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The History and Discourse of Kachung Forest

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View of Kachung plantation forest in 2016. Photo: Ghide Gebremichael

Master’s thesis in Global Environmental History
“If we can really understand the problem, the answer will come out of it, because the answer is not separate from the problem.” (Jiddu Krishnamurti)
Abstract
This study examined the history of the Kachung forest plantation in northern Uganda and associated environmental discourses. The forest, a project aimed at environmental protection and carbon offsetting, was designated a forest reserve in 1939 by the colonial government, as part of wider efforts to promote Ugandan timber for export and ensure their regeneration as a renewable resource. Since then, Kachung forest has been attributed different environmental significance by various actors, such as by the Uganda Forest Department, the Norwegian Agency for Development and Cooperation (NORAD), the Norwegian Afforestation Group (NAG) and presently by the Norwegian-based Green Resources company (GRAS).

Between 1939 and 2006, the forest reserve underwent only limited changes in terms of management and composition. More radical change began in 2006, when GRAS started large-scale tree planting. In 2012, Kachung Forest was certified as a Clean Development Mechanism (CDM) project in accordance with the Kyoto Protocol. Since then, people living in and around the forest have been prevented from using forest resources for their livelihoods. They have expressed resistance to this by encroachment, setting fires in the forest and mounting angry protests against GRAS. One possible reason for this resistance is that afforestation took place with little prior knowledge of the forest’s history and value for local communities.

The present analysis of the history of the forest and the associated environmental discourse throughout the 20th century was conducted using empirical data collected through interviews and from forest records, aerial photographs and GIS maps. Actor-Network Theory (ANT) was used as a theoretical framework to examine how the different actors are connected and their role in shaping the landscape. The study focused on four key areas: the status of Kachung Forest when the commercial forestry project began, evidence of recent environmental degradation, its location, and how the discourse about Kachung Forest was shaped by a broader environmental discourse about East Africa.

The data showed that all external factors involved in past and ongoing afforestation processes had little knowledge of the longer-term human and land use history of the forest, and often repeated ambitions by the former colonial government. Interviews with local communities living close to Kachung and other empirical material revealed that the area maintained its savannah woodland and tropical high forest nature until 1996, and since late 2000 the vegetation and land use system changed very significantly. Encroachment by local communities was identified as arising from lack of land for hunting, grazing, cultivation and cultural activities and lack of access to water. Thus successful afforestation can only be achieved with prior knowledge of land use history and by consulting local communities. Empowering the local community’s traditional environmental conservation practices could be a better way than CDM for tackling the wider environmental crisis.

Keywords: Actor-Network Theory, GIS, CDM, Africa tropical forest, human settlement, land use history.

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Moreover, all the data and results in this thesis are based on the story of the local communities of Kachung and their forest. Therefore I would like to thank all the individuals I interviewed and who participated in this research in one way or another. I also want to thank LFC for providing me with an office, a car and accompanying me during my field observations in KFCR. Thanks also to the NFA staff who accompanied and provided me with a car for my field study. I would like to thank my two patient translators who helped me to find as correct information as possible. My appreciation also goes to the DFO officers who provided me with valuable information.

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<tr>
<td>A/R CDM</td>
<td>Afforestation/Reforestation Clean Development Mechanism</td>
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<td>BFC</td>
<td>Busoga Forestry Company</td>
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<td>CCBA</td>
<td>Climate, Conservation and Biodiversity Alliance</td>
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<tr>
<td>CDM</td>
<td>Clean Development Mechanism</td>
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<td>CERs</td>
<td>Certified Emission Reductions</td>
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<td>CFR</td>
<td>Central Forest Reserve</td>
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<tr>
<td>COP</td>
<td>Conference of Parties</td>
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<td>DFO</td>
<td>Department of Forest Office</td>
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<td>DFS</td>
<td>District Forest Service</td>
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<td>FAO</td>
<td>Food and Agriculture Organization of the United Nations</td>
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<td>GIS</td>
<td>Global Information System</td>
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<td>GRAS</td>
<td>Green Resources AS</td>
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<td>IPCC</td>
<td>Intergovernmental Panel on Climate Change</td>
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<td>KPF</td>
<td>Kachung Plantation Forest</td>
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<tr>
<td>LFC</td>
<td>Lango Forestry Company</td>
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<tr>
<td>NAG</td>
<td>Norwegian Afforestation Group</td>
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<tr>
<td>NFA</td>
<td>National Forestry Authority</td>
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<tr>
<td>NOK</td>
<td>Norwegian Kroner</td>
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<tr>
<td>NORAD</td>
<td>Norwegian International Development Agency</td>
</tr>
<tr>
<td>PES</td>
<td>Paying Environmental Service</td>
</tr>
<tr>
<td>SEA</td>
<td>Swedish Energy Agency</td>
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<tr>
<td>THF</td>
<td>Tropical High Forest</td>
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<tr>
<td>UFD</td>
<td>Uganda Forest Department</td>
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<tr>
<td>UNCED</td>
<td>United Nation Conference on Environment and Development</td>
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<tr>
<td>UNFCCC</td>
<td>United Nations Framework Convention on Climate Change</td>
</tr>
<tr>
<td>VCS</td>
<td>Voluntary Carbon Standard</td>
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<tr>
<td>WMO</td>
<td>World Meteorological Organization</td>
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1. Introduction

The British social anthropologist Meyer Fortes once stated that “Africa is, […] a vast living laboratory of biological and social experiments […] but our scientific and sociological knowledge of Africa is extremely inadequate” (Fortes 1936\textsuperscript{1} cit. Tilley 2011:313). This statement was one of the inspirations for Tilley’s book ‘Africa as a Living Laboratory: Empire, Development, and the Problem of Scientific Knowledge 1870-1950’, in which she discusses the anthropological work of Meyer Fortes. Based on my experiences in Uganda, this statement is true today, eighty years later.

As constantly reiterated in many publications, the period 1870-1950 was especially significant for Africa. The 1870s saw the start of Europe’s scramble to establish different colonies, while the 1950s marked the onset of decolonisation and independence. Nevertheless, even after decolonisation the living laboratory is still continuing in one way or the other. Lately this notion appeared and has resurfaced in the guise of a green resources management and carbon offsetting revolution.

One of the reasons why it can be argued that outsiders still treat Africa as a giant laboratory is that most efforts aimed at implementing green resources management and carbon offsetting projects employ a flawed approach arising from limited knowledge of the social and environmental history of the continent. For instance, Ekblom (2008) argues that the new market for afforestation projects has emerged in Africa and other tropical area via carbon offset processes by legitimising degradation, and that this is a problematic strategy for addressing global climate change. One way this carbon offset mechanism developed has been through the Kyoto Protocol ratified by the UN, which saw the introduction of emissions reduction and limitation projects as part of the Clean Development Mechanism (CDM) and the associated programme known as Reducing Emissions from Degradation and Deforestation (REDD). The main purpose of the CDM is to provide certificates for afforestation or reforestation plantation companies, such as GRAS, so that they can sell their carbon credits with the idea of paying for environmental services (PES).

My interest in writing this thesis on the history and environmental discourses of Kachung Forest was stimulated by two important factors. The first came in the form of an opportunity to undertake a minor field study announced by Professor Flora Hajdu at SLU. When I looked in depth into the topic (about which I had little idea beforehand), I found that the concepts of carbon offsetting and green resources management are very important in political ecology. The second reason was when I took the course ‘Climate change leadership’ as part of the curriculum at Uppsala University. This course broadened my understanding of the side-effects of CDM on local communities and their environment. It also increased my understanding about climate change and UN policy, and demonstrated a need to study the history and discourse of forests based on the contemporary climate change and environmental issues.

\textsuperscript{1}Fortes, M. 1936, "Culture Contact as a Dynamic Process. An Investigation in the Northern Territories of the Gold Coast", Africa, vol. 9, no. 1, pp. 24-55.
Among many afforestation projects I could have explored for the purposes of this study, I selected Kachung Central Forest Reserve (KCFR), an area reserved for plantation forest (national forest reserve) in northern Uganda (Green Resources 2012). This forest was first reserved for plantation in 1939, when the British ruled the Uganda Protectorate and remains so until present time (see Bondevik 2013; Butt 1965; Forest Department 1962; Webster & Osmaston 2003. Over time, the forest has experienced constant changes to its landscape, vegetation and land use system as different actors have become involved.

The forest began as a test plot for timber trees, covering approximately 20 ha in 1939. It now covers 3590 ha and is leased by a Norwegian plantation company (Green Resources AS, hereafter referred to in this thesis as ‘GRAS’) (Green Resources 2012; Webster and Osmaston 2003). The government of Uganda first leased it to the Norwegian Afforestation Group (NAG) in 1999. Later, in 2006, NAG became a subsidiary of GRAS (Green Resources 2012) with the purpose of planting and having standing forests as part of carbon offset mechanisms. Amid this process, local people have resisted implementation of the new forest reserves, which have been defined mainly by Government of Uganda officials, who regard those local communities residing and using the forest as a threat (ibid.). Precisely why these communities pose a threat is unclear. This study therefore emerged as a way to fill a gap in research, especially when it comes to the long-term history of the forest and its role in sustaining local livelihoods.

There is a very limited literature on the causes of encroachment and the traditional land use system of the area. Existing data show that in addition to the colonial and state foresters, for almost a century since the area started as a forest reserve people living nearby have used the land in the reserve (under Ugandan law illegally) for farming, fishing, grazing and firewood collection. These practices were tolerated for a long time. Nevertheless, the argument that the land use system of the local community should be considered illegal has intensified since the forest leased was to GRAS and this has encouraged more encroachment.

By exploring the social and environmental history of Kachung Forest focused in the 20th century, this study aimed to identify the ecological role and possible impact of local communities and other actors in shaping the forest and to examine how the current discourses amongst different stakeholders in the Kachung area have been shaped in a wider political and global context. Much of the recent history of the area, for instance, is connected to the privatisation policy that the Ugandan government implemented in the late 1990s, when it adopted a new policy of restructuring different institutions in order to attract investors (www.nfa.org.ug accessed on 23-04-2016) and to promote development programmes. The hypotheses tested in this study were that: i) until recently most of the area covered by the KCFR has maintained its natural savanna grassland and thus ii) characterisation of the Kachung area as degraded land is ungrounded.

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2Forest is a type of vegetation dominated by trees, many species of which are usually tall at maturity and have straight trunks. The canopy is typically deep, being composed of several layers of foliage, and the herbaceous vegetation is generally rather open and lacks the tussock-forming grasses which are so characteristic of many types of savanna (Hamilton 1984:10-11).

3“Government of Uganda in 1998 adopted a policy to structure many government departments including the Forest Department. It recognized an urgent need for a change in the policy, legal framework and institutions controlling forest in the country. There was a sense of crisis about the state of the country’s forest and a particular outcry at the state of the forest reserves, in the hands of the Forest Department. It was deemed no longer appropriate for the task and thus it was decided that a new institutional arrangement was needed, hence the Forestry Inspection Division, The National Forestry Authority and the District Forestry Services were set up (www.nfa.org.ug accessed on 23-04-2016).
In the work I used mixed methodology employing both quantitative and qualitative approaches. Most of the secondary literature used was collected via Uppsala University’s digital and hard-copy resources. Additional literature and archive documents about Kachung Forest were collected from Ugandan National Forest Authority (NFA) offices and the forest district offices in Kampala and Lira. Members of local communities in close proximity to the forest were interviewed using a standardised questionnaire comprising both structured and semi-structured types of questions. In addition, open-ended interviews were carried out with NFA personnel and GRAS company forest supervisors. These interviews were concerned particularly with the possible impacts of GRAS on the livelihoods of people who depend on access to its resources. Geographic Information System (Arc-GIS) was used to manage maps from various dates concerning land use and vegetation cover change in KCFR. The maps mainly cover the period since 1990. Aerial photographs and satellite images of the forest were also obtained from Oxford University and integrated into GIS.

1.2. Aim of the study

This thesis is in partial fulfilment of my Master’s degree in Global Environmental History. To this end, the focus is on the history and environmental discourses of Kachung forest in relation to CDM, in order to understand how this new environmental policy can be applied while conserving both society (its economic activity, traditional values and beliefs) and the environment in order to mitigate climate change. Environmental policymakers can hopefully learn and understand better how to implement CDM policy based on the results in this work.

Moreover, it can be helpful as a case study, particularly for the UN-administered, market-based environmental policy of mitigating climate change. The work explored the socio-dynamics and environmental history of the Kachung forest area focusing on the 20th century, identifying the ecological changes and possible impacts on local communities, and impacts of the local community in shaping the Kachung area. It also examined how the current discourses amongst different stakeholders in the Kachung area have been shaped by a wider political and global context.

A large part of the work focused on the historical background of the forest since its inception in 1939 until the present day. The current situation of the forest in relation to the activities of GRAS and its predecessors is also scrutinised.

The fieldwork took place between 1 March and 5 April 2016, at the NFA head office in Kampala and in the field in the Kachung Forest area.

1.3. Structure of the Thesis

The thesis is divided into eight chapters. After this brief introduction, Chapter two sets out the methods used, the reasons for their selection and the overall theoretical framework of the study, particularly the value of a multi-source approach to studying environmental history and specifically landscape change. The importance of interpreting place names and interviewing local residents who have long been living in a certain landscape is discussed thoroughly. In addition, use of GIS in managing different information in maps, satellite images and aerial photographs of a certain area is described. The chapter ends by explaining why Actor-Network Theory was used as the theoretical framework throughout the thesis, to provide a good insight into the role of each of the actors involved in shaping the Kachung area over the last hundred years.
Chapter three introduces the general concept of biodiversity and forest conservation and explores the different narratives of biodiversity in general and African tropical biodiversity in particular. It also discusses how biodiversity and landscape can be related and influence each other and outlines the connections and role of tropical biodiversity and climate change mitigation.

Chapter four concentrates on the history of the Ugandan Forest Department in three sections examining forest management in Uganda before the colonial period (before 1894), during the colonial period (1898-1962) and after Uganda achieved independence (1962-present). The history of UFD in the case study area of KCFR is also described.

Chapter five discusses CDM and how it was conceived. It begins with a general overview of the concept, its role in contemporary global environmental policy and its limitations and future perspectives. It goes on to connect this scheme with the case study area of Kachung Forest, as Uganda is currently certifying this environmental protocol and as GRAS is receiving 4 billion US dollars from the Swedish Energy Authority to support its work. Chapter five also introduces the research question of how the forest has been affected since the introduction of CDM and critically examines various narratives concerning its effect on the environment and society (pros and cons). It concludes by discussing how GRAS interacts with the UN’s new protocol and the relationships between GRAS and the Ugandan government, the Swedish Energy Authority and the Norwegian government.

Chapter 6 presents the main results of this study in the form of interview data, GIS results, old maps and aerial photographs, with the focus on the human and land history of Kachung Forest.

Chapter 7 offers an analysis and discussion of the combined datasets, with particular emphasis on the value of CDM as a new environmental policy in both societal and environmental terms, and the role of CDM so far in mitigating climate change, both positively and negatively. It also discusses whether there is an alternative way of mitigating climate change, based on the findings.

Chapter 8 presents the final summary and conclusions from the work.

1.4. Research Questions

As stated above, this study aimed to reconstruct the social and environmental history of the Kachung Forest area focusing on the 20th century, identifying the ecological role and possible impact of local communities in shaping the Kachung area and presenting how the current discourses amongst different stakeholders in the Kachung area have been shaped in a wider political and global context.

To this end, this research set out specific research questions in relation to its research problem. The research questions were as follows:

1. What was the status of Kachung Forest when Kachung Central Forest Reserve (KCFR) was established?
2. What evidence is there that parts of KCFR are now degraded and where are these located?
3. In what way has the discourse on Kachung forest been shaped by broader environmental discourses about East Africa?
4. What actors have shaped Kachung forest and in what way?
5. How was Kachung forest transformed and framed from being a ‘natural’ forest reserve to being a plantation forest?

6. Can KCFR serve as a case study or prototype for other environmental studies in relation to climate change mitigation?
2. Methods and Theoretical Framework

In order to generate good results and to meet the objectives of this study, several methods were applied. This chapter describes the methodological approach and theoretical framework employed throughout this thesis. The first part of the chapter deals with the use of multiple methods in environmental studies in general, and why this approach was chosen in this study. I was particularly influenced by the work of Mitchell (2010), who argues that in order to find good forest and landscape narratives, one should use multiple sources and different types of data collection.

Therefore, taking into account the effectiveness of employing a multi-source approach in building narratives of forest and landscape change, I decided to collect, compare and contrast different sources and explore how they might complement and supplement each other. The approach adopted mainly comprised analysing maps using GIS, studying archive records, collecting oral information and histories through interviews and the use of questionnaires, and interpreting place names according to the local language. The questionnaires were managed and interpreted using Excel and SPSS software.

The second part of this chapter describes Actor-Network Theory (ANT) and the information this framework provides on how different actors can shape an area. In particular, when writing this thesis I found that studying landscape change and a land use system also involves studying the different actors involved in changing an area in one way or another. The actors involved can be both human and non-human, as both occur equally in the different networks that have developed.

2.1. Methods

2.1.1 Quantitative and qualitative methods

The data used in this thesis included both quantitative and qualitative data. Both types of data are useful in studying environmental dynamics, and particularly for exploring the history of a forest (Mitchell 2010). However, the emphasis here was on the qualitative data, in order to get a better sense of the different narratives about the history of the forest and its landscape. I found quantitative data to be equally useful, but they were more difficult to find and to access. Most old forest records were accessed from the archive of the Uganda Forest Office, both in Uganda.

“[f]orest change and disturbance of the past strongly influence the state of today’s forests and their biodiversity. However, knowledge of former forest landscape states can be subject to misunderstanding and the practical management of forests requires the establishment of correct narratives of forest cover change. […] on top of that [a] wide range of data sources … [should be] employed for a semi-quantitative analysis. Starting from an existing time series of satellite imagery classifications the research [should] incorporate the visual interpretation of historical aerial photography, forestry records, maps of both topographic and thematic type, archive documents, oral histories, place name meanings, and fossil pollen evidence. GIS is used as the means to manage and focus the evidence and to analyses the wide range of data.” (Mitchell, 2010: 1). 

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and the United Kingdom (Oxford University Library). The interviews conducted also included both quantitative and qualitative types of questions. The questionnaire was prepared in English and two translators were employed to help informants during the interviews, so that they could respond in their native language. However, there were some individuals among those interviewed who were sufficiently fluent in speaking and writing English.

Six different types of methods were used in this work: interviews, place name analysis, GIS analysis of maps, scrutiny of forest records, pollen analysis and ANT. The following sections discuss each method separately, reviewing their advantages and limitations in general, and their relevance to the work.

2.1.2. Interviews

Interviews take the form of a social interaction between a researcher and informants. Both the interviewer and informants enter their conversation informed by their previous experience and background. It is evident, therefore, that the current living situation, attitudes, culture, feelings and behaviour of both the researcher and interviewee can influence the data (Cohen et al. 2003). One serious challenge to the validity of interview data can be the tendency for either under- or over-representation of facts. Cohen et al. (2011) also noted that interviews on sensitive topics (i.e. research that may pose a threat to the interview participants) will usually exhibit an element of bias. For example, as Cohen et al. (2003:122) note, the interviewer “might be regarded as someone who can impose sanctions on the interviewee, or as someone who can exploit the powerless”. To minimise these kinds of bias, while conducting this study I first explained my aims clearly to the informants and requested their informed consent to include their responses in my study. I have also used fictive names in order to anonymise the informants.

For the purposes of this work, 19 informants were selected for interviews. These were drawn from the local community, Lira district forest officers, NFA leaders and GRAS managers. The interviews with the members of the local community were carried out in three villages adjacent to the plantation area. The results of these are presented in Chapter 6. The villages were selected simply based on their proximity to KCFR. Currently, there are 23 villages close to the reserve and whose inhabitants rely for their living on the forest and its resources. Nineteen of these are located immediately adjacent to the forest, while the other four are farther away. According to the 2014 Ugandan population census, the total population of all 23 villages is 12,297 (Uganda Bureau of Statistics 2014). However, this study mainly concentrated on the 19 villages adjacent to the forest.

The NFA is an autonomous body that controls all CFRs in Uganda. Whenever any plantation company leases a CFR, the NFA acts as host and manages all the private plantation companies on behalf of the government (Government of Uganda 1998). Thus, when GRAS leased KCFR, the NFA acted as host. It was important to this research, therefore, for me to have good personal relations with NFA and GRAS personnel from an early stage in the project. When I went to Lira, the nearest town, I spent the first three days developing good personal relations with NFA and GRAS staff. I briefly explained the aim of my thesis and its potential benefit to them. Both welcomed my requests to access their archives. Before I went to Lira, the NFA office was relocated to a new place and in the process some of their documents were lost, missing, incomplete (such as reports with missing pages) or poorly arranged. This created another challenge, to find the missing information. With the help of the NFA leaders I was able to reconstruct some of this material, especially one document which detailed 10 years of working plan within KCFR in the 1960s, and two old maps of KCFR drawn in 1962 which proved useful for understanding the forest’s history over 50 years.
The NFA also assisted me by providing a vehicle with a driver so that I could visit different areas and found me two translators who were already working in the field, and had a good knowledge of the local community. These two research assistants or translators were selected because the local language is their mother tongue and both were experienced translators. The common language around Kachung is Lango, which is part of the Nilotic language family. One of the translators was a university graduate and the other was an NFA patrolman.

Given the constraints on my time and other logistical factors, I selected 14 people who were willing to answer the questionnaire I had prepared before I travelled to the field. Before distributing the questionnaire, I explained my research, the purpose of the questionnaires and possible benefits of the research to the local community. I selected people according to age, the time they had spent living in the village (ideally, I tried to identify informants who had lived in the village all their life) and proximity to the forest. The assumptions underlying these selection criteria were firstly that people who live close to the forest would have better knowledge of it and were more likely to be directly or indirectly affected by the forest reserve; and secondly (owing to my interest in reconstructing forest history) that older informants were more likely to have more knowledge on the historical process of the forest and skills in narrating this.

