MINISTRY OF WATER AND ENVIRONMENT

Socio-Economic Baseline for Communities around the Six Central Forest Reserves (Mabira, Namukupa, Nandagi, Kalagala Falls, Namawanyi and Namananga) in the Mabira Forest Ecosystem

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EXECUTIVE SUMMARY

The main objective of this study was to collect and summarize baseline socio-economic information for the six Central Forest Reserves of the Mabira ecosystem. Specifically, the study assessed: (i) the current socio-economic status of the households and factors exerting pressure on the forest reserves; (ii) community interactions with the forest resource in terms of access, use, conflicts and regulatory policy and institutional frameworks; (iii) the demand and supply dynamics for value addition and marketing of key forest resources; and (iv) the socio-economic and livelihood strategies of households and local communities adjacent to the Mabira forest ecosystem.

The study applied a combination of quantitative and qualitative survey methods. A reconnaissance survey was conducted to identify communities to participate in the study. The study covered communities within and adjacent to the forest at three distance locations i.e. <1 km (including enclaves within the forest), 1-2 km and 3-5 km. Desk based review of documents, household and key informant interviews, focus group discussions as well as market surveys were conducted. Document review generated secondary information on the management and conservation of Mabira ecosystem, livelihood strategies and forest resource use. A pre-coded semi-structured household questionnaire was used to collect quantitative data from a representative sample of 302 households during face-to face interviews. Key informant interviews and focus group discussion guides were used during interactive sessions with forest resource users, such as firewood collectors, charcoal burners, hunters, herbal medicine practitioners, brick makers, fisher folk, and craft makers, among others. Market survey was conducted to explore market chains of key forest products (e.g. fuel wood, poles, fruits, timber and crafts).

The findings from the study show that household size around Mabira forest ecosystem was 4.8 persons, close to the national average of 4.7 persons. The number of households living adjacent to the CFRs increased by 31.3% since the 2002 national population and housing census. Over 88% of household members had attained formal education. About 49% had completed primary level education, while 32.8% had attained secondary level education. Taking primary level education as a minimum for literacy, then the literacy rate of 88.8% in the study communities is high compared to the national average that stands at 72%.

Most of the Households (70.6%) reported crop production as main source of income followed by livestock (27.1%). On average, crop production generated UGX 2,628,456 (approx. USD 821) annually representing 57.8% of the overall household income.

The overall annual average income from harvesting and sale of forest products was UGX2,312,972. Specifically, harvesting and sale of forest products generated UGX 5,566,667 (USD. 1,740) annually representing 79% of overall household income for households which considered it as primary source. It also generated UGX 1,104,750 for HHs that considered it as a secondary source and UGX 267,500 for HHs that considered it as a tertiary source. Overall average annual income from the harvesting and sale of forest products decreased as distance from the edge increases implying

that households located with 0km earned more income form forest products as compared to those located 3-5 km.

As far as peoples' wellbeing is concerned, a survey of their household endowments based on items used for housing, agricultural production, conservation and household health status revealed that:

i) Over 72% of households have constructed iron roofed houses, implying reduced use of timber for construction;
ii) Over 77% of households use hand hoes for agriculture while only 1.7% own a post-harvest storage facility, implying that there is likelihood of food insecurity in such households that do not store for the future;
iii) Only 15% of households own woodlots, implying that the majority of households obtain their wood products from off farm sources, and therefore probably depend highly on forest sources;
iv) Approximately 76% of households owned radios, while over 50% had mobile phones, implying that there is a high level of connectivity, which may, in some, instances be useful as vehicles for transfer of conservation messages, although the phones may also be used to enable illegal extraction of forest products.

Using 2015 as a reference year, most households experienced three months of food insecurity that year. Households' food security status was noted to improve as the year progresses with very few households facing food shortages during the month of December. Also during January, the most pronounced hunger month, more of the households that indicated experiencing food shortage. Larger households faced food shortages compared to smaller households and this difference were statistically significant ($t = 8.62$, $df = 272$, $p < 0.05$) further suggesting that; larger household are more food insecure than smaller ones. Larger households therefore need to incorporate more strategies for agricultural intensification to address food insecurity.

