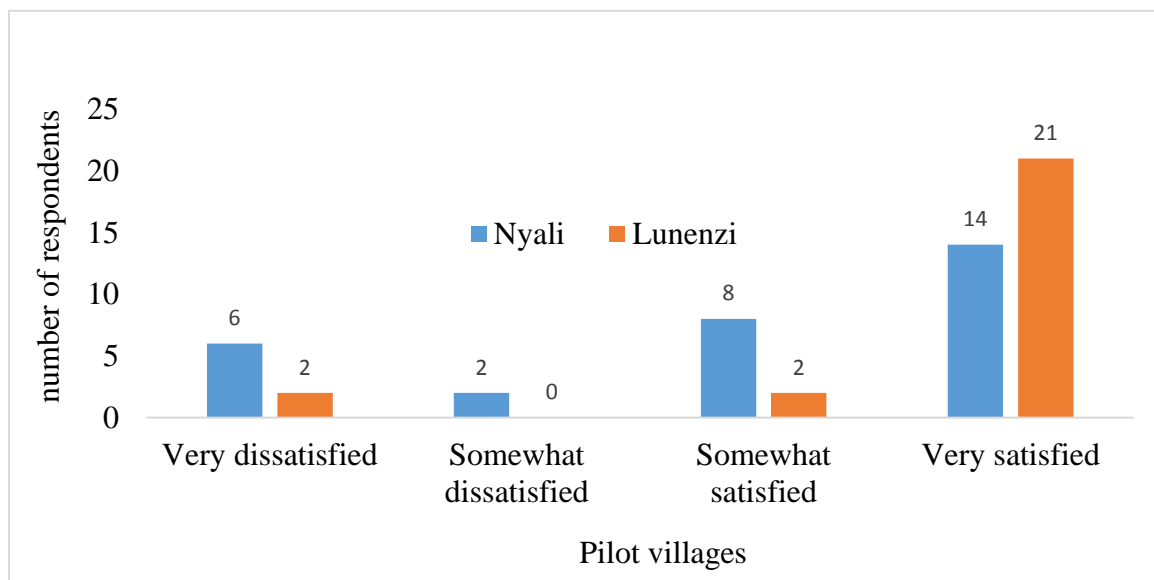


Figure 13: Satisfaction with pre-REDD+ rules in pilot villages, status in 2010 (N=55).

7.2. Satisfaction with the REDD+ rules

Similar to the pre-REDD+ rules, this study shows that most of the informants in the pilot villages in 2015 were also either ‘somewhat’ or ‘very satisfied’ with the REDD+ rules. Figure

14 presents an overview of the informants’ responses. It shows that 40 out of the 43 (93%) responding informants³⁴ in Nyali stated that they were ‘somewhat’ or ‘very satisfied’. In Lunenzi, we found that the figure was 45 out of the 47 informants (95%)³⁵. As we can see from the Figure, none of the respondents were ‘very dissatisfied’ with the rules in Nyali and that only three informants were ‘somewhat dissatisfied’ in 2015. As we might recall, this result supports what we were told by the village chairperson in Nyali. In Lunenzi, we can see that two people were ‘very dissatisfied’ and none was ‘somewhat dissatisfied’ in 2015.

Summing up, we see that 85 out of 90 (94.4%) of the responding informants in the pilot villages in 2015 were ‘somewhat’ or ‘very satisfied’ with the REDD+ rules. Moreover, the results show that the total informants in the pilot villages are more satisfied with the REDD+ rules compared to the pre-REDD+ rules (81.8 to 94.4%).

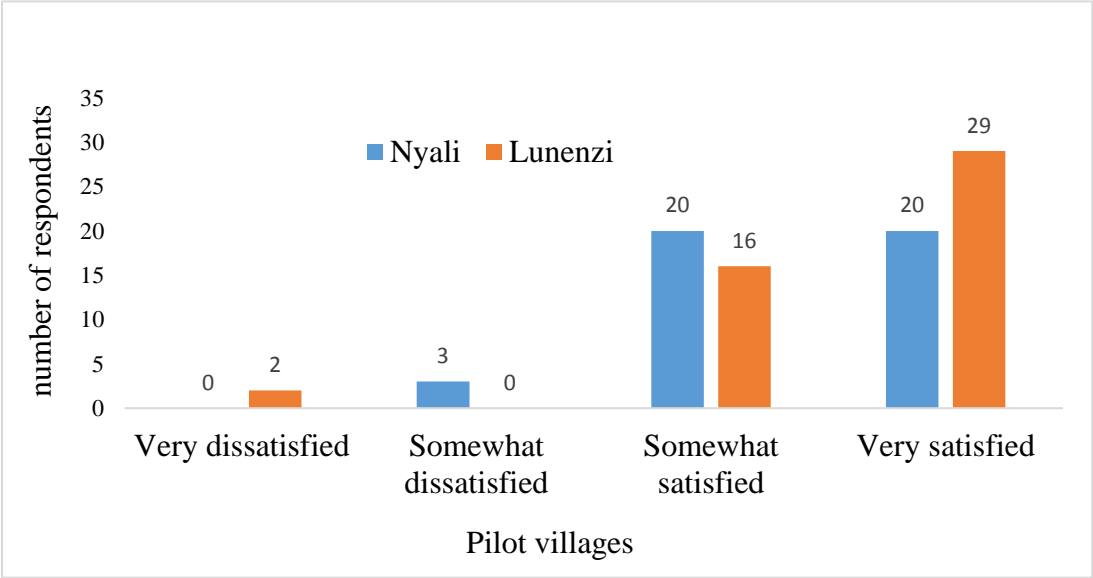


Figure 14: Satisfaction with the REDD+ rules in pilot villages, status in 2015 (N=90)

It should be noted that more responding informants were ‘somewhat’ or ‘very satisfied’ with the REDD+ rules compared to pre-REDD+ rules. To check if this difference is statistically significant, a chi-square test was performed. Since there were some zeros in the observations for each village, I pooled the data. The result was as shown in table 14.

³⁴ The term ‘responding informants’ is used in this chapter to mean informants who answered the particular question. For instance, informants who answered question C23a did not respond to C23b of the questionnaire (see appendix 1).

³⁵ Note: We did not pool in the data from sections on property rights (see section C of appendix 1) of the 2010 & 2015 questionnaires because of the changes in some parts of this section in 2015. Therefore, I did the analysis separately. In total 55 and 90 informants in the pilot villages responded to this question in 2010 and 2015 respectively.

Table 14 : Chi-square test for satisfaction, 2010 & 2015

Year	Satisfaction options				Total
	Very dissatisfied	Somewhat dissatisfied	Somewhat satisfied	Very satisfied	
2010	8	2	10	35	55
2015	2	3	36	49	90
Total	10	5	46	84	145

Pearson chi2 = 13.1467 Pr = 0.004

The test gives a very low p-value, implying that there is a difference between the distributions of the respondents in the two periods. The main difference seems to be that there is less strong dissatisfaction. There is also clearly an increase in those who are ‘somewhat satisfied’, while those stating ‘very satisfied’ may actually be reduced.

7.3. Reasons for (dis)satisfaction with the pre-REDD+ rules

As depicted in the Figures 13 and 14, we saw that most of the informants in the pilot villages were either ‘somewhat’ or ‘very satisfied’ with both pre-REDD+ and REDD+ rules. In this section, I will explore the reasons they gave for their responses. To understand why the informants were ‘somewhat’ or ‘very satisfied’ with these rules, nine pre-defined satisfaction options were given in the 2010 and 2015 questionnaires respectively. Those who were ‘very or somewhat dissatisfied’ with the pre-REDD+ and REDD+ rules had ten dissatisfaction options to respond to. Aside from the pre-determined choices, respondents could also enter their own reasons for (dis)satisfaction (open-ended options).

There are two reasons that stand out in both villages regarding why informants in the pilot villages were ‘somewhat’ or ‘very satisfied’ with the pre-REDD+ rules i.e., there were ‘equal distribution of use and benefits’ and ‘good access to resources’ – see Table 15.

Looking at each village more in details, we observe that in Lunenzi, most of the responding informants who were ‘somewhat’ or ‘very satisfied’ with the pre-rules ‘agreed’ to most of the reasons for satisfaction provided. In addition to the common reasons stated above, we can observe that a higher number of the informants thought that their ‘interests were well taken into account’, they had good forest management in 2010, that the forest rules were properly enforced

etc. However, there were some responding informants in this village who were ‘somewhat’ or ‘very satisfied’ with the rules, because of other reasons. For instance, the open-ended option revealed that some responding informants in Lunenzi were satisfied with the pre-REDD+ rules because they thought that forest protection is good for future generations; and that if there were no the rules there would be less rainfall and more fires in the forest.

In Nyali, a somewhat different picture evolves. Besides the two reasons mentioned above, people are more split as to their motivations. Here, statements like ‘the local community is involved in making rules’, ‘good management and coordination’, ‘proper enforcement of rules/sanctions’, ‘rules are followed’ are not an argument for many regarding their satisfaction with pre-REDD+ rules. Hence, the data indicate more international disagreement than in Lunenzi.

Table 15: Reasons given by informants who were either ‘somewhat or very satisfied’ with the pre-REDD+ rules in pilot villages; in number of informants.

Reasons for satisfaction	Village	Disagree	Disagree somewhat	Agree somewhat	Agree	Total
My/our interests are well taken into account	Nyali	6	0	3	12	21
	Lunenzi	0	1	1	21	23
Clear boundaries/outsideers are kept out	Nyali	8	0	0	13	21
	Lunenzi	3	1	1	18	23
Equal distribution of use and benefits	Nyali	3	0	0	19	22
	Lunenzi	1	0	0	22	23
Good access to resources	Nyali	4	0	1	17	22
	Lunenzi	1	0	0	22	23
Rules are followed	Nyali	10	0	4	8	22
	Lunenzi	4	0	0	19	23
The local community is involved in making rules	Nyali	14	0	5	3	22
	Lunenzi	4	0	0	19	23
Conflict resolution mechanisms are appropriate	Nyali	6	1	3	11	21
	Lunenzi	2	0	2	19	23
Proper enforcement of rules/sanctions	Nyali	10	0	1	10	21
	Lunenzi	1	0	2	20	23
Good management and coordination	Nyali	12	0	4	5	21
	Lunenzi	0	0	1	22	23

As few were dissatisfied with the pre-REDD+ rules, the basis for discussing why this was so, is weak. In the questionnaire, we offered several reasons for dissatisfaction – *see* appendix 3a. The results show that most of the responding informants in the pilot villages were dissatisfied with the pre-REDD+ rules mainly because they thought that ‘their interests were not taken into account’, and because of ‘unclear boundaries’ and ‘bad management’.

In Nyali, the results show that the responding informants were ‘somewhat dissatisfied’ or ‘very dissatisfied’ with rules because their ‘interests were not taken into account’; there were no clear boundaries and poor management of the forest. However, significant number of responding informants ‘disagreed’ that their reason for being ‘somewhat or very dissatisfied’ was ‘too strong limitation on access to resources’. Moreover, there was diverse opinions concerning reasons for dissatisfaction such as ‘unequal distribution of use and benefits’, ‘rules are not followed’ and ‘too weak enforcement of rules’ – as we can see some responding informants disagreed with the reasons for dissatisfaction provided while others agreed to the reasons.

In Lunenzi, the two responding informants agreed that their ‘interest were not taken into account’, that ‘rules were not followed’, and that there was ‘poor management’. However, there are some respondents who ‘disagree’ with some of the reasons given, such as ‘conflict resolution mechanisms are inappropriate’ and ‘too weak enforcement of rules’. In the open-ended part of the question, two responding informants (one from each village) said that they were dissatisfied because there was too much deforestation. In addition, one responding informant in Lunenzi maintained that he was dissatisfied with the rules because people frequently started fires in and around the forest.

A brief summary of section 7.3: It is crucial to emphasize that the responding informants in both villages were satisfied with the pre-REDD+ rules mainly because they had ‘equal distribution of use and benefits’ and ‘good access to resources’. In Nyali, we saw that majority of those who were dissatisfied with the pre-REDD+ rules thought that ‘their interests were not taken into account’, and because of ‘unclear boundaries’ and ‘bad management’. In Lunenzi, the number of responding informants who were dissatisfied with the pre-REDD+ rules were only two. If we link appendix 3a to Table 15, the results suggest weaker forest governance in Nyali compared to Lunenzi in 2010.