Both males and females were included in the interviews and in answering the questionnaires. However, marriage is exogamous, hence when women marry they move to their husband’s home. Therefore most of the women living in a village come from other villages around the forest. This led me to focus mainly on older men who had been in their village for a long time. I asked some woman if they had been born there and they all told me that they had come from a different village so they did not have much information to tell. However, two of the widowed women I interviewed did have valuable information especially about family household activities such as collecting firewood, farming, fishing and fetching water. They also shared with me a very valuable story about the forest.

Overall, the majority of the questions were either semi-structured or closed due to limited time, although some interviewees were also asked more open-ended questions. Although most questions were asked through a translator, some respondents also understood and spoke English which made the group discussions that followed after I had finished with my questionnaires easier for me to follow and join in.

2.1.3. Place names

In my open and closed questions I also included identifying the meaning of the place. Mitchell (2010) states that place names can be a good means to learn about the past history of a place, such as past vegetation cover, landscape and other topographical changes. However place name evidence is not always reliable, as name significance and knowledge of their genesis can be lost when people change their language and/or are replaced by other people who speak different languages. The meaning of different places was collected during interviews with local community members and forest officers. This established that the meaning of the name Kachung emerged from one of the local languages, Langi. I also compared the meaning of the place with the Lango grammar prepared by the British anthropologist Driberg (1923).

2.1.4. Geographic Information System (GIS)

Two experiences made me include GIS as part of my methodology. The first was while taking the course called ‘Current Debates’ at Uppsala University, in a seminar on the Integrated History of People on Earth (IHOPE) based on a book entitled “Sustainability or Collapse:
Integrated History of People on Earth (IHOPE)” (Robert 2007) and an article ‘Two steps back, one step forward: reconstructing the dynamic Danube riverscape under human influence in Vienna’ (Severin 2013). In both the book and article, the authors used GIS as their main methodology in order to build the riverscape using old maps, generating very reliable results. This gave me a good insight into how GIS can be used for analysing landscape change in an area.

The second experience was reading the PhD dissertations by Tobias Lung (2010) and that by Mitchell (2011). Both studies used digitised old maps and aerial photographs, which they managed using GIS to develop narratives of landscape change and to build a story of environmental dynamics. These studies further convinced me of the value of using GIS as part of my thesis methodology.

After undertaking four weeks of fieldwork at Kachung Forest in northern Uganda, I returned to Kampala and visited Makerere University Library to search for further documents about the forest’s history. I also visited the Forestry Department at the university, with the help of my local advisor Professor David Tumussiime. However at the time, Uganda was in a post-presidential election process and the Ugandan Supreme Court was hearing a petition from the presidential nominee. Therefore there was very tight security around Makerere University, which meant I could only spend one day in the University Library. As I was running out of time, I therefore decide to spend more time at the NFA library instead.

My local advisor from Makerere University already had good contacts with the NFA office in Kampala. This paved my way to meet the NFA manager. I visited the office and the manager directed me to both the mapping section and the library. In the mapping section I found three maps (land use cover stratification for KCFR 1996, 2005 and 2015), which provided an indication of the vegetation and land use of Kachung forest in this recent period. The mapping section helped me to manage the layout of the maps and show each land use and vegetation with a different colour. When I returned to Sweden I georeferenced these maps using ArcMap GIS 10.2.2, calculated the area of different land uses and compared the results with the interview material and forest records for different years.

In total, I collected six maps from different years. I obtained two further old maps at the NFA archives in Lira (from 1961 and 1962) and a recent GIS map (2012) from the GRAS office in Lira. Together, the six maps proved very important as they showed some of the most significant changes to the forest over the decades. Analysis of these maps is presented in section 6.2 of this thesis.

I also had the privilege of visiting the library and archive section of the NFA, where I found two old documents about the history of the Uganda Forest Department 1898-1929 and 1930-1950. I found both documents very useful for understanding the general history of the Forest Department in relation to the study area. However, I was unable to find any aerial photographs as they had been transferred to another ministry (Ministry of Land) and I was told many had in fact been lost. Therefore with the help of my advisor I accessed duplicates of these aerial photographs from Oxford University Library.

2.1.5. Forest record documents

In addition to maps, I examined other forest archive records at the District Forest Service (DFS) and NFA offices in Lira and Kampala, respectively. Although it was difficult to find any documents published before the 1990s, some important documents were collected. These included some older 10-year working plans for the CFR in Lango district and other relevant documents published in the 1960s.
2.1.6. Pollen analysis

In addition to the methods mentioned above I also included pollen analysis in this study. Pollen analysis or commonly referred as palynology examines environmental history by analysing pollen frequencies and with the aid of $^{14}$C carbon dating. Palynologists refer to palynology as a type of environmental study in which microscopes are used to identify and analyse the scale or
range of plant pollens present in archaeological layers (Vincens et al. 2006; Evans and O’Connor 1999; Dincauze 2000). It is claimed that these pollen records can show what crops, vegetation or ground cover were likely have been present when a layer was deposited (Vincens et al. 2006). Grass, tree, cereal and weed pollens all provide information about past forest clearance, grazing, cultivation and farming activities (Dincauze 2000; Vincens et al. 2006). It can be a particularly useful tool when combined with other methods as was done in this thesis. I do not go into the specific details of pollen data analysis here, as it was beyond the scope of this project. However, I present general findings and narratives provided by pollen data for East Africa in general and northern Uganda in particular, comparing different sites in close proximity to the study area. The comparison and data were based on pollen data already published of two areas found in close proximity to KCFR.

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5 First pollen is extracted from soil that has been excavated or extracted in auger cores (Evans and O’Connor 1999; Dincauze 2000; Hedberg 1954). Each layer of soil is then analysed separately. Radiocarbon dating is normally used to date the layers so that the pollen of different years can be measured. The soil is mixed with water and placed in a centrifuge (a machine that rotates very quickly), which leaves the lighter pollen on the top and the heavier soil at the bottom. Individual pollen grains are identified and counted and graphs are usually compiled for the types of pollen present along the time-scale studied (ibid).
Figure 2: Lango forest plantation (forest management map: standing stock and compartment updated June 2012). Source: Green Resources 2012
2.1.6. Study area

The study area is found in the mid northern part of Uganda, about 30 km south of Lira and 8 km north of Lake Kwania. The vegetation in the area is dominated by savannah, particularly *Terminalia/Combretum* woodland (Butt 1965). The reserve area designated in 1939 occupied a total area of 14.50 sq. miles (Webster and Osmaston 2003), but by the first survey, in 1961, its size had decreased to 13.86 sq. miles (Green Resources 2011). When the CFR was created, it was planted with exotic trees (*Chlorophora excels* and *Khaya grandifoliola*). However, these failed and were replaced with *Maesopsis eminii*, which initially proved more successful (Butt 1965). However, after nine years there was a slackening in the rate of growth, and extensive trials on other species, mainly softwoods and eucalypts, began in 1967. The most successful timber species to date has been *Pinus caribea*; other promising species are *Callitris endlicheri*, *C. preissii*, *Cupressus arizonica*, *Eucalyptus camaldulensis* (Zanzibar variety), *E. citriodora*, *E. grandis*, *E. tereticornis*, *Maesopsis eminii*, *Pinus khasya*, *P. leiophylla*, *P. massoniana*, *P. patula*, *P. radiata* and *Tectona grandis* (ibid.).

Mean annual rainfall at the site is 50.80 inches (1290.320mm). The bulk of the rainfall falls between April and October and the heaviest rain usually occurs in April/May and August/September. The dry season normally extends between November and March (Green Resources 2011; Butt 1965; Webster and Osmaston 2003). Shade temperature can reach up to 100°F in the dry season but during the rainy season it normally reaches 85-95°F. The geology and soils of the area are dominated by underlying granitic and metamorphic rocks. The soil is shallow, lateritic red, sandy loam over old lake deposits. The pH of the soil is between 5 and 6. The most common types of vegetation in the CFR are various grass species, including *Imperata cylindrica*, *Panicum maximum*, *Hypparrhenia filipendula*, *Setaria spachelata*, *Setaria megaphylla*, *Pennisetum species*, *Aframumum spp.*, *Sporobolus africana*, *Eragrostis exasperata*, *Paspalum scrabilatum*, *Vigna luteola*, *Cyprus tenax* and *Bulbosytlis* spp. The shrub land species that characterise the bushland vegetation are *Albizia zygia*, *Combretum spp.*, *Collinum spp.*, *Borassus aethiopum*, *Erythrina abbyssinica*, *Grewia mollis*, *Acacia hockii* and *Bridelia scleroneura*, together with shrub and tree species. The grass and herbaceous layer consists of *Cereteria megaphylla*, *Hypparrhenia filipendula*, *Panicum maximum* and *Aframumum* spp. (Green Resources 2012)

Figures 1 and 2 show the study area in different years. However, for the purposes of this case study I mainly used Figure 2, which was collected from the GRAS company office in Lira. The map was managed with GIS and shows the different compartments of the forest in relation to its vegetation.

2.2. Theoretical framework

I framed this research from the perspective of Actor-Network Theory (ANT). In my view, this theoretical framework provides a helpful and logically structured representation of the concepts, variables and relationships involved in a scientific study with the purpose of clearly identifying what will be explored, examined, measured or described (John 2013).

2.2.1. Actor-Network Theory (ANT)

Actor-Network Theory, otherwise known as the ‘sociology of translation’ (Latour 2005), came into practice as a theory and has been popular since its inception in the early 1980s. It was first developed by Callon and Latour in an attempt at understanding the process of technological innovation and the creation of scientific knowledge (see e.g. Callon 1998; Latour 2005).
A key aspect of ANT is that both human and non-human ‘actants’ play equal roles in making the network and both have equal responsibilities for the processes of network formation and maintenance (Latour 1987; Law 1992). This idea is particularly manifested in Law’s (1992; 1999) work, in which he argues that actants can become both a network and actors. Overall, ANT focuses on how scientific knowledge and technological innovations are connected through a series of social networks, but less on how these networks originated or who created them. Instead, ANT researchers are mainly interested in how networks were formed and how they can fall apart. As Andrea and André (2008:1) note, ANT “relies on the naturalizing ontology, unreflexive epistemology and a performative politics”6. This means that ANT does not question how networks come into being. Andrea and André (2008:1) further describe ANT as a “denaturalizing ontology and reflexive epistemology”. In summary, ANT researchers merely describe the actors that build the network and try to trace the route of the network. This narrow over description of the actors is a network is a common criticism of the approach (Michel 1998) and some view it as being fairly pointless (Andrea and André 2008). ANT has also been criticised for being a grand theory that has differing interpretations and definitions. For instance, it is sometimes known as ‘The Sociology of Translation’ (e.g. Callon 1980, 1981, 1986b), co-word analysis (e.g. Callon et al. 1986) or actant-rhizome ontology (Latour 1999).

Since ANT considers a machine as an actor (non-human actors) equal to human actors, some scholars criticise it as a theory that has lost its moral subject, or amoral. Similarly, it has been criticised for treating all actors equally, ignoring power imbalances between different actors/actants (Dave 2015; Jonathan 2011; Callon 1999). Jonathan (2011:1) criticised ANT by saying that “human actors generally possess powers of reflection and that these powers of reflection provide motive forces for action.” This means human actors have more power over the other actors and create a network in a deliberate manner so they can sway it in any direction they want.

Despite such criticism, ANT remains popular and quite useful “within a range of social science fields” John (2013:18). For example, it has spread to other disciplines such as sociology, geography, management and organisation studies, economics, anthropology, archaeology and philosophy, which have found it to be a useful tool for explaining different networks and organisations. More importantly, it has become a popular tool for how science and technology can be followed through its networks to its ‘black box’ (see example Andrea and André 2011, Michel 1998, Latour 2005). One of the important features of ANT is that it brings a good understanding of networking in natural environments and technological processes. One example of a network is the market, which has different human (customers, producers and shippers etc.) and non-human (goods, machines, product etc.) actors (Michel 1998). Thus:

Actor Network Theory (ANT) […] rejects the idea that ‘social relations’ are independent of the material and natural world […]. The contribution of ANT to organization studies lies in recognizing that there is no such thing as a purely social actor or purely social relation […]. This contribution is significant in helping to bring the ‘missing masses’ […] of non-human actors into the frame – an important and timely move, given

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6“First, denaturalisation involves recognising that the way things are is neither natural nor inevitable and therefore could be otherwise. Second, reflexivity involves rejecting the positivistic assumption that reality exists ‘out there’ waiting to be captured by the researcher in favour of recognising the role of the analyst in the construction of knowledge. Finally, an anti-performative stance involves moving beyond the sort of means-end rationality that reinforces existing power relations towards considering possibilities for new forms of social order” (Andrea and André 2008:2).
the influence of the linguistic turn in organization theory (Andrea and André 2011:1).

ANT was used in this thesis as a theoretical framework to identify and specify the actors who have shaped and are shaping the KCFR landscape. Not only that identifying the actants and their network is very curial in order to know who is doing what in shaping the landscape of the forest to its current state. However it is well-meaning to have a clear understanding about the history and background of this theoretical frame work in order to understand and relate the theory with the research objectives.

To start with, the objective of this research was primarily to study the environmental history and its current discourse of the CFR in order to understand how it reached its current state. This process was shaped by a number of actors, both humans and non-humans, although the emphasis of this thesis is on human actors. To this end, it made sense to use ANT to examine the historical process of the past hundred years and identify and study the role of different actors and to look behind their chain of networks. Hence it makes me sense to use ANT as a theoretical concept in order to examine the networks and role of the different actors during the last 100 years with in this case study. With this regard, I am now paraphrasing the general concept of ANT and I am going to discuss on how this theory will be appropriate for my research before continuing to the discussion of the finding of this research.

Application of ANT helped bridge the dichotomies between various social and environmental processes affecting KCFR, such as human and non-human, nature and culture, artificial and natural, as it is difficult to study environmental history without considering all actors. Moreover, in-depth description of the actors and their relations, as clearly discussed in Latour (2004), proved useful not only as a theoretical framework, but also as a methodological approach to identify the power relations between the actors who shaped KCFR to its current state. Furthermore, looking at the actors’ chain of networks and how these were framed (cf. Callon 1999) helped understand how the landscape has changed over time. In the case of KCFR, the human actors of this forest first framed themselves as nature conservationists, equal distributors of resources among the local residents and currently as climate alleviators.

The main human actors identified in KCFR were e.g. foresters, farmers, hunters and environmental policymakers such as CDM. The non-human actors were climate, weather, rainfall, wind, sun etc. Both types are intertwined in networks and both participate throughout the history of a changing landscape. For instance, when a forester or a farmer cuts down a tree, this can lead to deforestation and drought, leading in turn to climate change in the local area. The climate can affect the amount of rainfall and thus both the landscape of the environment and the society living in the area change. However, this theory fails to recognise that one of the driving forces for the network could be colonialism (see Dave 2015; Jonathan 2011). Kachung CFR was the result of colonial powers creating the initial reserve. However, their network and their power relations have changed through the history of this forest and in turn have shaped the landscape differently.

Application of an ANT perspective provided a clear insight for defining the actors (human and non-human) and the power relations between them. Latour (1992:1) argues that “[t]hose advocating the actor network approach agree with the social constructivist claim that sociotechnical systems are developed through negotiations between people, institutions, and organizations. But they make the additional interesting argument that artifacts are part of these negotiations as well.” By artifacts he means items created by humans, such as technological machines (vehicles, computers or any other technological artefact). Latour claimed that without understanding the influence of technologies in human relationships, it is difficult to study how society works, as technologies influence daily life
and mediate our personal relationships (ibid.). In the same token, comparing the actors who shaped KCFR throughout the course of history also involved considering their technological innovations.
3. Background

This chapter provides general background to the project by focusing on the past and present biodiversity of African tropical rainforests in general and Ugandan forests in particular. It explores the general idea of tropical biodiversity and conservation and how this has progressed over time, following the inception of European colonial rule in Africa. It also discusses how European colonial powers viewed African societies and their environment, with particular focus on the period from the 1870s until the end of the 1950s, years which mark the beginning and end of European colonisation of African countries. This was also an era during which many relevant and significant studies and explorations were undertaken by different scholars (Tilley 2011). The chapter begins by reviewing forest ecology in the context of east Africa.

3.1. African tropical forest – the attraction of colonialism

Over the course of the 19th and 20th century, tropical forests attracted the attention of different scholars, government and non-government institutions, among other things owing to their rich biodiversity and their economic importance for medicine, timber, recreation, crop production etc. In the 18th century a number of botanists and taxonomists had started to document species diversity in the African tropics7 (Huston 1994:5). From the late 18th and early 19th century it became obvious that there was more species diversity and fertile land there than in other parts of the world (Lung 2010). Therefore, especially after 1870, Europeans started to explore tropical areas for economic gains and established permanent human settlements in a more organised and scientific manner (Tilley 2011)8.

Gradually, the African tropics came to be recognised as “the frontier of the natural science” (see discussion in Huston 1994:16). A new space was also created for transdisciplinary research work or “Africa as a living laboratory” (as expressed by Tilley 2011:2). In British colonial Africa, various field studies were carried out to study the socio-cultural, socio-economic and environmental diversities of Africa, east Africa in particular (Tilley 2011:124). These studies gave much assistance to the colonial governance and administration in controlling communities and peoples, resources and environment (Tilley 2011:26; Giles-Vernick, 2002)9.

In the period 1870-1950, Africa was divided into different geographical compartments and shared between seven European countries. Most notable was the Berlin conference 1884-1885,

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7For instance the famous Swedish botanist, physician and zoologist Carl Linnaeus, who laid the foundations for the modern binomial nomenclature system, started classifying and cataloguing tropical species after he brought a variety of species from the tropics in the mid-18th century (Huston 1994:5)
8For example “[i]n July 1929, the British and South African associations for the advancement of science chose to hold their annual meetings as a joint assembly in South Africa [and] more than five hundred delegates came from Britain and several hundred more attended from South Africa, making it the largest scientific gathering the continent had yet seen” (Tilley 2011:1)
9Giles-Vernick says that social purpose, both cultural goals and values behind them, is important when attempting to understand how people use and modify natural resources around them in order to meet their needs. Therefore, these were the main key research questions on which European colonisers focusing once they dived deep into the tropical rainforest.
which resulted in an agreement between Britain, France, Belgium, Germany, Portugal, Spain and Italy over colonial rule of African countries (Worthington 1938; Tilley 2011). British hegemony was predominant over eastern Africa from Cairo in the north to Cape Town in the south (Tilley 2010). Therefore most of the tropical rainforest in eastern Africa fell under British administration (Worthington 1938).

Thus it is important to remember that both forestry and conservation emerged in east Africa in the colonial period of conquest and political and ideological hegemony that may still affect these practices today. For this reason, it is important to look more closely at the history of forestry and conservation in east Africa before discussing present-day discourses on forestry and conservation.

3.1.1. The emergence of forestry

Just as the rich tropical biological diversity attracted geographers, biologists, anthropologists and other study groups, European investors also started to invest in development for research, forestry and resource exploitation, hand-in-hand with the process of nature conservation (Tilley 2011). Tropical Africa was also heralded as a vital and important economic hub for the whole world in general and Europe in particular. For instance, the British Prime Minister Winston Churchill during his 1907 excursion in east Africa said that “tropical Africa as Europe’s future breakfast” and claimed that it would soon “play a most important part in the economic and development of the whole world” (Tilley 2011:123-124). Thus, tropical Africa has been divided into private plantations, forest areas, national parks and protected areas for the past hundred years (German et al. 2011; Tilley 2011). In most cases these nature reserves were commodified and commercialised for commercial purposes; forest reserves were used for timber production, pulp, paper production, electric poles, tourism, wildlife conservation, medicinal plants and other economic activities (Hamilton 1984; German et al. 2011). Many investments were made and many investors turned their gaze towards tropical Africa in general and east Africa in particular during the past hundred years (German et al. 2011).

A number of forestry departments were established in different parts of Africa at the end of the 18th century, so that the forest could more easily be managed by investors and colonial governments (Rajan 2006, 2010; Tewari 2011; Sunseri 2014:13). The first regulations on cutting and burning natural forest date back to 1882 (Tewari 2011). In Uganda, for example, the first forestry and scientific service was created in 1898 with its own director and then established as a separate government body in 1917. In following years the department was renamed a ‘forest department’ (ibid.). With similar aims, many forestry and forest reserves were established in other countries in Africa and started to become a source of income.

3.1.2. Emergence of conservation

Conservation history is a field within environmental history which studies past and present approaches to nature protection and related historical processes (see e.g. Borgerhoff Mulder and Coppilillo 2005; Carruthers 1995; Gissibl et al. 2012). Different scholars agree that the idea of nature conservation is as old as the period during which human beings have interacted with their environment, though the popularity of nature conservation as a field has grown since the end of the 18th century (ibid.). Basically, the first ideas of conservation were embedded within the idea of recreation and the ideal of conserving the so-called ‘natural state’.

The notion of preserving nature was mostly related to the concept of privatising and commodifying nature for the use/benefit of certain elite groups. Consequently, local communities living in and around the parks and reserve areas were forgotten and evacuated (see
examples in Ramutsindela 2007; Milgroom 2012; Anderson et al. 2013; Berglund 2015). British settlers were among the first to advocate the idea of national reserves (Harper and White 2012). Then the idea of conservation expanded more rapidly over the course of the 20th century to include tourism and other economic activities.

As discussed above, the idea of conservation became a useful tool for the colonial administration in tropical Africa. It was practised more consistently from the 1870s, when the British and other European countries started the formal colonisation process (German et al. 2011; Hamilton 1984; Tilley 2011). When the colonial governments divided up Africa at the end of the 19th century, the notion of nature reserves and national parks became prevalent (Carruthers 1995; Scholes 2009:8).

One of the main areas was east Africa, which became the centre for conservation ideology. Hamilton (1984:46) states that “the forest service in Uganda was created in 1898 with the appointment of the first ‘[d]irector to the Scientific and forestry of Uganda’. In 1917 the forestry department established a separate government body and it became the Forest Department in 1927 (ibid.). In other areas the notion of forestry and nature conservation also became popular. In most cases, the concept of nature conservation and reservation had more negative than positive impacts on the local community. For example in large parts of Africa the establishment of conservation areas and national parks often led to forced eviction of people who used to live in the area and use its natural resources for their livelihood (Scholes 2009:8). One classic example that used as a case study in this thesis is Kachung forest reserve.