With respect to livelihood strategies; 53% of the households reported crop farming as their major source of livelihood, while 25% said that they keep livestock for livelihood. A range of alternative sources of livelihood was recommended for the communities. These include: (i) Use of improved agricultural practices such as mulching, crop diversification and use of improved crop varieties; (ii) use of crop residues for energy; (iii) community ecotourism; (iv) use of agroforestry practices such as integrated crop-livestock systems and shaded coffee agroforestry; (v) smallholder diary; (vi) zero grazing; (vii) production pharmaceutical farming i.e. cultivation and processing of medicinal plants; (viii) fruit processing; (ix) tree planting; and (x) avoid deforestation.

Findings on land ownership indicate that the average land ownership by households in and around Mabira forest ecosystem is only 2.4 acres. The main land tenure systems in this area are registered freehold, leasehold and kibanja (tenants). However, within the enclaves and some areas adjacent to Mabira CFR, mailo land comprises the main form of land tenure system. Only a few households have leasehold status on land in the study area. The majority of the farmers in the area has no land titles and therefore do not enjoy security of land tenure. Land resource and tenure rights are sometimes overlapping promoting conflict and impeding development. Insecure land tenure poses a threat to conservation of neighboring forests given the uncertain rights of

occupants. Tenants on 'kibanja' land do not even have security of tree planting as this may be prohibited by the bonafide land owners. Therefore, there is need for communities to negotiate with land owners for implementation of the alternative livelihood strategies. Although some households are able to purchase their own land, they have not thought about this and therefore require encouragement so as to secure their tenure rights.

With regards to access, only 47% of households reported having direct access to forest products. More households located within the 0 Km (69%) and 1-3 Km (55%) distances from the forest reserves reported access to the forest. About 21.6% of households located 3-5 km from the forest reported having direct access to forest resources. This implies that households located up to 3 km from the forest have more access to (or have higher dependence on) forest products compared to those further away. In terms of gender, a larger proportion (51%) of male-headed households reported having access to forest resources as compared to 35% of female headed households. The forest products accessed from the forests include firewood, timber, poles, rattan canes, charcoal, water, climbers (for basket), medicinal herbs, fruits and wild yams. However, the most important forest products in order of mention by respondents include firewood, water, poles, timber and fruits.

Access to water in the CFR: Overall (Yes=69.64%, No=30.36%). When dis-aggregated by distance as key domain of analysis; 0km (*Yes=100%, No=0%*), 1-2km (*Yes=55%, No=45%*), and 3-5km (*Yes=40.74%, No=59.26%*). Access to water increased with a decrease in distance from the edge of the CFR and the relationship between was significant at 5% level. All HHS in enclaves accessed water in the CFRs.

Marketing of forest products was very low with only 14% of the households selling the forest products. These findings suggest that a majority of the households apparently access forest products for their subsistence use. Moreover, there was very little value addition to these products. This subsequently affects the prices, which were reported to be low, especially in the areas close to the CFRs. Markets further away from the forests tended to be more lucrative. However, there was very little access to such regional markets by the households sampled.
From the foregoing, this study recommends the following actions to be taken in ensuring sustainable coexistence of the forest resources and community livelihoods:

1) Community interactions with the forest resource in terms of entitlement, access, use, conflicts and regulatory policy and institutional frameworks

i). Strengthen enforcement of laws, policies and regulations governing the six CFRs. Monitoring of illegal activities is not undertaken with due diligence partly due to lack strong structures on ground which in turn is attributed to inadequate funding. NFA and district officials should be facilitated adequately to monitor the CFRs and enforce the laws. For example, conduct periodic, preferably, annual re-opening of forest boundaries and evict encroachers. This will also help discourage potential encroachers.

ii). Strengthen sensitization of the local communities on the existing laws governing the CFRs, and the importance of conserving the CFRs through community dialogues especially with lesser receptive communities e.g. in Sii Sub County. In addition, strengthen engagement with communities around CFRs to participate in the monitoring and prevention of threats to forest

health. Volunteers to serve as focal points to help in simple actions for monitoring health- and pest-related developments in the forest can be designated.

2) Demand and supply dynamics for value addition and marketing of key forest resources

i). Conduct a detailed value chain analysis of all main forest products from the CFRs. Investigating the sequence of forest production and marketing in all their facets – including research and development, the regulatory framework, raw material supplies – is a key to any systematic improvement. It enables policy makers to create favorable framework conditions which promote competitive enterprises, sustainable jobs and income for local people. Furthermore, it allows impact-oriented monitoring of initiated policy actions.

ii). Promote establishment of nurseries and woodlots among the communities within and around the 6 CFRs to provide alternative fuel sources and construction poles thereby relieving pressure from the forest reserves.

iii). Promote establishment of alternative water sources (such as boreholes, springs) in the adjacent so as to reduce reliance on the forest reserves.