7.4. Reasons for (dis)satisfaction with the REDD+ rules

Compared to 2010, more informants answered this question in 2015. The results show that most of the informants in the pilot villages who were ‘somewhat or very satisfied’ with REDD+ rules ‘agreed or agreed somewhat’ to the satisfaction options shown in Table 16 below. Moreover, in general, there is a significant number of responding informants who ‘disagreed or disagreed somewhat’ to the options for satisfaction given.

Table 16: Reasons given by informants who were either ‘somewhat or very satisfied’ with the REDD+ rules in pilot villages; in number of informants.

Reasons for satisfaction	Village	Disagree	Disagree somewhat	Agree somewhat	Agree	Total
My/our interests are well taken into account	Nyali	6	4	8	16	34
	Lunenzi	4	2	11	28	45
Clear boundaries/outsideers are kept out	Nyali	1	2	6	25	34
	Lunenzi	0	2	8	35	45
Equal distribution of use and benefits	Nyali	3	4	6	21	34
	Lunenzi	0	2	6	36	44
Good access to resources	Nyali	1	5	12	17	35
	Lunenzi	3	3	8	31	45
Rules are followed	Nyali	3	5	14	16	38
	Lunenzi	2	2	10	31	45
The local community is involved in making rules	Nyali	1	2	10	21	34
	Lunenzi	0	0	14	31	45
Conflict resolution mechanisms are appropriate	Nyali	1	4	8	18	31
	Lunenzi	0	1	14	27	42
Proper enforcement of rules/sanctions	Nyali	4	6	9	15	34
	Lunenzi	0	4	12	29	45
Good management and coordination	Nyali	1	5	8	20	34
	Lunenzi	2	0	15	27	44

In Nyali, there is still a weak tendency to more disagreement regarding reasons for satisfaction. We can observe that a majority of the responding informants were satisfied with REDD+ rules mainly because of ‘clear boundaries/outsideers are kept out’ and that ‘the local community is involved in making rules’. If we look at the responses corresponding to these two reasons in

Table 15 and compare with Table 16, we notice a positive change. Based on the two Tables, we can therefore say that REDD+ was behind this improvement. For some responding informants, it seems that the reasons for their satisfaction was not due to ‘proper enforcement of rules/sanctions’, ‘their interests are well taken into account’ etc. It is notable that some responding informants might have other reasons for satisfaction than the ones stated here. For instance, according to the VNRC in Nyali that the people are generally happy with the rules because they see ‘a positive change in the climate’; i.e., increased rainfall.

Similar to Nyali, most of the responding informants in Lunenzi who were ‘somewhat or very satisfied’ with the REDD+ rules ‘agreed or somewhat agreed’ that the reason for satisfaction was mainly because of ‘clear boundaries/outsidere are kept out’. Additionally, Table 18 indicates that all the responding informants ‘agreed’ or ‘somewhat agreed’ to the option that stated, ‘the local community is involved in making rules’. Moreover, the results show that most of the responding informants ‘agreed’ or ‘somewhat agreed’ to the satisfaction options for ‘rules are followed’ and ‘proper enforcement of rules/sanctions’. Indeed, the result supports what we were told by the village chairperson, deputy ward executive and ward executive officer in Lunenzi – i.e., the forest in the protected area has improved in quality because of the REDD+ rules. They firmly stated that: “the forest quality has improved because it [the protected area] has many trees now... the forest became so dense that one feels scared to go in ” (Madabuka et al., pers. comm.). As can also be seen in the Table, only few responding informants ‘disagreed’ or ‘somewhat disagreed’ with the options for explaining satisfaction that were provided.

Going by the information gathered, the results look promising at least in the context of Lunenzi village as REDD+ rules have been in operation in the pilot villages for only five years. In fact, nine responding informants in this village stated in the open-ended option that they were satisfied with the REDD+ rules because it stopped the previous overexploitation of the forest.

Appendix 3b offers an overview of the reasons for dissatisfaction with the REDD+ rules. As indicated earlier, very few informants said that they were ‘very or somewhat dissatisfied’ with the REDD+ rules. Most of these informants ‘agreed’ or ‘somewhat agreed’ to the options given in appendix 3b. Only one responding informant chose ‘disagree’ to the ‘too weak enforcement of rules/sanctions’ option, whereas two responding informants chose ‘disagree somewhat’ to ‘conflict resolution mechanisms are inappropriate’. Turning to the open-ended option, there was only one responding informant in Nyali who stated he was dissatisfied with the REDD+

rules because it restricts grazing. Concerning Lunenzi, none of the responding informants chose ‘disagree’ to any of the options for explaining dissatisfaction that were provided.

A brief summary of section 7.4: We have seen that most of the responding informants in the pilot villages ‘agreed or agreed somewhat’ to the reasons for satisfaction in Table 16. Nevertheless, it should be noted that Lunenzi is more positive compared to Nyali in 2015, as was the case in 2010. It was further stated that the number of responding informants who were dissatisfied with the REDD+ rules were very few. To sum up, forest governance in Nyali was arguably better in 2015 compared to 2010. Unlike in 2010, we saw that majority of responding informants in Nyali are more positive in 2015. This reasoning is based on results in Tables 15 & 16. Nevertheless, their evaluation is still more split than in Lunenzi. In Lunenzi, reasons offered for satisfaction with the REDD+ rules and those for the pre-REDD+ rules were more or less the same.

8. Impacts of REDD+ regime on local people's livelihoods

This chapter analyses whether REDD+ has had any effect on the local people's livelihood in the pilot villages. First, I present the descriptive statistics of the data, followed by a description of the gross household incomes in the two periods. Thereafter, I will present the results from panel data analysis used to test the impact of REDD+ on total household incomes, total forest income and total farmed area.

8.1. Descriptive statistics of the data

Table 17 below presents an overview of the basic features of the data collected in 2010 and 2015. If we begin with the mean age of the household head, one might expect to see age difference of approximately 5 years (i.e., 2010-2015). We observe, however, that the difference in the mean values in the pilot villages is about 1.5 year. There might be several reasons for this observation. Firstly, it might happen that some of the household head did not tell us their exact age in either of the periods. Secondly, the household head changed in some cases between 2010 and 2015. In fact, looking at the gender of the household head, we can observe increased female household heads in the pilot villages in 2015 compared to 2010. Finally, the result may also be due to the low number of observations(N). If we look at the N for the variable 'age' in the pilot and control villages in 2010, we can observe that the figures are noticeably lower (compared to most of the other variables). The reason for this big difference is not clear. Indeed, we have the same low N for gender and education in 2010.

In the case of the control villages, there are no significant changes in either mean age and gender of the household head.

Table 17: Sample characteristics by study villages, Kilosa district, 2010-2015

Sample characteristics (variables)		2010		2015	
		Pilot	Control	Pilot	Control
Mean age of household head (yrs.)		43.04 (16.01) ¶ N=68	51.15 (15.89) N=38	44.47 (15.69) N=93	54.82 (12.80) N=51
Gender of household head *	Male (%)	86.76	78.95	81.05	78.43
	Female (%)	13.24	21.05	18.95	21.57
Education level **	Primary (%)	79.41	78.95	75.27	78.43
	No formal educ. (%)	20.59	21.05	24.73	21.57
Mean household size (no.)		5.22 (2.45) N=92	5.12 (2.45) N=49	5.36 (2.22) N=95	4.57 (2.08) N=51
Mean social asset index (ranking)		1.37 (1.20) N=92	1.41 (1.43) N=49	0.76 (0.94) N=95	0.57 (0.67) N=51
Mean total area farmed (ha/yr.)		2.24 (1.43) N=92	1.89 (0.86) N=49	1.69 (1.26) N=95	1.35 (1.02) N=50
Mean forest area cleared for agriculture (ha/yr.)		0.05 (0.21) N=92	0.52 (0.78) N=49	0.005 (0.05) N=95	0.147 (0.45) N=51
Mean distance to the forest (minutes)		42.29 (53.14) N=92	60.45 (42.95) N=48	58.28 (60.34) N=91	78.55 (70.87) N=45
Mean of total livestock owned (TLU)		0.25 (0.50) N=92	0.27 (0.38) N=49	0.30 (0.78) N=95	0.15 (0.67) N=51
Distance to the market (km)		45.32 (15.07) N=92	18.94 (1.00) N=49	45.16 (15.07) N=95	18.94 (1.00) N=51

¶ Mean value (standard deviation); *N for Gender: year 2010 (pilot = 68, control = 38), year 2015 (pilot = 95, control = 51); **N for Education: year 2010 (pilot=68, control=38), year 2015 (pilot =93, control =51).

Looking at the percentage of household heads with formal education, the Table shows a reduction in the pilot villages if we compare the two study periods. In the control villages, we cannot see significant changes with respect to education level of the household heads. Turning

to household size, the result shows that there are no significant changes in general household size in both pilot and control villages.

When it comes to the mean social asset index, we can observe that the mean index is lower in both pilot and control villages in 2015 compared to 2010. If we consider 2010, the control villages had a higher mean index compared to the pilot villages. However, we observe that the pilot villages have a higher mean index vis-à-vis the control villages in 2015 (although the standard deviation is bigger in pilot villages than in control villages).

Going to the mean total area farmed for the last 12 months (either owned or rented from another farmer), the Table shows that that there was reduction in the mean area farmed in both pilot and control villages. Interestingly, the changes in both pilot and control villages are on average almost the same – 0.55 ha and 0.54 ha respectively. In the pilot villages, some farmers rent land in order to increase their crop production. For instance, according to men in FGDs, most of the people in Lunenzi get land for agriculture through renting from other farmers since the rules do not allow them to expand land for agriculture.

In terms of mean forest area cleared for agricultural purposes, there is a significant change since 2010 in both pilot and control villages - 10% and 28% reductions respectively. This possibly implies that there has been more clearing of forests for agricultural purposes in the control villages compared to the pilot villages; supporting the findings presented in chapter 6. It should also be noted that there were more mean forest areas cleared in the control villages in 2010 compared to pilot villages in the same year. The same applies to 2015.

Mean distance to the forests has increased in both pilot and control villages, possibly due to deforestation. In terms of total livestock ownership, we can observe an increased mean TLU in the pilot villages and a decreased mean TLU in the control villages. Increased TLU in the pilot villages can imply two things, notably increase in total number of animals kept or increase in the number of bigger animals (e.g., cows) kept in 2015 compared to 2010. In the control villages, we observe an opposite trend. Further, the result shows that the distance between the villages and their respective markets remain the same for the two periods, which should be expected. Note, however, that the distance between the pilot villages and their markets is bigger compared to that of the control villages.

8.2. An overview of gross household incomes in 2010 and 2015

As explained earlier, gross household incomes are the gross total household income and the gross incomes from the different household activities (referred here as income categories). Figure 15 below presents the status of these incomes in 2010 and 2015.

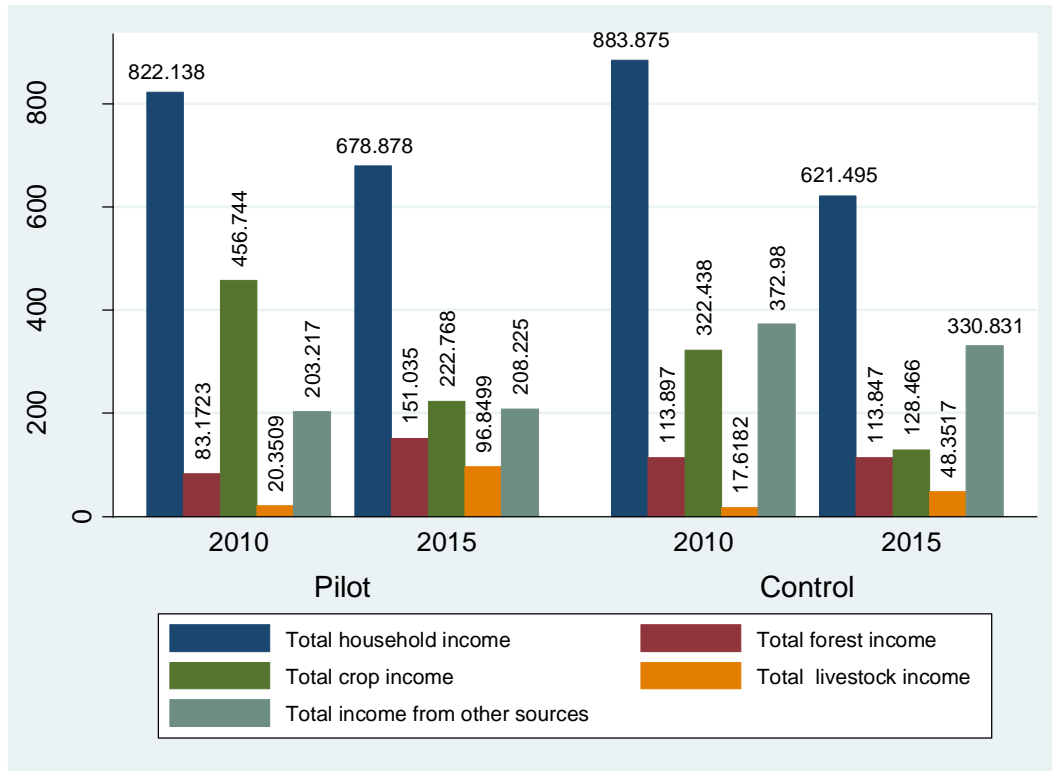


Figure 15: Mean household incomes (in USD) by income categories, pilot and control villages, 2010 & 2015.

