ACTOR NETWORKS AND POWER RELATIONS IN FOREST LANDSCAPE RESTORATION

A comparative case study of Gishwati and Mukura Landscapes, Rwanda

MSc Thesis

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ABSTRACT

Forest Landscape Restoration (FLR) is a recent new approach in forest conservation and use. It combines the increased concerns about joint development goals and environmental protection, and aims at a compromise between needs of humans and biodiversity conservation, by promoting the restoration of forest functions in degraded areas at a landscape level. Such restoration should simultaneously enhance the ecological, social and economic functioning of forested landscapes. Even though FLR is currently receiving a lot of attention, many cases studies show that such integrated landscape restoration is complicated, and that depending on local conditions, restoration activities can have different impacts. Several studies show that actors' engagement and dialogue are the key to achieving a sustainable landscape. The various actors involved in FLR are not operating individually, but are engaged in social networks. In these networks different actors use different means and resources to influence this process. Consequently, rather than individual actors, these networks play a major role in determining whether the restoration activities are effective and how they shape the landscape. This study has as objective to explore the nature of the social networks and the relations of different actors in these networks, by comparing two cases of FLR processes in Rwanda. The two FLR cases were purposively selected in view of their different characteristics. FLR is considered to be successful in Gishwati landscape, whereas the Mukura landscape is still experiencing degradation. These differences are related to different land-use practices and different types of FLR actor networks. To explore these differences, the study was based on a conceptual framework combining notions from social network theory, theory of frames, and the concept of power. It was hypothesized that the differences in actors' composition and constellation, and the different power relations among network actors are significantly influencing the FLR processes in the two landscapes. The basic design of this study was an exploratory comparative case study. The first phase of research consisted of a preliminary general qualitative survey that helped in identifying actors involved in FLR in Mukura and Gishwati, and their respective networks. From these networks, the most important actors have been identified. The second phase of research consisted of a qualitative participatory appraisal to assess how the landscapes' communities framed FLR and how they experienced the main types of power held by the most important actors of the FLR actor networks. The results of this study showed that the differences that exist between Gishwati and Mukura FLR processes depend on the types of actors involved in FLR process, and how these actors interact between themselves and with the communities. An actor network that included all important actors related to the dominant landscape processes, and that was actively involved in FLR on the basis of a specific and well-defined focus on FLR such as reforestation, tree planting and biodiversity conservation, was conductive to effective restoration in the Gishwati landscape. In contrast, an actor network that did not reflect the major actors within the local landscape, resulting in limited connection between the FLR process and mining activities, contributed to limited restoration in the Mukura landscape. The involvement of the communities in both restoration processes is still limited, with decision making about restoration concentrated within government institutions. This lack of involvement is reflected by the prevailing forms of power used by different actors to influence FLR process, even if no major differences in the power constellations between the two cases were found. This study concludes that even if restoration is striving in Gishwati landscape, there is still limited participation of local actors. The FLR networks are often skewed with most actors being located at the national level and rather limited connections between national and local subnetworks, and informal or even illegal land-use activities, such as mining activities in Mukura, are disregarded. To achieve sustainable outcomes, the government of Rwanda as well as the international sponsors of the FLR process in Rwanda, should further promote local actors' participation in decision making process. Specific attention should be given to the involvement of all landscape actors and activities of the local inhabitants, because they are the ones who directly affect and are affected by the outcomes of restoration.

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LIST OF ABBREVIATIONS

ARCOS: Albertine Rift Conservation Society

ARECO: Association Rwandaise des Ecologistes

CIFOR: Centre for International Forestry Research

EDPRS: Economic Development and Poverty Reduction Strategy

FAO: Food and Agriculture Organization

FHA: Forest of Hope Association

FLR: Forest Landscape Restoration

GACP: Gishwati Area Conservation Program

GoR: Government of Rwanda

GPFLR: Global Partnership on Forest Landscape Restoration

GWLM: Gishwati Water and Land Management

ICDPs: Integrated conservation and development projects

ICRAF: World Agroforestry Centre

ITTO: International Tropical Timber organization

IUCN: International Union for Conservation of Nature

LAFREC: Landscape Approach to Forest Restoration Conservation

MINAGRI: Ministry of Agriculture and Animal Husbandry

MINIRENA: Ministry of Natural Resources

NGO: Non-Governmental Organization

NISR: National Institute of Statistics Rwanda

PAFOR: Projet d'Appui a la Réforestation au Rwanda

PAREF NL: Rwanda Reforestation Support Program

REMA: Rwanda Environment Management Authority

RNRA/FNCD: Rwanda Natural Resources Management/Forest and Nature Conservation Department

RNRA/GMD: Rwanda Natural Resources Management/ Geology and Mining Department

RNRA/IWRM: Rwanda Natural Resources Management/Integrated Water Resources Management

USAID: United States Agency for International Development

WRI: World Resources Institute

WWF: World Wide Fund for Nature

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1. INTRODUCTION

1.1. LANDSCAPE APPROACH

Within the context of environmental conservation, balancing development and environment has since three decades received a huge attention. The significant rise of this attention has begun with the report of the World Commission on Environment and Development on sustainable development, "Our Common Future" also called the Bruntdland report, which introduced sustainable development as "*Development that meets the needs of present without compromising the ability of future generation to meet their own needs*" (Brundtland et al., 1987). This report emphasized that development and environmental protection can be both achieved if resources are managed in a sustainable way. These ideas have gained much attention from experts, countries, civil societies and international policies (Linehan & Gross, 1998), but in spite of this worldwide attention and many approaches dedicated to implementing it, a general powerful solution to meet both nature conservation and human needs has not yet been achieved (Sayer & Campbell, 2005; Sayer et al., 2013). This failure is mainly due to the fact that the management of the environment and natural resources has been characterized by a sectoral approach, implementing apart individual initiatives of agriculture, biodiversity conservation, and development, which has been proven not to be sustainable (Godfray et al., 2010; Tscharntke et al., 2012).

A recent new approach that combines the increased concerns about joint development goals and environmental protection is the landscape approach (Sandker et al., 2012).The word landscape is used in many field of studies, such as art, biology, philosophy, history, anthropology, politics and environment, and can mean different things for different people depending on which discipline is considered. Etymologically, the word landscape is constituted with the term "land", a Germanic word translated to "I own", which shows a sense of belonging, and a suffix "-scape" that means "to shape". This suggests that the word "landscape" emphasizes the fact that the land is shaped and influenced by human activities resulting in complementary land uses and sometimes land use competition. Thus, the landscape approach is a cross-cutting approach that seeks to combine the social, economic and environmental objectives in those sometimes complementary and sometimes competing land uses, to ameliorate not only agriculture and other productive activities, but also to enhance biodiversity and environmental goals (Sayer et al., 2013).

Even if the landscape approach is focused on an integrated land use and conservation approach, it has its roots in conservation and the science of landscape ecology (Lindenmayer et al., 2008; Sayer, 2009). Since the 1980s, biodiversity conservation has been considered in a landscape context (Noss, 1983), and island biogeography has promoted early conservation theories through landscape thinking (Kingsland, 2002). As the need to integrate protected areas management with local social issues was arising, new forms of management were born, mainly integrated conservation and development projects (ICDPs), the ecosystem approach, and many other landscape initiatives developed by conservation NGOs . Nowadays, many landscape initiatives have combined a variety of sectors in the search of integrating single sector biodiversity conservation, agriculture, and other land uses within broader landscape management strategies (Reed et al., 2015).

As developments in the landscape approach continue to materialize, ten landscape principles that characterize the landscape approach have been put together to help the process of decision making at the landscape level. These principles emphasize that there should be adaptive management, stakeholders' engagement and dialogue, and multiple objectives in order to achieve sustainable outcomes at the landscape level, where agriculture and other

productive land uses are in competition with biodiversity and environmental goals (Sayer et al., 2013). A summary of these 10 landscape principles is provided in appendix 1.

1.2. FOREST LANDSCAPE RESTORATION AS A LANDSCAPE APPROACH

One of the landscape approaches that is currently being promoted by world major international organizations, mainly the International Union for Conservation of Nature (IUCN), the World Resources Institute (WRI), the World Wide Fund for Nature (WWF) and the International Tropical Timber organization (ITTO), is Forest Landscape Restoration (FLR). This concept takes into account the compromises between needs of humans and biodiversity, by promoting the restoration of forest functions at a landscape level in degraded areas. The concern of restoring forest functions has been trigged by the global problem of deforestation and land degradation, where it is estimated that more than 2 billion hectares of land have been deforested and degraded all over the world (FAO, 2014). The main causes of deforestation and land degradation are logging of commercially valuable timber, fires, excessive removal of non-timber products, clearing to expand agricultural lands, and pollution caused by oil firms and mining (CIFOR, 2015). Because of this degradation, these lands have lost their ability to provide necessary resources and services to people and to the planet. Deforestation has conducted to the release of tons of millions of greenhouse gasses in the atmosphere which is leading to global warming. In addition to this, deforestation and land degradation have heavily impacted local communities who rely on forests as source of food and income, and have heavily contributed to the loss of forest biodiversity. It has also resulted in the loss of forest regulation services that positively impact on other land-uses such as hydrological and micro-climate regulation.

It is in the search of addressing the above issues that FLR aims at regaining ecological integrity of deforested and degraded lands, and to improve human well-being, by combining existing principles and techniques of development, conservation and natural resources management (IUCN, 2015). To achieve this, FLR joins both the planning and implementation of measures to restore degraded forests in a broader perspective of the wider landscape (van Oosten et al., 2014). This means that FLR can be a way of implementing the landscape approach on actual sites, by emphasizing the combination of restoration of ecological services of lands that shelter different land uses like agriculture, mining, protected areas and so on. FLR does not imply that it will necessary bring back forests to their original states, but rather emphasizes the restoration of the functionality of the forests in terms of biodiversity, ecological functionality, livelihood and income (Sayer et al., 2013). To achieve positive outcomes, FLR calls for necessary considerations about who should be engaged in the processes at the landscape level, by promoting the participation of local communities because they play an important role in shaping the landscape, and they are the ones who will benefit from restored forest resources and services (van Oosten et al., 2014).

In 2011, the largest restoration initiative has been launched by the world leaders in Bonn, Germany and was named the Bonn challenge. This challenge has an ambitious target of restoring 150 million hectares of degraded and deforested lands by the year 2020. Since it was launched, the Bonn challenge has seized the world attention and currently several governments, private sector and community groups have shown their interest in achieving this challenge by pledging the restoration of 20 million hectares (GPFLR, 2013). In addition to this, following the Rio+20 United Nations Conference on Sustainable Development in 2012, the Bonn challenge has been voted by more than one million people as the most important forest intervention, and the second most important overall intervention, after sustainable energy, that global leaders should support (GPFLR, 2013). Currently, some millions of hectares of degraded land have already been identified for restoration under this pledge. One of the countries that have already made a commitment of restoring its degraded lands under the Bonn challenge is Rwanda, where it pledged to restore 2 million hectares (Bonn Challenge, 2015). It is in this regard that Rwanda was used as a case study in this research, to help explore how FLR is being operationalized on the field.

1.3. FOREST LANDSCAPE RESTORATION: A CASE STUDY OF RWANDA

Rwanda is situated in the eastern part of Africa, on the Congo-Nile divide, an area known for its richness in biodiversity. Most of the country's biodiversity is conserved in protected areas. Among those protected areas are three national parks, volcanoes, Akagera and Nyungwe national parks, two forests reserves, Mukura and Gishwati, and natural forests remnants scatted all over the country. All these forests are under the management of the state, but have different protection status, with the highest protection being the national park status, and the lowest being the remnant natural forests (MINIRENA, 2013). Apart from their rich biodiversity, due to their location on the Congo-Nile-divide, the Rwandan natural forests serve as main sources of water for the country. The Nyungwe national park is the country's major watershed for both the Nile and Congo basins. The other natural forests also host many river sources (USAID, 2008). Economically, the conservation of the Rwandan biodiversity in protected areas has increased the country's incomes, as it forms the basis for ecotourism, which represents the largest foreign exchange earner in the country, even larger than coffee and tea exchange (Nielsen & Spenceley, 2010). Though the country have protected forests, with considerable ecological and socio-economic benefits, a trend of forest cover reduction has been observed all over the country. This reduction in forest cover was mainly the result of legal degazettement of some parts of protected forests, authorized by the government, to provide land cultivation and settlement areas for the country's growing population, or due to illegal encroachment of the forests to expand agricultural land (Weber, 1987; USAID, 2008; Nyandwi & Mukashema, 2011). In fact, Rwanda has one of the highest population density in Africa, with 441 inhabitants per square kilometer, where the population density has more than doubled between 1978 and 2012 (NISR, 2012). More than 90% of Rwandese rely on subsistence farming, implying that they directly rely on land and other natural resources, which drastically contributes to land use change and land degradation. Forests are severely affected by this high population density because they represent free space where other land uses can expand.

The reduction of forested lands in Rwanda has resulted in a significant loss of biodiversity and forest services that are crucial to people. This drastic forest loss was mainly observed in two forests reserves, Mukura and Gishwati. Mukura forest reserve is situated in the Northern-West part of Rwanda. When it was created in 1951, it had a total area of 3,000 ha, but due to human activities, the remaining forest currently covers only 1,798 ha, which means that around 40% of the total area was lost (Kasangaki, 2012). Gishwati forest reserve is also situated in the Northern-Western part of Rwanda. It is believed that this forest was connected to the Mukura Forest reserve, Nyungwe National Park and the Volcanoes National Park, before humans started to deforest the area (Musabyimana, 2014). When it was created in 1951, the original area of Gishwati reserve forest was 250,000 ha, but as years went by, a drastic reduction of forest cover has been observed. During the Genocide against Tutsi in Rwanda in 1994, a lot of refugees were settled in Gishwati and cleared it in a way that by 2007, the remaining small patch of forest was only 886 ha, meaning that more that 99% of the forest was lost (Nyandwi & Mukashema, 2011). This forest loss did not only result in a tremendous biodiversity loss, but also exposed the denuded land to soil erosion and landslides, which negatively impacted the people who lived there. It is was estimated that if deforestation and land degradation continued at that rate, both the Mukura and Gishwati forest reserves would be completely lost by the year 2020 (Musabyimana, 2014).

To tackle the problem of forest loss and forest degradation, recently several restoration initiatives have been started, supported by the fact that environmental protection has received a centre attention in the development plans of Rwanda. The national constitution states that *"Every citizen is entitled to a healthy and satisfying environment. Every person has the duty to protect, safeguard and promote the environment. The State shall protect the environment. The law determines the modalities for protecting, safeguarding and promoting the environment"* (GoR, 2003). To implement this constitutional principle, the Rwandan Vision 2020 and the Economic Development and Poverty Reduction Strategy (EDPRS) serve as an umbrella to achieve a sustainable development of the country and its people by setting clear goals for the various more specific sectoral development policies. Some of the

sectoral policies that focus on environmental and restoration activities are the National Forest Policy, the National Environment Policy, the National Land Policy and the National Water Resources Management Policy. In 2011 Rwanda indicated its commitment to FLR by signing an agreement with the Bonn challenge to restore 2 million hectares of degraded land and forests in the whole country by 2020 (GPFLR, 2013). Even though there is not yet a policy specific for FLR, significant restoration projects and activities have already started in the country. Gishwati and Mukura landscapes have received a particular attention in these restoration initiatives, mainly because of their degradation history and their geographic situation along the Congo-Nile divide, as well as between the main two national parks of the country, the Volcanoes National park and Nyungwe national park, which are believed to have historically formed one forest complex. In addition to this, early this year, the remaining Mukura and Gishwati forests reserves have been gazetted to become the 4th Rwandan national park, in order to enhance their protection and restoration, and to increase a better livelihood in the forests' broader landscapes (GoR, 2016).

Even though Mukura and Gishwati have a similar geographic situation and biodiversity importance, a similar history in what concerns their protection, deforestation and forest degradation, and even if they present the same opportunity in what concerns policies that favour their restoration, the present condition of the two landscapes is not the same. In general, communities around Mukura forest reserve live mainly on agriculture, cattle rearing, logging and bee keeping (Musabyimana, 2014). Additionally, many people who live around Mukura forest reserve practice mining, in the interior and outside the forest, which is an important economic activity in the area (Musabyimana, 2014). Mining activities in Mukura focus on Coltan, Cassiterite and Wolfram, mines used in electronic devices like computers and telephones. Because of this intensive mining, Mukura forest reserve and its surrounding are subject to a severe degradation. Mining also contributes to the pollution of rivers that serve as sources of water for local population.

Apart from the community living near Mukura forest reserve, several other actors operate in the local landscape. Some of these include local authorities, local businesses like tea, coffee and mining companies, government institutions as well as NGOs that have the protection of environment in their mandates. A local NGO, the Association Rwandaise des Ecologistes (ARECO) has initiated a conservation programme with local communities around Mukura forest reserve and has produced a three year management plan for this forest, but it was not implemented due to lack of funds. Another regional NGO called Albertine Rift Conservation Society (ARCOS) has carried out explorative studies which showed that in the Mukura landscape, ecosystem goods such as water and non-timber products such as firewood, are already over-exploited and that no restoration activities are currently going on (ARCOS, 2012).

In contrast, the community living near Gishwati forest reserve is predominantly composed of cultivators and cattle keepers. Only a few cases of mining activities are present outside the remaining Gishwati forest reserve, but these are not as pronounced as in the case of Mukura forest reserve (Musabyimana, 2014). However, several agricultural businesses related to tea plantation, logging, milk dairies… are also present near Gishwati forest reserve (NISR, 2012). And in contrary to Mukura, Gishwati has received much attention of conservation organizations for planning and implementing restoration activities. These organizations include both the government, local and national organizations, and international NGOs. The initiatives of these different organizations have contributed to a reduction of degradation and forest loss, and have increased the forest cover of Gishwati. One of the first interventions to restore Gishwati was taken by the government of Rwanda through its project called Projet d'Appui a la Réforestation au Rwanda (PAFOR) between 2005 and 2008. The activities of this project increased the area of the remaining forest from 600 ha to 886 ha (FHA, 2012). Between 2007 and 2012, another restoration program, called Gishwati Area Conservation Program (GACP), came to support PAFOR activities, as a result of cooperation between the Rwandan president Paul Kagame and Great Ape Trust, funded by Ted Townsend. This program protected the remaining patch of the Gishwati forest, and increased its area from 886 ha to 1, 464 ha through natural regeneration (FHA, 2012). This program involved local community in the management of the forest by employing them as eco guards and by promoting new sustainable livelihood practices. When this program ended,

a local NGO called Forest of Hope Association (FHA) took over the work, and continued to work with the communities.

Between 2010 and 2014, another restoration initiative has been implemented by the Ministry of Agriculture and Animal Husbandry (MINAGRI) in collaboration with the Ministry of Natural Resources (MINIRENA), under government funds. This initiative, named Gishwati Water and Land Management (GWLM), concentrated its activities on the deforested area of the former Gishwati forest. It divided the area into three land uses according to their fragility; crop land which beneficiated from radical terraces and agroforestry systems, range land which beneficiated from improved grass planting and shade trees, and forest land which has been planted with indigenous and exotic tree species. Channels to canalize water in the area and some roads have also been rehabilitated, and local communities have been sensitized on sustainable land use techniques (MINAGRI, 2010). It was not until the end of 2014 that a project interested in restoring the entire Gishwati and Mukura landscapes emerged. This project is called Landscape Approach to Forest Restoration Conservation (LAFREC) and is funded by the World Bank. Even if it has not yet started operating on the field, its main focus will be restoring forests and biodiversity in Gishwati and Mukura forests, enhancing sustainable land management in agricultural lands between the two landscapes and introducing silvo-pastoral approaches in rangelands of Gishwati landscape (World Bank, 2014). Even though, as it is shown above, these two landscapes have several comparable features, there are also important differences, notably in respect to the predominance of mining in Mukura and restoration programmes in Gishwati. Consequently, some similar and some different actors are present in the two landscapes.

1.4. PROBLEM STATEMENT

Even though FLR is currently receiving a lot of attention as a response that will enhance simultaneously ecological, social and economic needs in landscapes, cases studies on the field show that it is more complicated than it seems, and that restoration is not a *one-size-fits-all* solution. Depending on the local conditions, implementing restoration activities can have different social impacts. For example, it has been shown that restoration activities can intensify conflicts over the rights of access to resources and land use (Sikor & Lund, 2009; Dressler *et al*., 2012), and that it can push the state to increase the control over the degraded forests (Barr & Sayer, 2012). In response to these issues, several studies have tried to put together principles and guidelines that landscape approach initiatives could follow in order to achieve positive outcomes. Sayer et al. (2013) identified ten landscape principles in which actors' engagement and dialogue are indicated as important pillars in achieving a sustainably managed landscape. This implies that different landscape actors have to participate in decision making, at different scales and levels. This makes the decision making process quite complex, not only because of divergent actor interests, but also negotiation may become intensive when trade-offs have to be made. Thus, knowing who takes which decision in what concern landscape activities, in our case FLR, becomes even more important.