3.1.3. Legacy of forestry and conservation

As shown above, forestry and conservation, although potentially conflicting in their approach to nature, as one based on utilitarianism and the other on strict protection, have long been friends in east Africa. However, many environmentalists and non-government organisations (NGOs) have argued that the establishment and success of commercial forestry has come at the expense of the environment (e.g. Tewari 2006; Rajan 2006). Some of these environmental costs are loss of water yield, soil pollution from chemicals used in the plantation, loss of biodiversity and deterioration of scenic beauty and habitat. Similarly, both forestry and conservation have created social disabilities by evacuating communities from their homelands into unknown areas, with higher population densities, unclear access to customary rights to resources and less fertile land.

Recently, two important social forces have given further leverage to environmental exploitation by forestry industries and plantation companies. The first is the increased level of environmental awareness since the 1970s, which reached its zenith in 1991 with the Rio United Nation Conference on Environment and Development (UNCED) and the subsequent formulation of the UN millennium goals and sustainable development goals. The second is the devolution and decentralisation process most third world countries in Africa and other continents have introduced since the 1990s, whereby most forestry departments have come under the administration of the local community (see Tewari 2006; German et al. 2011). This change

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10 According to Harper and White (2012) establishment of reserves took place in four British colonial countries within 15 years between 1872 and 1887 (Canada, Australia, Canada, New Zealand).

11 Decentralization transferring power to a lower level in a government bureaucracy, whereas devolution encompasses broader transfer of power with and outside government (German et al. 2011: 3)
became the driving force for a new way of governing forest and forest management. For example, German et al. (2011:1) note that:

[...] the decade of the 1990s saw the rebirth of democracy in some parts of Africa, and with it the initiation of different governance reform initiatives, notably process of administrative and political decentralization. Many countries embarked on decentralization in response to demand for better management of natural resources, including forests, and for more equitable sharing of benefits derived from them. Forest governance reform and decentralization in countries in sub-Saharan Africa (SSA) have taken various forms and are proceeding at different paces and stages of implementation.

Moreover, in parallel to the UN sustainability goals and new governance of forest and forest management, the Kyoto Protocol (see Chapter 5) has been a milestone in new forestry. The main premises of the protocol centre on the notion of ‘common but differentiated responsibilities’ (see Chapter 5). This has led to the birth of a number of afforestation and reforestation projects funded by the global REDD+ programme for disbursing funds\textsuperscript{12} (Susan 2015). Moreover, in 2005 climate adaptation interventions under the broad notion of CDM started to certify different plantation companies with a UN protocol of certified emissions reduction (CER) (Dina et al. 2013).

As awareness of CDM increases, so do plantation companies and commercial forests. One of the main factors increasing the number of plantation companies and commercial forestry, especially in tropical areas, is the idea of mitigating climate change based on carbon trading (e.g. Hulme 2009; Dnar et al. 2013; Burian and Arens 2014). However, as CDM and other carbon trading companies increase, so does their impact on the landscape and biodiversity. The next section describes how the landscape, biodiversity and landscape history are influenced by these changes.

3.2. Landscape, biodiversity and landscape history

Biological diversity, or biodiversity, creates different landscape patterns and forms, apart from having varieties of species (Huston 1994)\textsuperscript{13}. For this reason, as the topographies of one place changes so does the biodiversity, and \textit{vice versa}. Thus studies of biodiversity usually go hand in hand with the landscape and topography of the area under study. Landscape history and historical ecology are an integral part of understanding not just biodiversity, but also social diversity. But first I need to pause to explain the concept of biodiversity as this is a concept that is widely used within CDM projects, although as I will argue here in somewhat perverse utilitarian frame of interpretation as discussed below. To make this argument I first have to explore the origin of the term biodiversity.

\textsuperscript{12}REDD+ is a global programme for disbursing funds, primarily to pay national governments of developing countries, to reduce forest carbon emission. REDD+ will require permanent local institutions that can integrate local needs with national and international objectives” (Council for the Development of Social Science Research in Africa 2015).

\textsuperscript{13}Huston cites that biodiversity includes the different colour of flowers in a meadow, the songbird that gives the forest different music than the field, the patterns of greenness that we can detect from the satellite in space as examples where genetic variation gives environmental beauty.
3.2.1. The idea of biodiversity

The term biological diversity (biodiversity) was first used by the wildlife scientist and conservationist Raymond F. Dasmann in his book entitled ‘A Different Kind of Country’ (Fitter 1968). The term has been adopted widely since the 1980s in different environmental and scientific descriptions (ibid.). It became an accepted term world-wide after the UN Global Convention on Biodiversity signed in 1992 (CBD 1992). Huston (1994:1) defined biodiversity as biological diversity covering the distribution from the lowest molecular and genetic level to the most advanced and well-organised organisms. Borgerhoff Mulder and Coppilillo (2005:2) also defined biodiversity broadly as “the whole set of species, genetic variation within the species, the different ecosystem in which the species live and the natural abundance in which those items occur” (see similar definition in Dirzo and Raven (2003:30). In other words, biodiversity is a comprehensive term which describes all natural variations that occur in a certain space and time.

When it comes to the advantages of biodiversity, these are not limited to ecological aspects but also include economic and cultural components, e.g. forest biodiversity underpinning different ecological services for the wellbeing of humans, directly or indirectly. For this reason, the Millennium Ecosystem Assessment (2005) addressed and listed the wide range of ecosystem services involved, such as provisioning (e.g. wood, fibre, fuel), culture (e.g. recreation), support (e.g. water cycling, primary production) and regulation (e.g. climate regulation, seed dispersal, erosion regulation), among many services humans can obtain from ecosystems (see discussion in Barthel et al. 2013).

However, tropical forests and biodiversity are severely harmed and threatened due to conversion of their habitats for different reasons. The loss of biological diversity is also interlinked with climate change and is one of the global environmental changes which is irreversible (see discussion in Harley 20011; Zaccai and Adams 2012). It is feared that one third of existing species could disappear with the destruction of tropical rainforest (Dirzo and Raven, 2003).

As the biodiversity in tropical forests was being damaged significantly in the 19th century, environmental activism gained momentum. In 1973, a set of tropical ecologists gathered at Turrialba, Costa Rica, in a workshop to evaluate the earlier knowledge of tropical forest ecology, in order to act as future reference and to develop recommendation for upcoming studies (Montagnini and Jordan 2005). The launch of the Convention on Biological Diversity provided regulatory mechanisms and a framework for biodiversity monitoring and protection, but also emphasised local knowledge as an integral part of biodiversity protection (CBD 1992). Therefore, these events could have been expected to become the cornerstone for the foundations of different environmental policies concerning biodiversity. However, concerns about climate change and reduction of greenhouse gas (GHG) emissions appear to have overshadowed biodiversity protection and policy, particularly perhaps in Africa.

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14 Huston defined biodiversity as a “biological diversity encompasses all levels of natural variations from a molecular and genetic levels to species level, where we have most of our interaction with biological diversity happened through enjoyment of the common, strange, and beautiful forms of life or through suffering caused by the effects of pests, parasites and disease” Huston (1994:1)
3.2.2. The importance of landscape history

In addition to the broad definition of biodiversity and landscape provided above, Borgerhoff Mulder and Coppilillo (2005) claim that its strength depends on the past history of a certain area in which a certain species occurs under its past and present human activities. Therefore in order to know and understand the foundation of biodiversity of a certain environment a profound understanding of it’s ecological, evolutionary, geological and biochemical processes is required beforehand. According to Lane (2010:30), “[t]he concept of ‘landscape historical ecology’ has been adopted by many researchers […] in order to know the long term effect of human-environment interaction”. Moreover, understanding how and when those processes came into being and started to interact with each other is a problem. For this reason, studying landscape and biodiversity usually comes at the forefront of environmental history (see discussion by Huston 1994; Gillson 2015).

Tropical forests such as in Africa, Asia and South America are among the world sites with a high variety of topography, landscape, culture and biology. Thus understanding the history of biodiversity in a certain area is almost similar to understanding landscape history (see e.g. Hubendikck 1962; Laurance 2015). The importance of biological diversity is greater as species diversity and their distribution are concentrated in and around the tropical regions rather than any other part of the globe. Lung (2011:1) noted that “[a]mong the terrestrial biomes of the earth, tropical and sub-tropical moist broadleaf forests stand out as reservoirs of exceptionally high biodiversity with a total of around 20,000 amphibians, birds, mammals and reptiles and an endemism rate of approximately 40%”.

Nonetheless, even though the value and threats to tropical biodiversity have been known since the 18th and 19th century (Montagnini and Jordan 2005), little has been done to conserve tropical biodiversity other than building some nature reserves. For example, Wright (2005) stated that even if less than 50% of tropical biodiversity still exists, the rate of deforestation in Africa between 1990 and 2005 was three-fold greater than the average world deforestation rate. In particular, east Africa has been continuously labelled as the hotspot of forest destruction, with reportedly a five-fold higher rate in the past two decades compared with the global average (FAO 2009). Recently, as part of the afforestation process, many plantation companies have started to plant and initiate nature reserve areas (Laurence 2015). However, as in the case of Kachung, some of these areas are being planted with non-indigenous species with similar and uniform types of plants. Therefore this monoculture is a major threat to biodiversity and nature conservation and possibly to local communities. With this regard, the next section will discuss about the relation of local communities biodiversity and affect and biodiversity and vise-versa.

3.2.3. Communities and biodiversity conservation.

When community is cited as a main actor in conservation, the terms enchantment\textsuperscript{15} and disenchantment\textsuperscript{16} are often mentioned. These theories are important in order to understand the role of community in conservation. Local communities have a close connection and enchantment with their environment and know which resources should be kept for the future

\textsuperscript{15}Enchantment is associated not only with transcendent meaning and purpose, but also with wonder and surprise; these were the qualities that modernity, with its emphasis on inviolable natural laws, threatens to extirpate.

\textsuperscript{16}Max Weber famously discussed the “disenchantment of the world” in a 1917 lecture, by which he meant the loss of the overarching meanings, animistic connections, magical expectations, and spiritual explanations that had characterized the traditional world, as a result of the ongoing “modern” processes of rationalization, secularization and bureaucratization (Agrawal and Gibson1999:695).
and which should be used at once. For example, Western and Wright (cit. Agrawal and Gibson 1999:631) argue that “[c]ommunities down the millennia have developed elaborate rituals and practices to limit offtake levels, restrict access to critical resources, and distribute harvests”. Therefore to achieve re-enchantment in the conservation process, local communities have a vital role (Agrawal and Gibson 199917), because they have a close attachment to their natural environment. However, state and international conservation organisations which develop policies without good prior knowledge of the local community present only the disenchantment side.

Another dichotomy arises between the global north (developed countries or Western states) and global south (usually referring to developing countries) (see discussion by Dargin and Ebrary 2013). These two areas perceive and frame biodiversity and conservation differently than local people normally do. Thus the laws and practices imposed on local communities in the global south tend to be predetermined by state authorities or NGOs adopting a global north idea of conservation, rather than defining it in partnership with the local community. For example, many areas are under state control in the name of nature reserves or community-based management (CBM) reserves (similar to KCFR) fall under this concept.

Recently, this idea has been re-contextualised for the purpose of climate change mitigation (Ekblom 2015). However, many scholars see this as a new form of imperialism, ‘green imperialism’ (e.g. Hughes 2005; Busher 2013). Regarding land ownership, critics view green imperialism as a very effective form of land grabbing (e.g. Alise 2010, 2011, 2014; Stig et al. 2014). Stig et al. (2014:334) state that:

[a]ccording to Article 17 in the Universal Declaration of Human Rights, ‘Everyone has the right to own property alone as well as in association with others’, and additionally, ‘No one shall be arbitrarily deprived of his property’. With regard to immovable property, this global norm can be operationalized in various ways in a national context from the mere communist way of state ownership of land, where buildings can often be owned as separate property, to a more liberal market approach, where land and also the buildings on the land constitute a property that can be owned as a separate asset.

Hence, the rhetoric of nature protection embedded in both biodiversity protection and CDM-related projects risks violating basic human rights to land use and property ownership. The problem is particularly severe in areas where the land is privatised (Ramutsindela 2007; Berglund 2015; Paul 2007). East Africa in particular has been greatly affected by the negative effects of nature reserves on communities, because the population of the region has increased sharply, in combination with poor land use planning (ibid).

This is also clearly manifested in the case of Uganda, where the population has doubled in recent decades and where much of the land is privatised and land ownership is poorly administered. For example, in interview, the NFA branch manager in Lira expressed her frustration over the land use issue and population size of Uganda: “the population is increasing but the land is not increasing” (interview, 9 March 2016). With no future land use planning.

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17 Agrawal and Gibson (1999:633) see community in three ways as “as a spatial unit, as a social structure, and as a set of shared norms”
conservation, CDM plantations and the needs and resource use of local populations risk coming into conflict. In the Kachung area, indigenous people who used to live in the forest were evicted by force in 1939 when the forest reserve was established (interview with Lango Forest Company (LFC) forest supervisor, 13 March 2016).

In summary, the concept of biodiversity and conservation in tropical Africa in general and East Africa in particular is connected to acts in the colonial era. For instance, forest in Uganda was established for the purpose of timber and other forest produce. The region is good for establishment of forestry and for conservation because of its fertile land and presence of diversified species. This notion of forestry and nature conservation has persisted after colonisation. One of the new concepts is green resource management, particularly for halting climate change, but it is sometimes referred as ‘green imperialism’. Twenty years ago, the UN introduced its CDM mechanism to facilitate the process of green resource management in countering climate change.
4. History of Uganda Forest Department

“[…] [T]he evolution of forest policy and legislation in Uganda […] […] highlights a trend from highly regulatory colonial forest service (1898-1961) characterized by a centrally controlled and industry biased forest policy with limited local stakeholder participation; followed by the post-independence era (1962-1971) that maintained the forest estate in a reasonably good condition through the process of command and control; through a non-directional phase characterized by disruption of economy, insecurity and impaired delivery of goods and services (1972-1986); to a more decentralized, participatory and people oriented approach that has typified the focus of the policy over the last two decades (1987-todate)” (Turyahabwe and Banana 2008:641).

As mentioned in Chapter 3, after the Berlin Conference of 1885 the African tropics were divided into different regions. In addition to conservation of nature and biodiversity, the colonial powers introduced a new system of forest management to produce timber and other forest products and introduced forest departments. The forest department in Uganda (UFD) was established in 1898. Its history is discussed in this chapter because the case of KCFR is more or less embedded in the department, which hosted its historical evolution. Moreover, the history of Uganda’s forest department, implicitly or explicitly, is embedded within the political process in Uganda, as the emergence of Uganda as a political entity affected land and forest produce (Turyahabwe and Banana 2008).

Three main sources were used as a reference for this chapter, ‘A History of the Uganda Forest’ (volumes covering 1894-1929, 1930-1950 and 1951-1965). The first two volumes were collected from NFA headquarters in Kampala and the third was accessed online from the Commonwealth Library. Other sources were consulted in order to compare data. The first two volumes were published during the colonial period and are descriptive, mentioning events but without any discussion. The third volume was produced by two senior ex-UFD officials and contains more reflections.

Uganda fell under the colonial administration of Britain and emerged as a political entity or mapped country between 1894 to1898 (e.g. Webster and Osmaston 2003; Turyahabwe and Banana 2008). It was ruled by the British from 1898 until independence in 1962 (see Turyahabwe and Banana 2008; Webster and Osmaston 2003). From 1962-1986, Uganda endured many political changes and instabilities (Turyahabwe and Banana 2008). However from 1986-present, it has been under one government, led by President Oweri Kaguta Museveni (ibid)\(^\text{18}\).

\(^{18}\)As mentioned in Chapter 2, while I was doing my field research in Uganda, the country was in the process of presidential election. Many Ugandans I spoke to were of the opinion that under the current president the country had experienced relatively stable political situations. While it is common to complain about corruption in Uganda, the institutions seem organized.
Forest and forest produce have long been the main income for Uganda, but managing the forest and land use system is still a challenge. The complexity of the situation is shown in the fact that there are a number of different institutions in Uganda that deal with forest and natural resource management, e.g. National Forest Authority (NFA), District Forest Service (DFS) and, formerly, Uganda Forest Department (UFD). Thus it is important to review the history of forest management in relation to the Uganda political transformation. The next section will discuss on how was the forest management in Pre-colonial Period (before 1894 AD).

4.1. Forest management in pre-colonial period (before 1894)

Prior to establishment of UFD in 1898, there was no centralised forest management in Uganda (Were and Wilson 1972). However, parts of the country had a well-developed monarchy system, such as the kingdoms of Buganda, Bunyoro, Ankole and Toro (ibid.). At that time, forests were considered part of each kingdom’s land and were either communally owned or open to everyone in the community (Turyahabwe and Banana 2008).

The forests were managed traditionally or informally by the local communities. For example, they considered some forests sacred and prohibited the use of some types of trees (from cutting, use as firewood or building). Turyahabwe and Banana (2008:643) note “[c]ontrols on some forests considered sacred were presided over by a person whom the community accepted as a caretaker and believed to be possessed by the spirit after which the forest was named”. In addition, all members of the community had responsibility in one way or another while being free for to use forest in their daily activities. Turyahabwe and Banana (2008:634) explain that “[t]he members of the clan were free to collect forest produce for domestic use such as firewood, grass for thatching and clay for making pots”. This customary law or communally organised way of managing forest is still practised in some parts of Uganda, though it has been affected significantly by the land use laws of the state.

Other countries in East Africa have similar experiences of local forest protection, with no specific rules, but with customary rules passed on either by oral tradition from generation to generation or through the culture. Banana et al. (2008) (cit. Turyahabwe and Banana 2008:643) found that “[t]here were no written rules to describe forest management; instead the community grew up knowing the ‘dos’ and ‘don’ts’ in relation to forest use which were passed on to future generations through oral instructions and cultural traditions”. Thus even though there were no written rules in the pre-colonial period in Uganda, the community had its own means of managing the forest. However, with the advent of British colonisation, this system of land ownership changed. Therefore the next section will discuss about the role of colonial period in the forest management of Uganda.

4.2. Forest management in the colonial period (1894-1962)

In the previous section we have seen that in the pre-colonial period even though there was no clear written rules and laws but there was a well-established system of local chiefs and monarchies. The chiefs’ act as leaders for the forest managements and land ownerships (Webster and Osmaston 2003; Turyahabwe and Banana 2008; Forest Department 1951). When the British started colonising Uganda, they used existing kingdoms as leverage in colonisation. For example, because local chiefs and monarchies had the power to control the local communities, they used them to govern the natural resources, mainly forests and forest products (ibid).
In order to legitimatise colonial rule, the colonial administration granted ordinances to these chiefs and clan leaders to regulate the cutting of timber and destruction of other trees by the local communities (Banana et al. 2008). In order to cover their administration costs, the British also introduced cash crops such as coffee, cotton, sugar cane and tea (ibid.), for which they needed to clear extensive areas of land. Moreover, they realised that if forest were to be protected, a central forest reserve system was required. Initially the protected reserve areas were mainly used for wild rubber trees (such as *Funtumia elastica*) (Turyahabwe and Banana 2008), but later for other purposes.

The British established a forestry department to manage the forest and forest produce in Uganda (Forest Department 1951). The ‘Scientific and Forestry Department of Uganda’ was established in 1898, but in the following years it underwent a number of different name changes, to ‘Scientific and Forestry Department’ in 1906, ‘Botanical and Scientific Department’ in 1907, ‘Botanical, Forestry and Scientific Department’ in 1908, ‘Forestry Department’ in 1917 and finally ‘Forest Department’ in 1927 (Forest Department 1951; Turyahabwe and Banana 2008).

At first the department had only a few qualified personnel: “[t]o staff [the Forest Department], Mr. Whyte was given two Assistants [sic]; one of these was styled Forester and General Assistant [sic], the other Naturalist and Mineralogist [sic].” (Forest Department 1951). However, staff numbers later increased and included more foresters. The history of the staff members is well discussed in the three documents from the Forest Department however here I will only be putting emphasis on the historical changes in the management of the forests. However, I believe that further studies can be done on the individual actors in and around the Ugandan Forest Department since the 19th century, and how they have influenced the current forest policy in Uganda.

As earlier noted that Uganda come under British colonization in 1894. In order to legitimate their colonisation, in 1900 they signed the Uganda (Buganda) Memorandum of Agreement between the Kingdom of Buganda and the British government. Turyahabwe and Banana (2008:644) claim that agreement was signed with the understanding that the British government would protect Buganda Kingdom from other external kingdoms like Bunyoro Kingdom, and in return the British would receive 1500 square miles (3885 km²). This was followed by agreement with the other kingdoms, such as the Toro Agreement (1900), Ankole Agreement (1901) and Bunyoro Agreement (1933) (Forest Department 1951; Turyahabwe and Banana 2008). These agreements affected Ugandan peasants, who were suddenly became tenants or were forced to leave their land.19

In addition to forest management, the Forest Department also promoted development of agriculture, experimental farms and establishment of meteorology and hydrology stations (Turyahabwe and Banana 2008). From 1927 onwards, it embarked on the process of making reserves and designating different areas for forestry under department control. The reservation process was carried out with the help of expatriate foresters from Britain. However, with the establishment of the Department of Forestry at Makerere University, African foresters became available and began to be employed in the forest management and reservation activities. The reservation process was gradual until the 1940s and gained more momentum from then until the 1950s (Forest Department 1951).

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19 “Peasants were transformed into tenants and their hunting and gathering (firewood, trees, honey, mushrooms, etc.) rights subordinated to the power of the landowner. Free hold titles were granted to the king of Buganda and his family, collaborators and chiefs while the rest of the land was declared crown land and put under the colonial Governor in trust for the people of Uganda” (Turyahabwe and Banana 2008: 644)
On all crown land\textsuperscript{20} (public land), the power of control over natural resources was transferred to chiefs and the colonial governor. Thus the rights of the local community were lost and the right to land was at the discretion of the colonial governor (Forest Department 1951; Turyabwe and Banana 2008:644). The regulations applied to both natives and foreigners, although there were some privileges granted to native inhabitants, e.g. they were allowed to collect some forest products for domestic use free of charge (ibid.).