3) Livelihood strategies of households and local communities adjacent to the Mabira forest ecosystem

i). Strengthen the functionality of CFMs through increased access to funding, skills development and adoption of appropriate production and value additional technologies to CFM products.

ii). Strengthen adoption of effective modern farming practices including introduction of better crop production technologies. MWE in partnership with key stakeholders (NFA and NaFORRI) should liaise with appropriate research institutions to introduce high yielding; drought resistant; and early maturing crop varieties to increase food production by households adjacent to the CFRs.

iii). Strengthen agriculture production on-farm by increasing adoption of modern farming methods, including agroforestry, agronomic practices, soil conservation practices in order to enhance agriculture production, food security and incomes to relieve pressure from the CFRs. Support households to diversify to other sustainable IGAs, e.g. planting of Cocoa as buffer around CFRs.

iv). Strengthen adoption of appropriate technologies for post-harvest handling and values addition to agriculture produce at household level. This will attract high prices at farm-gate level and marketed produce. Promote planting of indigenous and conservation of indigenous tree species on-farm, e.g. *Maesopsis eminii, Prunus africana, Warbugia ugandensis, Cordia milenni*, among others.

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ACRONYMS AND ABBREVIATIONS

ASSP	Agricultural Sector Strategic Plan
BBW	Banana Bacterial Wilt
CBD	Convention on Biological Diversity
CBOs	Community Based Organizations
CFM	Collaborative Forest Management
CFR	Central Forest Reserve
CITES	Convention on The International Trade In Endangered Species
COFSDA	Conservation for Future and Sustainable Development Association
CSOs	Civil Society Organizations
Df	Degrees of Freedom
DFS	District Forestry Services
EIA	Environmental Impact Assessment
EPRC	Economic Policy Research Centre
FAO	Food and Agricultural Organization
FGDs	Focus Groups Discussions
FMP	Forest Management Plan
FRUG	Forest Resource User Group
FSSD	Forestry Sector Support Department
GOU	Government Of Uganda
Ha	Hectares
HH	Household
HIV/AIDS	Human Immunodeficiency Virus/ Acquired Immune Deficiency Syndrome
IDA	International Development Association
IGAs	Income Generating Activities
IIED	International Institute for Environment and Development
IT-PGRFA	The International Treaty on Plant Genetic Resources for Food and Agriculture
IUCN	International Union for Conservation of Nature
KIIs	Key Informant Interviews
Km	Kilometer
KOSMP	Kalagala Offset Sustainable Management Plan
KSOER	Kampala State of Environment Report
LF	Leasehold Forestry
LFRs	Local Forest Reserves
LGs	Local Governments
LVFO	Lake Victoria Fisheries Organization
MAFICO	Mabira Forest Integrated Community Organization
MCFR	Mabira Central Forest Reserve
MoU	Memoranda of Understanding
MPA	Management Planning Area
MRA	Multiple Response Analysis

MTTI	Ministry of Tourism, Trade and Industry
MWE	Ministry of Water and Environment
NAADS	National Agricultural Advisory Services
NACOTHA	National Council for Traditional Healers and Herbalists Association
NaFORRI	National Forestry Resources Research Institute
NAPE	National Association of Professional Environmentalists
NDP	National Development Plan
NEMA	National Environment Management Authority
NFA	National Forest Authority
NFP	National Forest Plan
NPs	National Parks
PCS	Production to Consumption System
REDD	Reducing Emissions from Deforestation and Forest Degradation
RR	Response Rate
SCOUL	Sugar Cooperation of Uganda Limited
SPSS	Statistical Package for Social Scientists
TRIPS	The Trade Related Aspects of Intellectual Property Rights
UBOS	Uganda Bureau of Statistics
UCDA	Uganda Coffee Development Authority
UFWG	Uganda Forest Working Group
UGX	Ugandan Shilling
UNCCD	The United Nations Convention to Combat Desertification
UNFCCC	United Nations Framework Convention on Climate Change
UWA	Uganda Wildlife Authority
VCA	Value Chain Analysis
WESWG	Water and Environment Sector Working Group
WRs	Wildlife Reserves