In the case of Gishwati and Mukura landscapes, we have seen that landscape actors are partly similar, and partly different. Due to the fact that both landscapes are located in the same province, and share some districts, governmental actors, especially local authorities, are largely the same. Because of their protection status, they also share some similar actors in the form of organizations stimulating conservation, restoration and management. When we consider local actors, some differences can be distinguished. In Gishwati landscape, there are a lot of actors involved in restoration, from local to the international level, whereas in Mukura landscape there are two local NGOs weakly involved in restoration. In addition to this, the Mukura landscape harbours another type of actor, which are mainly private mining companies. This implies that activities taking place in these two landscapes, especially restoration activities, will be confronted to a variety of actors, which may result in different outcomes in the two landscapes.

The various actors in a landscape are not just operating individually, but they are involved in social networks. Rather than individual actors, these networks play a major role in determining what happens in the landscape and what does not. Many studies have shown the importance of involving different actors in natural resources management (Anderson et al., 1999; Ramirez, 1999; Burroughs, 1999; Duram &Brown, 1999; Varvasovszky & Brugha, 2000; Selin et al., 2000) and in landscape restoration (Sayer et al., 2013, van Oosten, 2013, van Oosten et al., 2014), and thus, it is important to understand the interests and roles of those different actor categories in FLR, especially their mutual relations in the landscape. Understanding actor networks is crucial, especially the fact that those networks can even be more important than the existing formal institutions in relation to decision making on environmental issues (Scholz &Wang, 2006). Analysing and understanding actor networks can therefore assist in ameliorating collaboration and coordination of the different network actors in issues concerning natural resources management (Bodin et al., 2006; Bodin & Crona, 2009; Prell et al., 2009). Thus, studying the different actors networks of Mukura and Gishwati FLR processes would permit a better understanding of who are the different actors involved in restoration activities in the two areas, how they are interconnected , and how this interconnectedness influence restoration activities in both landscapes.

There are many relationships that link actors in their networks and one of the most frequently studied relationship is power. Even if the concept of power has been applied in many fields of study, there is not one single understanding of this concept (Lukes, 1974; Baldwin, 2002). Many studies focus on power at the individual level, as something which is held by certain actors. This approach does not consider how power is situated in its broader social context, such as networks, as something that impacts and is impacted by the whole actor network. This approach is used in most studies in natural resources management which are specifically focused on decentralization, considering governments, local authorities and communities as major units of analysis (for example: Bratton, 1990; Ribot, 2002; McConnell & Sweeney, 2005). Although strongly recommended by different authors (Colfer, 1995; Sithole, 2002; Diaw & Kusumanto, 2005; Krott et al., 2014), understanding different power relations in and between networks is an issue that has not yet received much attention. This is also relevant to the issue of FLR. Currently, some studies have started to explore the concept of power in actor networks engaged in community forestry development. These studies indicate the importance of understanding the concept of power, how it is linked to different actors in a social network, and its impact and implications. That is why these authors recommend the exploration of the concept of power in other domains of natural resources management (Devkota, 2010; Maryudi, 2011; Schusser et al., 2013, Krott et al., 2014). In the case of FLR, which entails the involvement of a variety of actors and their complex networks, analysing actors' power used to influence this process has the potential of providing a significant understanding of how decision-making and implementation are made. Thus, knowing the power relations of different actors can contribute to determining the right actors hampering or fostering FLR, and which specific actors need to be empowered, to come to informed and inclusive decision making regarding objectives and methods of FLR. In addition to this, exploring power processes of FLR would enrich the scientific knowledge about what, how, and for whom to restore.

1.5. RESEARCH OBJECTIVE AND RESEARCH QUESTIONS

1.5.1. RESEARCH OBJECTIVE

The aim of this study was to explore relations that exist between actors in the networks of Gishwati and Mukura FLR processes. It was expected that the differences in actors' composition of both networks, and the different power relations among network actors, have differently impacted, and are still impacting restoration processes in Gishwati and Mukura landscapes.

1.5.2. RESEARCH QUESTIONS

In order to be able to achieve the general objective of this study, research questions have been generated, based on the theoretical framework of this study developed in chapter 2.

The general question: “How are FLR processes in Mukura and Gishwati landscapes influenced by the actors involved”?

The sub-research questions:

1. Who are the actors involved in the Mukura and Gishwati FLR process, and how are those actors connected?
2. Who are the most important actors of Mukura and Gishwati FLR actor networks?
3. Which different FLR frames are recognized by the communities of Mukura and Gishwati?
4. What kind of power do the important actors of FLR actor networks exert on the communities of Mukura and Gishwati?
5. How are the differences in actor networks and their power reflected in the FLR processes of the Mukura and Gishwati?

2. THEORETICAL FRAMEWORK

This study was based on three theories that constituted the analytical framework. First, the social network theory was used to show how different actors of Mukura and Gishwati FLR processes are connected. Second, the theory of frames was used to see how the communities of the two landscapes frame FLR. Lastly, the concept of power was used to understand what types of power important actors of the FLR actor networks exert on the communities of the two landscapes. This analytical frameworks is detailed below.

2.1. SOCIAL NETWORK THEORY

There is a great recognition of the importance of involving different actors in environmental and natural resources decision making, which is shown by the increased interest in analysing their involvement and their different roles in what concerns environment and natural resources issues (Burroughs, 1999; Varvasovszky & Brugha, 2000; Duram & Brown, 1999; Selin et al., 2000). However, what is sometimes omitted is to look beyond the different roles of the actors as individuals apart, and examine the relations that exist among them and how they are situated in the network of other different actors (Scott, 2000; Wasserman & Faust, 1994; Wellman & Gulia, 1999). Social network analyses have provided a best way to analyse those relations that link different actors in any social network.

A social network is a social structure made by social actors, who are either affected or affect the functioning of the system. They can be individuals, communities or institutions of any size, and operating at different levels. Thus, these actors can include government institutions, local authorities, communities, business groups, churches, civil society and so on. These actors are connected together by ties which can represent their common interest, religion, financial exchange or any other social link (Wasserman & Faust, 1994). Social network analysis stems from the network theory which considers that social life is the result of relationships and patterns created by those relationships. This theory views actors as nodes within a network, and relationships between the actors as ties that link them together (Scott, 2012). Social network analysis has become a key method of analysis in sociology, and has gained important attention in other research domains such as anthropology, communication studies, geography, psychology, biology and so on. Social network analysis has now developed its own theoretical statements, approaches, analysis software and researchers.

A key important aspect of network theory is that it does not focus on individual actors as separate elements to be analysed apart, but rather focus on how ties that link the different actors are structured and how they affect the individual actors (Scott, 2000; Wasserman & Faust 1994; Wellman & Gulia, 1999). This permits not only the understanding of how interactions between the different network actors either facilitates or constrains individual actors, but also how these interactions generate the properties of the social network as whole (Wasserman & Faust, 1994). This means that the social network approach is based on the fact that social ties, linking the different actors together, form patterns that create consequences affecting those actors. Thus, social network analysis permit to determine conditions under which those patterns rise and what their consequences are. This is why this approach was very important for the current study, compared to other social theories that emphasize only the importance of individual actors. Network theory emphasis is on the connections and relationships that link different actors of a network. This way, it gives an alternative view that can be used to better understand different real world phenomena, by understanding not only the actors but also the relationship that link them together.

Social network analysis has been used in some studies concerning natural resources management and environmental issues. Moreover, many researchers have identified social network analysis as an important approach to analyse situations in which different actors have to jointly and collaboratively deal with natural resources problems (for example: Gunderson, 1999; Pretty & Ward, 2001; Folke et al., 2005; Bodin et al., 2006; Hahn et al., 2006; Olssonet al., 2008; Bodin & Crona, 2009; Prell et al., 2009; Stein et al., 2011). In addition to this,

it has also been shown that actor networks can even be more important than the existing formal institutions in what concerns decision making on environmental issues (Scholz &Wang, 2006). In a social network analysis different aspects can be measured. In natural resources management, Degree centrality and Betweeness centrality are the two forms of social network measurements that have been identified as playing an important role (Prell et al., 2009). **Degree centrality** shows how many others an actor is directly linked to in a network (Wasserman & Faust 1994). Actors with a high degree centrality are considered as important elements who mobilize and bring other actors of the network together. **Betweeness centrality** shows how many times an actor is positioned between two other actors of his network, who are themselves not connected (Wasserman & Faust, 1994). Actors who have a high betweeness centrality play a broker role, by bringing together actors of the network who would be otherwise disconnected, and thus bridge segments of the whole network together (Bodin et al., 2006; Prell, 2003).

The current study used social network analysis to understand actor networks involved in the process of FLR in Gishwati and Mukura landscapes, and used degree centrality and betweeness centrality measurements to determine the important network actors.

2.2. FRAMING FOREST LANDSCAPE RESTORATION

FLR calls for necessary considerations of actors engaged in all landscape processes because they play an important role in shaping the landscape (van Oosten et al., 2014). In the ten landscape principles, it is recognized that many different issue frames and objectives are articulated in the landscape mainly due to the presence of multiple actors (Sayer et al., 2013). This is expressed in principle 5 that deals with multi-actor frames and objectives, in principle 2 which shows the need of having a common entry point in issue related to the landscape, and principle 6 which shows how transparency in landscape related issues is achieved through a mutually understood and negotiated process (Sayer et al., 2013). All this shows the importance of having a common understanding about all issues related to the landscape, even if the different actors do not necessarily have the same interests. Particularly, it has been shown that in order to achieve positive outcomes in what concerns FLR, the promotion of the communities' participation is necessary, because they play an important role in shaping the landscape and they are the ones who will benefit from restored forest resources and services (van Oosten et al., 2014). It is in this regard that even if the definition of FLR is available in literature, the different meanings of FLR to the communities who are the primary users of the landscapes, had to be understood.

Framing refers to how individuals, groups and societies perceive, construct, represent and interpret reality (Goffman, 1974; Dewulf et al., 2009). It is a process of sense making that develops through interaction with actors and their surroundings to give meaning to different phenomena (Dewulf et al., 2009). Thus framing is part of reality construction through which different actors understand, interpret and react to the situation differently, and exclude/include different things in their activities. In the landscape, the presence of multiple actors suggests that they have different frames about what FLR is. This is due to the fact that the interpretation of what reality is, is mostly based on those actors' different backgrounds and interests (Weick, 1995). The different frames of the actors about FLR permit them to have a specific position in all landscape processes by emphasizing what is important to them, which guide them to strategically set their future plans and actions in the landscape (Leone, 2015)

There are Many theories on framing available (for example: Capek, 1997; Benford & Snow, 2000; Dewulf et al., 2009), but there is a lack of insight in how landscapes are framed by the different actors involved, and how this influences decision making on specific objectives and methods for FLR (Leone, 2015). Traditionally, there are two main categories of framing. The first one refers to framing as what people think as something located in their minds. This is referred to as cognitive framing. The cognitive framing "emphasizes the way in which frames are stored and represented in the memory" (Aarts & Woerkum, 2006). From this point of view, frames represent the external world in a biased way compared to the accurate representation because of the background and interest of a specific

person (Dewulf et al., 2009). This means that cognitive framing represents what individual people believe is the reality but not necessarily the reality. The second category refers to framing as a strategic move to guiding what others think, and is called the interactional framing. "Interactional framing focuses on the enactment of frames in ongoing interaction between actors" (Aarts & Woerkum, 2006). It is a co-construction process in which meaning is determined by the actors' communication (Dewulf et al., 2009). This means that interactional framing represents the sense making of the interactions between actors in a certain event. There has been many arguments about separating or combining these two approaches (Aarts & Woerkum, 2006; Dewulf et al., 2009), but a complimentary approach, integrating both stand points on framing has been highly recommended. Combining both approaches to framing would permit the understanding of the framing process, taking into account actors' considerations on the context, content and process involved (Aarts & Woerkum, 2006).

This study used both types of framing, namely cognitive and interactional framing. This study was not particularly focused in detail on how actors frame FLR, as this has been done in previous studies (see Leone, 2015) covering FLR in Rwanda. In the current study, focus was on the actual understanding of FLR of the communities in both Mukura and Gishwati. This was done in order to better understand the types of power as they have been identified by the communities within the two landscapes (see chapter 3).

2.3. THE CONCEPT OF POWER

One of the important pioneer of power theories is Max Weber, who defined power as the aptitude of an actor within a social relationship to accomplish their own goals when others are trying to prevent them from realizing those goals (Weber, 1947). He emphasizes that power is the chance that an actor will realize his/her own will even if there is resistance from the recipient of power. This means that in order to break down this resistance, there must be use of force. Robert Dahl's theory of *"community power"* continued to explore power in Weber's approach, in terms of definition and attributing power to human actors. According to Dahl's theory, power is excised by a particular individual in a community while other individuals are prevented from doing what they prefer to do (Dahl, 1957). This theory presents power in terms of relations among people; for example an actor A has power over an actor B in a particular community setting. In this case, the excised power by actor A will cause actor B, subject of power, to follow the preferences of actor A who has power in that particular setting. This view of power by Robert Dahl has received criticism mainly from Peter Bachrach and Morton Barazt (1962) with their model of two faces of power, suggesting that there is a visible face of power, the way decisions are made, and the invisible face of power, the ability to prevent decision making. In addition to this, Steven Lukes (1974) added a third dimension of power, the hidden face of power, which is exercised by some actors over others because of their position in social structure. In natural resources management, these three dimensions of power have been studied. Coercive power is the one that is widely studied, and is referred to as the first dimension of power (Lukes, 1974). This power has been illustrated most of the time by examples of forced displacement of local people in the name of protected areas creation and it has resulted in negative social impacts (Hitchcock, 2002; Taylor, 2002; Fortwangler, 2003). The second face of power is illustrated by the fact that some issues related to natural resources management are excluded from the agenda to ensure their inaction by non-decision making about them (Raik et al., 2008). Studying the third face of power has conducted to supporting local participation in natural resources management, by considering that locals are disadvantaged due to their social position. This resulted in decentralization of the management of natural resources. Nevertheless, Raik et al. (2008) argue that most of these studies focus on the social conflict and the conflict mitigation that are the result of the struggles over power, but do not explore the mechanisms of power itself. In the late 50s, French and Raven (1959) had already presented power in a broader way, as a potential for social influence. They considered social influence to be the change in the belief, attitude, or behaviour of a person (the target of influence), resulting from the action of the influencing actor. In this case, social power was considered to be the aptitude of the actor who has power to bring about such change, using the available resources.

In the current study, the concept of power has been defined by combining the three views on power. Firstly, Dahl's point of view that power is a social construct that exists between two actors, and that there is a powerful actor who exercises his power over a powerless actor in a certain social setting. Secondly, the point of view of Weber that power is exercised against the will of the powerless actor was also used in a more general sense; not only considering that there must be use of force, but rather in the sense that there is presence of power, if the powerless actor would do otherwise in the absence of the influence from the powerful actor. Thirdly, the view of French and Raven, that power is a social influence, was the basis of my definition of power because it defines power in a way that broadens Weber's view, by permitting not only the consideration of force as the only social influence, but also other social relations that can conduct to the behaviour change of the powerless actor due to the powerful actor's influence. Considering the above explanation, I defined power as ***"a social relationship in which the powerful actor change the behaviour of a powerless actor without recognizing the latter's desires".*** This social relationship between the powerful and powerless actor is the source of power, without it power is inexistent.

The general understanding of power is that it is a social construct manifested when there is interaction between people. Therefore, power is relative; it is not a static characteristic of an actor and it cannot be said that one actor has a certain amount of power. This means that to assess the power of an actor, one must find out how strong or weak that actor is with respect to other actors within a given social setting, and considering the achievement of certain goals (Schiffer, 2007). For example, in the case of the current study, what type of power actors have was assessed considering the landscape of Mukura and Gishwati (social setting), in what concerns FLR (goals to be achieved). This suggests that a certain actor could be identified as powerful in influencing a certain social setting to achieve certain goals, in our case FLR, but be powerless in influencing other goals, for example decision related to private investments, because of the change in the social setting and goals to be achieved. Power itself is not visible, but considering the social relationship between the powerful and the powerless actor can help in understanding it. Etzioni (1975) suggested that in order to distinguish different types of power, the means and resources that the powerful actor uses to make the powerless actor comply, can provide information about which type of power is being used. As the social influence that exists between the powerful and powerless actors constitutes the source of power, it is critical to understand the different sources of power, which conduct to that social influence and thus to the existence of power. French and Raven (1959), and Raven (1965) distinguished six bases (sources) of power. These bases of power differ from each other according to how the social change between the powerful and the powerless actors is realized, the durability of such change, and the ways every base of power is established and sustained. Those six bases of power are grouped into three categories (adapted from Raven, 2008):

First, **there is power that conducts to socially independent change.** In this category, we find *informational power*. In this case, the powerful actor explains to the powerless actor how things should be, and the latter accepts the reasons given to him and change his behaviour. This base of power conducts to socially independent change in the way that the changed behaviour of the powerless actor will continue operating without the latter referring to the powerful actor who initiated the change.

Secondly, there is **power that results in socially dependent change which requires surveillance from the powerful actor.** In this category, there are two bases of power; ***Reward power*** that results in the aptitude of the powerful actor to offer a positive incentive or motivation to the powerless actor so that the latter can comply; and ***Coercive power*** in which the powerful actor threatens the powerless actor with negative penalties and/or force in order to make him comply. In these two cases, power is said to be socially dependent because the powerless actors will comply by relating to the rewards or penalties that they will get from the powerful actor. In addition to this, coercive and reward powers require surveillance from the powerful actor because the powerless actor will comply if and only if he thinks that the powerful actor is going to reward or penalize them in the absence of compliance. For this, the powerful actor has to keep on effectively surveying the compliance of the powerless actors.

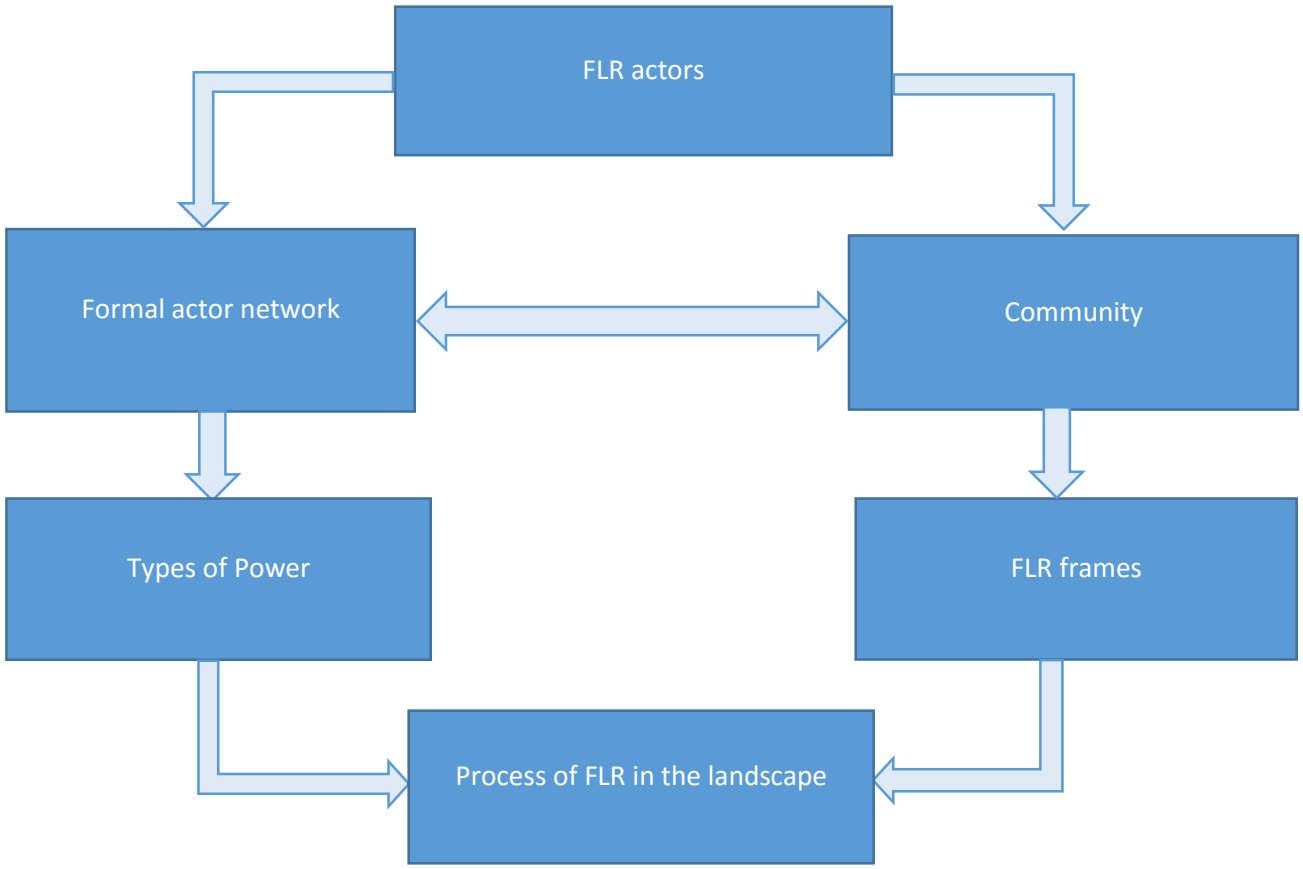
The third category is that of **power that conducts to socially dependent change, but does not require surveillance from the powerful actor**. In this category, there is ***legitimate power*** which is the result of social norms that require the powerless actor to comply with the request of the powerful actor. The powerless actor accepts that the powerful actor has the right to ask for behaviour change and that he (the powerless actor) must comply. ***Expert power*** is also part of this category. In this case, the powerless actor believes that the powerful actor is more knowledgeable about what is the best to be done in a certain situation. Expert power differs from informational power in the way that here, the powerful actor is considered as someone who understand the subject in question, and this faith that the powerless actor has into the powerful actor makes him change his behaviour. Lastly, in this category, there is also ***referent power***. In this case, the powerless actor identifies herself/ himself with the powerful actor by seeing him as a role model that he can imitate. These three bases of power (legitimate, expert and referent) conduct to socially dependent change in the sense that in order to comply, the powerless actor still take into account the influence of the powerful actor. While complying, the powerless actor keeps in mind why their behaviour has changed, and without the influence of the powerful actor, their behaviour change would not make sense. But though the powerless actors still refer to the powerful actors to maintain their behaviour change, in these three cases, it does not require that the powerful actors keep on monitoring their compliance.