Looking at the results, I will first concentrate on the pilot villages. I will look at the total household income and then proceed to the income categories.

8.2.1. Pilot villages, 2010 & 2015

Gross total household income:

Figure 15 above shows that the mean of total household incomes in the pilot villages have reduced in 2015 compared to 2010. Looking closer at the variations between the pilot villages, as shown in Figure 16 below, we observe that the reduction is greater in Lunenzi compared to Nyali.

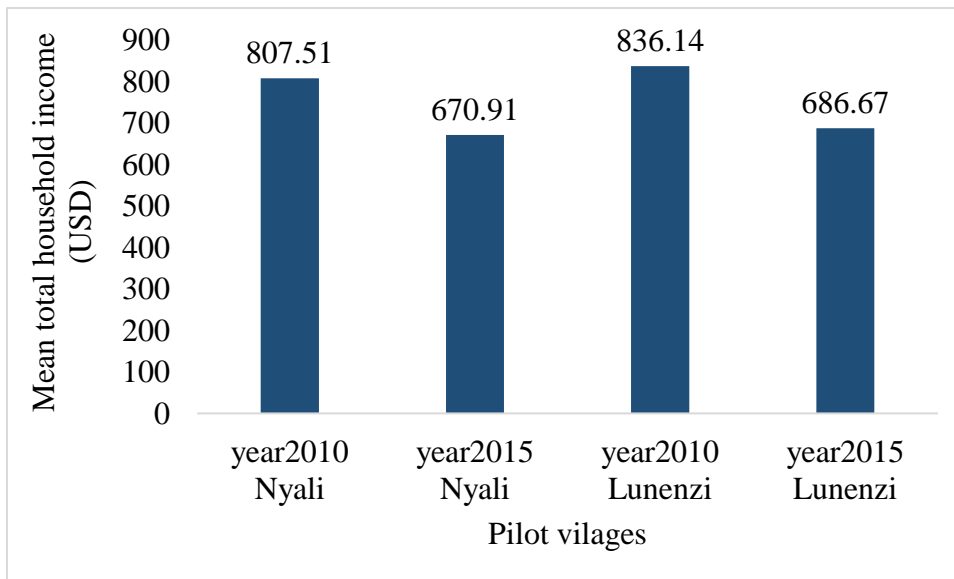


Figure 16: Gross total household income in pilot villages, Kilosa district, 2010 & 2015

This study found that the main reason for the reduction in gross total income was drought that struck these villages in 2014; although there were some improvements in farming practices due to REDD+ which might have had some counter effect. Besides improved farming techniques (i.e., conservation agriculture) which was payment ‘in kind’, TFCG offered some monetary compensation for lost forest incomes to the forest dependent households in 2012 as trial payments. Nevertheless, there were no payments made after 2012 as the TFCG did not get money from the carbon market.

It also emerged from the FGDs in both villages that they were negatively affected by drought and diseases. However, the impacts caused by these shocks varied across the pilot villages. In Nyali, men in the FGDs and the village chairperson said that the shocks (e.g., drought, diseases, floods and pests) were not severe in their village whereas the informants in the FGDs in Lunenzi insisted that their gross total incomes has gone down in 2015 mainly because of drought and diseases. Figure 16 somewhat confirms this.

Other reasons for reductions in the incomes include migration, population and prices. According to informants in the FGDs in Nyali, there was a tendency of people migrating to their village from other areas such as Dodoma, Iringa and Mbeya. People move to Nyali because of favorable conditions for agriculture. There was almost no out-migration observed. Migration into the village implies increasing the population in the area, and by extension competition for the available resources (e.g., the natural assets). Prices in Nyali were in 2015 higher compared to 2010. For instance, the prices for land – both buying and renting – have increased in the last

5 years. Land has higher value than before notably because of restrictions to expand the agricultural land following the introduction of REDD+. Moreover, prices for forest products have also gone up in the last five years most probably because of the restrictions by the REDD+ rules. Increase in prices will affect both demand and supply of the households' goods and services.

In Lunenzi, we observed similar trends as in Nyali. We were informed that there has been increased immigration for the last five years. Lunenzi attracts the new comers because of its highly fertile soil and many migrants establish their farms escaping from droughts in the other areas. Migration is mostly from the local villages Msagari, Chantuwila, Kidenge, Kwaga, Mingui, and Luhundwa. There was no out-migration from this village, only few households moved to the neighboring Ibingu village to establish small businesses, considering that Ibingu is close to the main road to Kilosa town. The prices for all products have been increasing for the last five years.

To cope with the unfavorable conditions, the pilot villages had to change their livelihood strategies/ take action. Responses from the surveys show that coping strategies included getting credits from neighbors and other village members, assistance from relatives, selling possession e.g., livestock and going for paid labour in both villages. In Nyali, people joined the sustainable charcoal making group according to the data from the men in the FGDs. In Lunenzi, men and women in the FGDS said that they grew vegetables using water from irrigation.

Total farm income:

As noted earlier, total farm income is the sum of incomes from crops (subsistence and sales) & incomes from livestock (subsistence and sales). Going back to Figure 16, we can observe that total crop incomes have reduced while total livestock income have gone up in the pilot villages.

According to the surveys, crop yields have gone down in 2015 compared to 2010 in these villages mainly because of droughts. In Lunenzi, the key informants said that they also observed some pests that invade their crops in 2015 – especially affecting tomatoes and other vegetables. When it comes to livestock production, the surveys in both villages showed that animals were dying of diseases. In addition, there were reports of wild animals ('vimbulu') killing chicks. It is therefore not surprising to see total livestock income going up because people might sell off live animals, or slaughter in order to sell or consume the meat of the animals to avoid further losses. This is also in accordance with the surveys. Cash from animals sold could be used to start

up small businesses or buy bigger animals (e.g., cows) that can resist drought better compared to smaller animals.

Total forest income:

The results in Figure 15 above shows that total forest income has increased in the pilot villages. This is not astonishing. From chapter 6 we might recall that charcoal making and timber logging are common activities in Nyali despite prohibitions by REDD+ rules. Moreover, prices have increased and we have already noted that people in Nyali joined the sustainable charcoal making scheme in order to offset income shortfalls. This partly explains why total forest income has increased in the pilot villages.

Total other incomes:

Other income, in this case, includes incomes from businesses and transfers (remittances, pension etc.). The result shows a slight increase in these incomes in the pilot villages. One reason for this observation could be the fact that people in the pilot villages have diversified their livelihoods. As was already indicated, some people went for paid labour and small business, while others borrowed credits from saving/credit unions in 2015.

8.2.2. Control villages, 2010 & 2015

Gross total household income:

If we look at the control villages, we can observe that total household income has gone down more than in the pilot villages (see Figure 15 above). Considering variation between control villages as shown in Figure 17 below, total household income in Lumango is more reduced compared to Zombo. In fact, we observe the highest drop in total household income in Lumango if we compare all the study villages.

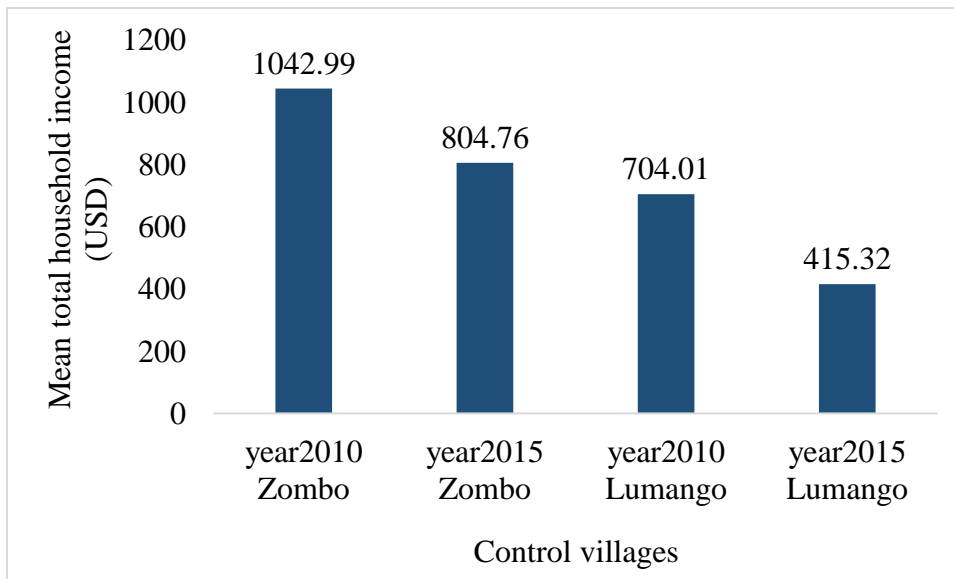


Figure 17: Total household income in control villages, Kilosa district, 2010 & 2015

When it comes to factors causing the reduction in total household incomes in the control villages, the study found more or less the same reasons as in the pilot villages. Similar to the pilot villages, the control villages have been affected by drought in 2014. Two reasons can perhaps explain the difference in the severity of reductions in the total household incomes in control and pilot villages. Firstly, the villages might have been differently affected by the drought. Secondly, villages' ability to diversify their incomes might have been different.

In Zombo, data from male FGDs seems to support the result shown in Figure 17. The informants argued that the overall income has gone down because of “decrease in rainfall”. Besides drought, Zombo has been experiencing pest invasion (‘katagaze’) for the last two years, according to the V.E.O. The key informant said that these pests damage vegetables.

Also, in Lumango, unpredicted weather patterns, and more so drought, was stated as the cause of the reductions in the total household incomes. According to the men and women in the FGDs, the people in Lumango have been experiencing droughts, winds and unexpected excessive rain for the last 5 years. In fact, they added that when it rains, the village is prone to flooding; thus also affecting crop production.

As was the case in the pilot villages, the informants in the control villages also mentioned other external factors that might have affect their incomes, e.g., increased prices and population growth (due to immigration and internal expansion of families).

As coping strategies, people in Lumango grew millet, pigeon peas and simsim, which are drought resistant crops according to the women in FGDs. Crops such as simsim were sold in order to buy food in times of food shortage. Moreover, many people depend on forest products as a coping strategy in line with information obtained from the village chairperson. Besides, people go for paid labour according to the surveys. The survey also shows that some people in Zombo moved to lowlands/ wetlands in order to cultivate some crops.

Total farm income:

According to data from the surveys and informants in the FGDs, the decrease in total crop income can be explained by the drought in these villages, while increase in total livestock income was due to drought and diseases (implying sell off or slaughtering animals) as was reported in pilot villages.

Total forest income:

Total forest income seems to be almost stable in the control villages. As we saw in chapter 6, there has been no changes in ‘practice’ in terms of use of forest resources in these villages. perhaps, the slight reduction in 2015 can be attributed to the fact that the forests might have been more degraded in 2015 compared to 2010 in line information obtained from, e.g., men in the FGDs in Lumango.

Total other incomes:

In the control villages, there is a significant decrease in total income from other sources. It could imply that people in these villages invest less in businesses or that they got less income from other sources in 2015 compared to 2010. However, it is notable that total other incomes still remain higher compared to the pilot villages.

8.3. Panel data analysis

To test whether REDD+ had any effect on the household incomes and total farmed area in the pilot villages, multivariate fixed-effects (F.E.), random-effects (R.E.) regressions and Hausman test were made, as was indicated in chapter 5. In this study, incomes were transformed using natural logarithm in order to ‘normalize’ the results, as income was highly skewed variable. Therefore, the coefficients are interpreted in terms of percentage increase (calculated as coefficient *100) – i.e., the coefficients represent the percentage increase in the total household

income if there is a unit increase in an independent variable, assuming that other independent variables are constant.