CHAPTER 1: INTRODUCTION

1.1. Background

Mabira forest ecosystem consists of six (6) Central Forest Reserves (CFRs) which include Mabira, Namakupa, Nandagi, Namananga, Namawanyi and Kalagala Falls. The forest complex lies within the administrative boundaries of Mukono, Buikwe and Kayunga Districts, and is the only remaining forest ecosystem within the Lake Victoria and Lake Kyoga watersheds that is highly rich in bio-diversity. It also doubles as a water catchment for Rivers Nile and Sezibwa. The forest is characterised by human settlement (approximately 27 enclaves) that are completely enclosed or partly surrounded by the forest reserve (Namaalwa *et al*, 2013). Settlers have occupied the enclaves, even before the forest was gazetted in 1932 (Fungo et al, 2013). Some of the enclaves are cleared for planting crops such as coffee and tea, while the others are cleared for human settlement.

In the recent past, the six CFRs experienced degradation mainly attributed to human activity both from within (enclaves) and adjacent communities. During the 1970s, the Idi Amin government declared a double crop production campaign. People encroached and cut down prime natural forest for cultivation of food crops. By the mid 1980's, the six CFRs were heavily encroached and large parts severely degraded. In 1989, eviction of encroachers was undertaken by the then Forest Department. By 1992, the Government had successfully evicted all encroachers. Even the 2007/2008 Mabira forest give away request for sugar cane growing was halted following Government's assessments and confirmation that the natural forests were of high conservation value.

Despite the previous encroachments, there have been initiatives to restore the Mabira CFRs. In July 2007, the Government of Uganda entered into an indemnity agreement with the International Development Association (IDA) of the World Bank to support the financing of the Bujagali Hydro Power Project. The agreement among other things designated Kalagala Falls as a biodiversity offset, including the preservation of Mabira CFRs. Objective 3 of the Kalagala Offset Sustainable Management Plan (KOSMP, 2010-2019) therefore, is to promote the conservation of the ecological and socio-economic values of the Mabira Forest ecosystem. Under this offset commitment, there are three components which include: (i) Conservation of Mabira ecosystem; (ii) Natural and modified resources and people within the defined area of Mabira ecosystem; and (iii) cultural assets whose values are associated with Kalagala Falls and Itanda Falls.

The basis for this socio-economic baseline is directly drawn from the three components of the offset commitment mentioned above. Local communities should be able to live and co-exist with the Mabira forest reserve in a more sustainable manner. To meet government commitments to the KOSMP, there is need to review and update the current Forest Management Plan (FMP) for Mabira CFRs. Ultimately, it's expected that the updated FMP will lead to achievement of outcomes such as increased forest health that will benefit local communities in terms of livelihood improvement and contribution towards sustainable natural resource utilization. Beyond that, it's expected that the plan will also create opportunities for the local communities, private sector and other forest actors to participate in the management of Mabira Central Forest Reserve. Therefore, this study was commissioned by MWE as part of strategies for enhancing the effectiveness of KOSMP.

1.2. Location

Mabira, Namakupa, Nandagi, Namananga and Namawanyi forest reserves are geographically located between latitude 00^0 22'and 00^0 35' North and between 30^0 56' and 33^0 02' East, while Kalagala Falls lies between 00^0 35' and 00^0 37' North and 33^0 03' and 33° 05' East (Figure 1). Five of the six Central Forest Reserves under the Mabira ecosystem namely Mabira, Namakupa, Nandagi, Namawanyi and Namananga are located in Mukono and Buikwe districts while Kalagala Falls lies in Kayunga district. The six central forest reserves cover a total area of 31,293 hectares i.e. Mabira (29,974 ha), Namakupa (280 ha), Nandagi (479 ha), Namawanyi (325 ha), Namananga (131 ha) and Kalagala falls (104 ha).

Figure 1: Map showing location of the Central Forest Reserves within Mabira Ecosystem

The largest of the six forests i.e. Mabira CFR is divided in to 2 broad zones, namely: production and conservation zones (Figure 2). According to the Mabira CFR Management Plan (2009-2019), the production zone accounts for 70% of the forest reserve, while the buffer zone and strict nature reserve zone, which constitute the conservation area, account for

10% and 20% respectively. The other five forests of the Mabira Forest Management Area combined cover about 4% of the study area.