As this study analysed power in actor networks, only power that results in socially dependent change (reward, coercive, legitimate, expert and referent powers) was considered. In socially dependent change, the relationship between the powerful and powerless actor is maintained, and the changed behaviour of the powerless actor is kept because of the influence of the powerful actor. Without recognizing this influence, the powerless actor cannot maintain the changed behaviour. Analysing power that lead to socially independent change (information power) in an actor network is out of the scope of this study because in socially independent change, powerless actors do no longer refer to the influence of the powerful actor as the origin of his behaviour change; behaviour change still exists without further implication of the powerful actors of the network. Thus, studying power that conducts to socially independent change (informational power) would not contribute to understanding the power relations among a network of actor.

2.4. OVERALL CONCEPTUAL FRAMEWORK

The current study used figure 1 as its general conceptual framework.

FIGURE 1: GENERAL CONCEPTUAL FRAMEWORK



3. RESEARCH METHODOLOGY

3.1. GENERAL RESEARCH DESIGN

The basic design of this study is a comparative case study between Mukura and Gishwati FLR processes. Comparative case studies involve two or more cases, to generate information on how and why certain programs or policies initiatives have worked of failed. This involves the exploration of features that contribute to the success or failure of these programs (Goodrick, 2014). Comparatives case studies analyse differences, similarities and patterns of the studied cases by using either qualitative or/and quantitative approaches (Goodrick, 2014). The approach used in the current study was an exploratory one. An exploratory comparative case study can be used when the situation studied have no clear single set of outcomes (Yin, 2003). In addition to this, a flexible and learning approach was also used to better accommodate certain issues that arose during fieldwork.

In view of its explorative nature, the current study consisted of a preliminary general qualitative survey that helped in identifying actors involved in FLR in Mukura and Gishwati landscapes and their respective networks. From these networks, the most important actors have been identified. It was followed by a more specific qualitative participatory appraisal in which the local communities of the two landscapes framed FLR, and identified the main types of power the most important actors of the FLR actor networks hold.

3.2. STUDY AREA: MUKURA AND GISHWATI LANDSCAPES

The study area was composed of two landscapes associated to Mukura and Gishwati forests reserves situated in Rwanda (figure 2), and were defined according to Rwandan administrative units, namely districts and then sectors, which fall under the former extend of the two forests reserves (figure 3). This was done to ease the delineation of the landscapes of Mukura and Gishwati, as there are no defined boundaries of the two landscapes.

Mukura Forest is a highland forest located in the Western Province of Rwanda. Administratively, Mukura Forest Reserve falls into two Districts; Rutsiro District (in Mukura and Rusebeya sectors), and Ngororero District (in Ndaro sector). This forest suffered from human threats including land degazettement for agriculture and human settlement, wood cutting, animal grazing, poaching and mining. All these threats conducted to its size reduction, from 3,000 ha in 1960 to the current size of 1,798 ha (Kasangaki, 2012). Gishwati Forest Reserve has a long history of deforestation and degradation. When it was created in 1951, Gishwati forest reserve had an area of 250,000 ha, which dropped to 65,000 ha in 1970, and by 2007 only 886 ha were remaining. This drastic loss was caused by a large scale cattle raising scheme, resettlement of refugees after the 1994 genocide against Tutsi, inefficient small-plot farming, free grazing of cattle, cutting native trees to get wood and make charcoal, and plantations of exotic trees (Muvara, 2011). The remaining part of Gishwati forest reserve is also situated in Rutsiro District, in four sectors; Nyabirasi, Kigeyo, Ruhango and Mushonyi. To this remaining forest has been added 578 ha as part of restoration of this forest, increasing its area to 1464 ha. In addition to the remaining patch of the natural forest of Gishwati, there is another area that used to be part of the former Gishwati forest reserve. This area falls under the Districts of Rubavu, Nyabihu and Ngororero. This part is currently subject of restoration in the form of forest plantations, radical terraces, agroforestry systems, and improved range land (MINAGRI, 2010). The management of Mukura and Gishwati forest reserves is in the hands of RNRA/FNCD, but a local NGO called Forest of Hope Association (FHA) is contributing to the conservation and restoration of Gishwati forest reserve. As soon as these two forests become national parks, their management will be transferred to RDB, a government institution in charge of parks' management.

FIGURE 2. GEOGRAPHIC LOCATION OF MUKURA AND GISHWATI LANDSCAPES IN RWANDA

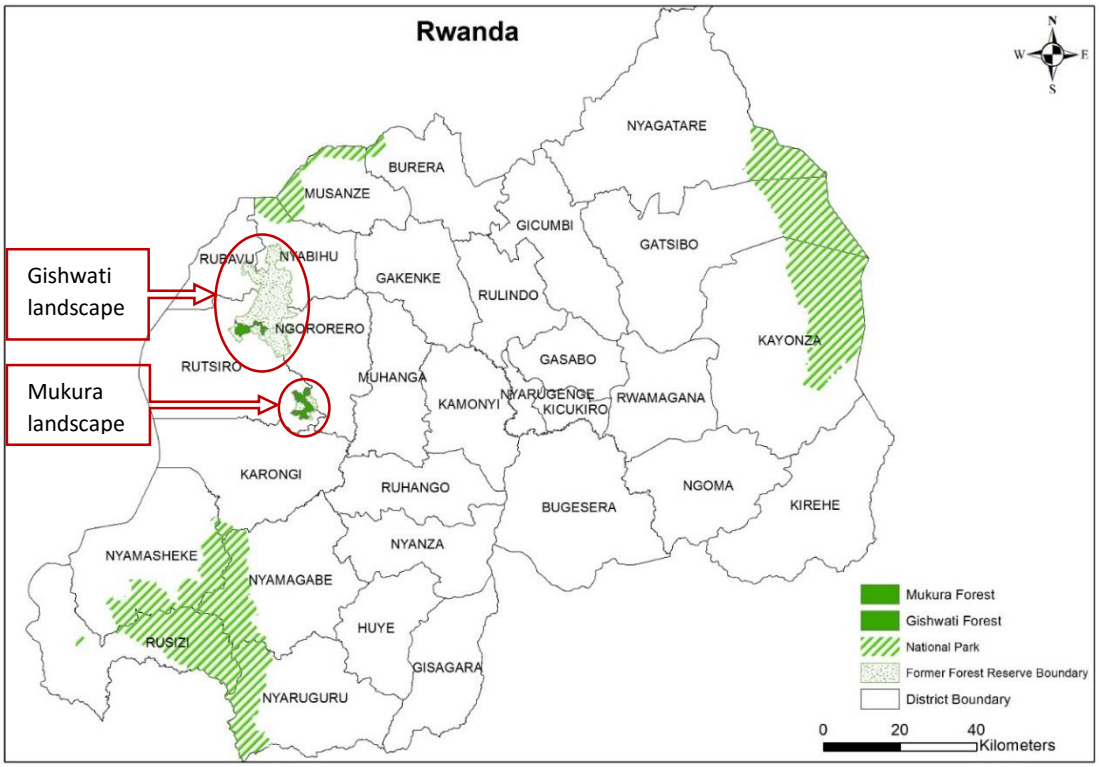
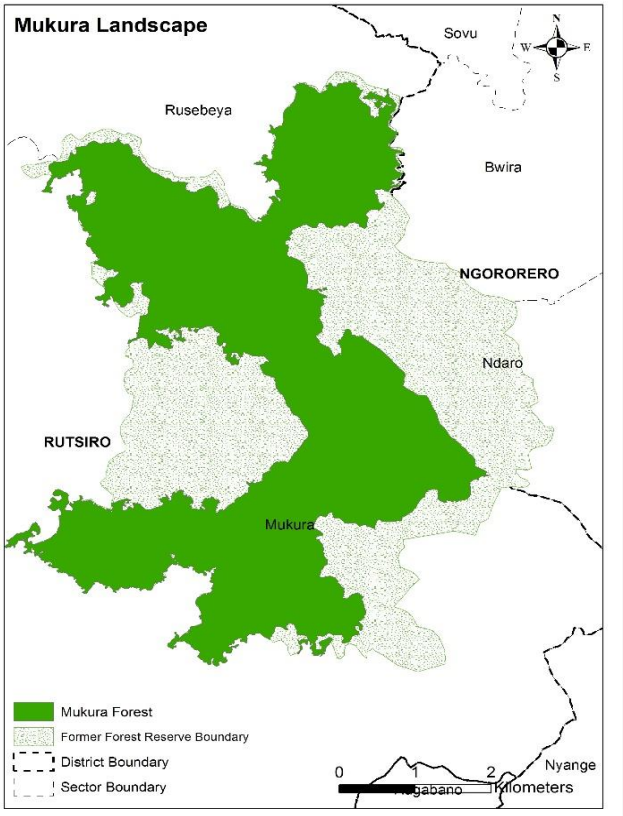
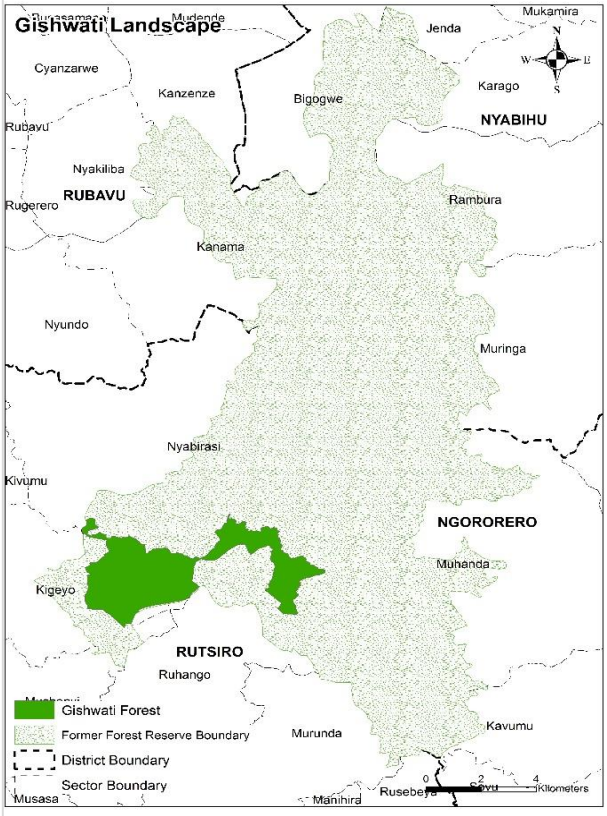


FIGURE 3: MUKURA AND GISHWATI LANDSCAPES





The socio-economic situation of Mukura and Gishwati landscapes has contributed to the way these landscapes have evolved. Mukura landscape falls into Rutsiro District which has an average population density of 279 inhabitants /km^2 and Ngororero District 491 inhabitants /km^2, but the sectors that border Mukura forest reserve have higher population densities. These are Mukura sector with the population density of 713 inhabitants /km^2, Rusebeya sector with 420 inhabitants /km^2 and Ndaro sector with 412 inhabitants /km^2 (NISR, 2012). On the other side, the landscape of Gishwati falls into Rutsiro (279 inhabitants /km^2), Ngororero (491 inhabitants /km^2), Nyabihu (555 inhabitants/km^2) and Rubavu (1,039 inhabitants/km^2) Districts. Nyabihu and Rubavu districts have the highest population densities in the whole Western province. In Rutsiro District, sectors that border the remaining Gishwati forest reserve are Nyabirasi sector that has 319 inhabitants /km^2, Kigeyo sector 600 inhabitants /km^2, Ruhango sector 507 inhabitants /km^2, and Mushonyi sector 747 inhabitants /km^2. The populations of Gishwati and Mukura landscapes rely on agriculture for subsistence and income, but most of the households have only between 0.3 ha and 0.9 ha to cultivate (Musabyimana, 2014). Coffee and tea are the major cash crops, and are grown near the buffer zones of Gishwati and Mukura forests reserves. In this area, poverty is a big challenge to local people becuase more than half of the population live under the poverty line (NISR, 2012).

The high population density, limited arable land, and poverty put pressure on Mukura and Gishwati forests reserves and their surroundings. People use these forests to search for alternative livelihoods like mining, logging, cattle raising in the forests' buffer zones, beekeeping inside and outside the forests and so on. The problem of energy is also a challenge because only 0.4% of all the households in Rutsiro and Ngororero, 10% in Nyabihu, and 21% in Rubavu have access to electricity. This increases their reliance on firewood as their primary source of energy for cooking, where 99.2% people in Rutsiro, 98.8% in Ngororero, 88.7% in Nyabihu and 73.9% in Rubavu rely on firewood as the only source of energy (NISR, 2012). The lack of sufficient energy and fuel thus increases the use of natural resources and puts pressure on forests and lands, especially Mukura and Gishwati forest reserves.

3.3. DATA COLLECTION AND DATA ANALYSIS

Data collection took place in Rwanda between October and December 2015. The first preliminary survey consisted of interviews that took place partly in Mukura and Gishwati landscapes, and in Kigali, the capital of Rwanda, because some of the concerned actors were based there. The second part of data collection was conducted through focus groups with the communities of Mukura and Gishwati landscapes. Over the whole process of data collection, additional data from observations and documents was used either to enrich, to validate, to triangulate or to check for missing information and errors that could have come from different sources.

3.3.1. IDENTIFYING FLR ACTORS AND THEIR NETWORKS

To be able to build a social network, it is important to first define who the actors are, and the ties that link them together. This permits the delineation of the concerned network. In the current study, the interest was on those actors who are involved in FLR processes in Mukura and Gishwati. The social network ties considered are 1) collaboration, 2) information/ knowledge exchange, and 3) funding. To build the FLR actor networks of Mukura and Gishwati, a hybrid network or snowball method was used (Hansen et al., 2008). This method consists of identifying the first actor of the network and then let him/her identify other actors he/she is connected to in the same network. The identified actors would then also be asked to identify other actors they are connected to and so on, till there are no new actors appearing. In the current study, the first actor identified was Rwanda Natural Resources Authority/ Forest and Nature Conservation Department (RNRA/FNCD). This institution is in charge of the management of Mukura and Gishwati Forests Reserves, and it is involved in FLR activities in the concerned landscapes. Thus, RNRA/FNCD served as the first actor from which the actor networks of Mukura and Gishwati FLR processes was built.

To collect relational data about the actor networks, a qualitative approach to social network analysis was used. The formal social network analysis normally uses a quantitative approach called name generator survey which only produces numerical data about the presence/absence of the ties (Edwards, 2010). The intention was to use participatory mapping (Emmel, 2008) to permit not only to see the presence/ absence of the ties between actors, but also to give meaning to those ties by providing additional attributes and information about the different actors. Given the reality of the field, it was not possible to use this approach with all actors. This was due to the fact that some actors did not have a lot of time to devote to this activity. Instead, some preferred to send this information through email or phone calls interviews, an approach that showed to be efficient. To build the actor networks, the information gathered was converted into a data matrix for quantitative analysis. For this purpose, a social network analysis software called UCINET (Borgatti et al., 2002) was used, in which the presence of a link between actors is represented by one and the absence of connection is represented by zero.

3.3.2. IDENTIFYING IMPORTANT ACTORS OF FLR ACTOR NETWORKS

In a social network analysis, different aspects can be measured, mainly the strength and weakness of ties that link the different actors together, and the position actors occupy in the network. In natural resources management, Degree centrality and Betweeness centrality are the two forms of social network measurements that have been identified as playing an important role (Prell et al., 2009). Degree centrality shows how many others an actor is directly linked to in a network (Wasserman & Faust 1994). Actors with a high degree centrality are considered as important elements who mobilize and bring other actors of the network together. Betweeness centrality shows how many times an actor is positioned between two other actors of his network, who are themselves not connected (Wasserman & Faust 1994). Actors who have a high betweeness centrality play a broker role, by bringing together actors of the network who would be otherwise disconnected, and thus bridge segments of the whole network together (Bodin et al., 2006; Brass 1992; Prell, 2003). In the current study, these two measurements were used to determine the important actors of the networks of Mukura and Gishwati FLR processes. These important actors were then assessed in the follow up survey, to determine the types of power they hold.

3.3.3. ASSESSING DIFFERENT FLR FRAMES, AND IDENTIFYING THE TYPES OF POWER IMPORTANT ACTORS HOLD

To collect data on FLR frames, both stand points of framing, namely cognitive and interactional framing, were used. In general, framing refers to how individuals, groups and societies perceive, construct, represent and interpret reality, in our case FLR. As FLR promotes the participation of the communities due to the important role they play in shaping the landscape, and because they are the primary beneficiaries of restored forest resources and services (van Oosten et al., 2014), the identification of FLR frames and the types of power important actors of the FLR actor networks hold was done by the communities of Mukura and Gishwai landscapes.

The types of power that were assessed in this study are coercive, reward, referent, expert and legitimate powers. Here, power was considered in the sense of actors having the capacity to influence FLR activities in Mukura and Gishwati landscapes. To be able to empirically assess actors' power in influencing FLR in Mukura and Gishwati landscapes, table 1 was used. It contains specific types of power which are linked to some of their observable facts. These facts include the action of power but also threats and sources of power that facilitated empirical data collection. For practical reasons, only the types of power of the important actors was assessed, as it would have required much time and more resources to assess the types of power of all networks' actors.

TABLE 1: TYPES OF POWER

Type of power	Definition	Observable facts	Examples
Reward	Altering behaviour by incentives, rewards, and advantages	Providing of, threat with, sources of material or immaterial benefits	Provision of subsidies Paying labour input Providing some advantages and favours…
Coercive	Altering behaviour by penalties and punishments	Physical action, threat of physical action or sources of physical action	Threatening or giving others penalties, punishments, imprisonment…
Expert	Altering behaviour by possessing knowledge or special skills	Being referred to as an expert	Providing knowledge about planting trees, water management, fertilizer uses …
Referent	Altering others' behaviour based on admiration, affection, friendship, respect and reputation, or the desire to gain approval	People want to be like someone else, and start to adopt the same thinking and behaviour in attempt to be like that other person.	People want to imitate the behaviour of a celebrity because they admire him and want to identify themselves with him.
Legitimate	Altering behaviour due to social norms and/or organizational position	Being powerful because you have a higher position in social structures.	In an organization, the director general has the power to take the final decision about an issue because his position permit him to do so.

The landscapes' communities were interviewed through a participatory approach, using focus groups discussions. This method was chosen because it is known to create a better understanding of the complexity of landscapes, and to provide the researcher with rich data. With the help of local authorities and local actors involved in FLR in the concerned landscapes, participants of the focus groups were chosen. This choice was based on the fact that the person live in the landscape, and if possible has some knowledge on restoration activities going on there.

In total, five focus groups were formed, two in Mukura landscape in Rusebeya and Mukura sectors, and 3 in Gishwati landscape in Bigogwe, Nyakiriba and Kigeyo sectors. In each group, the number of participants ranged from 7 to 10 persons. The list of all participants in the focus groups can be found in appendix 2. The first focus group discussion took place in Mukura sector. During focus group discussion, two stages were used. First, the focus group was asked to give different meanings of what they think is FLR. This stage helped the participants to have in mind what FLR is. It also helped in identifying the different FLR frames. In addition to this, it also prepared the focus group participants for the following stage of identifying the types of power important actors of the FRL actor network hold. After providing the different meanings of FLR, the focus group participants were then presented with the names of the important actors, as identified in the preliminary survey of this research. Participants were then asked to assess the types of power those important actors hold in influencing FLR in the landscape. To facilitate a better understanding for the focus group participants, the different types of power have been explained in the local language (Ikinyarwanda) and their respective illustrations were printed on hard papers, which were distributed to all

participants to ease their understanding (see appendix 3). Participants were then asked to attribute the types of power to the important actors, taking into account their different FLR frames.