Impact of REDD+ on the incomes and total farmed area (dependent variables) was measured by the variable ‘REDD+’ which captures any changes in the pilot and control villages between 2010 and 2015. In the analyzes, I controlled for age, gender, education, household size, social capital, distance to the market, distance to the forest, forest area cleared, total farmed area (in the case of incomes) and TLU. The regressions used some dummy variables – notably gender, education, Pilot and REDD+ (*see* for instance, Table 18 below).

As was explained in section 8.1, there were less observations (N) for age, gender and education in the pilots in 2010 compared to 2015 (*see* Table 17). To see whether the difference in the observations might have an effect on the regression, I analyzed regressions with and without the named variables. Since including these variable did not affect the conclusions drawn from the regressions, I decided to keep them as they also give us extra information.

8.3.1. Impact of REDD+ on gross total household income

After performing the fixed effects and random effects regressions, I did Hausman test. The results of the Hausman test are shown in *appendix* 4a. Since the P-value (0.3210) is greater than 0.05, it implies that the random effects multivariate regression is more appropriate/better compared to the fixed-effects method. Table 18 shows the findings from the random effect regression.

Table 18: Estimate results from multivariate R.E. regression for gross total household income.

Log of total household income	Coef.	Std. Err	z	P> z
Constant	5.465624	.3427024	15.95	0.000
Time (yrs.)	-.1833732	.1672074	-1.10	0.273
Pilot (pilot=1)	-.1479547	.2077406	-0.71	0.476
REDD+ (pilot=1)	.2801567	.1965194	1.43	0.154
Age (yrs.)	-.0093882	.0037717	-2.49	0.013
Gender (male=1)	.5820015	.1464775	3.97	0.000
Education (primary=1)	.2107771	.1363981	1.55	0.122
Household size (no.)	.0343556	.0234936	1.46	0.144
Social capital (index)	.0522784	.0496802	1.05	0.293
Distance to the market (km)	-.0058936	.0047963	-1.23	0.219
Distance to the forest (minutes)	.0012476	.0008579	1.45	0.146
Total farmed area (ha/yr.)	.2577325	.051891	4.97	0.000
Forest area cleared (ha/yr.)	.1171921	.1303088	0.90	0.368
Livestock owned (TLU)	.0821955	.0894435	0.92	0.358

N=235; significance level: p=0.05; Coef= coefficient; Std. Err = Standard error; overall R² = 0.3759

To examine whether the model was performing well, I checked for multicollinearity (that could affect the results) using correlation matrix. The correlation coefficients showed a very weak to weak relationship (0.00-0.4) between almost all the variables. Moreover, the overall R² in the table above also looks quite good; as it explains approximately 40% of the variations in the model.

Looking at the regression results, we can see that the p-value (0.154) for 'REDD+' variable is not significant as the significant level for this study was 0.05. This implies that REDD+ did not have impact on the gross total income of households in the pilot villages. Three variables are significant in this test, namely age, gender and total farmed area. The result shows that the age of the household head has a negative impact on the gross total household income. It further shows that one-year increase in the age of the household head results in a decrease of approximately 0.9 % in total household income.

Concerning gender, the model depicts a positive impact. The coefficient tells us that male-headed household have approximately 58.2 % higher total household income compared to female-headed household. This finding support the theory that male- headed households have more income compared to female-headed household – c.f. section 3.2.5. In terms of total farmed area, we can see that there is also a positive effect. The coefficient tells us that one-hectare increase in the total area farmed results in approximately 25.8 % increase in gross total household income. This makes sense, as we know that the greater the area farmed, the higher the probability of getting more crop yield.

8.3.2. Impact of REDD+ on total forest income

Impact of REDD+ on total forest income was also tested using F.E. and R.E. regressions, followed by a Hausman test. The results for the Hausman test are shown in *appendix 4b*. The test gives a p-value of 0.0055, which is smaller than the significance level in this study (0.05). This implies that the FE regression is better compared to the RE regression. Therefore, I considered the F.E regression in the case of total forest income. The results for the F.E. regressions are displayed in Table 19.

Table 19: Estimate results from fixed effects regression for total forest income.

Log of total forest income	Coef.	Std. Err	t	P> t
Constant	2.948522	1.154965	2.55	0.013
Time (yrs.)	.7873235	.3018409	2.61	0.011
Pilot (pilot=1)	0 (omitted)			
REDD+ (pilot=1)	.6511843	.3219619	2.02	0.047
Age (yrs.)	.0058083	.019927	0.29	0.772
Gender (male=1)	.169878	.7619598	0.22	0.824
Education (primary=1)	.1011735	.4544119	0.22	0.824
Household size (no.)	-.0575141	.058694	-0.98	0.330
Social capital (index)	.0341146	.1079092	0.32	0.753
Distance to the market (km)	0 (omitted)			
Distance to the forest (minutes)	.0011267	.0020105	0.56	0.577
Total farmed area (ha/yr.)	.1262963	.1282253	0.98	0.328
Forest area cleared (ha/yr.)	-.1475573	.2374201	-0.62	0.536
Livestock owned (TLU)	-.3392423	.2565993	-1.32	0.190

N=220; significance level: p=0.05; Coef= coefficient; Std. Err = Standard error; overall R² = 0.1219 within R²= 0.5269

As was the case with the gross total income, there was no clear multicollinearity observed in this model. Besides, the within R² explains almost 53% of the variations within information in the data, although the overall R² is low. As the within R² is an important indicator of variations in F.E., this model seems good.

Looking at table 19, we notice that the output excludes ‘pilot’ and ‘distance to the market’ variables because F.E. regression automatically drops variables that are constant across years, i.e., time-invariant variables. The variable ‘Gender’ was not dropped although one could argue that it does not vary with time. This is because as we have seen earlier, there were changes in household heads, which make it time-variant. The finding shows that REDD+ had a positive effect on total forest income, although the p-value (0.047) is close to 0.05. The coefficient further tells us that pilot villages had approximately 65.1 % more total forest income compared

to control villages, taking into account the study periods. In reality, this is not what we expected as we know that REDD+ restricts use of forest resources.

Another significant variable in this test is time ($p=0.011$). Similar to the 'REDD+' variable, time variable had a positive impact on total forest income. We can learn from the coefficient that one-year increase in time results in approximately 78.7% more total forest income. Comparing the effects of 'REDD+' and 'Time' on total forest income, the result indicates that time factor played a greater role. More specifically, it seems that the drought had more impact on total forest income compared to REDD+.

8.3.3. Impact of REDD+ on total farmed area

Besides total household income and total forest income, I performed the same tests for total farmed area in order to discover whether REDD+ had an impact on this variable. The results for the Hausman test in relation to total farmed area is presented in *appendix 4c*. Unlike the previous Hausman tests, the p-value (0.0565) is closer to 0.05. It implies that the coefficients for the two regressions are sufficiently close in terms to values as Hausman test compares the differences between the coefficients. In this case, I will use the random effects regression as it offers more information while the p-value is slightly greater than 0.05. Table 20 presents the findings from the R.E. regressions.

Table 20: Estimate results from multivariate R.E. regression for total farmed area.

Total farmed area	Coef.	Std. Err	z	P> z
Constant	-.0867331	.4441785	-0.20	0.845
Time (yrs.)	-.1098687	.2098894	-0.52	0.601
Pilot (pilot=1)	.3693053	.2674854	1.38	0.167
REDD+ (pilot=1)	-.4395977	.2451535	-1.79	0.073
Age (yrs.)	.0037872	.0049354	0.77	0.443
Gender (male=1)	.4753848	.1888542	2.52	0.012
Education (primary=1)	-.0317681	.1760932	-0.18	0.857
Household size (no.)	.1134027	.0293146	3.87	0.000
Social capital (index)	.1215497	.0634967	1.91	0.056
Distance to the market (km)	.0090548	.0062792	1.44	0.149
Distance to the forest (minutes)	.0011649	.001102	1.06	0.290
Forest area cleared (ha/yr.)	.3390004	.1650803	2.05	0.040
Livestock owned (TLU)	.7897883	.1026096	7.70	0.000

N=236; significance level: p=0.05; Coef= coefficient; Std. Err = Standard error; overall R² = 0.4385

The overall R² looks good in this model and there was no clear multicollinearity noted. As shown by Table 20, REDD+ had no impact on total farmed area, at a significance level of 0.05. However, it is notable that the p-value is close to the significance level and that the effect is negative. Another variable that is close to being significant in this study is social capital index. Moreover, we can observe that the Table has four significant variables, notably household size, gender, forest area cleared and TLU. To begin with, the Table shows that household size has a positive effect on the total farmed area. The coefficient indicates that an extra person in the household will result in an increase of approximately 0.11 hectare of total farmed area. As increased household size implies more labour, the result seems convincing.

The result also shows that gender has a positive impact. Men-headed households farm approximately 0.47 more hectares of agricultural land compared to female-headed households. Similarly, the variable ‘forest area cleared’ has a positive effect on total farmed area. The

corresponding coefficient indicates that one extra hectare of forest area cleared results in approximately 0.34 more hectares of total farmed area. This finding supports what we have seen in chapter 6, i.e., reports of illegal expansion of agricultural land. If we look at the variable 'TLU', we can state that the number of livestock owned has a positive effect on the total farmed area. The coefficient further shows that an increase of one TLU results in an increase of approximately 0.79 hectares in total farmed area. Perhaps, this also makes sense. For instance, if we look from the perspective of rented agricultural land, it is possible that some farmers sell their animals in order to rent land for crop production.

8.3.4. Did REDD+ affect household's income?

This study tried to find out whether REDD+ had any impact on two household incomes, notably gross total household income and total forest income. Hausman test for the gross total household income showed that the appropriate regression for this income was R.E. Results from R.E. showed that REDD+ had no effect on gross total household income. When it comes to total forest income, the Hausman test indicated that F.E. was a better choice. Based on the results from the F.E. regression, REDD+ had a positive effect on total forest income. In the next chapter, I will discuss these findings as well as findings regarding the institutional changes made.

9. Discussion: REDD+ initiative as an instrument for improving people's livelihoods

In the previous chapters, I presented the findings of this study. This chapter discusses those findings. In the first section, I will integrate and discuss the findings of chapter 6 and 7. Thereafter, I proceed to impacts of REDD+ on the local people's livelihoods.

9.1. Institutions and institutional changes

The role of Institutions in environmental governance cannot be overemphasized. Analysis of resource regime using Vatn's EGS framework and a critical realist perspective provided insights into the importance of the existing institutions in relation to forest and related resources, and not least to understand the complexity of environmental governance. As REDD+ is a form of resource regime, its introduction in Kilosa implied a change in institutions and institutional structure. This thesis focused on changes in property rights and more specifically use rights in Kilosa district. In terms of use rights, REDD+ restricted the use of some forest and related resources. For instance, REDD+ restricted agricultural expansion, charcoal making, timber harvesting and not least collection of fuelwood.

Before the introduction of REDD+, forests in the pilot villages were state property, although the local people considered it as their forest in line with the customary laws. Use of forest resources was *de facto* under open access. In 2010, it was noted that property and use rights changed in the pilot villages, whereby REDD+ rules took effect. Nevertheless, some mismatch between the formal REDD+ rules and the existing informal rules (norms) were observed, especially in Nyali village. Indeed, illegal timber logging and charcoal making were common in Nyali in 2015 as was in 2010. In Lunenzi, the findings show that people are following the REDD+ rules more consistently compared to Nyali.

Turning to the control villages, property rights have not changed since 2010. However, according to the forest laws, there exist formal rules that are supposed to regulate use of resources in these villages. It was argued that forest governance was weak in these villages in 2015 as was the case in 2010. Use of resources in these villages remains *de facto* under open access. Illegal agricultural expansions, charcoal making and timber logging are common activities in these villages. As this study used mixed-methods, triangulation played a great role. For instance, it was noted that the information provided by the V.E.O (a government employee)

in Zombo is hard to trust as it contradicted what all the other findings about this village. In Lumango, members of VNRC (whose mandate is to patrol the forest) admitted that they are engaged in the illegal forest activities.