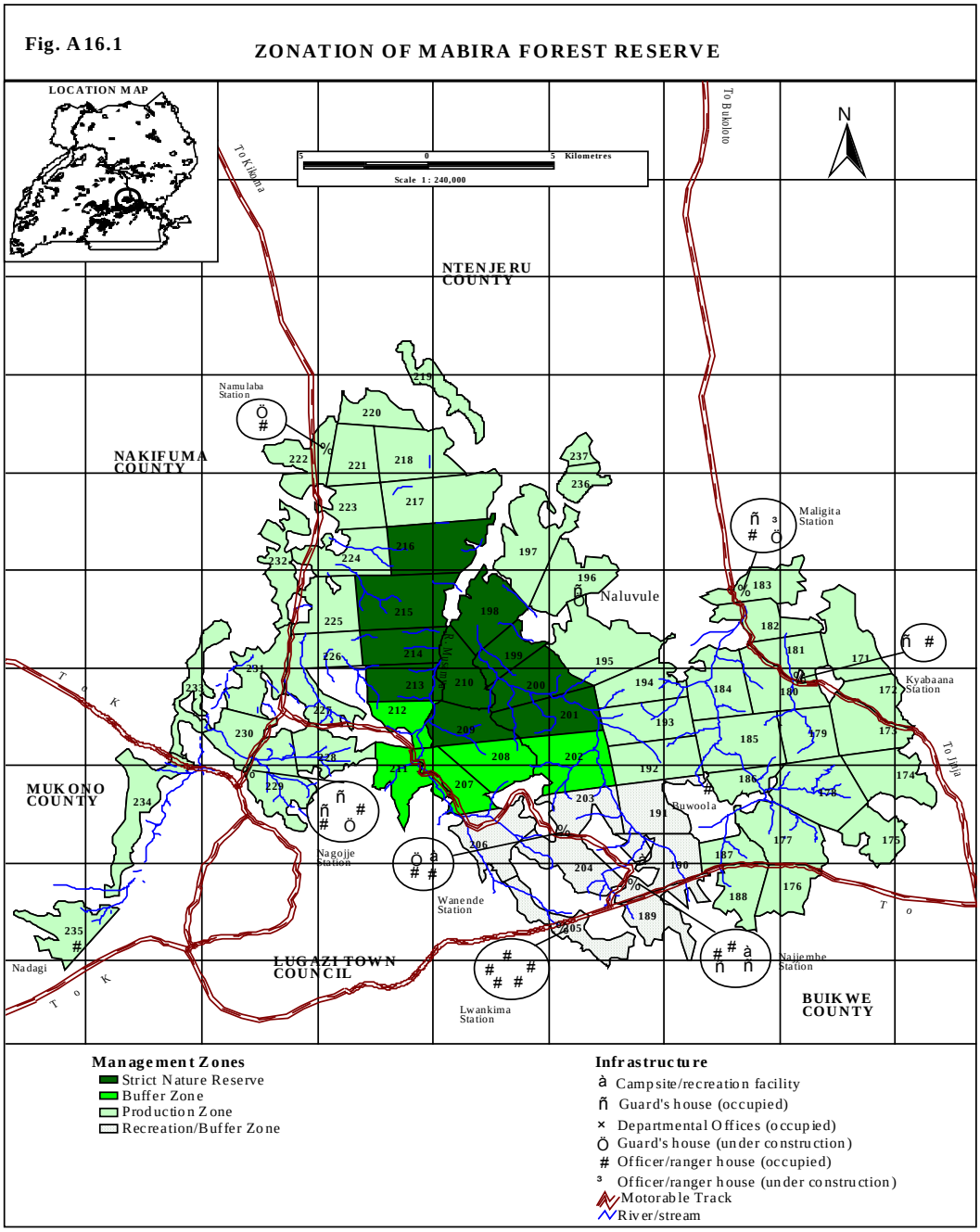


Figure 2: Map showing the zoning of Mabira Central Forest Reserve

1.3. Objectives of the study

The main objective of this study was to collect and summarize baseline socio-economic information for the six Conservation Forest Reserves (Mabira, Namakupa, Nandagi, Kalagala Falls, Namawanyi and Namananga). The specific objectives were to:

1) Assess the current socio-economic status of the households and factors exerting pressure on the forest reserves.
2) Understand community interactions with the forest resource in terms of entitlement, access, use, conflicts and regulatory policy and institutional frameworks.
3) Understand the demand and supply dynamics for value addition and marketing of key forest resources.