After the end of the first session of focus group in Mukura, and after a quick review of its outcome, it became clear that the resulted data were not as rich as expected. This was firstly attributed to the fact that there are no direct translation of coercive, reward, expert, referent and legitimate powers in the local language (Ikinyarwanda). Thus, it was hard to explain these types of power to the focus group participants. This limitation was known from the beginning of the research and it was hoped that the use of illustrations would help in resolving it, but it did not work. A second issue was that, because the focus group discussion was semi- structured, it did not leave room to a fruitful participation; participants only responded to the questions and were not willing to go further. A third concern was that some of the important actors of FLR actor network identified in the network analysis were not known by local community. It was thus impossible for the focus group participants to identify the types of power held by these actors.

Due to the above reasons, for the remaining focus groups sessions, one in Mukura landscape and three in Gishwati landscape, another strategy was adopted. It consisted of conducting an open focus group discussion, in contrast to the semi-structured discussion. The researcher directed the discussion depending on the missing or the acquired information from the discussion, but let the participants lead the discussion. The discussions started by an introduction of the research, followed by views of the participants on what FLR is. Participants would then openly discuss about FLR activities and involved actors. This method was a bit challenging because it did not have a specific format, nor questionnaire to fill. Everything that was said had to be written, especially as most participants were reluctant about the use of a voice recorder. All the focus group discussions have been transcribed in detailed field notes that have been coded afterward to identify the different FLR frames and the types of power. An example of how this was done is shown in a piece of vignette in appendix 4.

3.4. SUMMARY OF RESEARCH METHODOLOGY

In summary, the research methodology of the current study has been adjusted from the previously planned methods due to changes that occurred in the field. These changes consisted of widening the range of methods of data collection, using participatory mapping, phone call interviews and emails, and using open discussions during focus groups, instead of structured discussions. This has not only permitted to obtain richer data, but it was also a learning and adaptive process for the researcher. Table 2 presents the summary of the research methodology; how it was planned before and how it was adjusted after.

TABLE 2: SUMMARY OF RESEARCH METHODOLOGY

	Research question	Planned method of data collection and analysis	Adjusted method of data collection and analysis
1	Who are the actors involved in FLR in Mukura and Gishwati landscapes, and how are those actors connected?	Snowball selection of respondents. Data collection through participatory mapping with individual respondents. Data analysis through social network analysis.	Snowball selection of respondents Data collection through participatory mapping, semi-structured interviews through phone calls and emails with identified actors. Data analysis through social network analysis using UCInet software.

2	Who are the most important actors of Mukura and Gishwati FLR actor networks?	Systematic analysis (using Degree centrality and Betweeness centrality) of social networks constructed on basis of results of research question 1	Systematic analysis (using Degree centrality and Betweeness centrality) of social networks constructed on basis of results research question 1
3	Which different FLR frames are exhibited by the communities of Mukura and Gishwati landscapes?	Purposeful selection of focus groups at community level. Data collection through two rounds of participatory methods to ascertain meanings of FLR and power positions of most important actors in respect to dominant types of FLR Qualitative and semi-quantitative data analysis	Purposeful selection of focus groups at community level. Data collection through open discussion with focus group participants about FLR and power positions of the important actors, in respect to identified FLR activities. Qualitative data analysis: field notes coding to determine the different FLR frames and types of power identified by the community
4	Considering those different frames, what kind of power do the important actors of FLR actor networks exert on the communities of Mukura and Gishwati landscapes?		
5	How are the differences in actor networks and their power reflected in the FLR processes of the Mukura and Gishwati landscapes?	Comparative qualitative analysis of research findings	Comparative qualitative analysis of research findings

3.5. ETHICS

To be able to conduct my research with minimal ethical problems, I followed all the procedures required by the government of Rwanda for students. These include getting a permission from an appropriate authority (Districts), informing all the local authorities (Districts, Sectors and cells) of my study sites about my presence in the field as a student, and what the main target of my research is.

Nevertheless, some issues arose during my fieldwork. The first problem I encountered was to get access to actors involved in FLR, especially those based in Kigali, particularly when presented as a student who is doing research. To tackle this issue, I adopted a strategy of presenting myself as an employee of RNRA (I am still an employee of this institution) in order to easily get an appointment. When access granted, I would then explain to the concerned interviewee that I am currently doing my Master's degree and that I am collecting data for my thesis. This way, I managed to get access to many actors, either through face to face interviews, or through phone calls and emails. A second issue that occurred is that most of my interviewees did not want the use of a voice recorder, mostly because of their personal reasons. I respected this choice and tried to capture all the information through my field notes.

4. RESULTS

4.1. ACTORS INVOLVED IN MUKURA AND GISHWATI FLR PROCESSES

In Gishwati, a total, 50 actors have been identified as being involved in FLR. Among these actors, 13 represent international donors/partners, 12 local cooperatives, 9 central government institutions, 6 projects implemented by those central government institutions, 4 local government institutions, 4 private companies, 1 local NGO and 1 national university. In the Mukura landscape, 39 actors have been identified as involved in FLR activities. Among these actors, 6 represent international donors/partners, 2 local cooperatives, 8 central government institutions, 4 projects implemented by those central government institutions, 2 local government institutions, 12 private companies, 4 local NGO and 1 national university. Using their connection in terms of 1) collaboration, 2) information/ knowledge exchange, and 3) funding FLR, the identified actors were connected through their FLR actor networks. Figure 4 and 5 represent respectively the actor networks of Mukura and Gishwati FLR processes. The names of the identified actors, with their respective activities and roles in Gishwati and Mukura landscapes in terms of FLR, are detailed in appendix 5.

It is important to clarify that all interviewees identified actors belonging to formal networks only. Informal actors were not identified, especially not when it came to actors operating in the mining sector. Moreover, the communities were not identified as formal actors, as apparently, they are not considered to be actors in itself, but rather represented by their local authorities. The differences between the two networks are further discussed in Chapter 4.5

FIGURE 4: GISHWATI FLR ACTOR NETWORK

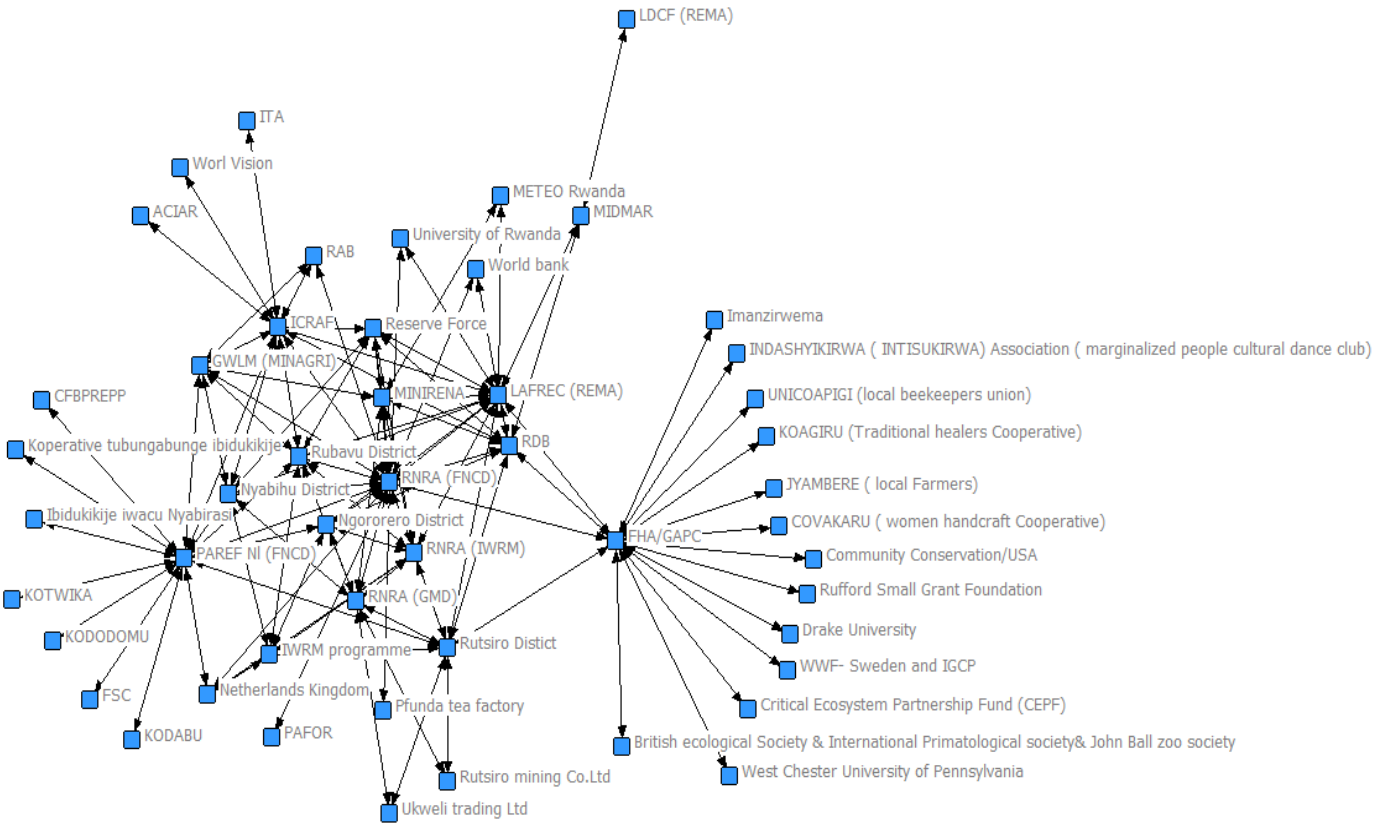
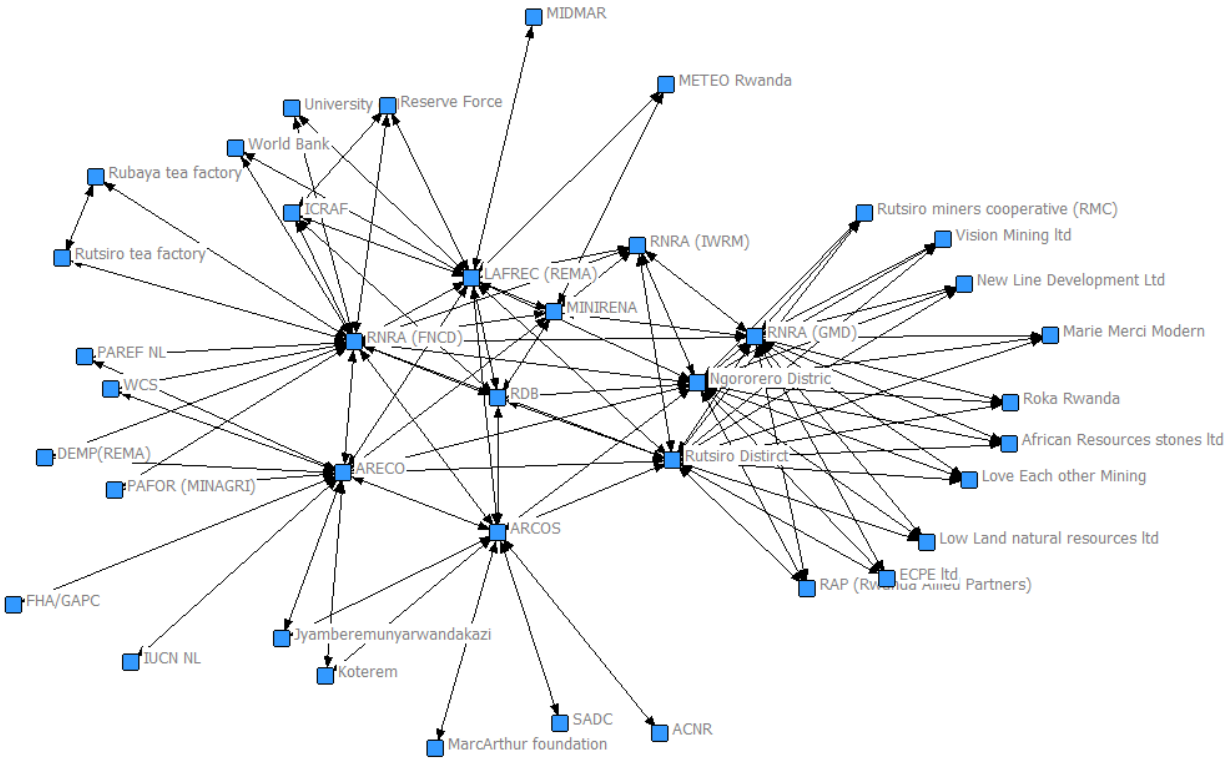


FIGURE 5: MUKURA FLR ACTOR NETWORK



4.2. IMPORTANT ACTORS OF THE NETWORKS OF MUKURA AND GISHWATI FLR PROCESSES

Recall that degree centrality shows how many others an actor is directly linked to in a network. Actors with a high degree centrality are considered as important elements who mobilize and bring other actors of the network together. Betweeness centrality shows how many times an actor is positioned between two other actors of his network, who are themselves not connected. Actors who have a high betweeness centrality play a broker role, by bringing together actors of the network who would be otherwise disconnected, and thus bridge segments of the whole network together. Thus, actors who showed the highest values of degree centrality and betweeness centrality are the most important actors of the FLR actor networks of Gishwati and Mukura. These values have been calculated using the actor networks of Gishwati and Mukura landscapes as presented in figure 4 and 5.

In Gishwati FLR process, RNRA (FNCD), FHA/GACP, PAREF NL (FNCD), LAFREC (REMA), ICRAF and Rutsiro District are the actors who had the highest values of degree centrality and betweeness centrality. In Mukura FLR process, RNRA (FNCD), Rutsiro District, Ngororero District, RNRA (GMD), ARECO, LAFREC (REMA) and ARCOS had the highest values of degree centrality and betweeness centrality. In addition to this, the identified important actors have been grouped into categories depending on what type of organization they fall into. In both cases, important actors are mainly government institutions or projects implemented by those institutions, few local NGOs, and in the case of Gishwati, one international actor. These results show how FLR decisions and influence in these two landscapes depend largely on central government. Tables 3 and 4 present respectively important actors of Gishwati and Mukura FLR processes, the type of institution they fall into, and their respective values in terms of degree centrality and betweeness centrality. Figure 6 and 7 represent the position of important actors in the actor network of Gishwati and Mukura FLR processes respectively.

TABLE 3: IMPORTANT ACTORS OF GISHWATI FLR ACTOR NETWORK

Important FLR actors in Gishwati	Category of actors	Degree centrality	Betweeness centrality
RNRA (FNCD)	Central government institution	20	362.279
FHA/GAPC	Local NGO	17	546
PAREF NL (FNCD)	Project implemented by central government institution	15	324.394
LAFREC (REMA)	Project implemented by central government institution	15	179.093
ICRAF	International partner/donor	12	158.675
Rutsiro District	Local government	10	168.152

TABLE 4: IMPORTANT ACTORS OF MUKURA FLR ACTOR NETWORK

Important FLR actors in Mukura	Category of actors	Degree centrality	Betweeness centrality
RNRA (FNCD)	Central government institution	19	209.194
Rutsiro District	Local government	17	130.002
Ngororero District	Local government	17	130.002
RNRA (GMD)	Central government	15	57.487
ARECO	Local NGO	14	148.279
LAFREC (REMA)	Project implemented by central government institution	14	108.46
ARCOS	Local NGO	11	134.672

FIGURE 6: POSITION OF IMPORTANT ACTORS IN THE ACTOR NETWORK OF GISHWATI FLR PROCESS

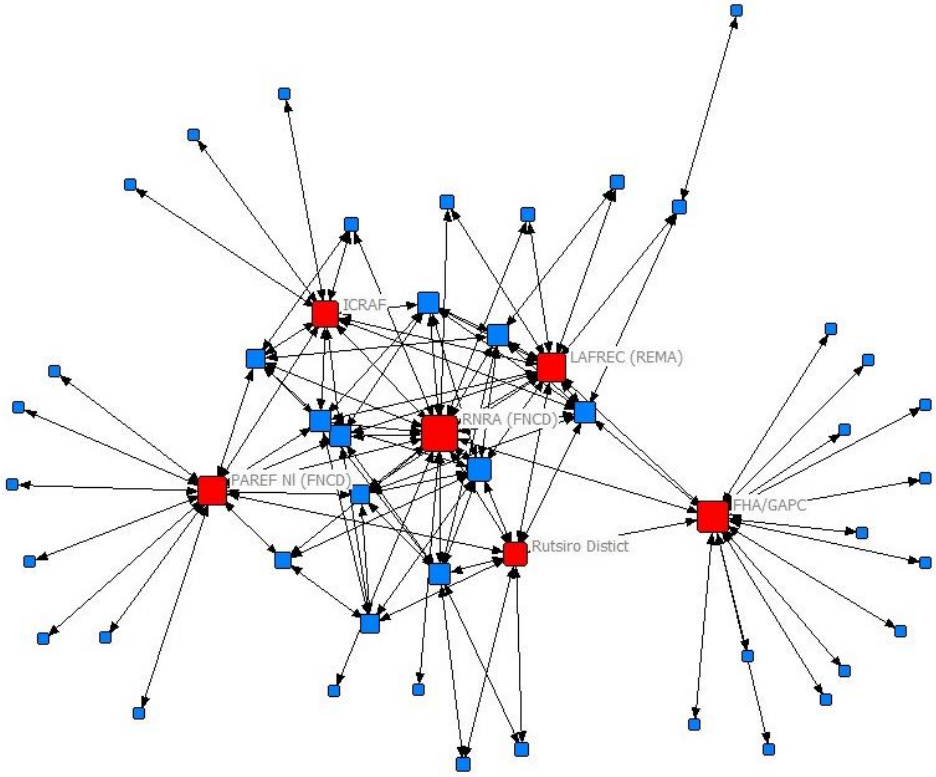
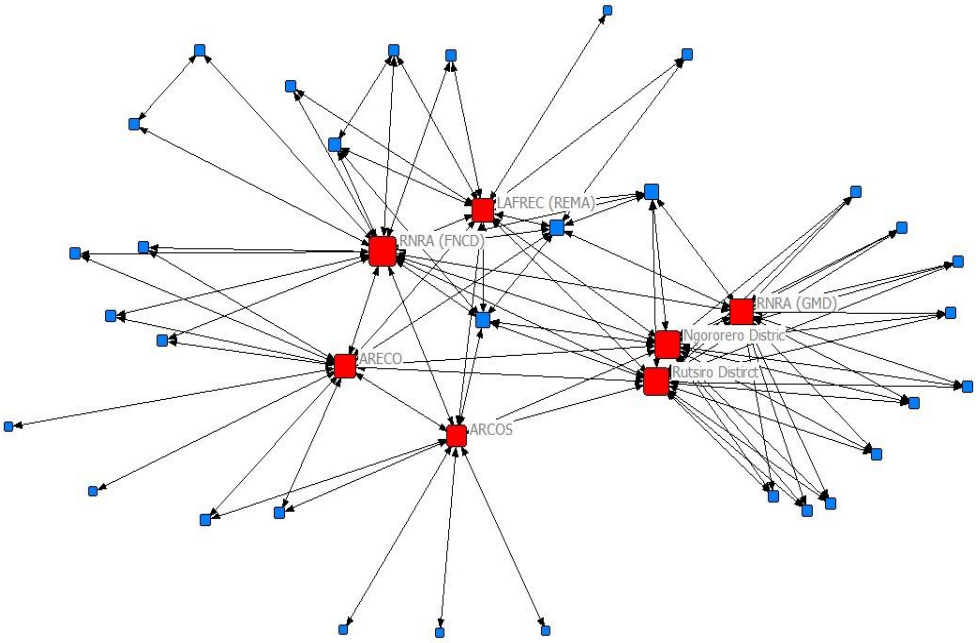


FIGURE 7: POSITION OF IMPORTANT ACTORS IN THE ACTOR NETWORK OF MUKURA FLR PROCESS



In both cases of Mukura and Gishwati, actors who presented the highest degree centrality have shown to be the ones who also have the highest betweeness centrality. This is explained by the fact that actors who are linked to many actors in these two networks (with high degree centrality) are also the ones who serve as a bridge between actors of the networks who would not be connected otherwise (high betweeness centrality). The fact that government institutions have this role in both networks suggests that the state is in control of most of FLR activities going on in Mukura and Gishwati FLR processes. Figure 6 and figure 7 illustrate better this situation, where the width of the dots represents the actors' degree centrality, and the colour red represents those actors who have the highest betweeness centrality. In both cases, important actors overlap. The two networks will be further compared in Chapter 4.5.