Notably, the findings showed a clear mismatch between ‘rules on paper’ and ‘rules in practice’ in the study villages, except Lunenzi. From management point of view, this is a big challenge. Several reasons might explain why people do not follow the formal rules. Here, I will highlight three possible reasons. Firstly, REDD+ is a performance based initiative i.e., compensation for lost incomes are made after measuring the amount of carbon stored, a procedure that is time demanding. On the other hand, people want to use the forest resources for immediate needs. Secondly, incentives from REDD+ do not fully cover lost incomes. In fact, most of the informants insisted that what they received from REDD+ as a ‘compensation’ in 2012 was too little to call compensation – cf. (Mwakaje 2013). Here comes the paradox of competing priorities and interest. Whilst the REDD+ intervention aims at reducing deforestation to increase carbon stocks in the forests, local people want to get their daily ‘bread’ from the same forest. In this regard, REDD+ promoters and the local people can be seen as “two distinct epistemic communities” (Hiedanpää & Bromley 2014:17). Many rural households in Kilosa district, depend on forests for their livelihoods. Thirdly, as REDD+ is an exogenous initiative that demands the approval by the district and the national government, some people might see it as top-down approach and not as a participatory approach – see Blomley et al. (2016). Therefore, they might implicitly disown the whole idea.

Reasonably, REDD+ cannot fully compensate all the lost incomes as forests provide many resources. However, evidence from Lunenzi shows that the incentives from the REDD+ interventions has worked to some extent. If we might recall, the key informants in Lunenzi argued that their forest was denser in 2015 compared to 2010. Data from other informants in the same village showed that institutions for forest management were more robust in Lunenzi compared to Nyali. In Nyali, forest governance was weaker compared to Lunenzi in 2015. However, it is important to underscore that forest governance has improved in Nyali in 2015 compared to 2010. These improvements can be attributed to REDD+ intervention. People’s evaluation of REDD+ shows that most informants in the pilot villages were quite satisfied with both REDD+ and pre-REDD+ rules. Indeed, people were more positive towards the REDD+ rules compared to the pre-REDD+ rules. The main reasons for satisfaction with the REDD+ rules seem to be improved forest governance. On the other hand, people were satisfied with the

pre-REDD+ rules mainly because of good access to resources and equal distribution of resource benefits.

In the control villages, there were no changes in governance since 2010. In Lumango, we expected improvements in forest governance as the forest was under CBFM. The finding reveals that there were no changes, in terms of use of forest resources, since 2010. Still, activities such as illegal timber logging and charcoal making are common. In the case of Zombo, use of resources were *de facto* under open access in both periods.

Another issue that emerged during the qualitative interviews was allegations of corruption. In fact, corruption was mentioned often in all the study villages except Lunenzi. Additionally, it was easy to notice the dynamics of power in the Nyali village while we interviewed the village chairperson. Use of power (manifest and/or hidden) in relation to use of resources, as we saw in Nyali, is normally considered as the basis for elite capture – cf. Kweka et al. (2015), Kajembe et al. (2015).

Of course, it was expected to observe some people deviating from the existing norms and rules, with or without exercising power, in any society – see Ostrom (1990), Lusambo et al. (2008). However, such practices create income inequalities and sustained poverty in the society. Kilosa district is not exceptional in this regard.

9.2. Impact of REDD+ on local people's Livelihoods

Ellis's RLA framework and the conceptual framework formed the basis for analyzing the impact of REDD+ on local people's livelihoods. Moreover, by using mixed methods strategy and BACI design, we could understand the livelihood changes in both pilot and control villages across the two periods.

The results showed severe reductions in gross household incomes in both pilot and control villages in 2015 compared to 2010. It is emphasized that the drought that hit these villages in 2014 had a strong negative effect on gross total income, 'diluting' the gains from the REDD+ intervention. Besides, other shocks such as diseases and pests have negatively affected the gross total income. The findings also showed that other contextual factors that might have negatively affected the household – see Figure 18.

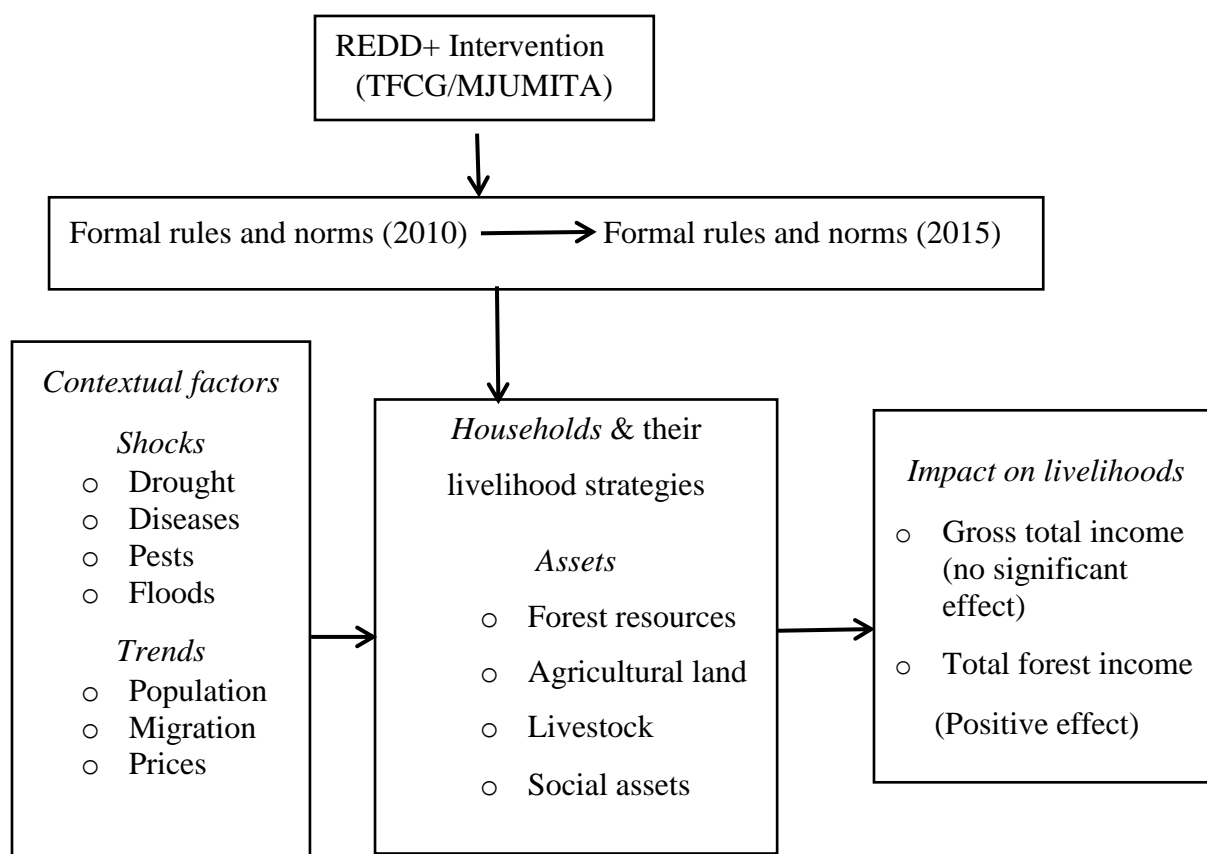


Figure 18: Impact of REDD+ on livelihoods in pilot villages, 2010-2015

For instance, based on data from key informants, population has increased since 2010 in all the study villages due to migration into the villages and increase in the size of the household. As indicated in section 8.1, the size of the households in the study villages has not increased greatly since 2010. Nevertheless, immigration was a common trend in all the villages as outlined in the previous chapter. Notably, migration has been a common trend in Kilosa district as was explained in chapter 4. We also learnt that prices have increased in 2015 compared to 2010, as one would expect.

Indeed, the above contextual factors are common in the Kilosa district – see e.g., Mugasha & Katani (2016), Lusambo et al. (2008). For instance, some of the factors identified by these authors are poverty, population increase, drought and weak institutions. Concerning weak institutions, we have seen that Nyali had weaker institutions vis-à-vis Lunenzi. Perhaps, this can partly explain why reductions in the overall gross income was lower in Nyali compared to Lunenzi.

The findings further reveal that some of the income categories decreased while others increased in both villages in 2015 compared to 2010. This observation can be explained by the fact that rural households diversify their incomes in times of unfavorable conditions – see Ellis (2000). For instance, we have seen that forest and livestock incomes have gone up in the pilot villages, whereas crop incomes have drastically gone down. Increase in forest incomes can be due to illegal charcoal and timber logging in Nyali or increased charcoal production through the sustainable charcoal-making scheme. Also, drought could be another reason, as many rural households go for forest resources in times of unfavorable conditions. Two reasons can explain the reductions in the crop incomes. Firstly, the drought might have reduced the crop yields. Secondly, the reductions in the crop incomes could have come from reduced total farmed area due to restrictions of agricultural extensification by REDD+. In the control villages, livestock income has also gone up, while crop income has reduced. Although both pilot and control villages were both affected by the drought, they have different coping strategies.

The panel data analysis showed that REDD+ did not significantly affect gross total household income and total farmed area. In the latter case, the effect was close to being significant. Furthermore, REDD+ had a positive effect on total forest income. The findings for total forest income and total farmed area were interesting. Indeed, we expected the opposite effect in the case of total forest income, as we know that REDD+ rules restricts use of forest resources. It is a bit difficult to comprehend this finding. However, the fact that people were joining the sustainable charcoal-making scheme could be one reason. Also, ‘Time’ variable showed a positive effect as we expected, since drought (captured by this variable) struck the pilot villages. Following drought, some people in these villages decide to violate the rules in order to get more income from the forest. When it comes to total farmed area, the predicted result was also a negative impact as the intervention restricted agricultural expansion.

To repeat, REDD+ regime played a crucial role in relation to forest governance in the pilot villages. Whether REDD+ can improve forest governance and people’s livelihoods or not has been a bone of contention among scholars – e.g., Salas 2014. According to Salas (2014), other forms of PFM can as well do the same work – i.e., protect forests and increase people’s incomes. From what we saw in this study, one could tend to disagree with these authors because Lumango was under CBFM since 2007, yet there is some evidence that the CBFM rules have failed with respect to protecting its forest and improving people’s livelihoods. On the contrary, we have seen at least improvements in forest governance in the REDD+ pilot villages.

Forest governance aside, this study showed that REDD+ did not have significant effect on gross total household income. I could not find literature that really documented whether REDD+ has improved livelihoods in Kilosa district or in any other areas. Some authors insist that REDD+ reduces household incomes by restricting agricultural expansion – e.g., Mutabazi et al. 2014. On the same note, this study showed that the impact of REDD+ on total farmed area was almost significant. Nevertheless, it is difficult to firmly state that REDD+ had a positive or negative effect on people’s livelihoods in Kilosa district. As REDD+ was operating for only five years, I argue that it was too early to assess its impacts on livelihoods in Kilosa district. Changes in livelihoods is a profound process that takes time as it involves institutional changes that later brings about changes in practices.

To sum up, REDD+ initiative should be seen as a ‘trial’ policy with the main objective of increasing forest carbon stock. Given its short period of operation in Kilosa district, one should not expect to see great changes in the pilot villages – cf. Jagger et al. (2010).

10. Conclusion and Recommendation

10.1. Conclusion

In this thesis, I have studied REDD+ institutions and their implications for livelihoods in the context of Kilosa district. REDD+ is a mitigation strategy for climate change. It promotes the reduction of greenhouse gases from deforestation and forest degradation as its main goal. Besides, REDD+ has the objective of improving local people's livelihoods through using incentives. REDD+ restricts use of forests and related resources in order to achieve its goals. Forests, on the other hand, are an important asset for the rural households. This implies conflict of priorities and interests.

REDD+ was established in the pilot villages in 2010. The introduction of REDD+ implied changes in property and use rights, village by-laws and establishing land-use plans in these villages. In the control villages, there were no changes in property and use rights from 2010. It was noted that there were mismatches between the rules 'on paper' and rules 'in practice' in Nyali and in the control villages with respect to use of forest resources.

REDD+ has largely improved forest governance in the pilot villages. People in the pilot villages seem to be more satisfied with the REDD+ compared to the pre-REDD+ rules. Reasons for satisfaction with REDD+ rules include clear boundaries and people's participation in making rules in both villages; whereas equal distribution of resources and good accessibility to resources seem to be the main reasons for satisfaction with the pre-REDD+ rules in these villages. It was also noted that there were some variations across the pilot villages. People in Lunenzi were more positive compared to those in Nyali in both 2010 and 2015. Indeed, people in Nyali were more split, in terms of evaluation, compared to those in Lunenzi. The results also suggested that forest governance was better in Lunenzi compared to Nyali in both periods. It should be emphasized, however, that forest governance in Nyali was better in 2015 compared to 2010.