Analyse the socio-economic and livelihood strategies of households and local communities adjacent to the Mabira forest ecosystem.

CHAPTER 2: APPROACH AND METHODOLOGY

2.1. Study design

Prior to the study a reconnaissance survey was conducted in the study area. The study employed a combination of quantitative and qualitative survey methods. A reconnaissance survey was conducted to identify the community to participate in the study. Desk reviews, household and key informant interviews, focus group discussions as well as market surveys were conducted. The study covered communities within and adjacent to the forest at three distance locations i.e. <1 km (including enclaves within the forest), 1-3 km and 3-5 km. Desk reviews were undertaken to collect and review related secondary information on the management and conservation of Mabira ecosystem, livelihood strategies and forest resource use. A pre-coded semi-structured household questionnaire was used to collect quantitative data from a representative sample of 302 households during face-to face interviews. Key informant interviews and focus group discussions were used during interactive sessions with forest resource users, such as firewood collectors, charcoal burners, hunters, herbal medicine practitioners, brick burners, fisher folk, and craft makers, among others. Market surveys were conducted to explore market chains of key forest products (e.g. fuel wood, poles, fruits, timber and crafts).

2.1.1. Reconnaissance

A reconnaissance survey was conducted within the communities around the six CFRs in the three districts of Buikwe, Mukono and Kayunga. The reconnaissance survey provided critical information for refining the methodology and data collection tools. This survey was also used to pre-test the data collection tools, identify likely key informants and groups. And select villages and households for the follow up survey. During this phase, field assistants and enumerators were selected and trained. The field assistants and enumerators were selected based on their knowledge of the study area and communities, ability to speak the local language and their level of education. In addition, this stage was also used to introduce the study team to the relevant local leaders and resource managers.

2.1.2. Sample size determination and selection

The six CFRs were purposively sampled because of need to collect socioeconomic data from each of them as required in the TORs. Purposive sampling was also used to select participants in key informant interviews as well as focus group discussions, specifically targeting persons who were familiar with different forest resource issues. Given the discrete and itinerant manner in which some resource users (e.g. charcoal burners, brick makers, firewood traders etc.) operate, a snowball approach was used to trace practitioners. Initial informants were identified during the field reconnaissance visit. For each category of informants, additional interviews were conducted up to a point of saturation when no new information was emerging.

The sample size was determined based on Yamane (1967) formulae. Three hundred and two (302) households were obtained and distributed proportionately around the six CFRs taking into consideration three strata: <1km, 1-3km and 3-5km (Table 1) in the assumption that households were normally distributed and internally homogenous. This enabled assessment of spatial spread of forest dependences. Within each stratum, households were selected using random number tables generated in MS-Excel 2013.

Table 1. Distribution of sampled households across the 6 CRFs and strata

Central Forest Reserve (CFR)	Number of households by distance categories				
	Within <1 km	Within 1-3 km	Within 3-5 km	Total	Overall (%)
Mabira	44	64	65	173	57.28
Namukupa	8	17	14	39	12.91
Nandagi	7	10	25	42	13.91
Kalagala Falls	7	2	4	13	4.30
Namawanyi	2	3	1	6	1.99
Namananga	14	14	1	29	9.60
Total	**82**	**110**	**110**	**302**	
Total (%)	**27.2**	**36.4**	**36.4**		**100**

2.2. Data collection methods

2.2.1. Desk-based review of documents

A desk-based review of key documents was undertaken to collect and review related secondary information on the management and conservation of Mabira ecosystem, livelihood strategies and forest resource use. A review of previous reports provided information on different forest products and their utilization, contribution to community livelihoods as well as implications on forest management and conservation. Background information on environmental services as well as characterization of forest zones was gleaned from reports obtained from various sector players like MWE, National Association of Professional Environmentalists (NAPE), Uganda Forest Working Group (UFWG), Nature Uganda and others. The review also covered the policy and institutional context within which the study was premised.