4.3. FRAMING FOREST LANDSCAPE RESTORATION AT THE COMMUNITY LEVEL

In order to better understand the opinions of the local actors on FLR in the two areas, the second phase of research specifically focused on their opinions on the FLR process. To do so, both types of framing, namely cognitive and interactional framing were used. Cognitive framing represents what people think, as something located in their minds. In this case, frames represent the external world in a biased way compared to the accurate representation because of the background and interest of a specific person. This means that cognitive framing represents what individual people believe should be the reality. Interactional framing refers to framing as a strategic move to guiding what others think. It focuses on the presentation of frames in ongoing interaction between actors. It is a co-construction process in which meaning is determined by the actors' communication. This means that interactional framing represents the sense making of the interactions between actors in a certain event.

From the group discussion field notes, a list of activities implemented in Gishwati and Mukura landscapes that participants considered to be part of ongoing FLR, and a list of activities that they thought should be part of FLR were produced. On one hand, activities that local people identified as being part of FLR represent the community's interactional FLR framing because those activities represent how people see FLR, as sense making of what is going on in their landscape, and as a co-construction based on communication between them and the different actors of

their landscape. On the other hand, activities that the communities thought should be part of FLR in their landscapes represent their cognitive FLR framing. This is because those activities refer to how people think FLR should be, based on their different backgrounds, and their different interests.

4.3.1. FRAMING FLR IN GISHWATI FLR PROCESS

FLR activities identified by the community as being implemented in Gishwati landscape

1. ***Tree planting, forests, forest protection and conservation***

In this category, tree planting was the first activity that has been identified by local people as part of current FLR. This includes planting native and exotic trees on state and private lands, as forest lots and agroforestry, mainly on terraced fields. People said that tree planting is part of FLR because it contributes to soil retention, clean water and air, and thus to environmental disaster reduction. In addition to this, planted trees provide local people with wood and firewood, and agroforestry increases their agricultural yield through soil fertilization.

In terms of forest protection and forest conservation, the community identified FLR activities that are currently being implemented in Gishwati landscape. One of these activities is the reduction of illegal activities in Gishwati forest reserve through forest patrols. These illegal activities include cattle grazing, trees and firewood cutting, small scale mining and bush meat hunting inside the natural forest. Another activity that has been identified in this category is the reduction of human-wildlife conflicts. This is done through cultivating crops that do not attract forest animals (reduced crop raiding), and through limiting cattle grazing inside the forest. Removing exotic species from the natural forest has been also identified as an FLR activity. This is the case of Eucalyptus trees that were inside Gishwati natural forest which has been removed to stop their spread into the natural forest. In addition to this, these trees have been given to local people for their household use. Another aspect of FLR that has been identified in this category is the capacity to adapt to the changes of forest cover that occurred in Gishwati landscape. The community gave an example of how Gishwati used to be a closed forest, but now it is a mosaic landscape with natural forests, planted trees, scatted trees, agriculture, residential areas… They said that in FLR programs implemented in this area, the focus is on forests, but there are also other areas where agricultural lands are being terraced and range lands are being improved as part of FLR.

2. ***Community involvement***

The community identified their involvement in activities related to FLR as being itself part of FLR. This is shown by the presence of many local cooperatives that have been supported financially and have received trainings in what concerns forests, improved agriculture and livelihood in general. In addition to this, the community reported that they receive job opportunities when FLR activities, like tree planting, are being implemented in their landscape, which increase their households' income.

3. ***Livelihood improvement***

Focus group discussions in Gishwati landscape suggest that local people take livelihood improvement as part of ongoing FLR process. In fact, people reported that FLR has not only been about forests and tree planting, but has been also improving their livelihood. In the process of protecting Gishwati forest reserve, people who used to do illegal activities have been supported in changing their ways of living. For example indigenous people who no longer live inside the forest have been given modern houses constructed outside the forest, where they access infrastructure like schools and hospitals, and services like bank credits, which improved their way of living. Another cooperative made of people who used to graze their cattle inside the Gishwati forest reserve have received improved grass for their cattle, to be planted outside the forest. This not only reduced cattle grazing inside the forest, but also increased the milk yield. As a result of this initiative, local people have now received financial support

that helped them to build a dairy where they can process the milk and sell it to local and regional markets. This is kind of improvement is also seen in other local cooperatives involved in agriculture and beekeeping.

4. Taking responsibility

Taking responsibility in what concerns FLR was also a point of discussion during focus groups. The community said that considering FLR activities implemented in their landscape, FLR appears to be a government agenda. This was further explained with the facts that most of projects and programs implemented in Gishwati landscape belong to the government. When asked if they do not think that current FLR activities are owned by local people, respondents in the focus groups said that they do not see their responsibility in FLR. They further explained that local people do not get involved in the design of most of FLR projects implemented in their landscape, and thus do not use their local knowledge to contribute to planned activities. In addition to this, when the planning of FLR project is done at the central level, locals loose the capacity to choose what must be done in their landscape. Respondents gave an example of how FLR in their landscape is facing land distribution issues, where state and some private lands have been taken to be part of the restoration areas. This has resulted in issues of compensation which usually takes long time to be executed. Nevertheless, an activity called Umuganda seemed to be more owned by local people compared to others mentioned earlier. Umuganda is a monthly community work in Rwanda, where locals meet and do something productive together. The community of Gishwati reported that when they plant trees during Umuganda, they feel more responsible of those trees because Umuganda is a traditional way of communally helping each other and improving a common livelihood.

Activities that the community think should be part of FLR in Gishwati landscape

1. Forests and water source protection

Local people think that planting forests should be the essential part of FLR. They think that Gishwati forest reserve should be highly protected and they support the plan of upgrading it to the national park status. They think that if Gishwati is a national park, their livelihood will improve through revenues that will come from ecotourism. Apart from forest lots, agroforestry and natural forests, local people think that trees should also be planted near water sources, especially rivers, to reduce siltation. They also think that FLR should include other activities that contribute to the protection of water bodies, especially in Gishwati landscape where mining activities take place near rivers.

2. Clear and defined FLR targets

Local people have shown their concern about FLR programs currently implemented in Gishwati landscape. These concerns come from the fact that a tree species called *Alnus acumunata* has been used in some of the restored areas in Gishwati. Many locals criticized the choice of this species, saying that they do not see its use in their landscape. They said that in the area where this species have been planted in monoculture, there are no other animal or tree species. This is due to the fact that *Alnus acumunata* does not create a habitat for biodiversity, according to local people. In addition to this, local people said that this tree species cannot be used as timber because it has a soft wood. So, they wonder what will be the use of many hectares planted with *Alnus acumunata*. Taking into account this example, local people reported that FLR should first clearly define its targets in order to achieve sustainable results. Clear uses of planted forests and trees should be defined beforehand; either being production forests or forests for biodiversity conservation.

3. Community involvement in all stages of FLR

In terms of implementing FLR, the community said that it is essential to involve local people from the conception of the FLR projects throughout their implementation. They also reported that if FLR activities are being implemented in their landscape, local people should be part of the decision making process, deciding what is going to happen in their own landscape. They gave an example of how some of the tree species planted in Gishwati landscape failed because local knowledge about those tree species was not used. They said that FLR projects are designed in the

capital city, whereas they should be designed at the local level, with the inputs from the landscape inhabitants. They said that sometimes they feel like outsiders in FLR and it is hard for them to own FLR results.

4. Equity in FLR

The community said that in order to embrace FLR, the latter should be equitable in all ways. This not only concerns community involvement in decision making in all FLR processes, but also in terms of land use distribution. The community said that FLR emphasis should not only be on trees and forests, especially in areas where local people rely on agriculture. They further explained that when there are many projects that have as main objective tree planting, this requires an increase in forest land and thus a decrease in agriculture land, especially in Gishwati landscape where most of the households practice agriculture as their main source of income, and where there is a high population density. Thus, they think that there should be equity in land use distribution when it comes to FLR.

4.3.2. FRAMING FLR IN MUKURA FLR PROCESS

FLR activities identified by the community as being implemented in Mukura landscape

1. Tree planting and forests lots

The community of Mukura landscape take all activities related to tree planting in their landscape as part of FLR. These trees have been planted either on government or on private lands by different projects. They think that these activities are part of FLR because not only trees protect the environment, but also provide local people with timber, firewood and fruits that they use in their everyday life.

2. Community involvement

The community reported that FLR programs in Mukura landscape are not only emphasizing tree planting, but also try to involve local people through supporting local cooperatives. For example, some local cooperatives involved in environmental protection and natural resources management in Mukura landscape have received financial support and trainings which has improved not only their revenues, but also their knowledge.

3. Livelihood improved

The community takes some aspects of local livelihood improvement as part of FLR. They reported that some projects implementing FLR not only emphasize tree planting but also give local cooperatives improved potato seeds to increase their agricultural yield. They also provided them with energy saving stove to help them reduce the amount of firewood they use, and the pressure on forest resources. The community said that FLR programs which included livelihood improvement on their agenda where more successful compared to those who do not.

Activities that the community think should be part of FLR in Mukura landscape

1. Tree planting, forests and water sources protection

In Mukura landscape, local people said that tree planting is essential in every FLR project. They think that the emphasis in their landscape should be put on agroforestry. This would permit local people to increase their agriculture yield and their household revenue, and not only rely on mining. They also said that trees should be planted along river bank to protect the latter from siltation that come from agricultural and mining activities. The protection and conservation of Mukura forest reserve has also been identified by local people as part of FLR. Some of the activities could be buffering the forest to reduce human-wildlife conflicts such as crop raiding, and illegal activities that degrade the forest, especially mining. Another identified action would be to put forest guards in Mukura forest reserve to enhance its protection.

2. Mining as part of FLR

Local people in Mukura landscape think that mining should be part of FLR. This is based on the fact that if FLR outcome has to be an improved landscape in all aspects, mining, as one of the major activities on which local people rely, should be added to FLR. Mining in this landscape is the main activity that degrade lands and forests because it is done unsustainably, and most of the time illegally. Local people think that if mining is put on the FLR agenda, not as something to combat but rather something to sustainably implement, viable results could be achieved.

3. Equitable land use sharing

The community thinks that in order to implementing FLR in Mukura landscape, an equitable land use sharing strategy should be adopted. They said that most of FLR projects emphasize tree planting and thus require lands that were being used for other activities, especially agriculture. They suggested that in order to be successful, FLR should consider equitably all activities in landscape.

4. Community involvement

Last but not least, the involvement of local people in all aspects of FLR was identified as one of the first steps toward desired FLR outcomes. Participants in group discussions said that most of the people in Mukura landscape are not informed about what and why FLR activities are being implemented in their landscape. They thus suggested that if FLR is a landscape based approach, the knowledge of local people who live in that same landscape should be taken into account throughout FLR implementation.

4.4. ACTOR POWER

The types of power that were assessed during this study are coercive, reward, referent, expert and legitimate power. These types of power were considered as the influence important actors of FLR actor networks exert on the communities of Gishwati and Mukura landscapes, considering the different FLR frames identified by the communities. It is crucial to note that, as power types were identified by the communities, some of the previously identified important actors of the networks were not known by those communities. These actors are government institutions and some government projects. It was thus impossible to assess the power held by these actors during this study. In addition to this, the communities identified power of additional actors who seemed not to be important in the FLR networks analysis. This was explained by the fact that they had local offices and activities based in the concerned landscapes and have involved local people in some of their activities.

In Gishwati, important FLR actors possess different types of power that they exert on the community. International actor and central government actors seemed to have no direct influence on the community. This is shown by the fact that the community did not know those actors (ICRAF and RNRA/FNDC), and thus these actor do not directly have power over them. Government projects seemed to be better known by local people. This is the case of PAREF NL/FNCD, PAFOR/MINAGRI, GWLM/MINAGRI and Reserve Force. This is due to the fact that these projects have/had local offices and their activities are directly based in the Gishwati landscape. In addition to this, these projects have/had some direct interaction with the community mainly based on reward power (offering trees seedlings for free, providing jobs to local people …) and training local people on different aspects of environment and natural resources management (Expert power). LAFREC/REMA, a new government project was not known by the community because it has not yet started implementing its activities in Gishwati.

At the local level, a local NGO called FHA/GACP and local authorities, represented by Rutsiro district, had a variety of types of power, also explained by the fact that these actors interact directly with the community and thus use different approaches to influence them. Both actors showed reward power, represented by financial support to local cooperatives. Coercive power was represented by punishments such as fines and imprisonment of those who do not comply with the protection of Gishwati forest reserve and planted trees. Referent power was represented by people who imitate how FHA/GAPC ensure sustainable beekeeping in the buffer zone of Gishwati forest reserve. FHA/GACP also showed expert power in terms of trainings provided to local cooperatives around Gishwati forest

reserve. The district of Rutsiro had legitimate power in terms of being recognized by local people as the official authority that represents them in all aspects of the landscape. Table 5 present important actors of Gishwati FLR process, as identified in the network analysis, and their respective types of power. Additional important actors identified by the community have been also added in table.

TABLE 5: POWER OF IMPORTANT ACTORS OF GISHWATI FLR PROCESS

Important actors identified in network analysis (Gishwati)	Coercive power	Reward power	Referent power	Expert power	Legitimate power	Type of power unknown
RNRA (FNCD)						×
FHA/GAPC	×	×	×	×		
PAREF NL (FNCD)		×		×		
LAFREC (REMA)						×
ICRAF						×
Rutsiro District	×	×			×	
Additional actors identified by the community						
PAFOR (MINAGRI)		×		×		
Reserve Force		×				
GWLM (MINAGRI)		×		×		

In Mukura, central government institutions (RNRA/FNCD and RNRA/GMD) were not known by the community, and thus they had no direct influence on them. As in the case of Gishwati, PAREF NL/FNCD was known by local people because its activities are based in the landscape, and it had some direct interaction with local people. This interaction was based on reward power expressed in offering trees seedlings for free, and providing jobs to local people. Training local people on different aspects of environment and natural resources management represented PAREF NL/FNCD Expert power. LAFREC/REMA, a new restoration government project was not known by the community because it has not yet started implementing its activities in Mukura.

At the local level, local authorities were represented by Rutsiro and Ngororero districts. These local entities directly influence local people through coercive power, represented by punishing people involved in illegal activities in Mukura forest reserve. Reward power was represented by the provision of free energy saving stoves to local people in the framework of reducing the use of a lot of firewood. Expert power was represented by training local people on how to build those energy saving stoves, and on tree nurseries establishment. Two local NGOs (ARECO and ARCOS) also are closely involved with local communities on whom they exert reward and expert power. These types of power are manifested through the influence these NGOs have on local cooperatives. Reward power is represented by free tree seedlings, free improved potato seeds, jobs and different materials provided to those cooperatives. Expert power is represent by trainings given to different members of those cooperatives, on issues concerning environment and natural resources management. Table 6 presents important actors of Mukura FLR process, as identified in the network analysis, and their respective types of power. Additional actors identified by the community have been also added.

TABLE 6: POWER OF IMPORTANT ACTORS OF MUKURA FLR PROCESS

Important actors identified in network analysis (Mukura)	Coercive power	Reward power	Referent power	Expert power	Legitimate power	Type of power unknown
RNRA (FNCD)						×
Rutsiro Distirct	×	×		×		
Ngororero District	×	×		×		
RNRA (GMD)						×
ARECO		×		×		
LAFREC (REMA)						×
ARCOS		×		×		
Additional actors identified by the community						
PAREF NL (FNCD)		×		×		

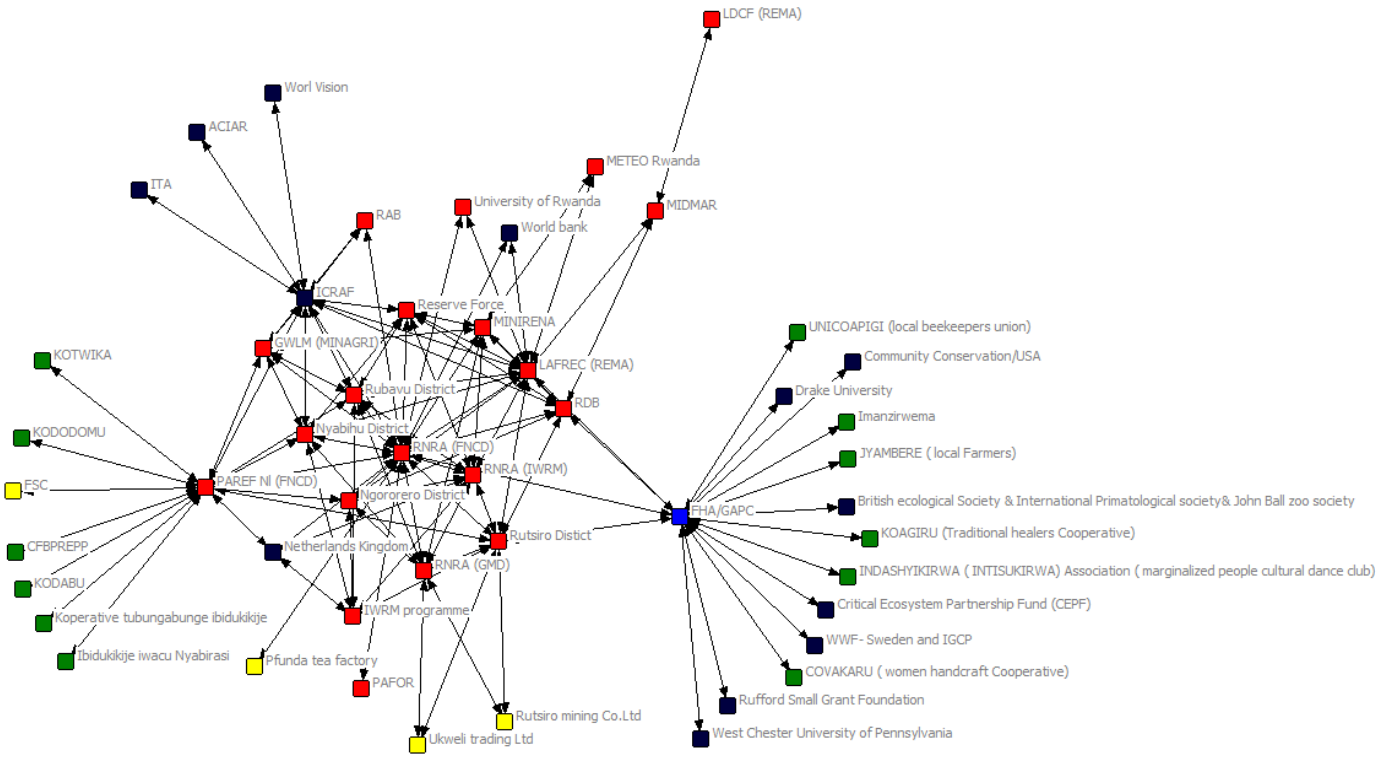
4.5. COMPARISON BETWEEN MUKURA AND GISHWATI FLR ACTOR CHARACTERISTICS

4.5.1. ACTOR COMPOSITION AND CONSTELLATION

As mentioned before, when comparing actor networks composition of Gishwati and Mukura FLR processes, specific categories emerge. In Gishwati actor network, there is a concentration of many international actors, local cooperatives and government projects. Mukura actor network presents a lot of private companies, mainly mining companies concentrated near the Mukura forest reserve, and local NGOs.

When visualized in terms of those actor categories, the network of Gishwati presents four subnetworks (figure 8). The first subnetwork is the centre of the network composed of government institutions, with dense connections between themselves. Apart from local government institutions, represented here by districts, most of government institutions in this subnetwork are based in Kigali, and so are most of their activities. Some of the projects implemented by those government institutions are also based in Kigali, but also have local offices in Gishwati, which may act as a gatekeepers, connecting central and local subnetworks. This is the case of PAREF NL/ FNCD which acts as a liaison (or gatekeeper) to a second subnetwork of locally operating actors (left part of the network). These local actors are local cooperatives and one private company all engaged in environmental protection in Gishwati. A third subnetwork of locally operating actors is specifically involved in a special landscape restoration programme, coordinated by ICRAF, involved in agroforestry in the former Gishwati area (upper left part of the network). The forth subnetwork (right part of the network) represents locally operating actors, coordinated by the local NGO FHA/GACP. Those actors are involved in conservation and restoration activities associated to the remaining Gishwati forest reserve. Both the ICRAF coordinated and the FHA/GACP coordinated subnetworks includes a relative high number of international actors which sponsor or partner with local projects. The three local subnetworks are linked to the central governmental subnetwork through their coordinating organisations (PAREF NL/FNCD, ICRAF and FHA/GACP), but are not connected among each other.