In terms of livelihoods, it is worth mentioning that gross total household incomes significantly dropped in 2015 compared to 2010 in both pilot and control villages. The main cause of this observation was drought that hit both pilot and control villages in 2014. It is emphasized that people coped with the unfavorable situations by diversifying their incomes. Forest income stands out as one of the main strategies used in the pilot villages.

According to the findings, REDD+ did not have significant impact on gross household income and total farmed area. However, it was observed that REDD+ had a positive effect on total forest income, despite the fact that the initiative restricted use of forest resources. As REDD+ was operating in Kilosa district for only five years, it is difficult to conclude that REDD+ had a positive or negative effect on the people's livelihoods.

10.2. Recommendation

TFCG/REDD+ left Kilosa district in 2014, but there is still a need to protect forests in order to mitigate climate change (as the phenomenon is still a global challenge) and improve people's livelihoods. Since people in Kilosa district depend on forest resources especially in times of unfavorable conditions, an increase in incomes from other sources (alternative livelihoods) can significantly alleviate poverty while at the same time discourage people from illegal forest activities. In line with the research findings, the following recommendations are made:

- There is a special need for national policies that address poverty in Kilosa district and beyond. Such policies might reduce deforestation, improve people's livelihoods and reduce migration of people from other regions. Future interventions for forest management by the government or other actors in Kilosa district should address the immediate needs of the forest dependent households through increasing alternative sources of livelihoods that can immediately compensate lost forest incomes.
- There is a potential to increase farm incomes in Kilosa district. Investing in irrigation schemes and providing subsidies to farmers can increase incomes from agriculture, as the district is rich with fertile soils. Vaccinating livestock and providing veterinary services can reduce incidences of livestock death.

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12. Appendices

Appendix 1: Household questionnaire for the impact survey in REDD+ pilot sites

NOTE: A **manual** is developed for the project. It is important to **read the manual carefully** before interviewing (**Sections 1-5** of the manual is most relevant for the questionnaire).

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	Longitude	
	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 training	Main occupation	How long have you lived here (no of yrs.)
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? _____

Note: The local team should define the different ethnic groups or tribes in the pilot area with code

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 (local units)	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 formal, 2= private informal 3= state; 4= communal formal, 5= communal informal
- 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.

Note: Please convert local units in ha when entering data into the database.

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	Village 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 and savings group			
8	Other			

1) Code: 1=household head; 2=spouse; 3=other

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? Please indicate the most important strategy
1	Serious crop failure		
2	Death/serious illness in family (productive age-group/adult)		

3	Loss of land		
4	Major livestock loss (drought, disease, etc.)		
5	Loss of waged employment		
6	Climate/drought/floods		
7	Price changes on products and consumer goods		
8	Protected area establishment		

1) 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 in the pilot areas. The household's use of land resources includes both forests and agriculture. We will also map livelihood outcomes, constraints and major changes in the use of land resources over time. 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 (local units)	Labour ²⁾	Total output (local units)	Sold (local units)
1					
2					
3					
4					
5					
6					
7					
8					

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' **Note:** Please convert local units (e.g. area, bushels of corn, sacks of potatoes, etc.) into ha and 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

If 'Increase', GO TO B2b

If 'Stable', GO TO B3

B2. Are there any problem(s) that limit your agricultural production?

Codes: 1=Yes; 2 =No (If 'NO', GO TO B2d)

B2a. If 'yes', what do you consider to be the most important problem limiting your agricultural production? _____ GO TO B2d

B2b. Are there any factor(s) that increased your agricultural production?

Codes: 1=Yes; 2 =No (If 'NO', GO TO B2d)

B2c. If 'yes', what do you consider to be the most important factor boosting your agricultural production? _____

B2d. Do you think REDD+ had any effect on the outcome of your production?

Codes: 1=Yes; 2 =No

B2e. Please explain your answer

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

1) Please indicate the number of animals sold live or slaughtered and convert to kilos or 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

If 'Increase', GO TO B7b

If 'Stable' GO TO B9

B7. Are there any problem(s) that limit your livestock production?

Codes: 1=Yes; 2=No (If 'NO', GO TO B7)

B7a. If 'yes', what do you consider to be the most important problem limiting your livestock production? _____ *GO TO B7d*

B7b. Are there any factor(s) that increased your livestock production?

Codes: 1=Yes; 2 =No (If 'NO', GO TO B7)

B7c. If 'yes', what do you consider to be the most important factor boosting your livestock production? _____

B7d. Do you think REDD+ had any effect in the outcome of your production?

Codes: 1=Yes; 2 =No

B7e. Please explain your answer

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:				

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 (local units)	For sale (local units)
		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'. Convert local units to kg as appropriate when entering into database.

- 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; 8= private

- 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 the following forest products, today compared to five years ago (before 2010)? What do you consider to be the most important factor(s) that influenced your access?

No	Product	Status ¹⁾	Main factors(s)
1	Fuelwood		
2	Poles		
3	Timber		
4	Charcoal		

1) Codes: 1= much reduced; 2= reduced; 3= the same; 4= increased; 5= much increased

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 (collected or grazed)				
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 \$): _____

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	<p>What was the cleared forest (land) used for?</p> <p><i>Codes: 1=cropping; 2=tree plantation; 3=pasture; 4=other</i></p>			
3	<p>What was the ownership status of the forest cleared</p> <p><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></p>			

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? (Left to fallow or converted to natural re-vegetation). *Please denote as ha per year.*

(NB: READ THE MANUAL ON INCOME CAREFULLY (End of Section 5.3.2))

B20. How much fish did your household catch in the streams, rivers and small lakes of the forest both for own use and sale over the last month?

No	Main fish species (common names) ¹⁾	Ownership ²⁾ where caught	Caught by whom ³⁾	Own use (kg)	For sale (kg)	Unit price (\$/kg)
1						
2						
3						
4						
5						

1) Codes: The local team must identify the main fish species. Please use common names
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

2) Use the code for the dominant category

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

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 \$): _____

NOTE: Payments already covered in B21 must not be included here

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**?

NOTE: Income directly from crops (B1), livestock (B6), forest products (B11, B14) or income covered above in questions B20; B21 and B22 must not be included here

NOTE: If the household is involved in different types of business fill in one column for each business.

	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.*

SECTION C: Property rights, use rights and management

The main issue here is to map out ownership, management and use rights to forest land and forest resources. We also want to map people’s views on management systems and the rules defined for use rights. A more detailed examination of the rules regulating access and use of forest and forest resources in the different pilot areas will be dealt with in the PRA interviews. **(NB: READ THE MANUAL ON PROPERTY/USE RIGHTS CAREFULLY (Section 4.8))**

C1. Do any members of your household belong to any forest management group in your community?

Codes: 1=Yes; 2=No (If ‘NO’, GO TO C12)

C1a. If 'yes', please indicate the name of the group: _____

MANAGEMENT SYSTEMS

C10. Please tick the box which most closely resembles the property and management arrangements present in part of the pilot/study area where the respondent lives (tick more than one if applicable). Then go on to answer the questions corresponding to the choice(s).

I. State forests with REDD+

II. State forests without REDD+

III. Community forests with REDD+

IV. Community forests without REDD+

You may want to use local names for the forest instead of e.g., state forest with REDD+. Be 100% sure that there is no misunderstanding regarding which forests you are talking about.

I. STATE FORESTS WITH REDD+

C12. Do you have user rights to resources in the state forest(s) with REDD+ in your community?

Codes: 1=Yes; 2=No, 3= Don't know

If 'NO' GO TO C12d1

If 'DON'T KNOW' GO TO C12e

C12a. Are your user rights to the state forest formal or informal?

Codes: 1=Formal; 2=Informal; 3=Both, 4=Don't know

Use the number for the dominant category. If one category clearly dominates, do not use 'both'

C12b. Do you have individual or common use rights?

Codes: 1=Individual; 2=Common (as member of community); 3=Both, 4=Don't know

Use the number for the dominant category. If one category clearly dominates, do not use 'both'

C12c. Are your user rights limited to particular resources in the state forest?

Codes: 1=Yes; 2=No, 3=Don't know (If 'NO' or 'DON'T KNOW GO TO C12e)

C12d. If 'yes', which are the most important forest resources you can use?

C12d1. Is the reason you have no user rights because it is a REDD+ forest without any rights to resources?

Codes: 1=Yes; 2=No, 3=Don't know

C12e. Do you have any influence on the rules that govern use and management of the state forest(s) with REDD+? You may tick more than one.

1 Yes, during village assembly meetings	2 Yes, during other meetings	3 Yes, through general discussions in my community	4 No, we have not taken part at all	5 I do not know

C13. How satisfied are you with the rules that govern use and management of the state forest with REDD+?

1 Very dissatisfied	2 Somewhat dissatisfied	3 Somewhat satisfied	4 Very satisfied

(Note: Dependent on responses to C13, you proceed by going to C13a or C13b)

C13a. If 'somewhat dissatisfied' or 'very dissatisfied' with the rules, why is it so?

No		1 Dis-agree	2 Disagree somewhat	3 Agree somewhat	4 Agree
1	My/our interests are not taken into account				
2	Unclear boundaries/outsideers are intruding				
3	Unequal distribution of use and benefits				
4	Too strong limitation on access to resources				

5	Rules are not followed				
6	The local community is not enough involved in making rules				
7	Conflict resolution mechanisms are inappropriate				
8	Too weak enforcement of rules/sanctions				
9	Creates opportunities for corruption				
10	Bad management/lack of coordination				
11	Other (please specify)				

C13b. If 'somewhat satisfied' or 'very satisfied' with the rules, why is it so?

No		1 Dis-agree	2 Disagree somewhat	3 Agree somewhat	4 Agree
1	My/our interests are well taken into account				
2	Clear boundaries/outsideers are kept out				
3	Equal distribution of use and benefits				
4	Good access to resources				
5	Rules are followed				
6	The local community is involved in making rules				
7	Conflict resolution mechanisms are appropriate				
8	Proper enforcement of rules/sanctions				
9	Good management and coordination				
10	Other (please specify)				

C14. Do you feel bound by the rules governing use and management of the state forest(s) under REDD+?

1 I feel bound by them and follow them always	2 I feel quite bound by them and follow them mostly	3 I feel somewhat bound by them and follow them sometimes	4 I don't feel bound by them and do usually not follow them	5 Not relevant to me

C15. Are you aware of any changes in the rules that govern use and management of the state REDD+ forest in the last five years?

Codes: 1=Yes; 2=No; 3=Not aware (If 'NO' or 'not aware', GO TO C16)

C15a. If 'yes', have the changes influenced your use of state forests?

1 It has worsened my livelihood a lot	2 It has worsened my livelihood to some extent	3 It did not have any effect on my livelihood	4 It has improved my livelihood to some extent	5 It has improved my livelihood a lot

C16. How is your relationship with those authorized to manage the state forests?

1 Very bad	2 Bad	3 Fair	4 Good	5 Very good	6. Not relevant

II STATE FORESTS WITHOUT REDD+

C17. Do you have user rights to resources in the state forest(s) without REDD+ in your village?

Codes: 1=Yes; 2=No, 3=Don't know

If 'No' or 'DON'T KNOW' GO TO 17e

C17a. Are your user rights to the state forest(s) formal or informal?

Codes: 1=Formal; 2=Informal; 3=Both, 4=Don't know

Use the number for the dominant category. If one category clearly dominates, do not use 'both'.

C17b. Do you have individual or common use rights to the state forest(s)?

Codes: 1=Individual; 2=Common (as member of community); 3=Both, 4=Don't know

Use the number for the dominant category. If one category clearly dominates, do not use 'both'.

C17c. Are your user rights limited to particular resources in the state forest(s) ?

Codes: 1=Yes; 2=No, 3=Don't know

(If 'NO', GO TO C17e)

C17d. If 'yes', which are the most important forest resources you can use?

C17e. Do you have any influence on the rules that govern use and management of the state forest(s)?

You may tick more than one.

1 Yes, during village assembly meetings	2 Yes, during other meetings	3 Yes, through general discussions in my community	4 No, we have not taken part at all	5 I do not know

C18. How satisfied are you with the rules that govern use and management of the state forest(s)?

1 Very dissatisfied	2 Somewhat dissatisfied	3 Somewhat satisfied	4 Very satisfied

(Note: Dependent on responses to C18, you proceed by going to C18a or C18b)

C18a. If 'somewhat dissatisfied' or 'very dissatisfied' with the rules, why is it so?