A number of rules and regulations were enacted after the start of reservation, starting in May 1900 under article 99 of African Orders in Councils 1898 (Forest Department 1951). Some of the main regulations were (Turyabwe and Banana 2008:644):

1. A ban on unlicensed cutting of forest products on any land that was not under private ownership except by natives for domestic use.
2. Making it a punishable offence to cause or set fire to a crown forest.
3. Prohibiting clearing of vegetation within 90 metres of a stream, river or lake without a permit, both on crown and private land.
4. Prescribing that when clearing for agriculture, at least three trees of a minimum height of six metres should be left per hectare of leased land that had 20 or more hectares of forest.

A new decree in 1903 gave the colonial governor the power to make new rules on timber cutting and wild rubber tapping. This was replaced by a forest ordinance enacted in 1913 which strengthened the power of forest officers to issue licences for cutting and other activities carried out inside the forest (farming, grazing, clearing forest for different purposes etc.) and to punish violations (e.g. Hamilton 1984; Forest Department 1951; Turyabwe and Banana 2008:644).

Most early forest policies in Uganda were short-term and subject to change when a new law was enacted. However, in 1929 the first national forest policy was established (Forest Department 1955). It stressed continued control of areas already under forestry and afforestation projects of additional land, but also advocated better management of forest for timber production for a robust financial national income (ibid.). The new policy was more transparent to the forest management and helped it to work more effectively with long-term management. The gazetting of forest reserves continued until 1940s and most of the current CFRs originate from that time (Hamilton 1984; Turyabwe and Banana 2008). Local people were forcefully evicted and relocated to other places (Turyabwe and Banana 2008; 645), but in parallel to the gazetting process, peasants were encouraged to plant trees and each farmer was recommended to have at least a private woodlot (Forest Department 1955).

A second forest policy was enacted in 1948 to consolidate the legal division of management responsibilities between the local and central government. By that time, forest management was structurally stronger and better adjusted to cope with new policy changes. The second forest policy specified a minimum area for each district to be forested, i.e. a goal of having 10% of land in Uganda under forest. The only district that refused was Lango, where KCFR is located. It rejected the forest enactment because officials were afraid that the land would be grabbed by white settlers (as had happened in Kenya) (Turyahabwe and Banana 2008; Webster and Osmaston 2003).

Towards the mid-1950s, forest in the form of agricultural productivity and natural resources management was endorsed by the colonial administration (Webster and Osmaston 2003). New regulations were enacted that encouraged the development of farm woodlots; in most cases

\textsuperscript{20}According to the 1900 forest regulations, crown lands were defined as all lands belonging to or under the control of her majesty, whether cultivated or uncultivated, and includes all forests, woodlands, waste, and uncultivated lands belonging to any private proprietor (Turyahabwe and Banana 2008:644)
local communities dominated management of these forests established in most regions of Uganda. During my field trip in northern Uganda, I observed that each farm still has a private woodlot.

In 1962, with Uganda independence, forest policy and management also entered a new phase. Therefore the next section will discuss the latest phase of forest management in Uganda from 1962 until the present time.

4.3. Forest management after independence (1962- present)

After independence, Uganda became a new political state and the country’s natural resource management also fell under the ownership and administration of the new government. During this time all natural resources, including crown forest, became the property of the government. The new government maintained the same approach as the British colonial administration towards forest management in the following 10 years (Government of Uganda 1962). However, it then started to centralise forest management but central and local governments developed parallel organisations, since they wanted to share the revenue from crown land (Webster and Osmaston 2003; Turyahabwe and Banana 2008).

In 1967, a new constitution for the independent Uganda was adopted. It brought enormous changes in the administration structure. For example, it abolished the kingdoms and declared Uganda a republic with an executive president (Hamilton 1984; Turyahabwe and Banana 2008). Local Forest Reserves (LFRs) which were previously under local government administration, came under a forest department (UFD) ruled by central government. At first the LFR staff members and local communities embraced the reform because they thought that the law was more inclusive, rational and efficient. However, over time it became clear that the new administration system was not fulfilling expectations. All the decisions concerning forest resources were fully assigned to the UFD as an agent with the power to regulate and distribute forest products to all governments and the public. As a result, a continuous conflict emerged between UFD and local governments, the latter became less cooperative and encroachment on forest reserves increased (Hamilton 1984; Webster and Osmaston 2003; Turyahabwe and Banana 2008; Government of Uganda 1962).

During this time there were significant research activities on forest management, such as timber management and establishing plantations. Forest officers were appointed at district level, forest rangers at county level and forest guards with the responsibility to monitor and enforce the provisions of the Forest Act. In addition, the Norwegian International Development Agency (NORAD) became actively involved in forestry activities in Uganda from the late 1960s. KCFR was one of the forest reserves to be actively supported by NORAD. NORAD also became actively involved in softwood plantation and establishing forest education at Nyabyeya Forest College near Budongo Forest Reserve (Hamilton 1984; Webster and Osmaston 2003; Turyahabwe and Banana 2008). In 1970, a Forestry Department was opened in order to train professional foresters (ibid.).

Amidst of this centralisation of forest management, Uganda again moved into a new political era. A military government led by Idi Amin took power by overthrowing the previous government, which meant that law and order completely broke down and there was a halt to all forest management and linked initiatives (Turyahabwe and Banana 2008:649). Sawmills owned by Asians were destroyed when Idi Amin expelled all Asians and other foreign citizens from Uganda. In 1973, the Norwegian government decided to withdraw NORAD (Turyahabwe and Banana 2008; Webster and Osmaston 2003). In interview, the LFC forest supervisor reported much burning and encroachment in Kachung Forest during Idi Amin’s regime and that NORAD
people left the forest in 1974 (interview, 12 March 2016). Uganda’s growing population, coupled with dissolution of the administration, led to frequent expansion of local communities into forest reserves for agricultural purposes (Hamilton 1984). In addition, in 1975 a Reform Decree issued by Idi Amin declared that all land should be owned by the public and “every Ugandan was free to settle in any part of the country” (Turyahabwe and Banana 2008:650). This decree was perceived by most people as encouragement to clear forest for agriculture.

After the fall of Idi Amin in 1979, three successive governments were formed and collapsed in quick order over the course of one year (Gawkwandi 1999). Later, a new government led by Milton Obote stayed for about five years and his rule paved the way for the formation in 1986 of a guerrilla group called the National Resistance Army (NRA). Since 1986, Uganda has been governed by the NRA, led by President Yoweri Museveni.

In 1987 the NRA government introduced a policy for resource management that decentralised the power of management, including management of natural resources, to district councils. However in 1988, in response to pressure from international agencies and donors, it decided to set aside 20% of tropical forests as reserves, 30% of which would have limited timber exploitation and 50% would be sites for timber management (Grove 1995). The government also designated about 30,000 ha tropical forest as national parks21. In 1993, some of the district power over forest management was passed on to local governments (see discussion in Government of Uganda 1993), a decentralisation approach that continued with the National Environments Act (1995) and the Local Government Act of 1997 (Government Act of 1995, 1997).

The main objective of the decentralisation legislation was to strengthen local governments by giving them full responsibilities for resources management, encourage participation by local communities in development programmes and reduce public finances by empowering local governments (Turyahabwe and Banana 2008). However, the devolution process for CFRs became controversial, as many districts lacked the technical expertise and financial resources for effective governance (ibid.). The government then decided to recentralise, but to allow all central and local forest reserves to stay under the administration of local government (Government of Uganda 1998). In 1999, a forest sector reform process started and resulted in the development of Uganda Forest Policy of 2001, the National Forest Plan of 2002 and the National Forestry and Tree Planting Act of 2003 (NFA 2005). Through these changes the Forest Department lost public trust and the government decided it replace with a more autonomous and efficient body to manage the CFRs. This body was the National Forest Authority (NFA), established in April 2004 (ibid.).

In summary, forestry and forest policies in Uganda have fluctuated over the years from a highly centralised policy in 1898 until 1971, when the new independent government was overthrown by a military regime and a non-directional policy was applied. In 1986 a decentralisation process began and all CFRs was decentralised by the late 1990s. Actors such as NORAD and donor agencies then began to affect forest management in Uganda. KCFR is one of the CFRs affected by these changing policies and actors over the course of the past hundred years.

21The parks include Mt. Elgon, Kibale, Bwindi, Rwenzori and Mgahinga forest.
5. Clean Development Mechanism: A Short History

It is important to have a clear understanding about the concept and history of CDM, as the case studied in this thesis is one of many projects run under the CDM umbrella. Hence this chapter describes how the CDM evolved as a concept and how it became applied in Africa. It also discusses the effects of CDM-related projects on livelihood practices and landscape locally and globally.

Kachung Forest is one of many CDM projects through which the landscape and the livelihood of local people are continuously changing. During my field work in KCFR, I talked to people living around the forest who knew nothing about CDM or its long-term goals. My field studies also showed that both the landscape and the livelihood practices of the local communities had changed significantly since GRAS started its tree plantations. Thus this chapter also describes the impacts of the CDM policy and related REDD forest projects on local communities, using KCFR as a case study.

The concept of CDM and its impact in the global context were summarised thus in 2010 by Lex de Jonge, then chairperson of the CDM executive board:

> [t]he Kyoto Protocol’s Clean Development Mechanism (CDM) has registered its 2000\textsuperscript{th} project [on 6 January 2010], a biogas extract and utilization project, in Sakaeo Province, Thailand, expected to reduce carbon dioxide emissions by more than 56,000 tons annually. The first CDM was registered on the 18\textsuperscript{th} of November 2004. It took almost three and a half years for the 1000\textsuperscript{th} project to be registered on the 14 April, 2008. The CDM has passed another milestone. It is fascinating to look back at how it started, and consider how far it has come.\textsuperscript{22}

The number of registered CDM projects has since continued to increase very dramatically. For instance by 2014 it exceeded 7000, which is more than seven times the number in 2010 (Röttgers and Grote 2014). Thus, the popularity of CDM has been increasing in terms of numbers of registered projects, but it has also received much criticism. Before discussing its short history and the general concept, the next section examines why it became popular despite its shortcomings and how it is framed in dominant environmental policies and political discourses.

5.1. The development of climate change as a science

To understand the logics behind CDM, it is necessary to understand the carbon cycle. Carbon exists in almost everything, whether living or non-living. In addition, there is a continuous cycle of carbon sequestered in soil and emitted back to the atmosphere (Pearson 2005). Unfortunately this cycle has been imbalanced by different human activities, especially burning large quantities

\textsuperscript{22}Lex de Jonge, Chair of the CDM executive Board (2010:1).
of oil, petrol and coal and clearing forest. The resulting increase in CO₂ and other GHG (e.g. methane, nitrous oxide and ozone) in the atmosphere is the primary cause of global warming and climate change (Dinar 2013:11).

During recent decades the debate on environmental issues has concentrated on global warming and the link to GHG emissions. Justification for a treaty on limiting GHG emissions stems from the notion that the global climate is warming and the main driving force or contributor is humans, giving rise to the term ‘anthropogenic climate change’ (cf. Pearson et al. 2005; Hulme 2009; Dinar 2013). The word ‘anthropogenic’ could potentially have a various meaning but the most convenient one which I presume for this argument was taken from Oxford dictionary. I also footnoted below for further referencing. On the other hand however, other scholars (see e.g. Nobel Laureate Ivar Giaever’s speech at the Nobel Laureates meeting on 1 July 2015) and other organisations argue that climate change is a political hoax (see https://www.youtube.com/watch?v=TCy_UOjEir0, accessed on 06 June 2016). One reason for this scepticism could be lobbying work by oil companies and other carbon-emitting industries. In most cases there are sufficient data to show that the climate is changing dramatically and having a significant effect on the lives of many poor communities (Hulme 2009).

While not a climate sceptic, in the next section I question the dominance of CDM-related discourses in the global south (see section 5.2). However, the research argument in this thesis is based on the assumption that climate change is real and that its main causes are anthropogenic. Based on that standpoint, it looks at how CDM as an offset system and carbon-neutral process regulated under the Kyoto Protocol can potentially change the livelihood of local communities around KCFR and also change vegetation cover and local climate.

The rhetoric on global warming started in 1861, when John Tyndall predicted that the extra release of CO₂ from combustible fossil fuels can cause an energy imbalance, leading to warming of the Earth’s atmosphere (Dinar et al. 2013). His claim was supported by the Swedish physicist Svante Arrhenius in 1896, who presented a theoretical model predicting global warming. However, Arrhenius estimated that the global warming effect would be slow and did not consider it a threat to the Earth as a whole (ibid.). Since then, global use of fossil fuels has greatly increased and the Earth’s cooling and warming mechanisms have become better understood.

The subject of global warming gained renewed attention when the discipline of environmental studies was developed (see Hulme 2009; Dinar 2013; Pearson 2005). For instance in 1957, an important paper by Revelle and Suess suggested that the ocean’s ability to absorb CO₂ from the atmosphere had become lower than ever before in history and that the risk to the living world was unequivocally threatening (Siegenthaler and Oeschger 1987). Environmental concerns thereby gained momentum and in 1958 measurements of atmospheric CO₂ were carried out at the Mauna Loa Observatory, Hawaii. The data confirmed an increasing concentration of CO₂ in the atmosphere (Dinar et al. 2013). Nevertheless, although there was broad consensus about the increase in atmospheric CO₂ and later its links with global warming, the complex atmospheric relationship which affects the cooling and warming of the Earth’s atmosphere remained uncertain.

23Anthropogenic: Something caused by intended or unintended human agency, as opposed to other causes such as natural forces. Global climate change is the most widely recognised anthropogenic phenomenon (5th edn, Oxford University Press 2015)
In the 1970s a series of conferences sponsored by the World Meteorological Organization (WMO), The United Nation Environmental Program and the International Council for Science led to the formation of the Special Advisory Group on Greenhouse Gases in 1985 and ultimately the establishment of Intergovernmental Panel on Climate Change (IPCC) in 1988 (Hulme 2009; Dinar 2013; JR 2014; Donald 2010). The main reason for establishing the IPCC was to have a formal way of reviewing human-induced climate change with the help of experts and of providing clear objectives for policymakers (Dinar et al. 2013:12). The first IPCC report was submitted to the UN General Assembly in 1990 and acted as the main platform for international treaties about climate change within the United Nations Framework Convention on Climate Change (UNFCCC), with the aim of preventing the Earth from warming by limiting GHG emissions (Donald 2010; Dinar et al 2013). The UNFCCC treaty created significant leverage for the signing of the Kyoto Protocol in 2005 (Dinar 2013:12).

The Kyoto Protocol had a strong scientific base in the IPCC reports released in 1995, 1997 and 2001 and was more widely accepted than earlier protocols. It has been suggested that this acceptance was due to integration of scientific knowledge held by scientists and climate experts. For instance, the IPCC reports are prepared by a special panel of scientists (Dinar 2013). Thus, establishment of IPCC and its continuous reports were an important milestone in politicising climate change and establishment of CDM under the Kyoto Protocol.

CDM endorses incorporation of climate change into macroeconomics by providing market tools and incentives. It also connects climate change to the financial market for the purpose of attracting interest from investors, while at the same time mitigating climate change. This market-based environmental investment system is regulated by the UN’s CDM department through transactions in terms of a credit system whereby industrialised countries can either reduce national emissions or pay for emission credits from other countries, usually either underdeveloped or developing countries (cf. Pearson et al. 2005; Dinar et al. 2013; Hieronymy and Schülle 2013; see also section 4.2).

5.2. The Kyoto Protocol and CDM

The Kyoto Protocol accepts that GHG emissions occur everywhere, but that their effects and the cost of reducing emissions differs from country to country: According to Dinar et al. (2013:93):

Early drafts of the treaty soon settled on restricting the richest countries to historical emission levels as the primary mechanism for limiting emissions, but debate continued on how to control abatement costs.

Another debated issue was whether and how historical national emissions should be taken into account, as this would mean that countries with more industries and a pollution history should pay more for the cost of mitigating climate change. Many industrialised countries with large emissions, e.g. USA and China, opposed the idea that historical emissions should be taken into account. During the negotiation, the government of Norway proposed introduction of an additional mechanism in order to allow partnerships between countries at lower cost than estimated when the protocol was established first ( Carraro 1999; Dixon and Mintzer 1999).

Once CDM was implemented, it received considerable criticism, primarily regarding the notion of additionality, whereby CDM offset projects must provide a reduction in emissions above and beyond the emissions that would be released in any case, since it would otherwise be a mechanism that does not reduce emissions, but merely reduces increases in emissions. For example a number of studies show that 30-50% of CDM projects are non-additional, pursuing
business as usual but calling it CDM (Pearson 2005). For this reason, many argue that the CDM mechanism cannot be a solution for climate change. The dilemma of carbon trading is explained by Pearson (2005:9):

[the CDM is a carbon-neutral process. It allows an Annex I Party and a non-Annex I Party to co-operate and carry out a project in the non-Annex I Party that will sequester carbon (or reduce emissions). Certified emission reduction credits (CERs) are created through the project and transferred to the Annex I Party, which is now able to emit an equivalent number of units of carbon while meeting its targets.

Therefore the amounts of carbon emitted and sequestered are equal, which means there is no extra carbon sequestering. Pearson (2005:9) concluded that: “[t]hus, the atmospheric concentration of greenhouse gases remains unchanged as a result of the transaction”, even though it’s main objective is to mitigate climate change while encouraging development for the poor countries and communities. Pearson (2005:9) added that “[t]he Annex I Party is assisted in meeting its commitments cost-effectively while, in well-designed projects, the non-Annex I Party benefits in meeting sustainable development goals”). However, as shown in the present case study of KCFR as part of CDM, there is great discrepancy between policy and practice.

Another criticism is that CDM projects increase net carbon emissions. For example, while constructing infrastructure in the project area, they add more carbon and other GHG emissions. A third criticism is that while CDM projects are investing their carbon reduction process in developing countries in e.g. Africa, they are using their income to build other industries which increase emissions of carbon in another area. A further criticism is the negative impact on the local communities in the global south, who may be forced to move from their homeland, disturbing the existing ecosystem (Pearson 2005; Dinar et al. 2013).

Moreover, although many praise CDM for its part in initiating carbon emissions reductions, they criticise it for being incomplete and ambiguous. Gregg et al. (2001:260) state that “[n]otable among the issues yet to be resolved is that the protocol prescribes emissions commitments without fully laying out either the accounting rules for measuring emissions and emissions offsets or the penalties for failure to meet commitments”. Similarly, in interview the manager of the carbon branch for Kachung Forest CDM stated that it is difficult to make standard and credible measurement of carbon sequestered in any forest and therefore most countries have developed their own way of measuring the amount of carbon sequestered (interview with Manager of Lango Forest Company Carbon Section, 12 April 2016).

The market and credit mechanism aspect of the protocol has also received criticism. Many argue that it is ambiguous and has more business and political rather than environmental protection benefits (Pearson et al. 2005). The Kyoto Protocol has also been detrimental in many projects under CDM, particularly in the developing world and in Africa. For example Röttgers and Grote (2014:201) state that it is possible to change “[environmental problems into business and development opportunities”, but that most of the global south, especially African countries, is suffering from this policy instead of benefiting.

5.3. Reduced Emissions from Deforestation and Degradation (REDD and REDD+)

Another carbon governance instrument called REDD, later expanded to REDD+, has a similar aim to CDM and is intended to play a major role in reducing emissions from deforestation and
degradation. For this reason, although the main focus of this thesis is on the history and discourse of KCFR in relation to CDM, it is worth briefly comparing CDM and REDD.

Essentially, CDM came into being to achieve a quantitative reduction in GHG emissions, mostly by sequestering carbon in the terrestrial biosphere, especially plants, to encourage development of alternative sources of energy such as solar and hydropower (Gregg et al. 2001) and to help transfer these technologies to the global south. In the same year, the countries of parties (COP) proposed REDD as part of mitigating climate change. At their 11th conference of parties (COP-11) (http://www.redd-monitor.org/redd-an-introduction/ accessed on 18-07-2016). Those countries initiated the program and it was led by Papua New Guinea and naming themselves as the Coalition for Rainforest Nations. Two years later at the COP-13 the proposal was adopted and endorsed for further implementation. For example REDD Monitor on their website stated that “[t]wo years later, the proposal was taken up at the Conference of the Parties to the UNFCCC in Bali (COP-13). In December 2010, at COP-16, REDD formed part of the Cancun Agreements24, in the outcome of the Ad Hoc Working Group on long-term Cooperative Action under the Convention” (http://www.redd-monitor.org/redd-an-introduction/ accessed on 18-07-2016).

The main aim of REDD was to pay or reward forest owners, government and companies mainly in the global south for not cutting down their forest. However, as most of the countries in the south currently have poor governance and are prone to corruption, most REDD money goes to the elite group and powerful organizations (Chomba 2015). Later, REDD became REDD+, to denote success in improving ecosystem services, forest management and conservation, “forest restoration and afforestation to enhance the capacity for carbon storage” (Chomba 2015:3). REDD is thus similar to CDM, but CDM it is a market-based system in which private companies can cut and sell forest products periodically and replant. Overall, CDM seems more rigid and less flexible than REDD and brings little advantage for local communities (ibid). Therefore bear in mind that the discussion of this thesis will be taking a case study which is operating under CDM carbon governing mechanism.

5.5. CDM and Kachung Forest

According to Röttgers and Grote (2014:202), of the more than 7,000 registered projects up to spring 2014, above 80% have been started as partnerships. These partnerships are projects by companies or state organizations in developing countries which are supported by partners in industrialized countries in return for emission rights to attract projects.