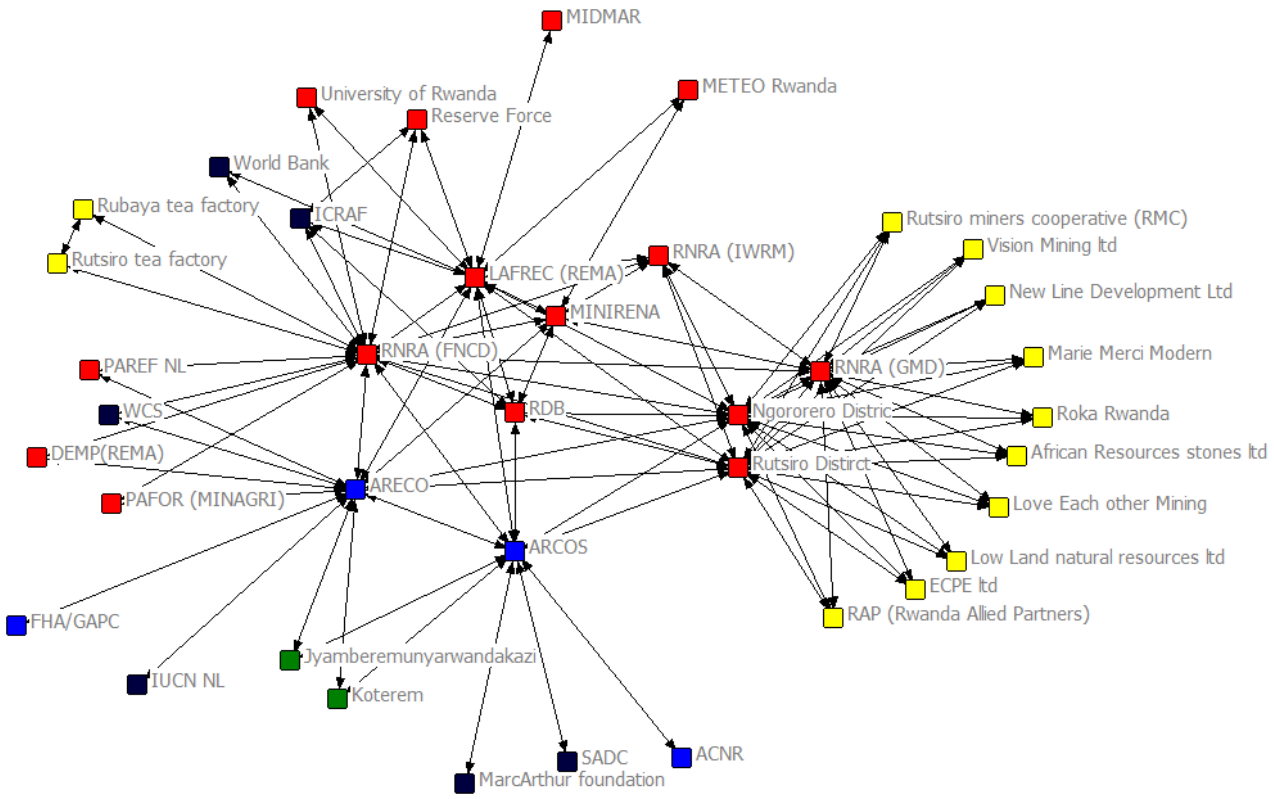
FIGURE 8: ACTOR NETWORK OF GISHWATI FLR PROCESS WITH ACTOR CATEGORIES [1]



In the Mukura, the actor network is not as clear cut as in the case of Gishwati. Nevertheless, two subnetworks can be distinguished (figure 9). The first subnetwork is the left part of the network, where in its upper part there is a concentration of government actors represented by central government institutions. On its lower part, there are local NGOs linked to their international partners and two local cooperatives. This first subnetwork represents in the network those actors involved in FLR activities. The second subnetwork (right part of the network) is composed of actors who are mainly involved in mining activities. These are private companies operating locally but are not necessary local based. These companies are linked to the remaining network through three gate keepers, namely a government institution in charge of mining (RNRA/GMD) and local authorities represented by Rutsiro and Ngororero districts. Most likely, there are more actors related to the mining industry, but as these actors may not be formally recognised, or even operating in the legal or illegal sphere, in or outside of the country, they have not been mentioned by the respondents.

[1]: **Red**: government institutions, **Dark green**: local cooperatives, **dark blue**: international actors, **yellow**: private company, **blue**: local NGO

FIGURE 9: ACTOR NETWORK OF MUKURA FLR PROCESS WITH ACTOR CATEGORIES [2]



When comparing the Gishwati and Mukura FLR actor networks, the actor network of the Gishwati FLR process shows a clear divide between actors in terms of their operating scale and in terms of their operating areas, whereas the Mukura FLR actor network division in subnetworks seems to be the results of limited communication between actors of the two subnetworks. In Gishwati FLR process, in terms of operating scale, government institutions are based at the centre of the network and represent those institutions that operate at the national scale. This suggests that most of the decision making regarding FLR is done by those central actors in the capital city. At the local scale, local actors (local cooperatives, local NGO and private companies) are peripheral to the network and show not only limited connectedness to the central network but also little connectedness among themselves. This suggests a limited participation of local actors in some FLR processes, especially those concerning decision making. In terms of operating areas, the three local subnetworks of Gishwati FLR actor network represent the specificity of each area under restoration in Gishwati landscape. The PAREF NL/FNCD lead subnetwork is involved in an area chosen for reforestation, the ICRAF lead subnetwork operates in areas where agroforestry prevails, and the FHA/GACP linked subnetwork operates in and near the remaining Gishwati forest reserve. This could suggests that actors in these three local subnetworks have constellated according to the specific restoration needs of each area.

In Mukura FLR process, the trend is that most of the actors involved in FLR, being government, NGOs, international, and local cooperatives, have limited connection with mining activities. This is an important remark because forest and land degradation in Mukura landscape are mainly caused by mining activities. This lack of connection can explain why restoration activities in this area are not as successful as in Gishwati landscape. The position of districts and RNRA/GMD, as connectors of the two subnetworks present a good opportunity of linking the two subnetworks.

[2]: **Red**: government institutions, **Dark green**: local cooperatives, **dark blue**: international actors, **yellow**: private company, **blue**: local NGO

These actors can play the role of gatekeepers, through which information about both mining and FLR projects can be channelled.

4.5.2. IMPORTANT ACTORS IN THE NETWORKS OF GISHWATI AND MUKURA FLR PROCESSES

When comparing important actors of both networks of Gishwati and Mukura FLR process, some actors are similar and others are different. Similar actors in these two networks are government institutions: RNRA/FNCD, a government institution in charge of forest and and nature conservation; LAFREC/REMA, a new restoration project that will be implemented by REMA (a government institution in charge of environment) in both landscapes; and local government institutions, here represented by Rutsiro district. The presence of the same important actors in both landcapes can be explained by the fact that central government actors are the ones that encompasse national activities in terms of environment and/or natural resources management, and local government institutions represent administrative juridictions of both Gishwati and Mukura lanscapes. It is thus not a surprise that these actors are present in both landscapes and that their activities are the same in both areas.

Different important actors have been found in both networks, which would suggest that these are the ones who make a difference when it comes to FLR processes and outcomes. In Gishwati, these actors are FHA/GACP, PAREF NL/FNCD and ICRAF. Coincidently, these three actors are the ones that represent the gatekeepers of the three local subnetworks as presented earlier. FHA/GAPC is a local NGO that is currenlty involved in the protection and conservation of the remaining Gishwati forest reserve. This NGO is unique to Gishwati landscape because it links not only many actors, as it is the case of government institutions, but most of these actors are local cooperatives and international partners. Activities of this NGO contribute a lot to the restoration of the remaining forest. This NGO also works with local communities in many livelihood improvement aspects. PAREF NL/FNCD is a government project implemented by RNRA/FNCD in partnership with the Netherlands Embassy. This project operates in the areas of Gishwati that have been completely deforested. It is involved in reforesting the area, and in the production of biomass energy. This project is also linked to the communities through local cooperatives. ICRAF is involved in Gishwati landscape in what concerns agroforestry. In contrast to FHA/GACP and PAREF NL/FNCD which are linked to many local actors, ICRAF is linked to many governement institutions and international partners.

On the side of the Mukura landscape, the different important actors identified are RNRA/GMD, ARECO and ARCOS. In contrast with the important actors of Gishwati actor network, these three actors do not represent any specific subnetwork. RNRA/GMD is the department of RNRA in charge of mining and geology. This actor showed to be important in the landscape mainly because it is directly linked to many mining companies that operate there. RNRA/GMD is entrusted with the supervision of mining sites all over the country, and thus in Mukura landscape. It works with concerned formal companies to make sure that everything is done according to the laws. But as mining in Mukura landscape invloves illigal mining, actors involved in this illigality tend not to follow the laws. ARECO is a local NGO that used to work in Mukura landscape. This actor is also important because of its connection to many different actors in the network. ARECO worked mainly with local cooperatives and schools in terms of providing trainings. It also developped a draft management plan for Mukura forest reserve, which was not implemented due to lack of funds. This NGO no longer work in the Mukura landscape but many actors still refer to it because it was the first NGO to be interested and work in Mukura landscape. ARCOS is also another local NGO that is an important actor of Mukura FLR actor network. It is also linked to many actors of Mukura landscape. ARCOS works mainly on awereness on environment and improved livelihood. It works with the same local cooperatives as ARECO. ARCOS also conducted a Total Economic Valuation (TEV) study for Mukura forest reserve, to determine the economic values of the ecosystem services and their contribution to livelihoods in Mukura landscape.

The difference in important actors of Gishwati and Mukura FLR processes suggests that these actors are the ones that contribute to the differences of FLR processes in the two landscapes. On one hand, in Gishwati all the different

important actors have specific activities that are directly linked to the restoration of the landscape, which consist of the protection and conservation of Gishwati forest reserve, reforestation, and agroforestry. In addition to this, the situation of these actors in the actor network permits the network to beneficiate from local, government and international actors at the same time. On the other hand, different important actors of Mukura show no direct link to the actual restoration of landscape. They are mainly involved in mining, environmental awereness, and the production of documents such as the management plan and TEV of Mukura, while showing less activties in terms of tree planting. In addition to this, one of the important actor of Mukura network, ARECO, is no longer involved in FLR activties in this landscape because of lack of funds. This reduce the impact this actor could have in FLR process in Mukura landscape.

4.5.3. FLR FRAMING IN GISHWATI AND MUKURA FLR PROCESSES

The communities' FLR frames in both Gishwati and Mukura landscapes showed a lot of similarities and some differences. When asked about FLR activities they think are present in their landscapes, the communities of both landscapes identified tree planting, forest plantation, protection and conservation as activities currently at the heart of FLR in Gishwati and Mukura landscapes. In addition to this, community's involvement and livelihood improvement has also been identified as being part of FLR in the two areas. The difference was spotted in Gishwati where the community said that FLR is a mainly a government agenda, and that this minimizes community's involvement and ownership of FLR activities and outcomes in Gishwati landscape.

When asked about what FLR should be, communities in both Gishwati and Mukura landscapes showed also some similarities and differences. The similarities are represented by the way both communities think that forest and water sources protection should be the main target of FLR. In addition to this, they both think that communities should be more involved in all processes of FLR, especially in the decision making process about what happens in their landscapes. Equitable land use sharing in terms of allocating the landscape according to different activities was also a point that both communities of Gishwati and Mukura shared. They think that land should be equitably shared among the different land uses that already exist, not only concentrating on forest plantation but also on other land based activities such as agriculture. The difference that rose was that in Gishwati landscape, local people pointed out that FLR should have clear and defined targets in terms of FLR activities implemented in the landscape, and in terms of targeted beneficiaries of the outcomes of those FLR activities. In Mukura landscape, the difference was that the community thinks that FLR in their landscape should include mining on its agenda instead of removing it, because mining is an activity on which many local people rely on.

Even though the communities of Gishwati and Mukura have similar basic FLR frames, the different frames that rose contribute to the explanation of the difference that exist between Gishati and Mukura FLR processes. On one hand, the fact that the community in Gishwati landscape think that FLR is reflecting a government agenda, shows how they recognize most of the projects and programs as being implemented by the government. A long exposure on FLR activities made them realize that the government is managing most of FLR activities in their landscape. The community lack the sense of ownership of FLR activities and outcomes because they are not sufficiently involved in all the phases of the process of FLR conceptualisation, decision making, planning and implementation. This results in the way local people see FLR, as having no clear targets, because those targets were not communicated nor discussed with them beforehand. On the other hand, the fact that in the Mukura landscape the community thinks that FLR should include mining, suggests that local people do not want to stop mining because it is part of their everyday activities, and it is one of the most income generating activity in the area. Thus, the community thinks that FLR should include, not remove, mining from its agenda. This can also explain why FLR is not succeeding in Mukura landscape, because no project has not yet include mining in its activities.

4.5.4. ACTORS' POWER IN GISHWATI AND MUKURA FLR PROCESSES

In terms of the actors' power to influence FLR in Gishwati and Mukura FLR processes, there were some similarities and some differences in both landscapes. In terms of similarities, it appeared that central government institutions and international actors were not known by the communities, and thus the later could not identify the types of powers held by those actors. This is the case of RNRA/FNCD, LAFREC/REMA and ICRAF in Gishwati, and RNRA/FNCD, LAFREC/REMA and RNRA/GMD in Mukura. Another similarity was that, in both landscapes, reward and expert power were the mostly used type of power in influencing FLR, and those types of power are held by actors who are locally based. Coercive power in both landscapes is exerted by local government represented here by the districts authorities.

In terms of differences, in Gishwati, PAREF NL/FNCD showed the possession of reward and expert power. Even if in Mukura, PAREF NL/FNCD was not identified as an important actor in network, the community identified this project as important in FLR process in their landscape and then identified the types of power it holds. In Mukura, PAREF NL/FNCD also uses reward and expert power. Speaking of other important actors identified by the community, but who were not among the important actors of the actor network, in Gishwati, three more actors were added by the community as being important. These are PAFOR/MINAGRI and GWLM/MINAGRI, which use reward and expert power. Both of these projects were implemented by the Ministry of Agriculture, but have currently completed their activities in the landscape. This may explain why they no longer have connections with most network actors, as they did not make it to the list of important actors during network analysis. The Rwandan Reserve force, a government institution under the Ministry of Defence was also identified by the community as being important, and has reward power. Another difference was that in the case of Gishwati, a local NGO (FHA/GACP) that manages the forest reserve showed the possession of Coercive power. This is due to the fact that this local NGO uses forest guards to monitor the forest in reducing illegally activities. FHA/GACP was also the only actor that showed the use of referent power. The use of legitimate power was only attributed to Rutsiro district in Gishwati landscape. In Mukura landscape, two local NGOs, ARECO and ARCOS showed reward and expert power.

In general, when comparing the Gishwati and Mukra FLR processes in terms of types of power held by different actors, it appears that there are no big differences. The types of power of government and international organisations, which most of the times do not have direct connection with local community, were not identified. This can even be expanded by saying that these institutions do not have direct connection with the communities in both landscapes, and thus do not exert direct power on them. This does not mean that these institutions do not have power to influence other actors in the network, but in the current study, power exerted on the landscapes' communities was only taken into account. When we go to the local level, in both landscapes, local government use mainly coercive power. This is explained by the fact that districts and other local government institutions have direct mandate to oversee environmental protection in their territories. They are the ones that officially have the capacity to punish those who do not comply with the law. This said, it would also suggests that that these entities have legitimate power because of their positions, but it is not the case in both landscapes. In Gishwati, the community recognised that local authorities have legitimate power because it is in their mandate to punish those who do not comply with the law, but in Mukura people said that even if the district have this mandate, the community also own their landscape and have the right to choose which activities should take place in the landscape.

In both cases of Gishwati and Mukura, reward power and expert power are used by most of the actors (government, projects and NGOs). This can be explained by the fact that these two types of power are the ones that have direct interest for the local population. Most actors use reward power to attract local people by giving something that people will consider as a benefit. The main types of rewards that are used in both landscapes are giving free tree seedlings, materials and infrastructures, and giving jobs to the communities. Communities in both landscapes stated that FLR projects which have reward power are mostly going to have a positive impact because people will feel that

they have been taken into account. This is also the case of expert power, which increases to local people's knowledge and skills that they can still use, even after the projects are terminated. Local people said that the knowledge and skills they gain from different trainings and awareness programs are important because they are something that they will always have, and won't be lost. Table 7 summarizes the comparison between Gishwati and Mukura FLR processes.

TABLE 7: SUMMARY COMPARISON BETWEEN GISHWATI AND MUKURA FLR PROCESSES

	Gishwati FLR process	Mukura FLR process
Actor network	Actor network divided into one central governmental subnetwork and three locally operating subnetworks, each engaged in a specific subset of FLR activities in different landscape areas. Interaction between central and locally operating networks maintained by gatekeepers acting as liaison between the two scales. No interaction between locally operating networks Concentration of government institution in the centre of the network: central decision making	Actor network divided into two subnetworks, one representing actors focused on FLR and another representing actors involved in mining. Although these two subnetworks have multiple links, overall the two subnetworks are not cooperating Not clear where the concentration of decision making is situated
Important actors	Similar important actors: government institutions. Different important actors: NGO, Projects and international actor: all still operational	Similar important actors: government institutions. Different important actors: central government, 2 NGOs: only 2 operational
FLR framing	Basic framing of FLR is the same Currently, FLR is a government agenda FLR should have clear and defined targets in order to achieve sustainable results	Basic framing of FLR is the same FLR should include mining instead of removing it
Power	Central government institutions not known by local people: no direct power exerted on them Reward and expert power were the mostly used types of power, and are held by most of the actors Coercive power is exerted by local government + a local NGO (FHA/GACP). Presence of referent and legitimate power	Central government institutions not known by local people: no direct power exerted on them. Reward and expert power were the mostly used types of power, and are held by most of the actors Coercive power is exerted by local government Absence of referent and legitimate power

5. CONCLUSION AND DISCUSSION

5.1. WRAP UP AND ANSWERS TO THE RESEARCH QUESTIONS

The aim of this study was to explore relations that exist between actors in the networks of Gishwati and Mukura FLR processes. It was expected that the differences in actors' composition of both networks, and the different power relations among network actors, have resulted in differences in the restoration processes in the two areas. To operationalize this objective, research questions have been developed using the theoretical framework of this study. On the basis of the research findings the various research questions can now be answered as follows.

1. *The sub-research question 1: Who are the actors involved in the Mukura and Gishwati FLR process, and how are those actors connected?*

In total, 50 actors were identified as involved in Gishwati FLR process. Among these actors, 13 represent international donors/partners, 12 local cooperatives, 9 central government institutions, 6 projects implemented by those central government institutions, 4 local government institutions, 4 private companies, 1 local NGO and 1 national university. In Mukura landscape, 39 actors were identified as involved in FLR activities. Among these actors, 6 represent international donors/partners, 2 local cooperatives, 8 central government institutions, 4 projects implemented by those central government institutions, 2 local government institutions, 12 private companies, 4 local NGO and 1 local university. It is essential to note that these are the actors that are situated in the formal networks. Those who operate informally were not captured during this study, but they may play an important role in shaping FLR in these two landscapes.

The actor network as identified in the Gishwati case did well explain the current situation of FLR process in this area. The network analysis demonstrated how central government institutions have built a core subnetwork in which decisions about FLR are made. This core is linked through gatekeepers to three subnetworks of locally operating actors. Each subnetwork is specialized in specific aspects of the FLR process in the form of either reforestation, agroforestry development or biodiversity conservation. These three locally operating subnetworks are not linked to each other. Moreover, the identified network did not include a direct link to local communities. Even though decision making is centrally organised, due to their specific knowledge and field experience, the locally operating development organisations do have a significant impact on local FLR process. However, the three locally operating subnetworks do not have direct connection among themselves, which limits communication and knowledge exchange. In contrast, the actor network of the Mukura FLR process only consists of two subnetworks. One subnetwork consists of actors interested in FLR and the other is composed of actors interested in mining. Although the links between these two subnetworks are not limited to one gate keeper as is the case in Gishwati, still there is overall little interaction between the two subnetworks. This is reflected by a lack of attention to mining in the local FLR process.

2. *The sub-research question 2: Who are the most important actors of Mukura and Gishwati FLR networks?*

In the Gishwati FLR process, within the governmental subnetwork, three organisations (RNRA (FNCD), LAFREC (REMA) and Rutsiro District) are most important. These actors are those institutions which have in their mandate environmental and natural resources management, and thus lead the FLR decision making. The three locally operating subnetworks are dominated by the respective gatekeeper organisations ICRAF, PAREF NL (FNCD) and FHA/GACP which showed to be important during network analysis. These actors represented respectively the three FLR actions that are currently being implemented in Gishwati landscape, namely agroforestry, reforestation, and biodiversity conservation. This confirms that the important actors are the main driver of FLR in Gishwati landscape, because they represent FLR main activities in this landscape.

In Mukura FLR process, in the first subnetwork, there are government institutions that operate at the central level with limited FLR activities in the landscape (RNRA (FNCD) and LAFREC (REMA)). There are also local NGOs, one that no longer operates in the landscape (ARECO), and another with limited FLR activities implemented in the field (ARCOS). In the second subnetwork, there is a government institution at the central level with limited action in the landscape (RNRA (GMD). Local authorities represented by Rutsiro and Ngororero districts connect the two subnetworks and can plays the role of gatekeepers. Nevertheless, these two districts do not play this role efficiently because there is little interaction between the two subnetworks reflected by a lack of attention to mining in the local FLR process.