No		1 Dis-agree	2 Disagree somewhat	3 Agree somewhat	4 Agree
1	My/our interests are not taken into account				
2	Unclear boundaries/outsideers are intruding				
3	Unequal distribution of use and benefits				
4	Too strong limitation on access to resources				
5	Rules are not followed				

6	The local community is not enough involved in making rules				
7	Conflict resolution mechanisms are inappropriate				
8	Too weak enforcement of rules/sanctions				
9	Creates opportunities for corruption				
10	Bad management/lack of coordination				
11	Other (specify)				

C18b. If 'somewhat satisfied' or 'very satisfied' with the rules, why is it so?

No		1 Dis-agree	2 Disagree somewhat	3 Agree somewhat	4 Agree
1	My/our interests are well taken into account				
2	Clear boundaries/outsideers are kept out				
3	Equal distribution of use and benefits				
4	Good access to resources				
5	Rules are followed				
6	The local community is involved in making rules				
7	Conflict resolution mechanisms are appropriate				
8	Proper enforcement of rules/sanctions				
9	Good management and coordination				
10	Other (please specify)				

C19. Do you feel bound by the rules that govern use and management in the state forest(s)?

1 I feel bound by them and follow them always	2 I feel quite bound by them and follow them mostly	3 I feel somewhat bound by them and follow them sometimes	4 I don't feel bound by them and do usually not follow them	5 Not relevant to me

C20. Are you aware of any changes in the rules that govern use and management of the state forest(s) in the last five years since 2010?

Codes: 1=Yes; 2=No; 3=Not aware (If 'NO' or 'not aware', GO TO C21)

C20a. If 'yes', have the changes influenced your use of state forest(s)?

1 It has worsened my livelihood a lot	2 It has worsened my livelihood to some extent	3 It did not have any effect on my livelihood	4 It has improved my livelihood to some extent	5 It has improved my livelihood a lot

C21. How is your relationship with the forest management committee of state forest(s)?

1 Very bad	2 Bad	3 Fair	4 Good	5 Very good	6. Not relevant

III. COMMUNITY FORESTS WITH REDD+

C22. Do you have user rights to resources in the community forest(s) with REDD+ in your village?

Codes: 1=Yes; 2=No, 3=Don't know

If 'NO' GO TO C22d1

If 'DON'T KNOW' GO TO C22e

C22a. Are your user rights to community forest(s) with REDD+ formal or informal?

Codes: 1=Formal; 2=Informal; 3=Both

Use the number for the dominant category. If one category clearly dominates, do not use 'both'.

C22b. Do you have individual or common use rights to REDD+ community forest(s)?

Codes: 1=Individual; 2=Common (as member of community); 3=Both

Use the number for the dominant category. If one category clearly dominates, do not use 'both'.

C22c. Are your user rights limited to particular resources in the REDD+ community forest(s)? Codes: 1=Yes; 2=No
(If 'NO', GO TO C22e)

C22d. If 'yes', which are the most important forest resources you can use?

C22d1. Is the reason you have no user rights because it is a REDD+ forest without any rights to resources?

Codes: 1=Yes; 2=No

C22e. Do you have any influence on the rules that govern use and management of the community forests? You may tick more than one.

1 Yes, during village assembly meetings	2 Yes, during other meetings	3 Yes, through general discussions in my community	4 No, we have not taken part at all	5 I do not know

C23. How satisfied are you with the rules that govern use and management of the community forest(s)?

1 Very dissatisfied	2 Somewhat dissatisfied	3 Somewhat satisfied	4 Very satisfied

(Note: Dependent on responses to C23, you proceed by going to C23a or C23b)

C23a. If 'somewhat dissatisfied' or 'very dissatisfied' with the rules, why is it so?

No		1 Dis-agree	2 Disagree somewhat	3 Agree somewhat	4 Agree
1	My/our interests are not taken into account				
2	Unclear boundaries/outsideers are intruding				
3	Unequal distribution of use and benefits				
4	Too strong limitation on access to resources				
5	Rules are not followed				

6	The local community is not enough involved in making rules				
7	Conflict resolution mechanisms are inappropriate				
8	Too weak enforcement of rules/sanctions				
9	Creates opportunities for corruption				
10	Bad management/lack of coordination				
11	Other (specify)				

C23b. If 'somewhat satisfied' or 'very satisfied' with the rules, why is it so?

No		1 Dis-agree	2 Disagree somewhat	3 Agree somewhat	4 Agree
1	My/our interests are well taken into account				
2	Clear boundaries/outsideers are kept out				
3	Equal distribution of use and benefits				
4	Good access to resources				
5	Rules are followed				
6	The local community is involved in making rules				
7	Conflict resolution mechanisms are appropriate				
8	Proper enforcement of rules/sanctions				
9	Good management and coordination				
10	Other (please specify)				

C24. Do you feel bound by the rules that govern use and management in the community forest(s) with REDD+?

1 I feel bound by them and follow them always	2 I feel quite bound by them and follow them mostly	3 I feel somewhat bound by them and follow them sometimes	4 I don't feel bound by them and do usually not follow them	5 Not relevant to me
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C25. Are you aware of any changes in the rules that govern use and management of the community forest(s) with REDD+ in the last five years since 2010?

Codes: 1=Yes; 2=No; 3=Not aware (If 'NO' or 'not aware', GO TO C26)

C25a. If 'yes', have the changes influenced your use of community forest(s) with REDD+?

1 It has worsened my livelihood a lot	2 It has worsened my livelihood to some extent	3 It did not have any effect on my livelihood	4 It has improved my livelihood to some extent	5 It has improved my livelihood a lot

C26. How is your relationship with the forest management committee of REDD+ community forest(s)?

1 Very bad	3 Bad	3 Fair	4 Good	5 Very good	6. Not relevant

IV.COMMUNITY FORESTS WITHOUT REDD+

C27. Do you have user rights to resources in the community forest(s) without REDD+ in your village?

Codes: 1=Yes; 2=No, 3=Don't know

If 'No' or 'DON'T KNOW' GO TO 27e

C27a. Are your user rights to community forest(s) formal or informal?

Codes: 1=Formal; 2=Informal; 3=Both, 4=Don't know

Use the number for the dominant category. If one category clearly dominates, do not use 'both'.

C27b. Do you have individual or common use rights to the community forest(s) without REDD+?

Codes: 1=Individual; 2=Common (as member of community); 3=Both, 4=Don't know

Use the number for the dominant category. If one category clearly dominates, do not use 'both'.

C27c. Are your user rights limited to particular resources in the community forest(s) ?

Codes: 1=Yes; 2=No, 3=Don't know

(If 'NO', GO TO C27e)

C27d. If 'yes', which are the most important forest resources you can use?

C27e. Do you have any influence on the rules that govern use and management of the community forest(s) without REDD+? You may tick more than one.

1 Yes, during village assembly meetings	2 Yes, during other meetings	3 Yes, through general discussions in my community	4 No, we have not taken part at all	5 I do not know

C28. How satisfied are you with the rules that govern use and management of the community forest(s) without REDD+?

1 Very dissatisfied	2 Somewhat dissatisfied	3 Somewhat satisfied	4 Very satisfied

(Note: Dependent on responses to C28, you proceed by going to C28a or C28b)

28a. If 'somewhat dissatisfied' or 'very dissatisfied' with the rules, why is it so?

No		1 Dis-agree	2 Disagree somewhat	3 Agree somewhat	4 Agree
1	My/our interests are not taken into account				
2	Unclear boundaries/outsideers are intruding				
3	Unequal distribution of use and benefits				
4	Too strong limitation on access to resources				
5	Rules are not followed				
6	The local community is not enough involved in making rules				
7	Conflict resolution mechanisms are inappropriate				

8	Too weak enforcement of rules/sanctions				
9	Creates opportunities for corruption				
10	Bad management/lack of coordination				
11	Other (specify)				

C28b. If 'somewhat satisfied' or 'very satisfied' with the rules, why is it so?

No		1 Dis-agree	2 Disagree somewhat	3 Agree somewhat	4 Agree
1	My/our interests are well taken into account				
2	Clear boundaries/outsideers are kept out				
3	Equal distribution of use and benefits				
4	Good access to resources				
5	Rules are followed				
6	The local community is involved in making rules				
7	Conflict resolution mechanisms are appropriate				
8	Proper enforcement of rules/sanctions				
9	Good management and coordination				
10	Other (please specify)				

C29. Do you feel bound by the rules that govern use and management in the community forests without REDD+?

1 I feel bound by them and follow them always	2 I feel quite bound by them and follow them mostly	3 I feel somewhat bound by them and follow them sometimes	4 I don't feel bound by them and do usually not follow them	5 Not relevant to me

C30. Are you aware of any changes in the rules that govern use and management of

the REDD+ community forests in the last five years since 2010?

Codes: 1=Yes; 2=No; 3=Not aware (If 'NO' or 'not aware', GO TO C31)

C30a. If 'yes', have the changes influenced your use of community forests without REDD+?

1 It has worsened my livelihood a lot	2 It has worsened my livelihood to some extent	3 It did not have any effect on my livelihood	4 It has improved my livelihood to some extent	5 It has improved my livelihood a lot

C31. How is your relationship with the forest management committee of community forests without REDD+?

1 Very bad	4 Bad	3 Fair	4 Good	5 Very good	6. Not relevant

SECTION D: Perceptions, attitudes and norms concerning resource conservation

This section maps the changes in local peoples' perceptions, attitudes and norms about forest conservation that have occurred since 2010 when the baseline survey was done. The section highlights the importance of forest conservation within the REDD+ pilot control areas after REDD+.

D2. How do you feel about forest protection under the REDD+ project?

1 Against	2 Somewhat against	3 Indifferent	4 Somewhat supportive	5 Supportive

D2a. If 'against' or 'somewhat against', why is it so?

No	Response	1 Disagree	2 Disagree somewhat	3 Agree somewhat	4 Agree
1	It restricts my access to forests				

2	Inadequate compensation for losses				
	No access to benefits from tourists				
	Other (please specify)				

D2b. If 'supportive' or 'somewhat supportive', why is it so?

No	Response	1 Disagree	2 Disagree somewhat	3 Agree somewhat	4 Agree
1	Protection is important				
2	Protection increases long-term access to forests resources				
3	Receive compensation for reduced use				
4	Secures access to income from tourists				
5	Other (please specify)				

SECTION E: Post-REDD Analysis

The aim of this section is to gain insights about what type of REDD policies local residents prefer. The interviewer must evaluate if the below questions are of any relevance to the respondent. For example in the case of a person who does not depend on land for agriculture or does not harvest any forest wood resources (see question B11), the questions E2 and E3 below may be irrelevant.

E1. To what extent are you aware of the role forests play in climate change?

1 Not aware	2 Somewhat aware	3 Aware	4 Very aware

(If '1 and 2', GO TO E2)

E1a. If '3 and 4', what relationships between deforestation and climate change do you find especially important? _____

E2. Given the information you now have concerning REDD+ in your village, how do you evaluate the following options as a compensation for your loss of income from agriculture, fuelwood, poles/timber and/or wood for charcoal production etc

No	Types of compensation	1 Disagree	2 Disagree somewhat	3 Agree somewhat	4 Agree
1	By individual payments				
2	By increased employment opportunities				
3	By alternative sources of livelihoods				
4	By better social services in my community				
5	Combination of individual payments and social services				
6	Other (specify)				

E2a1. How satisfied are you with the compensation you have received so far?

1 Very dissatisfied	2 Somewhat dissatisfied	3 Somewhat satisfied	4 Very satisfied

If "Very dissatisfied" or "Somewhat dissatisfied" GO TO E2a

If "Very satisfied" or "Somewhat satisfied" GO TO E2b

E2a. If the respondent has answered 'Very dissatisfied or 'Somewhat dissatisfied' in question E2a1, why is it so?

No		1 Disagree	2 Disagree somewhat	3 Agree somewhat	4 Agree
1	My livelihood depends too much on the forest				
2	The forest has a strong cultural value to me and it is wrong to accept compensation to stop present use				

3	Money cannot compensate for reduced use of the forest				
4	The compensation received so far from REDD+ does not cover my loss of income				
5	Other (please specify):				

GO TO E3

E2b. If the respondent has answered ‘Very satisfied or ‘Somewhat satisfied’ in question E2a1, why is it so?