This is also true of KCFR, which is leased by the Norwegian company GRAS and supported financially by countries such as Norway, Sweden and Finland in return for emissions reductions. This reserve is an interesting case study for many reasons, e.g. it was announced as part of CDM in 2012 and has received considerable internal and external criticism, e.g. for

24 The agreements, reached from 29 November to 11 December in Cancun, Mexico, in 2010 United Nations Climate Change Conference which passes a number of key steps forward in capturing plans to reduce greenhouse gas emissions and helping developing nations protect themselves from climate impacts and build their own sustainable futures (please see Liu 2011)
joining and also for not meeting the CDM criteria (Redd-Monitor Org 2016; Katchung plantation 2012).

One main aim of this thesis was to discuss the current discourses amongst different stakeholders in the Kachung area who are shaping its landscape in a wider political and global context. One of the main discourses on this plantation project emerged when KCFR came under the management of GRAS and was certified as a CDM project. The next sections focus primarily on the discourse by GRAS and UN CDM policy on this plantation project. First, however, as noted by Liu (2011:43):

[t]wo separate negotiating tracks had been set up in the aftermath of the Bali Conference in 2007: one to address long-term cooperative action under the UNFCCC, the other to address further commitments under the Kyoto Protocol. The 'Cancun Agreements' include decisions under both the Convention and Protocol negotiating tracks and contain provisions on mitigation, adaptation, financing, technology, reducing emissions from deforestation and forest degradation in developing countries (REDD+)

To this end, in 2009 30 billion USD was made available for the period 2010-2012, with further mobilisation of 100 billion USD per year by 2020 (ibid). As part of this agreement, in 2011 GRAS signed a 20-year (2012-2032) US$4 million emissions reductions purchase contract with the Swedish Energy Authority (SEA) whereby the latter would purchase approximately 365,000 carbon credits from Kachung forest (http://www.redd-monitor.org/ accessed 19 July 2016). In 2015 this contract attracted much criticism when the Swedish channel TV4 screened a documentary on the problem caused by the plantation for local communities (http://www.redd-monitor.org/ accessed on 19 July 2016). This led the SEA to freeze further payments to GRAS on 3 November 2015. Similar criticism has been raised by researchers elsewhere, e.g. by Chomba (2015) concerning a REDD+ project in Kenya which concluded that the long cooperation on funding between governments in the global south and private organisations results in class divisions and social crisis in local communities, worsening conditions for the disadvantaged and enabling the elite group to continue with corruption and enjoy the legacy of climate change.

The next section presents a brief history of GRAS.

5.5.1. The Green Resources company (GRAS)
under the name Fjordgløtt AS (Molberg 2012). It changed its name to Tree Farms in 2000, before becoming Green Resources AS in 2007 (Gaarder 2009). Asprem came up with the idea of establishing a company in a forestry business and, based on his knowledge, he estimated that East Africa was the best location in the world for conducting this business, due to land availability, low labour costs, stability of governance, good rainfall and long traditions of Nordic development aid (Green Resources 2012). The company was registered in Norway as Norwegian Afforestation Group AS and in Uganda as Norwegian Afforestation Group (U) (Green Resources 2012, 2013, 2014).

GRAS has a total of 45,000 hectares of plantation in Mozambique, Tanzania and Uganda. Furthermore, it is planning another project in South Sudan, but to this date it is not operational. Its project in Kachung is registered under the CDM and GRAS sells carbon credits generated from this plantation to the SEA through its subsidiary company Lango Forest Company (LFC) (Green Resources 2012, 2013, 2014). This subsidiary was started in April 2006, when GRAS directly or through the subordinate plantation company Busoga Forest Company (BFC) became the new main shareholder in NAG (U) Ltd, which later became LFC (Green Resources 2012; 2013, 2014). LFC is currently the owner of the Kachung Plantation project, which occupies approximately 2800 ha (ibid.). Its company name derived from the local tribe (Lango) and local language (Langi) of people living around the forest (interview with LFC forest supervisor, 12 March 2016). According to that officer and other people involved with LFC, this name was chosen so that the local community would feel a sense of ownership for the company.

LFC received a licence from the Ugandan government as NAG (U) Ltd and was granted a 50-year permit (No. 4230) to establish a commercial tree plantation. This permit number was changed to No. 815 in January 2010 (Green Resources 2012:17).

5.5.1.1. Kachung Plantation Project

LFC’s forerunner, NAG (U) LTD, was first established in 1999 as a private and profit-orientated company for managing and establishing forest plantation in order to produce forest products for domestic use, carbon storage, environmental conservation and social economic development for people living nearby. However, it did not start its plantation activities until 2006, when GRAS became its major shareholder and financier of its activities (ibid).

Afforestation of Kachung by Norwegian groups has been attempted long before NAG (U) Ltd, e.g. through NORAD in the period 1969-1974. When asked about the forest before the 1980s, in interview the LFC forest supervisor replied:

It was […]hmm] just planted by the government [before NORAD]. They were trying some softwood species. Like pine trees such as *Pinus carribea* and *Pinus oocarpa*. Those two species were planted on a large scale from the 1970s […]when the government] got some aid from the Norway, it was NORAD. Then after planting on a large scale the NORAD left again. During the period of Idi Amin they took off and since then there were no more planting (interview, 13 March 2016).

Therefore Kachung forest has been transferred through a number of Norwegian afforestation groups with similar intentions but of increasing scale and supported by different Nordic countries and shareholders. GRAS describes the project as “[…] being developed to meet all the criteria for certification under the Clean Development Mechanism (CDM). The goal of the project is therefore to contribute to the emission reduction of greenhouse gasses globally and hence mitigate climate change” (Green Resources 2012:1). Another goal is to create jobs for the local communities and people from other parts of Uganda. During my visit to the Kachung Forest project, I interviewed managers of the Carbon Section of the project and the community
A relations officer for GRAS. I also talked to lay workers currently working in the field. They told me that all the working staff, including the manager of the LFC in Uganda, are from Uganda. Visits to the study area over two days with NFA and GRAS representatives confirmed that all staff members working in the company and the field workers are Ugandans. However, since the average salary paid by LFC to field workers is very low, it is easy to assume that it is not their sole means of subsistence. In interview, the LFC community relations officer reported that the salary paid to workers in the field is usually 6000-7000 Ugandan shillings per day, which is equivalent to 1.78-2.08 US dollars per day, while their average monthly salary paid is 180,000-210,000 Ugandan shillings (~53-62 USD) (interview, 12 March 2016).

Another aim of GRAS and LRC is to play a greater role in market production of timber, electric poles for both domestic use and export, carbon storage and afforestation and reforestation in the Kachung area. However, the objectives stated in GRAS documents (Green Resources 2012:1) about conserving the environment and the actual conservation process are contradictory. For example, within the same documents it is stated that “[t]he main tree species to be planted are clonal eucalyptus [species], Pines [species] with maesopsis and other proven promising indigenous species for enrichment planting”. However, if clonal eucalyptus and pine trees are the only trees grown in the plantation then conservation of biodiversity cannot be happening, especially since GRAS also sprays herbicides to clear grasses growing underneath the main commercial planted trees. One NFA officer interviewed said that “we spray chemicals to remove small grasses underneath the pine and eucalyptus and now they are completely lost and other new grasses appear which we don’t recognise” (interview, 13 March 2016).

These chemicals are not only dangerous to indigenous grasses and small shrubs, but could also contaminate swamps and water bodies downstream. The villagers living around the forest fetch their drinking water, water their cattle and herds, bathe and fish the waters inside the plantation project. During field visits with NFA and GRAS staff, I saw children carrying fish collected from downstream areas. The local people have no knowledge of the chemicals and their consequences. Moreover, the forest is becoming a monoculture and local communities are losing former benefits such as shrubs for firewood, honey, traditional medicinal plants and other cultural resources. One of the main sources of running water is beside the GRAS field office inside the plantation project and it is tagged with a notice to “boil/treat water before drinking”

Figure 3. Drinking water source found inside Kachung forest (picture taken from The Oakland Institute (2014))
(Figure 3). The local communities I met also complained that the downstream water is contaminated and not safe to use for drinking or other activities.

5.5.2. GRAS and the Ugandan government

During decentralisation in the 1990s, government-owned companies and CFRs were leased to private companies (Turyahabwe and Banana 2008). GRAS leased two forest reserves, one of which was KCFR, with the NFA acting as intermediary between the government and the LFC. Initially the plantation area was leased at 6600 Ugandan shillings per hectare and year, but this has since been increased to 8000 Ugandan shillings per hectare and year (interview with NFA officer, 13 March 2016).

The major leasing bodies are LFC, NFA and other regional private plantation projects such as Edola & Sons, which has a small plantation beside the tarmac road. The total area of Kachung forest reserve is about 3590 hectares, of which GRAS currently leases about 2800 ha (Green Resources 2012; interview with LFC community relations officer, 12 March 2016). Within the GRAS-leased area, 2669 ha are planted with pine and eucalyptus and a very small area contains indigenous trees (Figure 9). Some free space is also left to act as a fire-break between the planted areas and roads.

In summary, CDM emerged as policy when climate change entered science. Later CDM-related projects such as REDD were developed. Kachung forest is a CDM project managed by GRAS and other small shareholders.

By taking chapter 5 as a background, chapter 6 will discuss the detailed landscape history of case study- Kachung Forest. This chapter is also the one which I am going to demonstrate my findings. The chapter will try to explore the landscape history of the forest one century back with the introduction of forestry in Uganda until the present time.
6. Landscape History of Kachung Forest

As shown in chapter 1 and chapter 3 forestry, conservation and biodiversity have a problematic colonial legacy in Africa, and some critics argue that today’s carbon projects are a continuation of this legacy by enabling green imperialism or land grabbing, masked as conservation or carbon offsets. One of the main criticisms is that the projects fail to address the colonial past and also lack social, economic and democratic equity and justice in terms of information disclosure, participation and inclusion of local residents in decision making, planning and implementation. Moreover, as mentioned in Chapter 5 there are serious environmental threats locally and globally that need to be addressed in carbon projects.

This chapter presents the long-term history of the Kachung Forest area, particularly the effects of CDM policy. Based on the background provided in previous chapters, empirical material obtained in field work in Kachung forest area is analysed through a local perspective to determine how these transformations took place and their effect on local communities and the landscape.

6. 1. Introducing Kachung Forest area

The Kachung study area is around 380 km from Kampala, the capital city of Uganda (Green Resources 2012:20), along the tarmac road that leads to northern Uganda. The geographical position is between latitude N22.0° and N 22.5°N, and longitudes E49.1° and E49.9°. The reserve is relatively rectangular in shape (Figure 1), extending east to west, and is around 30 km south of the nearest town, Lira (Green Resources 2012:17). Before it was taken over by LFC, the forest reserve comprised five areas characterised by different types of vegetation. Most was classified as ‘degraded woodland’ (70.5% of total area) and areas used for farming (667 ha or 18.6%). Coniferous plants and grassland represented relatively small proportions (8.2% and 3.6%, respectively) (Table 1).

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26Some environmental advocates view land grabs as a major threat to the lives and livelihood of rural communities and oppose the idea. Others embrace them as an economic opportunity for the rural poor, although they acknowledge negative consequences of corruption. Therefore they call for better land governance (see the discussion by Borras et al. (2011).
There is some disagreement on when the full area was gazetted as a forest reserve. The local community, researchers and some forest officers believe that the area was all gazetted in 1939 (Butt 1965; Webster and Osmaston 2003), and the UFD report for 1951-1965 states that the area started as a 14.5 sq. mile (3755.483ha) test plot named Kachung Crown Forest (Webster and Osmaston 2003:129)\(^\text{27}\). However, most of the official documents obtained from GRAS and

\(^{27}\text{Native administration planting spread to Lango shortly after 1926 and a number of very good nsamba (Markhamia platycalyx) plantations were established there. Around 1929 planting of mvule became popular in Lango and in 1933, 770 mvule were successfully planted in Koli county. At this time it was reported that Koli and Eruti counties were free from mvule gallfly and that the trees were growing well and fast. Most of the plantations were of pure mvule at wide spacing which encouraged heavy}\)
NFA state that the actual gazetting process by the British colonial government started in 1952. According to a survey carried out in 1961, the total area of the reserve when gazetted was 13.86 sq. miles (3590ha), which is its present size (see Figure 5). Thus the initial area has been reduced by 0.64 sq. miles (Webster and Osmaston 2003:129). According to GRAS and UFD documents, the reserve was established to provide equal distribution of forest resources in Uganda and provide wood-based products for local people (Green Resources 2012). However, local communities and forestry people agree that the area first gained attention as a test site plot for trees such as mvule (*Chlorophora excelsa*) and other species, notably *Phyllanthus discoideus* (interview with LFC forest supervisor, 13 March 2016; Webster and Osmaston 2003).

KCFR was originally located in Lango district, but according to the new Ugandan district classification from the 1970s it now lies in Dokolo district (Figures 1, 5 and 6). According to the recent Kachung census, there are 19 villages adjacent to KCFR and a total of 22 villages depend on it for their living.

Table 1. Land cover and different types of shrubs and trees before the forest reserve came into the ownership of LFC (source: Green Resources 2012)

<table>
<thead>
<tr>
<th>S.No</th>
<th>Vegetation type</th>
<th>Size in hectares</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Broad-leaved plantation</td>
<td>30</td>
<td>0.84</td>
</tr>
<tr>
<td>2</td>
<td>Coniferous plantation</td>
<td>296</td>
<td>8.2</td>
</tr>
<tr>
<td>3</td>
<td>Degraded woodland</td>
<td>2532</td>
<td>70.5</td>
</tr>
<tr>
<td>4</td>
<td>Grassland</td>
<td>110</td>
<td>3.06</td>
</tr>
<tr>
<td>5</td>
<td>Subsistence farming</td>
<td>667</td>
<td>18.6</td>
</tr>
<tr>
<td></td>
<td>Total area</td>
<td>3590</td>
<td>100</td>
</tr>
</tbody>
</table>

Kachung is situated in a high rainfall belt with 1250-1375 mm rainfall/year, falling in two rainy seasons, April-May and August-October. These are followed by two dry seasons, December-March and June-July. Evaporation is very high, well over 1800 mm/year (Green Resources 2012), owing to the warm climate with low seasonal variability. Mean annual temperature is 30°C (mean minimum 25.5°C, mean maximum 33.6°C). The wind usually falls during the rainy season to speeds of 1-4 m/s, compared with 4-8 m/s in the dry season (Green Resources 2012).

According to NFA maps and as discussed above, in 1996 most of the project area was classified as ‘woodland’, i.e. a mix of grasses and trees with relatively low density28 (Green Resources 2012). The natural vegetation in KCFP is dominated by shrubs and grassland with scattered trees. The main species was *Combretum*, with lush growth also of *Hyparrhenia* species (Green Resources 2012). The area is now divided into eastern and western blocks, with the western block containing a large area dominated by swamps and wetlands. The topography is flat and a

---

28Woodland, according to the FAO definition, has a sparse tree density, and can also be defined as a savannah. Savannah grassland generally has fewer trees than woodland. This definition was also used by respondents from the local community during field interviews.
The common types of vegetation found in the forest reserve area are a variety of grass species including *Imperata cylindrica*, *Panicum maximum*, *Hyparrhenia filipendula*, *Setaria spachelata*, *Setaria megaphylla*, Pennisetum species, *Aframumum* spp., *Sporobolus africana*, *Eragrostis asperata*, *Paspalum scrobilatum*, *Vigna luteola*, *Cyprus tenax* and *Bulbosytis* spp. The shrub species that characterise the bushland vegetation are *Albizia zygia*, *Combretum* spp., *Collinum* spp., *Borassus aethiopum*, *Erythrina abbyssinica*, *Grewia mollis*, *Acacia hockii*, and *Bridelia scleroneura*, together with rarer shrub and trees species. The grass and herbaceous layer consists of species such as *Cereteria megaphylla*, *Hyparrhenia filipendula*, *Panicum maximum* and *Aframomum* spp. (Green Resources 2012). In the southern part there are remnants of the former government plantation of broadleaved species, mainly exotic species such as *Gmelina arborea*. This part of the forest was used to test different species such as *Phyllanthus discoideus*, mvule (*Chlorophora excelsa*) and *Pinus* spp. from 1939 before it became plantation area (Webster and Osmaston 2003:129). As a consequence of continuous exposure to different exotic trees, the composition of species has changed significantly, and now much of the floristic diversity has been significantly reduced to monoculture of pine and eucalyptus (personal observation on field visits in March-April 2016; see also Hajdu et al. 2016).

Green Resources (2012:21) described the vegetation of the forest before plantation as “a degraded savanna environment - principally grass and scrub land with herbaceous, shrubs and isolated trees”. However, in interviews with the local communities and an old forest supervisor who had worked in KCFR for more than forty years, the area was covered with savannah woodland and big trees. Few of the documents in the GRAS archive have any information on past vegetation patterns, and thus it is difficult to assess the biological health of the area prior to plantation. Similar difficulties have been encountered by other researchers (Hajdu et al. 2016). However, this lack of information in archive sources was complemented by information from local residents. Therefore information from local residents is vitally important in assessing landscape change.

Within the plantation projects, most of the area (70%) is planted with pine trees and the remaining 30% with eucalyptus (Table 2). In 2012 the planted area was 2520 ha and in 2016 had increased to 2669ha (http://www.greenresources.no, accessed 30-9-2016). These monoculture plantations have negatively affected forest biodiversity (The OaklandInstitute2014; Hajdu et al. 2016). As one forest officer told me “the herbicide we use [to kill the undergrowth] has completely eradicated the undergrowth shrubs and grasses which used to grow here before and a new weeds have started to grow” (personal communication, KFP forest officer, 16 March 2016).
Table 2. Annual allowable cut projections for Kachung Forest

<table>
<thead>
<tr>
<th>Plantation category</th>
<th>Area of plantation (ha)</th>
<th>Percentage of total planted area</th>
<th>Average annual allowable cut from commercial thinning (m³/ha)</th>
<th>Average annual allowable cut from final harvest (m³/ha)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pine</td>
<td>1764</td>
<td>70%</td>
<td>40</td>
<td>120 harvested as poles</td>
</tr>
<tr>
<td>Eucalyptus</td>
<td>756</td>
<td>30%</td>
<td>30</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>2520</td>
<td>100%</td>
<td>70</td>
<td>608</td>
</tr>
</tbody>
</table>

Source: Green Resources (2012:39)

6.2. Methodology

Field data were collected in the field between March and April 2016, during visits to Kachung forest. Primary data were collected through a total of 19 structured and semi-structured interviews with LFC, NFA and DFO leaders in Kampala, forest officers in Lira and members of local communities living around the Kachung plantation area.29

As I had too little time to include people from all the villages, I focused on three villages situated close to the forest and I prepared structured or closed types of questionnaires. In these villages marriage is exogenous, i.e. women commonly move to the husband’s village. For this reason I chose predominantly to interview male respondents, assuming that the female respondents would have limited knowledge about the history of the forest and long-term agricultural practices. However, I met four older women who had lived in the area for many years and were willing to answer my questionnaires.

It proved difficult to find people in Kachung who were born and raised there, as the people have been continuously displaced because of war by the insurgency group Lord’s Resistance Army (LRA)30. Some of the residents came from other villages and stayed in the nearby refugee camps and resettled in Kachung. When the current government seized power in 1986 this rebel group ousted from by the previous regime resided in northern Uganda, primarily around Kachung, and the “indiscriminate killings and the abduction of children to become fighters, auxiliaries

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29 Among these 19 respondents, 14 were from the local communities and the other five were working in the LFC, DFO or NFA. Of the 14 local community respondents, four were female and the rest were male. All the respondents from the local community were selected randomly from three of the 19 villages adjacent to the plantation area.

30 The LRA began as Lord’s Salvation Army (LSA), then it became the United Salvation Christian Army (USCA), and finally LRA in 1994. It emerged as a result of a north-south divide imposed during the colonial period, which permitted little economic and political participation by people living in the northern part. It was considered a “reservoir of labour, mainly to be recruited in the army” by the colonial and successive governments (Apuuli 2004:392). The southerners, who were in power as a part of the colonial government, enjoyed many privileges. When Museveni came to power he perpetuated the north-south divide by defeating Obete (ibid) and abducting people in the north (Acholi people). The Acholi people fled to the bush with weapons and formed the LSA (Branch 2011; Apuuli 2004).
Figures 8, 9 and 12)

3) Land use cover stratification of Kachung Central Forest Reserve 1996, 2005 and 2015 which was prepared by NFA (see Figure 7).

Search engine for aerial photographs of Kachung, but found none

The first Timber Plantation Reserve of Acholi and Lango Locality Map drawn by M.A. Ssekyondwa January in 1962 (see Figure 3).

An elderly man (‘Mr. Peter’) who was born and raised in Kachung provided very valuable information and I therefore held an in-depth interview with him using open questions. During interviews and work with the questionnaires I had the assistance of two translators; one (Mr. Asiku Wania) was a forest supervisor who knows the local language very well and has worked with the local communities for a long time. The other (Mr. Obai Amose) has worked in the forest as a patrolman, field officer and community relations. Both have worked as translators for other researchers and both knew the local communities very well. I also discovered that some informants could write and speak English (the questionnaires were in English).

In all parts of this thesis the names of respondents are kept anonymous in order to safeguard their privacy. The names used in this chapter are not the real names, but are typical names in northern Uganda. However, real names are mentioned for people living outside Uganda who would not be harmed by participating in this research.

The focus of this interviews was on the story of the people and their lands, based on their daily activities, how they affect the landscape and how various actors were involved in shaping the area through time. The questionnaires were based on seven themes to elucidate environmental and social changes during the past hundred years. The themes explored were general demographics, environmental changes, climate change, changes in crop production, grazing activities, vegetation changes, and local views on the plantation and relations with the present owner of the forest (LFC). The general demographics section was aimed at obtaining general information on the informants and the other sections covered the themes, and all set out to gather as much information as possible. Environmental changes may also have effects on social practices and ways of living and I attempted to capture this in interviews.