3. *Sub-question 3: Which different FLR frames are recognized by the communities of Mukura and Gishwati landscapes?*

In general, the communities of Gishwati and Mukura landscapes presented similar FLR frames. However, even though the overall FLR frames were more or less similar, some differences could be observed. The community in Gishwati landscape considers that FLR reflects the government agenda. This shows how they recognize that the government is managing most of FLR activities in their landscape. The community lacks ownership of FLR activities and outcomes because they are not sufficiently involved in all processes of FLR, especially in decision making. The FLR targets are not only not discussed with local people, but also not communicated to them. The Gishwati community's FLR frames are confirmed by the results of the actor network analysis showing that decision making about FLR is made by central government actors with limited participation of local actors.

In the case of Mukura, a locally specific frame emerged suggesting that FLR should include mining. This indicates how mining is an important activity in the Mukura landscape, and thus should be considered in the FLR process. However, the FLR projects have not yet include mining in their activities, and in addition to this, there are no links between the two subnetworks representing FLR and mining in the network. This discrepancy at actor level can explain why FLR is not succeeding in this region.

4. *Sub-question 4: What kind of power do the important actors of FLR actor networks exert on the local community of Mukura and Gishwati?*

In both Gishwati and Mukura FLR processes, there was a combination of different types of power, but overall the government institutions exert limited to no direct influence on the communities, whereas local actors used a combination of all types of power. The different types of power recognized by the local actors in both Gishwati and Mukura showed the predominance of reward and expert power. Giving rewards and transferring expertize has shaped the way in which local people see FLR, as a development activity that emphasizes tree planting as a means to improve the local livelihood. This is reflected in the way local community emphasized that improved livelihood and community involvement are crucial to a successful implementation of FLR. Nevertheless, according to the results of this study, it is difficult to say to what extent the use of different types of power has contributed to different FLR outcomes in the two landscapes.

5. *Sub-question 5: How are the differences in actor networks and their power reflected in the FLR processes of the Mukura and Gishwati?*

The results of this study show that the differences that exist between Gishwati and Mukura FLR processes depend on the types of actors involved in FLR process, and how these actors interact between themselves and with the communities. An actor network that included all important actors related to the dominant landscape processes, and that was actively involved in FLR on the basis of a specific and well-defined focus on FLR, as involving reforestation and tree planting and biodiversity conservation, was conductive to effective restoration in the Gishwati landscape. In contrast, an actor network that did not reflect the major actors within the local landscape, resulting in limited connection between the FLR process and mining activities, contributed to limited restoration in

the Mukura landscape. The involvement of the communities in both restoration processes is still limited, and the communities are aware of this. This lack of involvement is reflected by the prevailing forms of power used by different actors to influence FLR process. Overall these showed little difference, even though in the Ghiswati case some forms of legitimate and referent power were indicated.

5.2. COMPARISON WITH OTHER STUDIES

Sayer et al. (2013) have argued that, in order to achieve sustainable outcomes at the landscape level, FLR could have multiple benefits, if decision makers adopt the principles of adaptive management, pursue active stakeholders' engagement and constructive dialogue. This process is referred to as landscape governance (van Oosten et al., 2014). Landscape governance is regarded as a collaborative way in which landscape actors (inhabitants and other actors involved) make their landscape productive in a way that is sustainable for their current and future needs (van Oosten, 2013). Even if the different actor categories involved in landscape governance are represented, van Oosten (2013) argues that most of the time, planning mechanisms used tend to lean towards the political agenda, rather than the needs and demands of landscape peoples. In this way, the outcome of landscape governance is not accepted nor sustained by local actors, because they do not feel that they are being considered (van Oosten, 2013). This is confirmed by the results of the current study, which showed that, even if in Gishwati landscape FLR is being successfully implemented, the network of actors involved is led by a core subnetwork of government institutions that take decisions related to what happens in this landscape in terms of FLR. This has conducted to a limited participation of local actors and the community in decision making, and the outcome of FLR is not being owned by the landscape inhabitants. The case of Gishwati and Mukura landscapes, where government institutions lead FLR decision making, are also very similar to other cases many part of the world. Using case studies from Asia and southern Africa, Shackleton et al. (2002) have shown how most of the time, the state and local people have different expectations when it comes to natural resources management. These case studies showed that government institutions were more interested in timber production, revenues and environmental conservation, which overrode local people's interests in improved livelihood and income (Shackleton et al., 2002). They also showed how state oriented decision making favoured formal and generalized resource management, whereas the communities preferred a management that is specific to the concerned area and that takes into account the local context. The results of the current study thus confirm the literature.

Community involvement in natural resources management has been highly recommended by many scholars, based on the fact that local people have knowledge of the place in which they live, and that they have been locally managing their resources for years (look for McKean, 1992; Ostrom, 1990, 1992; Peters, 1994). It is generally acknowledged that the involvement of local people in many cases of natural resources management lead to more realistic policies, and more local ownership, as local people's preferences have been included. Community participation in natural resources management challenges the way in which many conservation projects portrayed local people as an obstacle to an effective resources management. Conservation and local people used to be considered to have opposing needs and interests, with conservation emphasizing the protection of resources on which the communities rely on (Agrawal & Gibson, 1999). In many developing countries, this has conducted to a coercive conservation, often referred to as fortress conservation, which created conflicts between locals and conservation/government projects (Hitchcock, 2002; Taylor, 2002; Fortwangler, 2003). However, with local people relying more and more on basic resources such as fodder, firewood and other local wildlife for their everyday life, the use of coercive conservation has failed in many cases, and that's when many community based models started to be integrated in natural resources management (Dressler et al., 2010). The use of incentives is one of the ways communities are integrated in resources management, and it is always expected not only to help the community to feel included in the implemented projects, but also to help them in ameliorating their livelihood (Dressler et al., 2010). The cases of FLR in Gishwati and Mukura landscapes are in line with the growing insight that communities within the landscape matter. Results of the current study have shown that in both landscapes, there is limited use

of coercive power illustrating less coercive conservation, and an important use of reward and expert power expressed through community based mechanism of natural resources management. The fact that in both the Gishwati and the Mukura FLR processes reward and expert power are taking over, reducing coercive resource management, supports the idea that FLR is not only being interested in forests, but also considers the social aspect of the landscape, by emphasizing an improved livelihood for the landscape inhabitants. But to be able to achieve sustainable results, rewards and compensation are not the only thing that communities need; the government have to create favourable space for other actors, especially resource users, to be able to participate in decision making about what has to be done and where it should be done in the landscape. This would allow for a better division of responsibility, and it would provide multiple benefits for the communities as well as the other actors involved.

Apart from the government actors' subnetwork, the actor networks of Gishwati and Mukura FLR processes have shown to be composed of other locally based subnetworks. Different studies in natural resources management have shown that the existence of subnetworks in an actor network can generate positive or negative outcomes. Positive outcomes are generated when the division of networks is caused by geographical boundaries, i.e. the biophysical boundaries that act as 'natural' boundaries of the landscape separating different concerned areas, and thus distinguish the different actors involved (Ramirez-Sanchez, 2007). In addition to this, the existence of subnetworks could also be the result of actors who have acquired specific knowledge and experience in one or more aspects of the concerned areas (Crona & Bodin, 2006). This permits the actors of the different subnetworks to develop specific knowledge linked to their specific local areas and this knowledge can be transferred to the other actors of the whole network, as long as the subnetworks are not totally separated (Ghimire et al. 2004, Crona & Bodin 2006). The results of this study confirm the above literature, especially in the case of Gishwati landscape. Even though this landscape is considered as one area and does not have "natural boundaries" that separate its different parts, there is a certain division that has been observed. The three local subnetworks that have been observed in the Gishwati FLR actor network are linked to three separated areas inside the landscape, which are under specific restoration initiatives. One subnetwork is composed of actors located near the Gishwati forest reserve, where emphasis is put on biodiversity conservation. Two other subnetworks are located in the deforested Gishwati area, with one part of this area being reforested and another being under agroforestry systems. This division of the Gishwati landscape in three areas under specific restoration initiatives has conducted to positive FLR outcomes, as Gishwati is considered as successful in FLR. Nevertheless, as the three subnetworks are not connected among themselves, knowledge transfer among their actors is still limited. The formation of subnetworks can also conduct to negative outcomes. This is the case when the actors in those subnetworks cannot simply develop many relations with other actors of their network (Gladwell, 2002). This can thus create the spirit of division between "us" and "them", which can contribute to non-flexible groups with specific interests. This can limit the achievement of the common goals of the whole network, because the different subnetworks are unable to communicate and search for a common ground (Borgatti & Foster, 2003). This is illustrated by the case of the actor network of Mukura FLR process. This network is composed of two subnetworks, one representing actors interested in FLR and another representing those actors involved in mining. The division of these two subnetworks are not based on geographical boundaries in the landscape, but rather on the absence of proper communication between network actors, and thus an absence of aligned common landscape interests. This division of the Mukura FLR actor network into two non-communicative subnetworks has conducted to not considering mining activities in the Mukura FLR process, even though mining is the first issue that degrade the area and thus conduct to the need of restoration.

In order to ameliorate the connection and communication between different FLR actor subnetworks, there is a need of identifying those actors who serve as gatekeepers of the different subnetworks so that they can be empowered, to facilitate and ameliorate communication between the subnetworks they connect. In addition to this, there is a need of facilitating new connections between the different subnetworks, especially in the case of the existence of international, national and local scales. Increasing the links between the different scales would permit the inclusion

of all the actors in all the FLR processes, especially in decision making. This would also facilitate knowledge and resources transfer between the different network actors.

5.3. REFLECTION AND COMMENTS ON THE THEORETICAL FRAMEWORK

Social network analysis

Many researchers have identified social network analysis as an important approach to analyse situations in which different actors have to jointly and collaboratively deal with natural resources problems (for example: Gunderson, 1999; Pretty & Ward, 2001; Folke et al., 2005; Bodin et al., 2006; Hahn et al., 2006; Olssonet al., 2008; Bodin & Crona, 2009; Prell et al., 2009; Stein et al., 2011). In addition to this, it has also been shown that actor networks can even be more important than the existing formal institutions in what concerns decision making on environmental issues (Scholz &Wang, 2006). As illustrated by the results of the current study, when making a social network analysis it is important to consider not only the formally recognized actors, but also to be aware of whether potentially relevant types of actors are not included. As illustrated by the Mukura case, the low degree of success of the Mukura FLR process could be related to the lack of attention to a major local actor category in the form of illegal miners as well as their related actors in the informal mining network.

The degree centrality and Betweeness centrality are the two forms of social network measurements that have been identified as playing an important role in natural resource management (Prell et al., 2009), and thus were used in the current study to determine who the important actors are. Even though these measurements represent those actors who have a high influence in the network, King (2000) has shown that if those positions do not coincide with formal authority positions, the influence of those actors in the network is considered to be lower compared to those who have formal authority position. Bodin & Crona (2008) gave the following example to illustrate this issue: They identified two important actors of a rural fishing actor network, using degree centrality. One represented an official government institution, formally recognized by the government, but had a limited influence in the concerned village. The other actor was the chairman of the village, who was not recognized officially by the government, but played a central role in the village and thus was very influential locally. With these two important actors and their different official attributes, the outcome at the village level depended on how these two actors collaborate. A similar process could be observed in the Gishwati and Mukura cases. In the actor network of Gishwati FLR process, important actors were represented by government authorities, which operate at the central level, and which are not known by local communities. At the local level, there was an important actor which is a local NGO actively involved with the community, but does not have an official power of decision making about FLR, compared to the government institutions. The outcome of FLR at the landscape level will have then to rely on the collaboration of these actors who have different official power position. This is also the case in Mukura landscape, where government and local NGOs occupy the same place as important actors in the same network, but do not have the same power of decision making. The point I am trying to make here is that, even if it is important to know who the actors occupying those important places in the network are (using degree centrality and betweeness centrality), it is also important to see how those actors utilize their official position to influence landscape governance. In addition to this, it is equally important to also see if those important actors are aware and are willing to act for the common goal of the whole network. Emphasising the recommendations already provided by Bodin and Crona (2008), deep investigation should be made about the different interests and objectives of these important actors, not only based on their position in the network, but also on their level of formal and unformal authority and influence. This would permit a better understanding of their whole influence in the FLR processes.

In general, using results of the current study, combined with suggestions from other studies on natural resources management, social network analysis can be used in FLR to visually see how the different actors are connected, or disconnected, forming different subgroups divided over geographies, sectors or scales. This can facilitate FLR

implementers and scholars to understand who is making which decision, who is communicating with who, and who is involved in designing, planning and implementing FLR. Thus, as suggested by Bodin and Crona (2009), social network analysis could serve a guiding tool of assessing communication between different actors, sectors and scales. Such understanding helps in enhancing the FLR process, and to ensure efficiency and sustainability of the action in the whole network.

Theory of frames

Using the theory of frames in the current study has permitted to depict communities's understanding of FLR in Gishwati and Mukura landscapes. Knowing how different actors frame FLR is important, because it can contribute to assessing whether the different interests represented by different actors are being taken into account. It has been shown in different studies that, most of the time, conflicts in natural resources management result in how different actors involved define the concerned issues (Lewicki & Gray, 2003; Wolsink, 2006; Buijs, 2009). The different groups of actors advocate for a specific interpretation of the concerned issue, and suggest actions that will conduct to the fulfilment of their respective interests (Schön & Rein, 1995). In this way, understanding the different frames can be used in defining and shaping what should/ should not be done in the landscape (Benford and Snow, 2000). To illustrate this, the current study has shown how some FLR frames are not being taken into account when it comes to implementing FLR in both Gishwati and Mukura landscapes. A concrete example is that of Mukura landscape, where local people think that mining should be part of FLR rather than being removed. The fact that FLR actors are barely connected to the mining actors aggravate this situation, and thus make it even harder for mining to be included in FLR. Thus, assessing different FLR frames can give a well-represented view of what different actors think about FLR, whose view is being implemented, and who is not being taken into account.

The concept of power

During this study, power was defined as a social relationship in which the powerful actor change the behaviour of a powerless actor without recognizing the latter's desires. Five bases of power from Raven (2008) were used to assess the influence important actors of Gishwati and Mukura FLR processes exert on the communities of the two landscapes. According to Raven (2008), the five types of power are categorised into 2 categories. The first category is that of power that results in socially dependent change, which requires surveillance from the actor exerting power. This category contains coercive and reward power. In this category, power is said to be socially dependent because the powerless actors will comply by relating to the rewards or penalties that they will get from the powerful actor. In addition to this, coercive and reward powers require surveillance from the powerful actor because the powerless actors will comply if and only if they think that the powerful actor is going to reward them in case of compliance, or penalize them in the absence of compliance. For this, the powerful actor has to keep on effectively surveying the compliance of the powerless actors. The second category is that of power that conducts to socially dependent change, but does not require surveillance from the actor exerting power. This category contains legitimate, referent and expert power. These three types of power conduct to socially dependent change in the sense that in order to comply, the powerless actor still take into account the influence of the powerful actor. While complying, the powerless actors keeps in mind why their behaviour has changed, and without the influence of the powerful actor, their behaviour change would not make sense. But though the powerless actors still refer to the powerful actors to maintain their behaviour change, in these three cases, it does not require that the powerful actors keep on monitoring their compliance.

Let's consider the first category of power that results in socially dependent change and requires surveillance from the actor exerting power. The use of coercive and reward power would suggests that the communities, who are subjects of these two types of power, will only comply with FLR by relating to the rewards or penalties that they will get from the powerful actor. In addition to this, if coercive and reward power require surveillance from the powerful actor, the communities will comply because they think that they will get from the powerful actor either

rewards if they comply, or punishments in the absence of compliance. This exactly illustrates the case in both the Mukura and Gishwati FLR processes, in which the communities have reported that they do not go into the reserve forests because they fear punishments. They also reported that they prefer FLR projects that provide them with jobs and other rewards or compensations. It can be argued that if landscape inhabitants are involved in FLR because they want rewards or fear punishments, then it will require continual presence of the FLR actors to provide incentives to the communities or take coercive measures against them, otherwise people would stop being involved in FLR activities.

The category of power that conducts to socially dependent change, but does not require surveillance from the actor exerting power, can conduct to a more sustainable behaviour change toward FLR. This is because it does not require a continual influence of the powerful FLR actor. To illustrate this, let's use the cases of Gishwati and Mukura, where expert power was the mostly used type of power that falls into this category. The use of expert power was expressed through knowledge transfer via trainings and awareness programs that targeted the landscapes' communities. The communities still referred to these trainings and awareness programmes that happened in the past, which have changed their ways of seeing FLR activities till now. A concrete example is that of ARECO, a local NGO that operated in Mukura landscape in the past. This NGO was involved in training local people about environmental issues and tree nurseries installation. Even though this NGO have stopped operating in Mukura landscape, local communities still refer to it as important and powerful because of the trainings it provided them. Some people still use the knowledge achieved through these trainings to install their own tree nurseries without the help of an outside actor. This illustrates how the use of the types of power that fall under the category of power that conducts to socially dependent change, but does not require surveillance from the powerful actor, have more durable results than the previous power category that requires continual presence of the powerful actor.

The concept of power, as it was used in the current study, was very informative because it allowed to understand the means used by different FLR actors to influence local people's behaviour toward FLR in Gishwati and Mukura landscapes. Using the five types of power can thus permit to scholar and practitioners to better understand what is happening in landscapes in terms of knowing which FLR actor is using which type of power, and what will be the implications. Nevertheless, it was also hard to operationalize empirical data collection of the fives bases of power due to lack of local definition of power in the sense of French and Raven (1959) and Raven (2008), and thus some readjustments should be made depending on specific situations.

In summary, the theoretical framework of the current study has helped to identify different aspect of FLR that can contribute to better explaining the current situation in Gishwati and Mukura FLR processes. If taken apart, each theory can provide some insight about FLR processes. The network theory could permit the exploration of how the different FLR actors are connected and the implication of this on the whole network. The theory of frames could permit the depiction of how the communities, among other actors, perceive FLR. The concept of power could permit the assessment of the means and resources that powerful actors use to influence other actors in what concerns FLR. Even though each theory apart gives specific insights about FLR process, combining the three theories explained better how those different aspects are interconnected. Actors in the networks are the ones who have power to influence landscape people. But also those people have different FLR frames, which determine how they interact with the other network actors, and how they react to the power exerted on them. This intertwined aspect of FLR actors and processes symbolises the complexity of FLR itself.

5.4. REFLECTION ON METHODOLOGY

In general, the methodology used in this study permitted the collection of all the necessary data, but also presented some limitations. These limitation were mainly associated with the use of snowball method to identify FLR actors of Gishwati and Mukura landscapes. This method consists of identifying the first actor of the network and then let

him/her identify other actors he/she is connected to in the same network. The identified actors would then also be asked to identify other actors they are connected to and so on, till there are no new actors appearing on the list of identified actors. The first limitation of this method was associated with the fact that it did not permit the identification of all actors involved in FLR, especially the unformal ones. This was the case in both Gishwati and Mukura landscapes, where no actor identified community as an actor that belongs to the FLR networks. Particularly, in Mukura landscape, where there are a lot of "illegal" actors involved in mining, the snowball method did not leave room to the inclusion of such actors, due to the fact that no other actor was willing to say that they are associated with such illegality. Nevertheless, when all the actors to be assessed in the research are not known in the first place, the snowball method permits the depiction of as many actors as possible. A second limitation of the snowball method was associated with the fact that, in order to identify the actors one is linked to in FLR actor network, each actor must have a specific definition of what FLR means to him/her. How each actor frames FLR, defines who that actor think is linked to. This way, depending on the specific interests in FLR of the actors, they could consider some actors as being part of their network, and others not. Even if this limitation is linked to the snowball method, it is also linked to limited time and resources. The availability of time and resources would have permitted to also assess the different FLR frames of all the identified actors, as it was done with the communities. Even though the methodology presented some limitations, these limitations resulted in an adaptive learning process on my side. The process of acknowledging the limitation of the theory and the data collection method, and their adaptation to the local situation resulted in a learning process that, not only increased my knowledge, but also conducted to a richer data.

5.5. CONCLUSION AND RECOMMENDATIONS

Rwanda has embarked on the journey of restoring 2 million hectares of degraded land and forests in the whole country by 2020 (GPFLR, 2013). To achieve this ambitious target, different restoration projects are being initiated and implemented around the country, especially in the landscapes of Gishwati and Mukura. The results of this study showed that even if restoration is striving in Gishwati landscape, government institutions are still in control of decision making about what happens in the landscape, with limited participation of local actors, especially the community. This is also the case in Mukura landscape. To achieve sustainable outcomes, the government of Rwanda as well as the international sponsors of the FLR process in Rwanda, should further promote local actors' participation in decision making process. Specific attention should be given to the involvement of all landscape actors and activities of the local inhabitants, because they are the ones who directly affect and are affected by the outcomes of restoration.