No	Response	1 Disagree	2 Disagree somewhat	3 Agree somewhat	4 Agree
1	The compensation from REDD+ will make me equally well or better off				
2	Forest protection is important				
3	It improves our environmental conditions				
4	I need more income				
5	It improves the conditions of our village/community				
6	Other (please specify)				

E2c. What commitments could you make to avoid deforestation in your community if compensated for that specific activity?

No	Response	1 Disagree	2 Disagree somewhat	3 Agree somewhat	4 Agree
1	Stop expansion of farming activity in forests				
2	Reduce wildfires in forest				
3	Stop harvesting fuelwood				
4	Stop harvesting poles/timber				
5	Stop producing charcoal				

6	Other (please specify)
---	------------------------

E3. Have the following managed REDD+ in your community well?

No	Response	1 Disagree	2 Disagree somewhat	3 Agree somewhat	4 Agree
1	Government officials				
2	The village leader(s)				
3	Specially elected village committee				
4	NGOs				
5	Other (please specify)				

E4. How do you evaluate the following issues as related to the REDD+ program?

No	Response	1 Disagree	2 Disagree somewhat	3 Agree somewhat	4 Agree
1	The overall income situation in the village/community is better				
2	Has resulted in corruption				
3	Unequal distribution of payments				
4	Payments go only to land owners				
5	There are less conflicts in the village/ community				
6	Increased privatization of land				
7	Other (specify)				

E5. Do you perceive of any other problems arising from the REDD+ program?

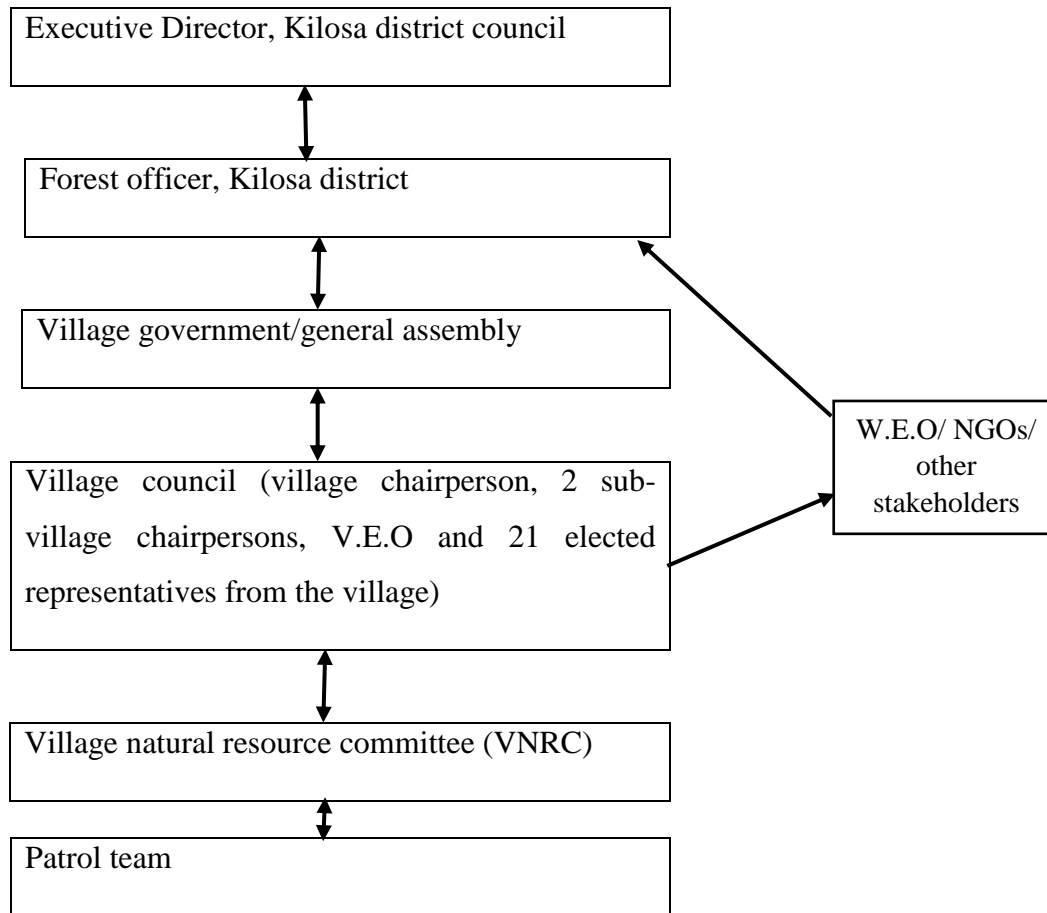
Codes: 1=Yes; 2=No

E5a. If yes, how do you think they could be best handled?

E6. How do you think REDD+ will affect the sufficiency of forest resources in the future?

No	Forest products	1 Reduce availability substantially	2 Reduce availability somewhat	3 No change in availability	4 Increase availability somewhat	5. Increase availability substantially
1	Firewood					
2	Timber					
3	Poles					
4	Charcoal					
5	Fodder (collected or grazed)					
6	Medicinal plants					
7	Wild fruits and leaves					
8	Nuts					
9	Bush meat					
10	Mushroom					

Appendix 2: Reporting Structure in Lunenzi village



Source: based on KDC (2012:21) and personal notes.

In the reporting structure shown above, the V.E.O(village executive office) and the W.E.O (ward executive officer) are government employees, the rest are elected by the villagers. The V.E.O reports to the W.E.O. (KDC 2012).

Reference:

KDC. (2012). Kilosa District Council. Management plan for protected forest in Lunenzi village. “HALMASHAURI YA WILAYA YA KILOSA. MPANGO SHIRIKISHI WA USIMAMIZI WA MSITU WA HIFADHI WA KIJJI CHA LUNENZI”. Obtained from Lunenzi village office; 24. November 2015.

Appendix 3: Reasons for dissatisfaction with pre-REDD+ & REDD+ rules

Appendix 3a: Reasons given by informants who were either ‘somewhat or very dissatisfied’ with the pre-REDD+ rules in pilot villages; in *number* of informants.

Reasons for dissatisfaction	Village	Disagree	Disagree somewhat	Agree somewhat	Agree	Total
My/our interests are not taken into account	Nyali	1	0	0	7	8
	Lunenzi	0	0	0	2	2
Unclear boundaries/outsideers are intruding	Nyali	2	0	0	6	8
	Lunenzi	1	0	0	1	2
Unequal distribution of use and benefits	Nyali	3	1	0	4	8
	Lunenzi	1	0	0	1	2
Too strong limitation on access to resources	Nyali	6	0	0	2	8
	Lunenzi	1	1	0	0	2
Rules are not followed	Nyali	3	0	1	4	8
	Lunenzi	0	0	0	2	2
The local community is not enough involved in making rules	Nyali	3	0	0	5	8
	Lunenzi	1	0	0	1	2
Conflict resolution mechanisms are inappropriate	Nyali	4	0	0	4	8
	Lunenzi	2	0	0	0	2
Too weak enforcement of rules/sanctions	Nyali	4	1	0	3	8
	Lunenzi	2	0	0	0	2
Creates opportunities for corruption	Nyali	3	0	0	5	8
	Lunenzi	1	0	0	1	2
Bad management/lack of coordination	Nyali	2	0	0	6	8

	Lunenzi	0	0	0	2	2
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Appendix 3b: Reasons given by informants who were either ‘somewhat or very dissatisfied’ with the REDD+ rules in pilot villages; in *number* of informants.

Reasons for dissatisfaction	Village	Disagree	Disagree somewhat	Agree somewhat	Agree	Total
My/our interests are not taken into account	Nyali	0	0	2	2	4
	Lunenzi	0	0	0	2	2
Unclear boundaries/outsideers are intruding	Nyali	0	0	1	1	2
	Lunenzi	0	0	1	1	2
Unequal distribution of use and benefits	Nyali	0	0	2	1	3
	Lunenzi	0	1	0	1	2
Too strong limitation on access to resources	Nyali	0	0	1	3	4
	Lunenzi	0	0	0	2	2
Rules are not followed	Nyali	0	1	2	1	4
	Lunenzi	0	0	2	0	2
The local community is not enough involved in making rules	Nyali	0	0	1	3	4
	Lunenzi	0	0	0	2	2
Conflict resolution mechanisms are inappropriate	Nyali	0	2	0	1	3
	Lunenzi	0	0	1	1	2
Too weak enforcement of rules/sanctions	Nyali	1	1	0	1	3
	Lunenzi	0	1	0	1	2
Creates opportunities for corruption	Nyali	0	1	1	2	4
	Lunenzi	0	0	0	2	2

Bad management/lack of coordination	Nyali	0	0	2	1	3
	Lunenzi	0	0	0	2	2

Appendix 4: Results of the Hausman tests

Appendix 4a: Hausman test for impact of REDD+ on gross total household income

	Coefficients			
	(b)	(B)	(b-B)	sqrt(diag(V_b-V_B))
	FE	RE	Difference	S.E.
Time (yrs.)	.0348997	-.1833732	.2182728	.131466
REDD+ (pilot=1)	.0958197	.2801567	-.184337	.1066488
Age (yrs.)	-.0124472	-.0093882	-.003059	.0140234
Gender (male=1)	1.152739	.5820015	.5707375	.5441459
Education (primary=1)	.0036162	.2107771	-.207161	.286625
Household size (no.)	.049118	.0343556	.0147624	.0306222
Social capital (index)	.0488108	.0522784	-.0034676	.0578014
Total farmed area (ha/yr.)	.294647	.2577325	.0369145	.0705877
Forest area cleared (ha/yr.)	-.1178757	.1171921	-.2350677	.1152136
TLU	.1919044	.0821955	.1097089	.1583522
Distance to the forest (min.)	.0009884	.0012476	-.0002591	.0010541

chi2 (11) = (b-B)'[(V_b-V_B) ^ (-1)] (b-B) = 12.59; Prob>chi2 = 0.3210

Appendix 4b: Hausman test for impact of REDD+ on total forest income

	Coefficients			
	(b)	(B)	(b-B)	sqrt(diag(V_b-V_B))
	FE	RE	Difference	S.E.
Time (yrs.)	.7873235	.6918952	.0954283	.1820897
REDD+(pilot=1)	.6511843	.5228343	.12835	.1555758
Age (yrs.)	.0058083	-.0084857	.014294	.019111
Gender (male=1)	.169878	.4552328	-.2853548	.729744
Education (primary=1)	.1011735	.1488422	-.0476687	.4083076
Household size (no.)	-.0575141	-.0012632	-.0562508	.0475522
Social capital (index)	.0341146	-.0387359	.0728506	.0810627
Total farmed area (ha/yr.)	.1262963	.1009628	.0253335	.1036375
Forest area cleared (ha/yr.)	-.1475573	.1660016	-.3135589	.1513044
TLU	-.3392423	-.0685411	-.2707012	.222689
Distance to the forest (min.)	.0011267	.0001815	.0009452	.0014832

chi2 (11) = (b-B)'[(V_b-V_B) ^ (-1)] (b-B) =26.48; Prob>chi2 = 0.0055

Appendix 4c: Hausman test for impact of REDD+ on total farmed area

	Coefficients			
	(b)	(B)	(b-B)	sqrt(diag(V_b-V_B))
	FE	RE	Difference	S.E.
Time (yrs.)	-.3925872	-.1098687	-.2827185	.1488839
REDD+ (pilot=1)	-.3144278	-.4395977	.1251698	.1210931
Age (yrs.)	.0218486	.0037872	.0180613	.0172165
Gender (male=1)	-.5455902	.4753848	-1.020975	.6728868
Education (primary=1)	-.9148885	-.0317681	-.8831204	.3173538
Household size (no.)	.0513724	.1134027	-.0620302	.0377167
Social capital (index)	.0061407	.1215497	-.115409	.0703407
Forest area cleared (ha/yr.)	.3957568	.3390004	.0567564	.1335107
TLU	.763293	.7897883	-.0264953	.1841165
Distance to the forest (min.)	.0011369	.0011649	-.000028	.0012771

chi2 (10) = (b-B)'[(V_b-V_B) ^ (-1)] (b-B) = 17.91; Prob>chi2 = 0.0565

Appendix 5: Some selected fieldwork photos³⁶



Photo 2: Highland topography of Lunenzi village ^đ.

đ – Photo's foreground: note soil type and crops grown (banana crops; and maize plantation in the valley). Middle ground: the left side shows burnt crop residues in preparation for next crop cultivation. Background: community forest protected under REDD+ management regime.

³⁶ source: author's photo gallery



Photo 3: Plateau topography of Nyali village.



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