I obtained most of the secondary sources and forest records from the DFO and NFA offices in Lira town and NFA head office in Kampala. These sources included old maps, forest records, contemporary maps of vegetation cover change managed by GIS and other relevant information. I obtained two volumes of the history of Uganda Forest Department (1898-1929, 1930-1950) from the NFA library in Kampala and the 1951-1965 volume (published 2003) from the Commonwealth library31. I also looked for aerial photographs at Oxford University Library, with the help of my advisor Paul Lane and my co-advisor Klara Fischer from SLU. The historic aerial photograph coverage of all former British colonies in East Africa is typically recorded on the 1:50 000 maps of these area, because those photos were used to produce the maps.32 I used five maps from different years (those cited in Figures 1, 5-6, 13, 14, and 18) as a search engine for aerial photographs of Kachung, but found none.

31 Written by former officers George Webster and Henry Osmaston (see Webster and Osmaston 2003).
32 The maps are:
1) Timber Plantation Reserve of Acholi and Lango Locality Map drawn by M.A. Ssekyondwa January in 1962 (see Figure 3).
2) The first map of KFR, drawn by E.N. Kizito in 1963 based on a survey by R.H. Waston in 1961 (see Figure 7).
3) Land use cover stratification of Kachung Central Forest Reserve 1996, 2005 and 2015 which was prepared by NFA (see Figures 8, 9 and 12)
The main aim of this part of the work was to compile the interview results and analyse the current livelihood of people living adjacent to KCFR. The actual location of the three villages (Agengi, Alawal and Akei-debe) in which the 14 local informants lived is shown in Figure 5. As stated in Chapter 2, the informants were selected randomly from the three villages (eight from Alawal, three from Akai-Debe and three from Agengi). Since the villages are close to each other we asked all the informants to come to Agengi. The numbers varied between the villages depending on informant availability and willingness to participate. In some of the villages there were few old people or long-term residents because of continuous displacement of people in the LRA era.

In preparation for the field work, I watched the documentary video by Swedish TV4 about problems for local people around the forest regarding the issue of land ownership and being evicted from land for the sake of the plantation. As recommended by Cohen (2005), I also sought to develop a good personal relationship with NFA and GRAS staff members. For this reason, my first action on arriving in Uganda was to visit their offices almost daily. I shared lunch or breakfast and had conversations on general land issues in Uganda, in which I subtly raised the issue of Kachung. This conversation eased my way to visit the forest and interview the local communities.

I also had letters of recommendation from my supervisors at Uppsala University, SLU and Makere University explaining my research and clarifying the support I required. The work was part of a larger research project funded by the SEA and headed by Dr. Flora Hajdu and Dr. Klara Fischer (SLU, Uppsala). Most of the officers at NFA and GRAS saw the benefit of my research and asked me to send them the final results.

As discussed in section 5.5.2, some community members had a negative perception of the funding for Kachung Plantation CDM from the Swedish Energy Authority and their anger was clear in the TV4 documentary. However, the investigative journalist in that case went to the forest without consulting NFA or GRAS. Therefore all the authorities are now very careful not to permit visits to the forest without prior consultation with their head office.

In my case, NFA and LFC staff were very supportive and friendly, providing me with necessary facilities such as a car and a driver and some staff members to guide me while touring the forest. The NFA office also allowed me to access their archives and view documents related to the forest. These archives were in need of organisation and it was difficult to find the right documents, but I obtained three valuable old maps and written documents of great importance for the research.

Likewise, GRAS provided me with a car and driver and space in their office when I was looking at the archives. During this time I had the opportunity to scrutinise their archives and build a close personal relationship with staff members. Equally moreover, the DFS officers directed me to people from whom I could get information about the history of the forest, including a senior forest supervisor with whom I had an extensive interview (section 5.1.7). Material from his interview and from that with the community relations officer at the LFC field office is presented in full in the following sections. The results of the questionnaire are also presented and compared with some other findings and research carried out either in the forest or in the
area. The names of all shrubs, trees and grasses mentioned by the informants or in other materials are presented with their scientific names.

Figure 5: Map showing the location of Kachung Forest Reserve (Green Resources 2012)
6.3. Kachung local history

As seen in previous chapters, major social and environmental changes have occurred in Uganda in the past hundred years and particularly since the 1950s. Most of the environmental changes were connected to the increased interest by the colonial government in extracting wood and forest products, the more recent increase in population, climate change, political instability and changes in lifestyle. Therefore my research explored these social and environmental changes as experienced locally, focusing on the past 50 years.

6.3.1 Environmental change

After obtaining details about the general background of the respondents, such as their age, length of time living in the area, place of birth, gender, ethnicity and religion, I asked them six open questions about the general history and environmental change. The first question was
when and why the area was given the name ‘Kachung’. The objective was to identify how Kachung was defined as a place in history and what meaning may have been attached to it, prior to its becoming a reserve. Mitchell (2010) argues that examining place names is a useful tool in understanding the ecological and landscape change of any place, but also acknowledges that it might be difficult to depend solely on this information, as meaning may change constantly when people and languages in a specific area change.

Most respondents and the senior forest officer in LFC provided similar answers to this question. Two respondents said that they did not know the meaning. The other 12 informants explained that Kachung was derived from the Langi language, which is widely spoken by the Lango tribe33 in the area, and comprises two parts; “‘Ka’ meaning place, place for herding, and pasturage and ‘chung’ site of stopping, to cause to stand and to set in a position” (see Driberg 1923:336, 385). A similar interpretation is also given in the anthropological work of Driberg (1923) in reference to the Langi-English dictionary34.

A further explanation given was that the name signifies a landing site where ferries and small ships came with foreign goods and landed to exchange these goods for local goods. Reportedly, traders came through a lake called Lake Kwania, situated quite close to Kachung forest (approximately 10 km away). When I asked the respondents when they believed the name was given, they replied that it was some years back, 70 years ago or more. The reason given for this date was that this was a time when there was a lot of trade exchange taking place in that particular area. This was confirmed by the forest supervisor and other community members working in the plantation forest. To summarise, Kachung means a ‘place of herding and pasturing’, which coincides with the common narrative that Kachung was savannah grassland and woodland that favours herding and pasturing.

The second question concerned the livelihoods of people in the area before it became a CFR. All 14 respondents give similar responses, that they used the forest for hunting, grazing, cultural customs and, very rarely cultivation. Similarly, most respondents agreed that the area was savannah woodland before it was gazetted as a plantation reserve. This description fits with information documented and discussed elsewhere (Hamilton 1984; Forest Department 1951; 1955; Webster and Osmaston 2003) that north-eastern Uganda was generally savannah woodland. In 1939, as the area had little agricultural activity it was deemed geologically suitable as a test plot for mvule and other timber trees (Webster and Osmaston 2003).

The third question asked ‘What do you value most about the forest and why the forest is important?’ Each respondent listed a number of reasons and a wide range of resources (Table 3). Some of the reasons mentioned frequently by the respondents were for cultivation, grazing and firewood, but also for charcoal production as a source of income, poles for making houses, for hunting, collecting snakes and termites as a source of food, amongst other things (Table 3, Figure 8). Many of the items on the list were associated with their livelihood. When I asked the informants as a group, they agreed in almost all cases that all resources listed are very important

33 A Nilotic tribe predominately living in northern Uganda (Driberg 1923)
34 Ka: Pl. [plural] KAGI. Place KA MUKENE, elsewhere-, KA-CHA, that place, there.
   Ka. In order to, for (of purpose)
   Ka. When, if, whether.
   Ka-. Locomotive prefix. KATWAT, place for herding, pasturage.
   Ka. And (connecting sentences only).
   EN KA Owoto, and he went.
   Chung. Chaff of grain
   Chungo. To cause to stand, to set in a position. Pass. CHUNG, to stand, stand up, stand still, to go surety for; Cungo ALIRO, to come to a sudden stop, to stand still.
to them. When I asked Peter, the oldest man among the respondents, this question, he looked at me, smiled in surprise and said “The forest is our life. We would not have any life without it, it is like the sea and a fish” (interview, 14 March 2016). Besides these values, the local communities use the forest for other means, including cultural recreation (Table). When I asked the respondents if there are any particular places in the forest that are considered sacred places, it was noticeable that this question primarily attracted the older respondents. A total of eight respondents said that ‘it is very important for rain-making worship’, in particular a big tree inside the forest. When the rainy season was delayed, until recently old people used to visit this special tree located. However, that tree has now been cut down and removed. When I asked the LFC community relations officer why, she said that “nobody knows who cut the tree and the old man who used to make the rain worship is also dead and his instruments were broken” (interview, 12 March 2016). A similar study by the Oakland Institute, in which 152 local communities were interviewed, found that local communities were excluded from entering their forest and practising their cultural activities (The Oakland Institute, 2014:2)\textsuperscript{35}.

All the values attached to the forest by the local communities and access to the forest by local communities thus have effects on livelihoods, but also on residents’ sentiments regarding the reserve. However, the reinvigoration of the forest reserve has also brought new livelihood opportunities. For example when I asked one NFA leader why local people ‘encroach’ in the forest, he replied:

\begin{quote}
You know the demands of the local community are not great, but they need understanding. Which means complete understanding. For example the local community burn the forest for two reason. One is that because they need termites. The termites come out from their mounds at night so people usually go to the forest with a fire in order to attract them. Because usually termites are attracted by fire. However the fire may go out of control and burn the forest. And the second reason is that whenever they need money they set a fire, because GRAS and NFA usually pay the local community to stop the fire (interview, 15 March 2016).
\end{quote}

As shown by this quote, there is an understanding amongst forest managers that local people deliberately set fire to the forest to obtain salaried labour, but this was not mentioned by any of the local residents.

Table 3: Shows number of informants frequently agrees with different benefits of the forest.

<table>
<thead>
<tr>
<th>Types of benefits from the forest</th>
<th>Number of respondents</th>
</tr>
</thead>
<tbody>
<tr>
<td>Poles for making houses</td>
<td>14</td>
</tr>
<tr>
<td>Cultivation</td>
<td>14</td>
</tr>
<tr>
<td>Grazing</td>
<td>12</td>
</tr>
<tr>
<td>Charcoal production</td>
<td>12</td>
</tr>
<tr>
<td>Firewood</td>
<td>10</td>
</tr>
</tbody>
</table>

\textsuperscript{35}Findings based on a field study carried out in 2012 and 2013 including interviews with 152 affected villagers across the two GRAS planation project areas (Kachung and Bukaleba), company and government employees or representatives and documented evidence and reports. The study revealed that access to land to produce food is the most pressing issue, and that people have difficulties performing their cultural practices.
Collecting snakes and termites 10
As cultural centre 8
Hunting 7

<table>
<thead>
<tr>
<th>Types of benefits from the forest</th>
<th>Number of Respondents</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cultivation</td>
<td>14</td>
</tr>
<tr>
<td>Grazing</td>
<td>12</td>
</tr>
<tr>
<td>Fire Wood</td>
<td>10</td>
</tr>
<tr>
<td>Charcoal Production</td>
<td>12</td>
</tr>
<tr>
<td>Poles for making house</td>
<td>14</td>
</tr>
<tr>
<td>Hunting</td>
<td>7</td>
</tr>
<tr>
<td>Collecting Snakes and Termites</td>
<td>10</td>
</tr>
<tr>
<td>As cultural centre</td>
<td>8</td>
</tr>
</tbody>
</table>

Figure 7: Shows the response frequencies of respondents in relation to the various benefit of the forest.

On the issue of population size, all respondents agreed that the population has increased steadily every year except during the LRA\textsuperscript{36} war (1987-2006) when people left their homes. However, since 2006 people have come back to their villages. According to population statistics for 2014 published by the Ugandan Bureau of Statistics (2014), the population of people living around Kachung forest has increased to 12,297. Another sign of population increase is that before 2012 there were only 15 villages around the forest, but now there are 19 (Figure 5). Both the LFC and NFA leaders said the main reason for the population increase was people moving into the area because they hoped they might get work in the plantation. Moreover, according to the local informants’ local people have no family planning or birth control, resulting in a high birth rate (UBOS 2014).

6.3.2. Climate change

The second theme in the questionnaire related to climate change, focusing on the past 40-50 years. This timeframe was chosen because most of the respondents were aged 40-50 and because this was a period of significant transformation of the forest area. This part was designed to be complementary to investigations by two Swedish agronomists (Lovisa Neikter and Tove Ellingsen) from SLU that took place being carried out in the same month as my research. Their research investigated local development activities in connection to Kachung plantation project

\textsuperscript{36}Refer about LRA in section 5.2 of this chapter.
and how these are affecting different social categories in the local community (class and
gender).

When I asked informants ‘Do you think the climate has changed over the past 40-50 years?’,
eight said that it had changed from cold to hot, but the remaining six respondents said that they
had not noticed any changes in this regard. Nine of the informants said that rainfall had
increased slightly, three of the respondents said that rainfall had decreased, two respondents
said that rainfall had increased greatly, one informant said that the rainfall was unchanged and
the remaining one said it was not clear in his memory. Neikter and Ellingsen made similar
findings in their interviews. I also put this question to the two forest officers I interviewed and
they said that rainfall had generally increased over the past 40-50 years. When I asked the senior
forest officer who had worked in the forest since the 1970s (Mr. Peter), he said that rainfall had
increased from when the forest started to be planted.

In relation to rainfall change, I asked the respondents what they thought was the main cause of
the change. Eleven of the respondents stated that it was due to the increase in vegetation, three
stated it was due to the decrease in vegetation, one stated that the rainfall was not changed and
one respondent replied that it is because of changes in temperature. In interviews, NFA, GRAS
and DFS leaders responded that there had been a change in rainfall, but with a similar diversity
of replies concerning the cause of change. They pointed out the lack of metrological data but
were in agreement that generally the rainfall has increased slightly in recent decades.

East Africa has experienced a wide range of rainfall variability over the past 50 years (IPCC
2007; FAO 2004). Rainfall variability generally decreases from north to south in East Africa
and the same trend can be found in Uganda. This explains the rainfall variability noticed in the
case of Kachung, as it lies in the mid-southern part of northern Uganda, an area that has
experienced weather and climate variability (Uganda National Environmental Authority 2009;
Uganda National Metrological Authority (https://www.unma.go.ug, accessed 10-10-2016). It is
interesting to consider the possible micro-climate changes taking place with the forest area and
how changing vegetation in a small place can affect the weather and climate of a specific area.
According to most informants, the change in vegetation in Kachung has caused the changes in
rainfall.

6.3.3. Livelihood and crop production

As already discussed, farming was less common 50 years ago, but people were highly integrated
in a trade network, as indicated by the place name Kachung. In the present work I examined
change in crop production and farming trends over the past 50 years, because crops are one of
the main sources of food and economic income for people in Kachung and thus changes in crop
production would have had a significant impact on societal lifestyle and the environment
(Hamilton 1984). Moreover, as the lifestyle of a community changes, there is also a high
possibility that the types and amounts of crops produced change (ibid). In the Kachung case,
there have been environmental changes in vegetation types, vegetation cover and landscape, in
combination with social changes, resulting in changing patterns of crop production.

My first question concerning crop production was whether crop production has increased or
decreased in the past 40-50 years. The majority of the informants agreed that crop production
has increased, but it should be remembered that the population has also increased. A
complementary GIS analysis of vegetation cover and land use cover change in the area 1990-
2015 (Figure 8) revealed that the total area of subsistence farming until the late 1990s was only
20.59%. However, from the late 1990s to 2005 it increased by 106.36%, with the result that
subsistence farming comprised 42.49% of the total forest area by 2005. However, from 2005 to
2015 subsistence farming decreased by 46.45%, and now comprises 22.75% of the total area (Figure 8).

When asked about the causes of the expansion of farming before the plantation project, most informants agreed that the expansion took place because of changing agricultural practices. Factors mentioned were the availability of modern fertilisers, more rainfall, population increase and a change to subsistence farming as a livelihood. For example, a majority of the informants agreed that before the forest was changed to a plantation area, hunting was one of the main means of living in Kachung. As discussed above, the amount of farmland was restricted at the time the reserve was gazetted, which suggests a considerable transformation of livelihoods.

Before 1996, more land was also available for hunting. As can be seen from Figures 8 and 13, in 1990-1996 69.71% of the total forest area was covered by tropical high forest (THF). However, starting in the late 1990s, the THF area completely changed into bushland (44.28%) and subsistence farming area (42.49%). For more details, see Figures 8-11.

Figure 8: Percentage of Land Use and Vegetation cover of Kachung Forest 1990-2015
### Figure 9: Vegetation Cover and Land Use Area in Hectares of Kachung Forest 1990-1996

#### Vegetation Cover and Land Use Area of Kachung Forest in Hectares 1990-1996

<table>
<thead>
<tr>
<th>Vegetation Type</th>
<th>Area in Hectares</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bush and woodland</td>
<td>235.145</td>
</tr>
<tr>
<td>Deciduous Plantation</td>
<td>22.617</td>
</tr>
<tr>
<td>Grass land</td>
<td>91.54</td>
</tr>
<tr>
<td>Subsistence farming</td>
<td>739.181</td>
</tr>
<tr>
<td>Tropical High Forest</td>
<td>2502.589</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>235.145</strong></td>
</tr>
</tbody>
</table>

#### Deciduous

### Figure 10: Vegetation Cover and Land Use Area in Hectares of Kachung Forest 1996-2005

#### Vegetation Cover and Land Use Area in Kachung Forest Area, in Hectares, 1996-2005

<table>
<thead>
<tr>
<th>Vegetation Type</th>
<th>Area in Hectares</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tropical High Forest</td>
<td>0</td>
</tr>
<tr>
<td>Subsistence Farming</td>
<td>1525.391</td>
</tr>
<tr>
<td>Bush land</td>
<td>1589.652</td>
</tr>
<tr>
<td>Needle Leaved</td>
<td>182.013</td>
</tr>
<tr>
<td>Grass Land</td>
<td>292.944</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>292.944</strong></td>
</tr>
</tbody>
</table>

#### Series 1

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It was generally agreed amongst informants that crop production was the primary means of livelihood, so intensification of agricultural practices over time could be expected and activities which support other means of living could be expected to decrease over time. The majority of the informants confirmed that hunting activities had decreased significantly in the past 40-50 years since they were banned from using the forest as a hunting ground and the forest was converted into a plantation area.

When I asked the informants to mention any three crops they thought were popular during the past 50 years, almost all mentioned cassava, millet and cotton and, to some extent, coffee. The production of cotton as important has also been discussed by Baffes (2009). In the 1960s, Uganda was the largest cotton producer in sub-Saharan Africa. However, when the country was been politically unstable and due to poor policy choices, national cotton production decreased significantly (Baffes 2009). Even with the recent political stabilisation, cotton production has continued to decrease due to the low development of domestic textile industries (cotton quality is too poor for export). The factors that have affected cotton production in the Kachung area are lack of a good market and the protracted war with insurgency groups such as LRA.

Cassava is still a very popular crop in the Kachung area\(^{37}\), as I found when I visited Kachung forest during my field study. During my in-depth interview with the elderly respondent Peter in his home, we shared a very good lunch prepared from millet, maize and cassava. When I asked him about the most popular food in Kachung, he pointed to the dish of cassava porridge and said “this is the food you will find anywhere around, and among them cassava is the most

\(^{37}\)It is believed that cassava was introduced to Africa from South America by Portuguese explorers in the mid-16th and 17th century (Howeler et al., 2013; Nweke 2012). It soon became a popular food replacing traditional crops such as millet and yam. It has many advantages over the other crops and locally it is named as a crop of famine reserve, a crop which provides a reliable source of food during drought, locust attack and famine (ibid). Howeler et al. (2013:3) state that cassava is “the ‘food of the poor’ that has become a multi-purpose crop that responds to the priorities of developing countries, to trends in the global economy and to the challenge of climate change”. For example, people can use cassava as flour or in other forms.
popular” (interview, 13 March 2016). This information agrees well with the responses from the other informants, and it seems clear that cassava, millet, and maize are very popular crops in Kachung.

Millet is used in many ways and is usually combined with cassava flour to make bread, porridge, cakes, and other types of food. Most of the informants agreed that even though millet has been grown for generations (it is a traditional African crop), its production increased when people were banned from using the forest for hunting activities and other resources (see also Okumu 2011).

Finally, I asked the respondents to name the most extensively grown crops within the last 20 years. I included this question to find out how crop cultivation has changed and the possible links to social and environmental changes. Most respondents gave quite similar answers, listing cassava, millet, and maize, but also mentioned crops such as coffee, cowpea, tobacco, and sorghum. However, cassava and millet have always been common and remain the most popular crops today, as confirmed by 15 and 13 respondents, respectively (Tables 4 and 5).

Tobacco was one of the commercial crops which gained popularity since the 1920s when it was brought in by the British American Tobacco company to stimulate commercial farming in Uganda (https://masakeonline.wordpress.com/2013/12/02/history-of-the-tobacco-industry-in-uganda-and-a-glance-at-its-impact-on-the-country/ accessed 10/08/2016). The introduction of tobacco had effects in the Kachung area, for example in 1953 tobacco curing barns were established in Anyeke, served by the Aloro and Gung-Gung forest reserve (Forest Department 1962). One forest officer and some of the other respondents reported that the KCFR area used to have curing barns for tobacco production, indicating that there was cultivation and processing of tobacco in the local area.

Table 4: Shows the types of crops ranked with a number of respondents who agree with their popularity

<table>
<thead>
<tr>
<th>Types of crop</th>
<th>Number of respondents who mentioned its popularity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sorghum</td>
<td>5</td>
</tr>
<tr>
<td>Cowpea</td>
<td>7</td>
</tr>
<tr>
<td>Coffee</td>
<td>8</td>
</tr>
<tr>
<td>Banana</td>
<td>9</td>
</tr>
<tr>
<td>Cotton</td>
<td>10</td>
</tr>
<tr>
<td>Maize</td>
<td>10</td>
</tr>
<tr>
<td>Millet</td>
<td>13</td>
</tr>
<tr>
<td>Cassava</td>
<td>15</td>
</tr>
</tbody>
</table>
When I asked the informants how hunting activities had changed in the past 40-50 years, seven responded that they have been decreasing because there are no animals for hunting, while two informants responded that hunting has decreased because the government controls the hunting process. The remaining eight informants said that hunting is decreasing because the forest was changed into plantation and people have been banned from using it as a hunting ground. In addition, the respondents said since the vegetation types and other activities happening in the plantation area have changed, then most of the animals which used to be hunted have either disappeared or migrated to other areas. All of the informants agreed that hunting activities have decreased significantly.