With the new law upgrading Gishwati and Mukura to the national park status, it is expected that the management of the two forests will remain in the hands of a government institution (RDB) with increased coerce protection. In addition to this, the creation of buffer zones around the forests could generate land and wildlife conflicts between the neighbouring communities and the parks' management authority. It is also expected that the creation of this park will bring new actors in the landscape, especially the private sector, civil society and international actors, all with various interests. Thus, in addition to the already existing issues, new and maybe more complex issues will rise with the arrival of new actors. The creation of Gishwati - Mukura national park can thus serve as an opportunity to widen the links between the local, national and international scales, by bringing together the different actors, from government, to local actors, private sectors and international partners. The results of this study can inform the next FLR processes in Gishwati and Mukura landscapes, especially in knowing where the emphasize should be put to make sure that all the actors and interests are represented throughout the whole FLR process.

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7. APPENDIX

1. **Ten principles for a landscape approach to reconciling agriculture, conservation, and other competing land uses** [Adapted from Sayer et al (2013)]

Principle 1: Continual learning and adaptive management: landscape processes are dynamic, thus learning from outcomes can improve management.

Principle 2: Common concern entry point: Solutions to problems need to be built on shared negotiation processes based on trust.

Principle 3: Multiple scales: Outcomes at any scale are shaped by processes operating at other scales. An awareness of what happens at each scale is important.

Principle 4: Multi-functionality: multiple uses and purposes, valued in different ways by different stakeholders should be considered.

Principle 5: Multiple stakeholders: They frame and express objectives in different ways. Failure to engage them in decision-making processes will lead to unsustainable outcomes.

Principle 6: Negotiated and transparent change logic: transparency is the basis of trust. Transparency is achieved through a mutually understood and negotiated process of change and is helped by good governance.

Principle 7: Clarification of rights and responsibilities: The rights and responsibilities of different actors need to be clear to, and accepted by all stakeholders.

Principle 8: Participatory and user-friendly monitoring: To facilitate shared learning, information needs to be widely accessible.

Principle 9: Resilience: System-level resilience can be increased through an active recognition of threats and vulnerabilities, and to allowing recovery.

Principle 10: Strengthened stakeholder capacity: the complex and changing nature of landscape processes requires competent and effective representation and institutions that are able to engage with all the issues raised by the process.

2. List of participants in focus group discussion in Mukura and Gishwati

LIST OF PARTICIPANTS/ PAYMENT

Landscape name: Mukura
Districts: Rutsiro
Sectors: Mukura

Date: 03/11/2015

No	Names of participants	Amount received	Signature
1	MUKANDINDA christine	1000	
2	BAKOMEZA Eliab	1000F	
3	BIMENYIMANA ARON	1000 F	
4	KAGIRANEZA INNOCENT	1000 F	
5	BITUNGURAMYE Emmanuel	1000Frs	
6	HERUMBAHTE JAPHET	1000 Fr	
7	NSANZIMANA Providasi	1000 F	
8	MAHUKU ATHANASE	1000 Frs	
9	KARAMA ABURAHAMU	1000Frs	
10	HABIYAMBERE. Emmanuel	1000 FRS	
11	GASHOGOZI Domescène	1000	
12	TWAHIRWA. JEROME	1000	
13	IRIBAGIZA. daurence	1000 F	
14	DUSABE	1000FR	
15	Myina habimana	1000F.	
16	NDAKIJIMANA BONAVENTURE	1000 FRS	
17	Ndutiye.	1000FR	

LIST OF PARTICIPANTS/ PAYMENT

Landscape name: Gishwati
Districts: Rutsiro
Sectors: Ngeyo

Date: 03/11/2015

No	Names of participants	Amount received	Signature
1	UWANYIRIJURU J. Damascène	1000 F	
2	MUNYAKARAMA Théoneste	1000 F	
3	MUKESHIMANA Justine	1000 F	
4	MUKESHIMANA Jeanine	1000 F	
5	MUBASALIA Isae	1000 F	
6	KABENGA Edison	1000 F	
7	AJINGENEYE Judithe	1000 F	

LIST OF PARTICIPANTS/ PAYMENT

Landscape name: Gishwati
Districts: Rubavu
Sectors: Nyakiriba

Date: 04/11/2015

No	Names of participants	Amount received	Signature
1	MUSABIREMA MOISE	1000 F	
2	SEMIGISHA Céléstin.	1000f.	
3	BANYANGA · domascène	1000 F	
4	NGURUNZIZA Evariste	1000 f.	
5	MBABAZIENDE · ~~Pister~~ Céléstin	1000f	
6	NIYIRUHUNGA · Evariste	1000 f	
7	HABIMANA Elie.	1000f	
8	Twahirwa Innocent	1000f.	

LIST OF PARTICIPANTS/ PAYMENT

Landscape name: Gishwati
Districts: Nyabihu
Sectors: Bigogwe

Date: 05/11/2015

No	Names of participants	Amount received	Signature
1	BUHUTERI J. Damascène	1000 Frs	
2	KARIWABO - Léonard	1000 Frw	
3	RUKARA - Gatesi	1000 Frw	
4	KALISA RUGENZI	1000 Frw	
5	NSENGIYUMVA BYILINGIRO	1000 Frw	
6	NYIRACANTSI PÉLITH	1000 Frw.	
7	MUNYANGORORE Jake	1000 Frw	
8	KAJYIBWAM Museretti	1000 Frw	
9	N-RAMUNEZA Alice	1000 Frw	

3. Pictures used in focus group discussion to explain the types of power

4. **Vignette coding**

Coding different types of power in field notes (18th January 2016)

No	Vignette Mukura (3rd November, 2015)	Type of power identified
1	**PAREF:** local people said that this project planted trees in different places of the landscape, in states lands and on people personal lands. Trees that have been planted in the states' lands belongs to the government whereas those planted on people's own lands belongs to those people. Local people feel that this was a very good project because it encouraged them to plant trees on their own fields, and especially provided them tree seedlings for free. In addition to this, this project hired some of the local people and they beneficiated from being paid for the activities they were doing for the project. People who were also involved in this project activities have been trained about different components of tree plantings and the benefits of doing so.	PAREF NL - **Reward power**: hiring and giving trees for free - **Expert power**: training local people
2	**ARECO Rwanda nziza**: this project has been identified by local people as one that was involved in FLR. It was involved in providing fruit trees (prunes de Japon), tree seedlings, and improved irish potatoes to local communities, especially a women cooperative called Jyamberemunyarwandakazi. This project also provided equipment that were used in the above activities for free. It also organized competition on environmental protection in which the winners were given different rewards. It also gave trainings on how to install tree nurseries.	ARECO RWANDANZIZA - **Reward power**: providing tree seedlings, potatoe seeds and equipment to local people for free , organizing competition - **Expert power**: training local people in what concerns tree nureries
3	**Local authorities (District, sector, and cell):** local people stated that they do not know any activities of tree planting that have been implemented by the local authorities. They said that in other sectors they have tree nurseries installed by the district, but in their area there are none. On the other hand, local authorities have trained people on how to build energy saving stoves (Rondereza) to help people use less firewood, and the authorities helped in building them for free. Apart from that, local authorities are the ones who are in charge of punishing people who are caught mining or grazing their cattle in the forest illegally. They charge them with money depending on the severity of the illegal activities.	**Local authorities** - **Expert power:** trainings on energy stoves - **Reward power:** giving energy saving stoves to local people for free - **Coercive power:** punishing those involved in illegal activities
4	**RNRA (FNCD):** people said that sometimes they see civil servants from this institution coming in the forest, measuring things, trees and the boundaries of the forest but they do not know what they do exactly. They said that they also saw them when the minister of natural resources came to visit the forest in line of its upgrade to the	RNRA (FNCD) - Types of power unknown

	national park status. They also came with deputies in the same line, but they do not know activities that are field based in their landscape.	
5	**REMA (LAFREC):** people said that they do not know this project.	LAFREC (REMA) - Types of power unknown
6	**RNRA (GMD):** people said that they have never heard of this institution. They only know some private mining companies, but they do not know a government institution in charge of mining.	RNRA (GMD) - Types of power unknown

Example of Frames of FLR in Gishwati landscape

Current activities that are part of FLR in Gishwati	**Additional activities that should be in FLR**
Planting trees: native and exotic trees: provide wood and firewood, clean air, soil retention (reduce disaster_landslides), clean water	Protecting water sources from degradation caused by mining
Removing eucalyptus trees from Gishwati forest reserve	Involving and informing local people about all decisions made about their landscapes, especially in what concerns the protection of the forest reserve and FLR, otherwise they feel like outsiders, they do not own the results of FLR
Forest guarding-forest patrol to reduce illegal activities (cattle grazing, trees and firewood cutting, small scale mining, bush meat hunting)	Upgrading the forest to the national park status. This will beneficiate local in terms of revenues from ecotourism (like those near the VNP)
Supporting local cooperatives whose activities are linked to environmental protection	Defining why restoration is being done: production, biodiversity conservation or protection forests
Working/involving local people in activities related to the protection of the forest: job provision	The use of local community knowledge: they have been living in the landscape for years, they know more about the area
Reducing human-wildlife conflicts: crop raiding caused by animals from the forest by cultivating crops that do not attract animals, and limiting cattle grazing inside the forest	Livelihood improvement to be included in FLR projects, not only emphasizing tree plating
Benefiting from the forest: beekeeping, tourism revenues (examples: selling handcrafts and dancing troupe)	Equitable distribution of land use_ FLR should not only concentrate on forests especially in areas where people rely on agriculture (forest planting reduces their arable lands)
Enhancing other social economic aspects of the landscape: banks, dairies,	
Monthly communal work (umuganda)-mass planting of trees where local people are massively involved	
Landscape changed from a more dense forest to an open area with scattered patches of forests and trees. This was due to increased population density which conducted to expanding agricultural fields.	
People think that FLR is a government plan to protect the environment	

Protection of the area where FLR is being implemented, especially planted forests	
Job creation for the local population	
- Radical terraces	-
- Agroforestry	-
- Compensating local people who gave their lands for FLR_ these lands will be part of the protected area	-

5. List of actors involved in FLR and their roles in the landscape

Actors of Gishwati FLR process

No	Actors	Category of actor	Activities
1	ACIAR	International donor/Partner	Australian Centre for International Agricultural Research_ ICRAF Partner in Gishwati landscape
2	British ecological Society & International Primatological society& John Ball zoo society	International donor/Partner	FHA Donor/ Funding for Community outreach and conservation education in Gishwati landscape
3	CFBPREPP	Local cooperative involved in FLR	Cooperative pour la Fabrication des Blaises et la Protection de l'Environment au Profit de la population de Rutsiro (received PAREF nl training in forestry and reforestation)
4	Community Conservation/USA	International donor/Partner	FHA Partner/ one year partnership to support in community conservation in Gishwati landscape
5	COVAKARU (women handcraft Cooperative)	Local cooperative involved in FLR	FHA-Collaboration / Improving livelihood aimed at protection the forest resources in Gishwati landscape
6	Critical Ecosystem Partnership Fund (CEPF)	International donor/Partner	FHA Donor/ Funding to strengthen the conservation of Gishwati
7	Drake University	International donor/Partner	FHA Partner in the research project/ Crop raiding and forest restoration in Gishwati landscape
8	FHA/GAPC	Local NGO	Forest of Hope Association: Local NGO that manage the remaining forest of Gishwati
9	FSC	Private company	Forest Sustainable Company: involved in Reforestation in Gishwati
10	GWLM (MINAGRI)	Project of central government institution	Gishwati Water and Land Management. A project that conducted Restoration activities in the former Gishwati area
11	Ibidukikije iwacu Nyabirasi	Local cooperative involved in FLR	(received PAREF nl training)

12	ICRAF	International donor/partner	International Center for Research in Agroforestry/World Agroforestry Center. http://www.worldagroforestry.org/aciar/stories/Trees-for-food-Security-project
13	Imanzirwema	Local cooperative involved in FLR	?
14	INDASHYIKIRWA (INTISUKIRWA) Association (marginalized people cultural dance club)	Local cooperative involved in FLR	FHA-Collaboration/ Improving livelihood aimed at protection the forest resources in Gishwati landscape
15	ITA	International donor/Partner	??
16	IWRM programme	Project of central government institution	Programme of RNRA (IWRM) that will be involved in the protection of Sebeya river (in Gishwati landscape)
17	JYAMBERE (local Farmers)	Local cooperative involved in FLR	FHA-Collaboration/ in reducing human-wildlife conflicts (cattle Grazing and crop raiding) in Gishwati landscape
18	KOAGIRU (Traditional healers Cooperative)	Local cooperative involved in FLR	FHA-Collaboration / Improving livelihood aimed at protection the forest resources in Gishwati landscape
19	KODABU	Local cooperative involved in FLR	Koperative Dusazure Amashyamba Bujyeshi (received PAREF nl training in forestry and reforestation)
20	KODODOMU	Local cooperative involved in FLR	Received PAREF nl training in forestry and reforestation
21	Koperative Tubungabunge Ibidukikije	Local cooperative involved in FLR	(received PAREF nl training)
22	KOTWIMIKA	Local cooperative involved in FLR	Koperative Twihangire Imirimo Kanama (received PAREF nl training in forestry and reforestation)
23	LAFREC (REMA)	Project of central government institution	Landscape Approach to Forest Restoration and Conservation (Mukura and Gishwati are the project area of intervention), project of REMA (Rwanda Environmental Management Agency)
24	LDCF (REMA)	Project of central government institution	Reducing Vulnerability to Climate Change by Establishing Early Warning and Disaster Preparedness Systems and Support for Integrated Watershed Management in flood prone areas (ended project)
25	Local community	Local community	FLR beneficiary

26	METEO Rwanda	Central Government Institution	will be involved in LAFREC in what concern early warning system in the landscapes of Gishwati
27	MIDMAR	Central Government Institution	will be involved in LAFREC in what concerns risk reduction in the landscapes of Gishwati
28	MINIRENA	Central Government Institution	Ministry of Natural Resources
29	Netherlands Kingdom	International donor/Partner	Funder of some restoration activities, Mainly PAREF NL
30	Ngororero District	Local Government	local authority
31	Nyabihu District	Local Government	local authority
32	PAFOR (MINAGRI)	Project of central government institution	Projet d'Appui a la Reforestation au Rwanda (ended project)
33	PAREF Nl (FNCD)	Project of central government institution	Projet d' Apuit à la Reforestation, project of RNRA (FNCD): One of the first interventions to restore Gishwati taken by the government of Rwanda between 2005 and 2008. The activities of this project increased the area of the remaining forest from 600 ha to 886 ha
34	Pfunda tea factory	Private company	Tea factory that use wood as a source of energy to process tea in Gishwati landscape
35	RAB	Central Government Institution	Rwanda Agriculture Board
36	RDB	Central Government Institution	Rwanda Development Board. It Will manage Mukura and Gishwati when they become national parks
37	Reserve Force	Central Government Institution	Reserve Force is a part-time military service of the Rwanda Defense Forces. It signed an MoU with MINIRENA to conduct restoration activities in most of MINIRENA projects
38	RNRA (FNCD	Central Government Institution	Forest and Nature Conservation Department in Rwanda Natural Resources Authority (FNCD)
39	RNRA (GMD)	Central Government Institution	Geology and Mines Department of RNRA
40	RNRA (IWRM)	Central Government Institution	Integrated Water Resources Management Department of RNRA
41	Rubavu District	Local Government	local authority

42	Rufford Small Grant Foundation	International donor/Partner	FHA Donor/ Funding to reduce conflicts between local farmers between them and the forest in Gishwati landscape
43	Rutsiro Distict	Local Government	local authority
44	Rutsiro mining Co.Ltd	Private company	Mining company in Gishwati landscape
45	Ukweli trading Ltd	Private company	Mining company in Gishwati landscape
46	UNICOAPIGI (local beekeepers union)	Local cooperative involved in FLR	FHA-Collaboration/ beekeeping project in Gishwati landscape
47	University of Rwanda	Local Research institution	University of Rwanda (Involved in Research)
48	West Chester University of Pennsylvania	International donor/Partner	FHA Partner in the research project/ Wildlife and forest dynamism in Gishwati landscape
49	Worl Vision	International donor/Partner	International partner of ICRAF
50	World bank	International donor/Partner	Funder of some restoration activities, Mainly LAFREC
51	WWF- Sweden and IGCP	International donor/Partner	FHA Donor/ Funding to support the forest protection / larger protection advocacy in Gishwati landscape

Actors of Mukura FLR process

No	**Actors**	**Category of actor**	**Information**
1	RNRA (FNCD)	Central government institution	Forest and Nature Conservation Department of Rwanda Natural Resources Authority
2	Rutsiro District	Local government	Local government
3	Ngororero District	Local government	Local government
4	ARECO	Local NGO	Association Rwandasie des Ecologistes (has worked in Mukura Landscape, has drafted the management plan of Mukura forest, worked with local cooperatives). Ended its activities in the landscape because of lack of funds.
5	ARCOS	Local NGO	Arbertine Rift Conservation Society: conducted a Total Economic Valuation (TEV) study for Mukura Forest to determine economic values of the ecosystem services and their contribution to livelihoods
6	Rutsiro tea factory	Private company	Uses wood as primary source of energy to process tea. Also involved in a management plan of Mukura forest reserve with RNRA/FNCD to use government forests in the landscape as source of

			energy, and to replant the sites afterward (Rutsiro)
7	Rubaya tea factory	Private company	Uses wood as primary source of energy to process tea. Also involved in a management plan of Mukura forest reserve with RNRA/FNCD to use government forests in the landscape as source of energy, and to replant the sites afterward (Ngororero)
8	LAFREC (REMA)	Project of local government institution	Landscape Approach to Forest Restoration and Conservation (Mukura and Gishwati are the project area of intervention), project of REMA (Rwanda Environmental Management Agency)
9	DEMP(REMA)	Project of local government institution	Decentralization and Environment Management Project, implemented by REMA with main goal of rehabilitating fragile ecosystems such as lakes and rivers. (ended project)
10	WCS	International donor/partner	Wildlife Conservation Society: It was involved in a biodiversity survey and the demarcation of Mukura forest reserve
11	FHA/GAPC	Local NGO	Forest of Hope Association: currently locally managing the remaining forest of Gishwati. But is also involved in a process of providing indigenous seedlings to be used in Mukura during restoration activities of LAFREC
12	MINIRENA	Central government institution	Ministry of Natural Resources
13	IUCN NL	International donor/partner	International Union for Conservation of Nature/Netherlands has provided funds to ARECO when it was still operating in Mukura landscape
14	PAREF NL (FNCD)	Project of local government institution	Is involved in an advisory commission on protecting and Conserving Mukura Forest that was established by MINIRENA
15	PAFOR (MINAGRI)	Project of local government institution	Projet d'Appui a la Reforestation au Rwanda (already ended)
16	METEO Rwanda	Central government institution	Rwanda Meteorology Agency. It will be involved in LAFREC in what concern early warning system in the landscape of Mukura
17	MIDMAR	Central government institution	Ministry of Disaster Management and Refugee Affairs. It will be involved in LAFREC in what concerns risk reduction in the landscapes of Mukura
18	RNRA (IWRM)	Central government institution	Integrated Water Resources Management Department of RNRA

19	ICRAF	International donor/partner	International Centre for Research in Agroforestry/World Agroforestry Centre. Involved in agroforestry in the landscpe
20	University of Rwanda	Local research institution	University of Rwanda (Involved in Research)
21	World Bank	International donor/partner	Funder of some restoration activities, Mainly LAFREC
22	Jyamberemunyarwandakazi	Local cooperative involved in FLR	Local cooperative involved in tree nurseries, tree fruits, making of energy saving stoves, and improved Agriculture in general
23	Koterem	Local cooperative involved in FLR	Local cooperative involved in beekeeping in the buffer zone of the Mukura forest reserve
24	MarcArthur foundation	International donor/partner	Funder of ARCOS activities in Mukura
25	SADC	International donor/partner	Southern African Development Community. Funder of ARCOS activities in Mukura
26	ACNR	Local NGO	Association pour la Conservation de la Nature au Rwanda. Partner of ARCOS in research in Mukura landscape
27	RNRA (GMD)	Central government institution	Geology and Mines Department of RNRA
28	RAP (Rwanda Allied Partners)	Private company	Mining company in Mukura landscape
29	Roka Rwanda	Private company	Mining company in Mukura landscape
30	Marie Merci Modern	Private company	Mining company in Mukura landscape
31	Low Land natural resources ltd	Private company	Mining company in Mukura landscape
32	ECPE ltd	Private company	Mining company in Mukura landscape
33	Love Each other Mining	Private company	Mining company in Mukura landscape
34	African Resources stones ltd	Private company	Mining company in Mukura landscape
35	Vision Mining ltd	Private company	Mining company in Mukura landscape
36	Rutsiro miners cooperative (RMC)	Private company	Mining company in Mukura landscape
37	New Line Development Ltd	Private company	Mining company in Mukura landscape
38	Reserve Force	Central government institution	Reserve Force is a part-time military service of the Rwanda Defence Forces. It signed an MoU with MINIRENA to conduct restoration activities in most of MINIRENA projects
39	RDB	Central government institution	Rwanda Development Board. It Will manage Mukura and Gishwati when they become national parks