6.3.4. Grazing activities

Climate is perceived locally to have changed in the last 40-50 years and climate change can also affect vegetation cover and the landscape. As the vegetation cover changes, so also do grazing activities. The fifth part of the questionnaire examined changes in grazing practices.

In general, the informants reported that there has been a decrease in the vegetation and number of trees, which affects grazing. The first question concerned livestock composition and was phrased ‘What was the most abundant kind of livestock in the last 30 years?’ Thirteen of the informants said that cattle were the most abundant and still are today. For example David, an elderly man said: “We graze sheep and goats but since cows are more profitable and they are useful in ploughing our farmland, every one strives to have them” (interview, 14 March 2016). The remaining three informants respond that cattle, sheep and goats have been the most abundant livestock in the last 30 years.

When I asked about the reason for the prominence of cattle, the general response was that cattle can supply good economic income by providing dairy products and can be used for other agricultural activities. For example, residents use oxen to plough their farmlands, cows as a source of milk, meat and also as a means to store wealth and a source of social prestige. Cattle numbers reached their maximum in Uganda as a whole in the 1960s, when more modern commercial ranches were developed with the aid of the government and NGOs (Kaiser 1991).
However, because of Uganda’s political crisis and cattle disease, cattle numbers decreased from the 1970s onwards, as found e.g. by Hamilton (1984) in a survey from 1966-1981 for the whole of Uganda. Thus this is likely to have occurred in the Kachung area too.

When asked why cattle became popular, all respondents agreed it was because of the change in access to grazing land. The reason given was that when the area was gazetted as a reserve, it became more difficult to keep goats and sheep, since they feed on tree leaves and small shrubs. However, cattle can be grazed on grasses collected in summer from farmland. While I was visiting in some of the villages, I saw that almost every household had a grass stock reserved for their cattle, awaiting the dry season. Moreover, as was discussed earlier, the people around Kachung area have increased their agricultural activities and, as they are dependent on cattle for ploughing their farmland, cattle numbers have increased.

6.3.5. Vegetation change

A key aim of this thesis was to determine how the vegetation of the forest has changed within the past hundred years. For this reason, several questions related to vegetation change. The creation of the reserve and the later plantation in Kachung forest were explained by most external actors as a means of alleviating deforestation. Relevant actors include LFC, DFS, NFA and NORAD, who have been involved in the area for a long time and all frame themselves and their activities in terms of promoting afforestation. However, as already noted above, the informants reported that there were more trees in the area before plantation. When I asked the informants what Kachung Forest looked like in terms of vegetation cover 40 years ago or before, all of the informants responded that there were more trees than today, but all also stressed that the vegetation was savannah woodland and grassland.

This information provided by the respondents agrees with findings by Webster and Osmaston that Kachung Forest was a savannah woodland (Webster and Osmaston 2003:129). They also stated that “[…] 14.5 sq. miles of savanna land near Kachung Port were obtained and gazetted as the ‘Kachung Crown Forest’. This area then planted with trees for timber. In 1939 alone, 50 acres of mvule and other species were planted and in 1941 a programme of planting 50 acres per year was set up”. This information contradicts the common narrative that KCFR was reserved for afforestation purposes (as replantation of ‘degraded forest’) and indicates that it was instead selected because it had proven suitable for growing timber trees such as mvule and other species.

Therefore, considering that KCFR was first reserved for growing and planting non-local trees and that it was later afforested by UFD, NORAD and local planting companies in less than 50 years, it does not meet the requirements to be considered a CMD project. According to the Kyoto Protocol, for a forest to be considered a CDM afforestation/ reforestation (A/R) project, [insert footnotes]

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38George Webster was recruited to the Uganda Forest department as Forester in 1937, after five years’ service in the UK Forestry Commission, and served continuously until his retirement in 1965, having been Chief Conservator of Forests for the previous three years (Webster and Osmaston 2003).

39Henry Osmaston served in the Uganda Forest Department from 1949 to 1965 in most districts of the country and also as WPO. He was advisor to the Uganda Forestry Department on natural forest until he passed away in 2006 (Webster and Osmaston 2003).

40The COP7 in Marrakesh decided to include afforestation and reforestation as the only qualified land-use activities under the CDM. Afforestation is the conversion of land that has not been forested for a period of at least 50 years to forested land through planting or seeding. Reforestation is the conversion of non-forested land to forested land through planting on land that was forested but that had been converted to non-forested land. For the first commitment period (2008-2012) reforestation activities were limited to land that had been unforested since 31 December 1989 (UNDP 2003) (Mattson 2009).
it must have been unforested for at least 50 years (Dinar et al. 2013; Mattson 2009) or it should be unforested after 1 January 1990 (http://www.redd-monitor.org accessed on 20-10-2016; Mattson 2009). As mentioned, Kachung forest has been under reforestation by the UFD since the 1930s, although arguably not on a large scale. GRAS leased the area while it was still undergoing afforestation.

Other relevant activities that should be looked at more closely were the plantations in KCFR with the aid of NORAD development agency. These plantations, mainly with two species of pine, were established from 1970 until 1974 (interview with LFC forest supervisor, 12 March 2016). However, the documents relating to the forest do not mention this at all, or only in passing. Nevertheless, NORAD sponsored and played a great role in changing the vegetation cover until it left in 1974, when Idi Amin took power and when all expatriates, companies and NGOs were expelled from Uganda (Forest Department 1951; Ofcansky 1996).

With regard to the vegetation history of Kachung Forest, I also carried out an exclusive interview with a senior forest supervisor (Peter) currently working for LFC, who also owns a small private plantation area. His full interview was used for further reference, as he had extensive knowledge about the forest. The interview was carried out by myself, in English, as the respondent was fully fluent in English. The community relations officer from LFC was also present and engaged in the interview sporadically. The interview took place at the LFC field office in Kachung on 12 March 2016 and lasted 1 hour and 20 minutes. With their permission I recorded the full interview.

There is uncertainty about the time when Kachung Forest was first gazetted. Peter described the early story of the reserve as follows: “The area was gazetted in 1939, by then it was under the British [colonization] when they started some trees. They were trying some species such as Cassia species and mvule”. As discussed earlier, Webster and Osmaston (2003) also stated that the forest was first gazetted in 1939. Peter started to work in the UFD in 1974 and started in KCFR in 1980. He described the forest when he first arrived as follows:

Most of the forest reserve was not yet planted but a few areas were planted along the road [tarmac road that divides the forest into eastern and western blocks] planted by the government. Cassia was the original species before I came. Before 1980s they tried it and it was a trial species along with others species including khaya [Khaya nyassica41] and locally they call it mahogany. There were also other trial species such as Gmalina arborea, mvule [Chlorophora excelsa] and they were the first species under trial plots from 1939-1950s.

Peter described KCFR before 1980s (1962-1979) as a forest reserve planted only by the government. He said that the government tried some softwood species such as Pinus carribea and Pinus oocarpa, which were planted on a large scale from 1969 when the government received development aid from NORAD. However, when NORAD left there was no more planting and the forest department only maintained the already planted trees. Peter said “We were just maintaining what was left along the road and the whole of the reserve remained vacant under the forest department”.

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Kachung Forest before 1939 was described by Peter as free land which it could be accessed by anybody. It was communal land and people used it as a hunting and grazing ground. The vegetation was dominated by savannah grassland and woodland.

General pollen analysis of northern Uganda (see section 6.5) confirms that the vegetation of northern Uganda was savannah and woodland (Hedberg 1954; Taylor 1990; Kaige and Liu 2006). As the vegetation cover of an area changes, so does the landscape (Huston 1994; Lung 2010). The next section therefore discusses analysis of landscape changes by GIS.

6.4. Landscape change and GIS

In order to investigate the vegetation change in the Kachung area from maps and other spatial data in GIS, I obtained three maps from the design and layout section of NFA head office in Kampala. The maps covered the 25-year period from 1990 to present, as they were drawn in 1996, 2005 and 2015 (Figures 13, 14 and 18). Hence, all the maps were drawn after the forest area had decreased to 13.86 sq. miles (in the 1960s). They were the only maps at NFA indicating different vegetation cover and land use, but they did not indicate how much vegetation change had taken place. Therefore I digitised them and measured each area (%) indicated with different colours using Arc Map GIS 10.2.2 (see Figure 8).

The 1996 map shows Kachung forest vegetation and land use in the early 1990s, when most of the area was covered by tropical high forest, representing (69.71%), and subsistence farming (20.59%) and the remainder was occupied by needle-leaved trees (6.52%), deciduous plantation (2.55%), and grassland and swamp (0.63%). As mentioned in earlier chapters, there were fewer people living around this area at that time as rebel groups had forced them to flee. Peter (former forest supervisor) said:

You know when Yoweri came to power this rebel group came in 1986 [the Lord’s Resistance Army (LRA)]. Those were the Konya people combining with the Karamojong. They are the rebels. So we don’t stay here and we always run away.

Because of the rebel activities, settlement and subsistence farming by the local communities (which the Ugandan government commonly referred to as encroachment) was very limited compared with later years.

As indicated on the map (Figure 13), there were only small areas under cultivation, along the main road through the middle of the forest reserve and around the edge. There was also a small area, indicated with purple, of needle-leaved types of vegetation. This part of the forest had long been planted with Gmelina arborea, mvule, pine species, khaya and other needle-leaved types of vegetation (Webster and Osmaston 2003; interview with Peter, 12 March 2016). Even today, there are many traces of these types of trees.

However, the rest of the forest was covered mostly by savannah woodland, tropical high and low forest, and well stocked except in the southern part, where there was a small area of deciduous forest and grassland. Therefore the 1996 map is important as it gives a comprehensive picture of the forest before it was acquired by a modern private plantation company (NAG) in 1999. While there were not many plantation activities going on at that time, agriculture and grazing activities started to expand exponentially as the rebel groups had diminished. People had also started to come back from their refugee camps, re-establish their homes and use the land. In interview, Peter explained that “at that time the forest was quite stable. And in 1999 the Norwegian Afforestation Group acquired this land from the National Forest Authority and other private planters took their shares”. Peter also confirmed that in these
years many people who were displaced during the LRA war started to come back and begin farming inside the forest.

Figure 13: Kachung central forest reserve land use cover stratification in 1996 (source, NFA (1996))

The map from 2005 (Figure 14) was drawn at a time when the forest had started to change significantly. It was already leased to NAG but there were no plantation activities as yet. The yellow-shaded areas on the map (42.29% of total area) represent subsistence farming. The large part of the area dominated by tropical high forest in 1996 (see Figure 13) had vanished and was replaced by subsistence farming, which had increased by 105.3%. Bushland occupied about 44.28% and the distribution of tropical high forest and woodland had greatly changed as a result of farming activities. For instance, needle-leaved vegetation decreased from 6.72% before 1996 to 5.7% (see Figure 13 and Figure 14). There was also a sharp increase in grassland and swamp area, from only 0.63% in 1996 to 8.61% in 2005.

The common narrative among informants and NFA leaders regarding vegetation change is that from the late 1990s onwards, as the rebel group came under control and people migrated back to their homes, this resulted in clearance of more land. In addition, people displaced from other areas to refugee camps close to the forest resettled in the forest. As can be seen from the 2005 map (Figure 14), even the small planted area along the road decreased in size and changed into subsistence farming. In particular, the areas of Badyang and Amuda, which were previously dominated by tropical high forest, were overwhelmed by subsistence farming. Much of the western block was dominated and replaced by bushland, grassland and wetland (see Figure 5 on how the eastern and western blocks were arranged).
Another phase of radical vegetation change took place in 2006, when the forest reserve was acquired by GRAS and its subsidiary LFC started to plant pine and eucalyptus on a large scale. In addition, other private planters such as the NFA and other smaller local private planting enterprises took part in the plantation process. Green Resources (2012:21) refers to the land as an area which used for grazing and had lost its forest character: “[a]t [that] time, the land was used for grazing activities, suggesting an absence of forest due to the prevalence of grass being used as a fodder”. As shown in Figure 13, the majority of the area had changed to subsistence farming (42.29%) and bushland (44.28%). Even though it seems too simplistic to generalise that the forest had lost its forest character, almost all the deciduous and tropical high forest had been replaced by bushland. From 2006 to the present, 2639.368 ha have been planted as a shared venture by different plantation groups (mostly pine and eucalyptus trees) (see Figure 13). Of these, 2012.84 ha are leased by GRAS, 350 ha by NFA and the remainder by other private small planters (Table 6).

The map from 2015 represents the current state of the forest (Figure 18), when the majority of the forest is leased by GRAS. This map was prepared when LFC was formed.

As can be noted from a comparison of Figures 8 and 18, a large part of the reserve is now planted with pine and eucalyptus, indicated by pink shading. In areas which were previously under subsistence farming (before 2005), bushland and shrubs have now been replaced by needle-leaved plants (73.52%) such as pine and eucalyptus. In the southern part of the plantation area there is still subsistence farming that accounts 22.75% of the area. For example, the pictures in Figures 15 and 16 were taken during my field study in KCFR.
Pine and eucalyptus occur in both the western and eastern blocks of the plantation area (see Figure 2). Pine trees dominate, covering approximately 1826.24 ha, whereas the total area of eucalyptus is roughly 180.76 ha of the total area planted by GRAS (Green Resources 2012; Table 5). The other part of the forest was planted with similar plants by NFA and other small private planters. In addition, as can be noted from Figure 18, some of the wetland has been transformed into grassland and needle-leaved tree plantations and its total area has decreased from 8.16% in 2005 to 3.6% (Figure 8).

In general, two types of pine trees and three types of eucalyptus are present. Cloned eucalyptus is quite new to the area and it has been cloned for the purpose of producing timber. By the end of 2012, the total area planted by LFC had reached 2021.84 hectares (see Figure 2). However, the total planted area is now being increased to 2050 ha. As mentioned earlier, the total area leased by GRAS is 2669 ha, of which 546 ha is reserved for conservation and 73 ha for
infrastructure (see http://www.greenresources.no/Plantations/Uganda/Kachung.aspx accessed on 01/09/2016). The remaining area is distributed among NFA (350 ha) and private planters, mainly along the road and in the eastern bloc of the plantation area.

As can be noted from Table 5 and Figure 6, the area managed by LFC is planted mainly with six different species of trees, of which pine trees (*Pinus caribaea*) account for 89.9% and eucalyptus trees just 8.94%. The vegetation types which used to be present before 1996 have been completely replaced by the pine and eucalyptus trees (see Figure 14, 15 and 17). The tropical high forest and savannah woodland have disappeared. In 2005 grassland comprised 8.16% of the total area, but this has decreased to 3.60%, while bushland has decreased from 44.28% to 0.13% (Figure 8). Moreover, subsistence farming has declined significantly to 22.75%, from 44.28% in 2005 (Figure 8). The area of subsistence farming in 2015 was similar to that in 1996 (20.59%).
Table 5. LFC plantation stock species updated June 2012 (Green resources updated map June 2012)

<table>
<thead>
<tr>
<th>Species</th>
<th>Hectares occupied</th>
<th>% of total planted area</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>Eucalyptus camululensis</em></td>
<td>19.33</td>
<td>0.96</td>
</tr>
<tr>
<td><em>Eucalyptus clones</em></td>
<td>87.76</td>
<td>4.34</td>
</tr>
<tr>
<td><em>Eucalyptus grandis</em></td>
<td>73.67</td>
<td>3.64</td>
</tr>
<tr>
<td><em>Gmeila arborea</em></td>
<td>8.53</td>
<td>0.42</td>
</tr>
<tr>
<td><em>Mella azedarach</em></td>
<td>3.37</td>
<td>0.17</td>
</tr>
<tr>
<td><em>Markhamia lutea</em></td>
<td>0.31</td>
<td>0.02</td>
</tr>
<tr>
<td><em>Pinus caribaea</em></td>
<td>1817.73</td>
<td>89.9</td>
</tr>
<tr>
<td><em>Pinus oocarpa</em></td>
<td>8.51</td>
<td>0.42</td>
</tr>
<tr>
<td><em>Tectona grandis</em></td>
<td>2.64</td>
<td>0.13</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>2021.84</strong></td>
<td><strong>100</strong></td>
</tr>
</tbody>
</table>

Figure 15: The western block of the plantation area, with eucalyptus trees (Photo by the author).

Figure 16: The western block of the plantation area, dominated by pine trees (Photo by the author).
Figure 17. Shows area planted by LFC updated in 2012 which represents 6 species of trees
Figure 18. Kachung Central Forest Reserve land use stratification for 2015
6.5. Pollen analysis

In order to put the results on vegetation changes over time reported above into perspective, I compared them against longer-term palynological records. Palynology examines environmental history by analysing pollen frequencies and with the aid of $^{14}$C carbon dating. Palynologists refer to palynology as a type of environmental study in which microscopes are used to identify and analyse the scale or range of plant pollens present in archaeological layers (Vincens et al. 2006; Evans and O’Connor 1999; Dincauze 2000). It is claimed that these pollen records can show what crops, vegetation or ground cover were likely have been present when a layer was deposited (Vincens et al. 2006). Grass, tree, cereal and weed pollens all provide information about past forest clearance, grazing, cultivation and farming activities (Dincauze 2000; Vincens et al 2006). It can be a particularly useful tool when combined with other methods as was done in this thesis. I do not go into the specific details of pollen data analysis here, as it was beyond the scope of this project. However, I present general findings and narratives provided by pollen data for East Africa in general and northern Uganda in particular, comparing different sites in close proximity to the study area.

In general, East Africa has experienced a series of paleo-environmental changes according to pollen data analysis by different researchers (see discussion in Kiage and Liu 2006; Hedberg 1954). According to Kiage and Liu (2006:633) the “period prior to c.42,000 $^{14}$C yr BP was characterized by warm climatic conditions similar to the present”. However, cold and dry conditions followed from 42,000 to 30,000 $^{14}$C year BP and moist and cold conditions from 30,000 until 21,000 $^{14}$C year BP (ibid.). Temperatures in the latter period, which led to the Last Glacial Maximum, were probably 2 to 4.1°C lower than at current time (Kiage and Liu 2006). East Africa experienced generally cool conditions between 21,000 and 12,500 $^{14}$C year BP, but interrupted by two significant prolonged dry periods (see discussion in Schuler et al. 2014; Kiage and Liu 2006). This period followed by warm and moist conditions, although there was a rapid climate change during the deglacial and middle Holocene period (see Schuler et al. 2014; Meadows and Coetzee 1967). According to Kiage and Liu (2006), ice core records show that two abrupt drought events also occurred around 8300 $^{14}$C yr BP and 5200 $^{14}$C yr BP. However a long dry period started around 4000 $^{14}$C yr BP, when East Africa was generally dried than present time, and it later entered into a fairly wet period (Little Ice Age) punctuated three times by more arid conditions than today (ibid).

Lacking local vegetation proxies, I compared two sites in relative close proximity to Kachung with longer records that could have had similar vegetation and landscape changes as the Kachung area. These were Lake Alberta, around 100 miles west of Kachung, and Lake Victoria near Jinja, about 100 miles south of Kachung (see Figure 20).

As the temperature changes over the ages, so does the vegetation cover and the landscape (Hedberg 1954; Hamilton 1984; Kiage and Liu 2006; Hedberg 1954; Taylor 1990). The pollen findings indicate that the recent warm and dry period in east Africa in general and Uganda in particular started at about 5500 $^{14}$C yr BP and that possible forest disturbance by humans started

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42First pollen is extracted from soil that has been excavated or extracted in auger cores (Evans and O’Connor 1999; Dincauze 2000; Hedberg 1954). Each layer of soil is then analysed separately. Radiocarbon dating is normally used to date the layers so that the pollen of different years can be measured. The soil is mixed with water and placed in a centrifuge (a machine that rotates very quickly), which leaves the lighter pollen on the top and the heavier soil at the bottom. Individual pollen grains are identified and counted and graphs are usually compiled for the types of pollen present along the time-scale studied (ibid).
from ca. 2200 $^{14}$C yr BP (Kaige and Liue 2006; Taylor 1990). The warm, dry conditions led to the replacement of forest with savannah grassland and woodland (Hamilton 1974; Hedberg 1954) (Figure 20). The area north of Lake Victoria, including Kachung and Lake Alberta, became dominated by savannah-type vegetation, including *Combretacea* and *Acacia* savannah (Kiage and Liue 2006:640). The vegetation in Kachung agreed with this general biome construction of East Africa from pollen analysis.

Thus, though humans may have made a significant contribution to the paleoenvironmental changes over millennia (Kiage and Liue 2006), it also needs to be taken into account the long environmental history of the area. However it is too simplistic to conclude that an area is degraded based only on the presence of human activities and evidence from e.g. records of paleoenvironmental changes should also be considered seriously.
<table>
<thead>
<tr>
<th>Site/AGE ((^{14}C) yr BP)</th>
<th>Rukiga Highlands</th>
<th>Ruwenzori Mountains</th>
<th>Lake Albert</th>
<th>Lake Victoria</th>
<th>Lake Naivasha</th>
<th>Mt Elgon</th>
<th>Mt Kenya</th>
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<tbody>
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<td>1000</td>
<td>Warm and increasingly dry, forest clearance</td>
<td>Abrupt aridification</td>
<td>Warm and moist</td>
<td>Warm and moist punctuated by prolonged periods of low moisture</td>
<td>Cold and dry</td>
<td>Warm and dry</td>
<td>Warm and dry punctuated by episodes of heavy convective precipitation</td>
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Figure 19. Late quaternary paleoenvironmental changes in East Africa (from Kiage and Liue 2006:644)
Figure 20. The spatial distribution of the major vegetation types of East Africa. The figure was taken from Kiage and Liue (2006) and modified with circled orange color for the purpose of comparison and simple understanding in this discussion.
7. Discussion

“Struggles for control over and access to nature and natural resources; struggles over land, forests, pastures and fishers, are struggles for survival, self-determination, and meaning. Natural resources are central to rural lives and livelihoods: they provide the material resources for survival, security, and freedom. To engage in the world requires assets that enable individuals, households, and communities to act in and on the world around them. The ability to accumulate assets and the ability to access government and market services depends partly on such resources along with the political-economic infrastructure – rights, resources, representation, markets, and social services- that are the domain of the government” (Chomba 2015:5).

Clean Development Mechanism (CDM) is seen as a system that can promote climate change mitigation by virtue of encouraging market-based afforestation or reforestation (Röttgers and Grote 2014; Dinar 2013). However, with the advent of this mechanism, many plantation companies have over-emphasised degradation in order to legitimise their activities for the purpose of engaging in the emerging business around CDM. In most instances, when CDM projects are preparing their project document design (PDD), they are criticised for a lack of proper analyses of landscape and community (Pearson et al. 2005; Hulme 2009; Dinar 2013). Plantation companies may investigate only a short period of time in which they claim an area has been degraded, which means they may ignore the environmental health or history of the area. Another risk is that the plantation companies marginalise local communities in order to proceed with plantation, either through physical or economic displacement. In Uganda, for example, CDM projects have been criticised for their poor understanding of the social and environmental history of the area where the projects are located (Flora et al 2016; The Oakland Institute 2014).

The present analysis, based on the analytical perspective of Actor-Network Theory (ANT), revealed that various actors that have played and are playing a strong role in the afforestation process for the Kachung plantation project are doing so with little knowledge of the human and landscape history of the area. The forest was started as a forest reserve in 1939, as a test plot for trees such as mvule (Cholophora) and Phyllanthus discoideus (Butt 1965; Webster and Osmaston 2003). Plantation began with 50 acres and from 1941 onwards it continued with 50 acres every year. Later the forest reserve area slowly decreased, to 13.86 sq. miles in 1961 (which is similar to area before it was planted by GRAS).

With the help of interviews with members of local communities, written records, aerial photographs and maps of different years, I explored the overall vegetation and landscape changes over the years since reserve formation. I found that despite these changes, the reserve maintained its savanna woodland and tropical high forest vegetation until the late 1990s. I identified the causes of what the state or forest department call ‘encroachment’ as being lack of land for local communities to exercise their hunting, grazing, cultivation, cultural activities and to gain access to water. From interviews, it was also clear that the area has been under
continuous use by local communities over time. Various resources (honey, termites, firewood) are taken from the forest and it also has heritage and cultural values. However, with forest plantation the vegetation and land use system has changed significantly, particularly since the reserve area was leased to GRAS in 2005.

One of the erroneous statements made by GRAS in its project design document (PDD 2012) is that KCFR was started as a forest reserve in 1952, with the aim of equal distribution of natural resources among the local communities and the state. However, I found that the aim of creating the reserve was mainly connected to the general colonial geopolitics of East Africa and the ambition to find a suitable place for producing timber and other forest produce. GRAS may have other motives today, but in fact its activities are rather similar to, or a repetition of, the ambition of the former colonial government of Uganda.

Views on the history and discourses of Kachung forest emerged as being embedded in the struggle for control and access to the forest. This antagonistic power struggle has given the forest its present shape. The 14 local residents interviewed remembered the forest forty years ago as mainly a place for hunting and grazing. However, the value of the forest as hunting ground has decreased, with only half the informants reporting that they now use it for hunting. On the other hand, all informants said that they still value the forest for cultivation and grazing activities.

The informants were also asked about the name Kachung, since e.g. Mitchell (2010) argues that the meaning of place names can sometimes assist in understanding the history of landscape change. The meaning of Kachung reflected the high value given to the forest in the past as a place for herding, hunting and grazing. Devaluing the activities of local communities and their use of the forest as a place of grazing, hunting, cultural practices and cultivation has a long history, beginning in the colonial period (Webster and Osmaston 2003). In the Kachung case, the demonization of local communities as ‘land degraders’ has been continued by GRAS for legitimatisation of its plantation activities. For example, its documents describe the Kachung area as vacant and severely degraded before it was made a reserve (Green Resources 2012). However, except for the particular change in 2005 relating to war against the LRA insurgency group, the forest maintained its savannah woodland and grassland over the years and most local communities depended on it for their living.

Before the forest was reserved, the livelihood of the local communities mainly depended on grazing, hunting and limited farming. However, when the forest became a reserve, access to the forest’s resources became very limited and many activities that were previously conducted inside the forest decreased significantly. In addition to the decrease in hunting, the forest is now less frequently used for cultural activities and forays for other sources of food. For example, only eight of the respondents said that they still value the forest for cultural practices. However, all the informants still value the forest as an area for farming and grazing. The informants said that their cultural activities had also decreased because the younger generation exchanged their traditional religion for Christianity. In addition, access to the forest was limited and a tree used for worship had been cut down (interview with local residents, 13 March 2016; interview with LFC forest supervisor, 12 March 2016).

In Uganda, farming and grazing has increased in the past 40 years, in parallel to forestry (Webster and Osmaston 2003; Forest Department 1950; Baffes 2009; Kaiser 1991). This trend was reflected in the Kachung area. Cash crops were introduced during colonial times, in order to cover the cost of managing the forest (Webster and Osmaston 2003; Turyahabwe and Banana 2008). In Kachung, some cash crops, such as cotton, coffee, tobacco and tea, have remained popular over the years, but with a dip in popularity in the 1970s under Idi Amin’s because of the political instability of the Amin government and poor quality of some cash crops such as

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cotton. Later, these crops have mainly been replaced with food crops such as cassava, millet, maize, banana and sesame for local consumption. Towards the late 1990s the population around Kachung began to increase and more land was needed for subsistence farming. The population increase at that particular time was connected to the refugee camps around Kachung for people from other parts of northern Uganda who had fled the LRA insurgency. When the insurgency came under control in the late 1990s, the people in the refugee camps relocated to the forest and many of them established subsistence farming (Apuuli 2004). This trend is evident from the three maps from different years analysed in this study with the help of GIS. The analysis showed that in the early 1990s the area under subsistence farming was 20.59% of the total area, but towards the late 1990s it increased by 105% to account for 42.29% of the total area. Since then, subsistence farming has diminished significantly following the start of plantation and only accounted for 22.75% in 2015. This shows an area in which people used to have farming was converted into plantation projects.

Another factor in the history of Kachung forest is that East Africa has experienced massive fluctuations in cooling and warming over the millennia. Pollen analysis indicates that the recent warm, dry period in east Africa in general and Uganda in particular started from about 5500 14C years BP and the possible forest disturbance by humans started ca. 2200 14C yr BP (Kaige and Liue 2006; Taylor 1990). This indicates that climate change in the region is not only due to anthropogenic activities but is also connected to long-term processes of cooling and warming on Earth. However, anthropogenic activities appear to be associated with a much more rapid rate of change. The disturbance by humans intensified the effects of the warming climate in East Africa and new vegetation which tolerated the warm conditions emerged. Pollen analysis of northern Uganda has shown that the dry and warm conditions in the past two millennia led to the replacement of forest with savannah grassland and woodland, vegetation favoured by warm, dry weather (Hamilton 1974; Hedberg 1954). Comparing this vegetation to the current vegetation in Kachung forest, it seems too simplistic to say that an area like Kachung with savannah vegetation is degraded because of anthropogenic activities only.

Forestry policy in Uganda has changed over the past hundred years (Turyahabwe and Banana 2008:641; Webster and Osmaston 2003). It went from being highly regulated under the colonial forest service (1898-1961), characterised by a centrally controlled and industry-based forest system with limited local stakeholder participation, to a post-independence era (1962-1971) that maintained the forest estate in moderately good condition through the process of command and control. This was followed by a non-directional phase characterised by disruption of the economy, insecurity and impaired delivery of goods and services (1972-1986), leading to a more decentralised, participatory and people-orientated approach that has typified the focus of forest policy over the past three decades (1987-to date) (Turyahabwe and Banana 2008:641). These fluctuations in policy have also affected the landscape of the forest through changes in land use and lifestyle.

In the case of Kachung, a series of actors have played contradictory roles since the forest was first made a reserve in 1939. Planting in the forest was first started by the British colonial government and the forest was managed by the Uganda Forest Department under the auspices of colonial government one way or another until 1964, two years after Uganda obtained independence. In the late 1960s, the Norwegian development organisation NORAD provided aid to the Uganda Forest Department and KCFR the Kachung central forest reserve (KCFR) became part of this scheme. As a result, from 1969 to 1974, with the help of NORAD, KCFR was planted extensively mainly with two species of pine trees (interview with LFC forest supervisor, 12 March 2016). NORAD left Uganda in 1974 after Idi Amin took power, when all expatriates, companies and NGOs were expelled (Forest Department 1951; Ofcansky 1996). None of NORAD’s contributions are mentioned either in the GRAS project document design.
or in the records of the current state forest body, the National Forest Authority (NFA), even though some of the trees planted by NORAD remained until the forest it was leased to GRAS. After Idi Amin took power he declared that any Ugandan could settle anywhere they wished. As a result, many central forest reserves were converted into agricultural land (Turyahabwe and Banana 2008:641). In addition, many of the people who settled in the reserve interpreted this as a licence to cut and destroy forest and convert it to agriculture. For example, in the case of Kachung forest, of the pine trees planted by NORAD very few remain and only along the tarmac road. In interview the forest supervisor Peter, who has been working in KCFR since the 1980s, remembered that there was a lot of burning and encroachment in those times. When Idi Amin was overthrown, leading to the establishment of the current government, KCFR came again under the central control of the NFA and the forest was leased to GRAS. Like the afforestation group NORAD, which played a central role in changing the recent landscape of KCFR, GRAS produced a similar narrative about the forest and over-problematised degradation. However, this over-emphasis on degradation and deforestation seems only to have been done to achieve certification under the UN’s Clean Development Mechanism (CDM) and to legitimise the plantation activities (see e.g. Flora et al. 2016 and The Oakland Institute 2014).

CDM has the potential to leverage climate change mitigation and enhance development, particularly in countries such as Uganda where development is seen as the main national goal. In order to do so, however, CDM intervention should be based on long-term social development and environmental conservation. A short-term intervention may only result in promoting mutually enforcing factors that worsen climate change, while a long-term intervention could possibly decrease climate change and enhance development goals. The Kachung project provides some lessons about long-term and short-term interventions and their effects on local communities and the environment. The CDM intervention in KCFR is based on a short-term business perspective, which can lead to exclusion of social science considerations within degradation narratives, the voices of local communities and the environmental history of a proposed project area. Therefore CDM project design documents should not be based solely on the common colonial representations of local land use practices.

There are important lessons to be learnt from the KCFR project about accurate problemitazation of degradation and about giving ethical consideration to the local communities. In the case of KCFR, the problem of degradation described in project documents was based on poorly founded evidence, e.g. the project design documents did not include the long environmental history of the area and an ethical review of the local community. The decision for establishing a CDM project was based only on cut-off dates and a particular short period of land use change, which was not sufficient to define the area as degraded. In the period in question, there was a strong increase (105%) in subsistence farming in KCFR from the early 1990s, resulting in 42.29% of total KCFR area being under subsistence farming in 2005. However, this particular change does not prove that the area was degraded. In fact, the rapid change in land use was connected to an increase in population after an insurgency war forced local communities to relocate to the forest. Moreover, agricultural incentives such as availability of modern fertilisers and a changing lifestyle played a significant role in the changing land use.

The other area in which CDM projects apply a double standard is their way of approaching local communities. The CDM laws and regulations are intended to be of benefit to the livelihoods of local communities and to development, but the CDM projects seem only to benefit the plantation projects. During this research I found that the forest is of enormous value for local communities and its contribution to their livelihoods should not be compromised, even if the plantation project provided them with paid work. According to the Ugandan Bureau of Population Statistics (2014), there are 12,297 people who depend on KCFR for a living, but
only 267 (2.17%) of them are currently working in the plantation project. However, NFA and GRAS in their dealings have paid little attention to the value of the forest for the local communities.

In terms of methodology, in this study I employed multiple methodologies such as interviews with local residents, analysis of archive data on land use, employing GIS as a management tool of maps, aerial photographs, identifying place names and pollen analysis. I found it very useful to adopt an inclusive approach, e.g. the information from different methods complemented each other and revealed insights that would otherwise be difficult to obtain with only one method. Based on the results, I can make the following recommendations for future CDM projects: i) Whenever a CDM plantation project is proposed, the parties behind the project should study the long-term environmental history of the project area, and ii) the project should be scrutinised by an independent body that does not stand to benefit directly from the project. This is because the Kachung case showed that reinforcing degradation rhetoric without empirical evidence can result in over-problematisation and over-simplification of degradation narratives. If projects such as KCFR are brought into the CDM system without prior research on the history of the forest and its value for local communities, then halting climate change by reducing emissions through afforestation runs the risk of prioritising economic interests over the rights of local peoples.

Studies such as this could be improved by further analysis of pollen records and aerial photographs and more detailed interviews with local communities. In addition to changes made by local people to the landscape, recent changes deriving from climate change brought about by anthropogenic activities far beyond their control should be considered.
This study showed that a network of actors has shaped the landscape of Kachung Central Forest Reserve (KCFR) in the past hundred years. By applying the perspectives of Actor-Network Theory (ANT), it was possible to identify how the different actors were interconnected and their combined effects of the forest landscape.

In general, the history of KCFR is more or less reflects the history of the Uganda Forest Department. The forest was established, mainly for timber production, under the highly regulated colonial regime (1898-1961) with limited local stakeholder participation. In the early post-independence era (1962-1971) the forest estate was maintained reasonably intact. However, in a later non-directional phase characterised by economic disruption, insecurity and market breakdown (1972-1986) the forest was taken into use by local people for their livelihoods. There was been a more decentralised, participatory and people-oriented approach in recent decades (1987-present). This case study identified six main actors that have played a very significant role in shaping KCFR: i) the colonial forest service (1939-1962); ii) Uganda Forest Department (1962-1971); the Norwegian Development Agency (NORAD) (1969-1974); iv) the District Forest Service (DFS) (1986-1999); v) Norwegian Afforestation Group (NAG) (1999-2006) and finally vi) the Norwegian company Green Resources (GRAS) (2006-present).

In most cases, the activities of all these actors are a repetition of the ambitions of the colonial government. All the external actors involved in past and ongoing afforestation processes have done so with little knowledge of the longer-term human and land use history of the forest area. GRAS has greatly increased the scale of operations in the reserve, representing the largest plantation forestry operator to date, but its activities have also been initiated with little assessment of the human and environmental history of the area.

In Chapters 4-6 of the thesis, I describe the status of Kachung forest when the reserve was established, the evidence on whether parts of the forest area are now degraded and where are these located. I also examine how the discourse on Kachung forest been shaped by broader environmental discourses about East Africa and the actors involved, whereby KCFR has been transformed and framed from being a ‘natural’ forest reserve to a plantation forest.

In examining these issues, a multi-source approach proved very useful in building narratives of forest and landscape change and produced sound results. I compared and contrasted different sources in order to complement and supplement pieces of information they provided, which improved the reliability of the findings. Through this approach I came to the conclusion that depending on only one method is not reliable and can easily lead to misunderstandings about landscape history, inaccurate data and shallow conclusions. The GIS approach proved very useful in calculating and comparing how each component of the landscape has been degraded over the years. The other methods I used, such as studying archive records and old maps, collecting oral information and histories in interviews and through the use of questionnaires, and examining place names according to the local language helped me cross-checking the findings made from GIS.
I can conclude that the early discourse on Kachung forest was shaped by the broader perception of East Africa as a good place for establishing forestry to generate timber and other tree produce owing to its suitable soil, cheap human labour and good rains. In latter years this discourse has come to be dominated by the idea of ‘green resource management’, which some critics have viewed as ‘carbon colonialism’ ever since the idea of tackling climate change emerged. Kachung forest became a target of carbon emissions reduction and timber production in the late 1990s under the auspices of the UN and GRAS.

Based on my analysis of the history and land use of Kachung forest, I concluded that apart from a rather abrupt land use change by local people in the early 2000s, which was related to war with an insurgency group, the forest had maintained its savannah woodland and grassland up to that time and most local communities depended on it for their living. Over-emphasis of a degradation narrative by previous actors and Green Resources served to legitimise their forestry industry activities, which have been certified under the UN’s CDM. This raises questions about the ethics of this carbon emissions trading system and its benefits for local people in the global south relative to those of commercial interests in the global north.
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Maps:


Appendix

**Interview Questionnaires**

Questionnaires for the purpose of studying the history and discourse of Kachung Forest in Donkolo District, Northern Uganda.

You have been selected as one of the participants to take part in this study of the History and Discourse of Kachung Forest. The information you are giving is strictly confidential and will only be used for the purpose of this study. Thank you for your cooperation.

Date of interview ______________________ Questionnaire ID
No/Name__________________________________
Parish_________________________________________Village
cell______________________________________________

**Section One**

**A. General Information**

A1. How long have you lived in this area/village?

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<th>Less than 5 years</th>
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<th>21-40 years</th>
<th>40-60 years</th>
<th>60-80 years</th>
<th>More than 80 years</th>
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A2. What is your sex?

Male □           Female □

A3. What is your current marital status?

Single □       Marriage □       Divorced □       Widowed □       Never married □       Other (Please □ specify)

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A4. How old are you

18-24 □       25-30 □       31-40 □       41-50 □       51-60 □       Above 60 □

A5. Education attained

Never □       Primary level □       Junior Level □       High school □       Certificate □       Undergraduate □       Graduate □

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A6. What is your clan or ethnicity?

________________________________________________________________________
A. What is your religion?

- Catholic
- Muslim
- Lutheran
- Anglican
- Seventh Day Adventist
- Traditional religion
- Others (please specify)

Section Two

B. Environmental Changes

B1. The area or the forest is called Kachung. How did the name come out or why did you call it Kachung?

B2. Now this area is a reserve. What was this area before?

B3. Why do people call this Kachung? When do you think the name started?

B4. Has the population living in this area decreased or increased since you started to live here?

B5. If the population has increased then what was the main cause?

B6. If the population has decreased then what do you think the main cause?

Section Three

C. Climate Change.

C1. How was the climate change during the last 40-50 years?

- From cold to hot
- From hot to cold
- Unchanged

C2. In the last 40-50 the rainfall was

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<th>Increased</th>
<th>Decrease</th>
<th>Unchanged</th>
<th>Slightly increased</th>
<th>Slightly decreased</th>
<th>Unclear</th>
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C3. The main cause of changing rainfall was

- Vegetation increase
- Vegetation decrease
- Unchanged
- Temperature increase
- Temperature decrease
- Unpredicted

Section Four

D. Crop Production

D1. During the last 40 years, has crop production increased or decreased?
Increased □ Decreased □

D2. The main cause for the increase of crop production is due to
More cultivation area □ Soil fertility increased □ more working people □ more rainfall □

D3. The main cause for the decrease of crop production is due to
Less cultivation area □ less soil fertility □ Less working people □ Less rainfall □ Less land □

D4. Mention three types of crops which are more popular in the last 50 years?

D5. Name the most extensively grown crops in the last 20 years?

D6. List them in decreasing order of their amount of production with the last 30 years
Example: Coffee, Cotton, Maize

D7. From the three mentioned crops, please select one cause for the increase in their production.
Soil fertility □ Rainfall □ Increase in Trade □ Increase in demand from outside □

Section Five

E. Grazing Activities

E1. The most abundant livestock in the last 30 years
Cattle □ Sheep □ Goats □ Pigs □ □ Other (Please Specify it) ______________

E2. Please select one of the main causes which led to livestock change in Kachung in the last 30 years.
Change in vegetation □ Change in grazing land □ Livestock disease □ □ other specify it ______________

E3. How have hunting activities changed in the last 40-50 years?
Decreased because there are less animals to hunt □
Increased because there is less agricultural activities □
Decreased because the government controls hunting activities □
Decreased because the forest was changed to plantation forest □

Section Six

F. Vegetation Change

F1. The vegetation of Kachung forest during the last 40 years was ____________ than today.
More trees □ More grass □ Less trees □ Less grass □

F2. The size of the trees in the last 30-40 years was
Shorter □ Taller □

F3. The type of the forest in the last 40 years was
Dense or thick forest □  Forest with less trees □  Forest with more grass □  Forest with open land □

F4. Is the number of trees currently increasing or decreasing?
Increasing □  Decreasing □

F5. The main cause for decreases in the types and number of trees in the forest is
Agriculture □  Firewood □  High demand for charcoal □  Decrease in rainfall □  Encroachment □
Planting exotic trees □  Other, please specify ______________________

F6. Do you remember any trees which vanished due to planting other trees like eucalyptus? If so please could you mention it to me?

F7. How was access to the forest before it was changed into a forest reserve?
We use a customary law in our village and abide by that law to manage our forest □
We had no limitation or control from any body □

F8. Do you believe if there is a free access to the forest it will lead to deforestation?
Yes □  No □  To some extent □  It will be better than is today □

F9. Did you previously burn the forest or use a fire to manage the forest?
Yes □  How often do you burn it?
When did you used to burn?
No □

F10. How has soil erosion been in the last 40 years?
Increasing □  No much change □  Decrease □  Others (Please specify it)_____________________________________________________

Section Seven
G. Plantation Company and Kachung Forest

G1. Do you support Kachung forest becoming a plantation forest?
Agree □  Disagree □  Strongly agree □  Strongly disagree □  Neither □

G2. I support Kachung being a plantation forest because
□ I can get a job in the plantation company
□ The plantation company is planting more trees and conserving our forest
□ Other, please explain

G3. I don’t support Kachung forest being a plantation forest because
A. The forest has lost its diversity and number of trees
B. They plant our agricultural land
C. They didn’t hire me to work in the plantation
D. My living depends on the forest

G5. Why do you think encroachment happening in the forest?
A. Because people didn’t have enough cultivation land
B. Because people don’t like the plantation company
C. Because people want to collect firewood and charcoal
D. Other (please specify)
Figure 21: Forest Reserve in Lira District
Figure 22: Kachung Central Forest Reserve when first mapped in 1961
Figure 23: Lango Forest Plantation in KCFR Last Updated in 2012
Figure 24: Timber Plantation Reserve of Acholi and Lango Locality Map and when KCFR was in Lango District
Figure 25: Kachung Forest Plantation Project first season of 2008-2009