2.2.2. Community meetings

Consultative meetings were organised in communities around each of the six CFRs. For each of the smaller reserves, one village was selected, while five communities were selected for Mabira CFR. A total of ten community meetings were held in the study. A checklist of questions guided the discussion on a wide range of issues. e.g. current livelihood strategies, alternative livelihood activities to forest resources, socio-economic value of forest resources, and trends in forest resource use, contribution of the forest goods, and services to their livelihoods, access and use of the forest resource, conflicts, regulatory policy and institutional frameworks, and community involvement in conservation activities, measures employed to maintain or enhance the applicable conservation attributes, perceptions on conservation of natural forests and related benefits, and effectiveness of the Mabira CFR Management plan.

2.3.3. Key informant interviews and Focus Group Discussions

Interviews with resource users sought to understand the drivers behind forest resource dependency. The study team held interactive sessions with firewood collectors, charcoal burners, hunters, herbal medical practitioners, brick burners, fisher folk, and craft makers among others that had been identified during the reconnaissance study. Resource users of each category were met either as a group or individually, depending on the situation on ground. In either approach, discussion rotated around issues e.g. quantities of resource harvested, quantity of tree products consumed and their sources; quantities of products, sale of forest products etc. This component used guided interviewing, critical observation and case histories as the main data collection techniques, guided by a customised checklist.

2.2.4. Household surveys

A pre-coded semi-structured household questionnaire was designed and used to collect quantitative data. The questionnaire was based on some of the issues raised during the KIIs for which quantitative data were required. Data were collected on: socio-demographic characteristics (e.g. household size, age-sex composition, ethnicity, settlement history etc.); land size, use and ownership; ownership of and size of private forests, encroachment of forest reserves; agricultural systems (i.e. crops grown, acreage, yields etc.); socio-economic value and utilization of tree and forest products; income sources and levels; as well as expenditure patterns.

The questionnaire was administered to selected household heads (or adult and responsible household members representing household heads) during face-to face interviews. Trained enumerators that are familiar with the Mabira ecosystem and conversant with the local languages conducted interviews. Data quality control was ensured through close supervision, review of completed questionnaires and validity checks.

2.3.5. Market surveys

Market surveys explored and profited market chains of key forest products (e.g. fuel wood, poles, fruits, timber and crafts). The aim of this survey was to determine the magnitude of pressure exerted on forest resources. A production to consumption system (PCS) approach was used to track products from the extraction to the consumption points. Non-formal interviews were also conducted with different segments of the chain to understand market structure, product modification, gross margins, as well as incentives and disincentives.

2.3. Data analysis

Data analysis was performed using descriptive statistics i.e. means, frequencies, percentages, totals and cross-tabulations generated in STATA 10 and Statistical Package for Social Scientists (SPSS) 17. SPSS was used mainly to perform Multiple Response Analysis (MRA). Data were also subjected to inferential statistical tests (*t-tests for determining mean differences between variables, and chi-square tests for determining relationships between categorical variables*). Qualitative data were analysed using discourse and content analysis techniques. The synthesized information was then triangulated through quantitative surveys, expert opinion and direct observation.

2.4. Quality assurance

Data reliability was determined using Cronbach's Alpha in SPSS 17. The reliability score of the data in this study was $\alpha = 0.5$ indicating that there was internal consistency within the dataset. Other quality assurance measures were mainly administrative so as to achieve the required deliverables. These included:

1. Obtaining letters from MWE introducing the team of researchers/consultants to the institutions, districts and local communities.
2. Involving local community leaders at village, parish and sub county levels in introducing the study to the communities.
3. Working with local community leaders in data collection (community mobilization, household interviews, market surveys).
4. Careful recruitment of research assistants basing on their level of skills and education as well as prior experience in conducting field research for related assignments.
5. Training of research assistants on the use of the data collection tools so as to achieve accurate and intended results from the field.
6. Supervision of all the fieldwork activities so as to ensure that the recruited research assistants carry out their designated tasks and within the time frame of the assignment.

7. Maintaining close communication between the consultants and the client's reference team to ensure they are updated on the progress of work and any new developments.

CHAPTER 3: DEMOGRAPHIC AND SOCIOECONOMIC CHARACTERISTICS

3.1. Demographic characteristics

3.1.1. Household headship and gender

A household is defined as a person or group of persons that usually lives and eats together (UBOS, 2012). A household head therefore, is that person in the household acknowledged as the head by other members by virtue of either his/her age, or social standing or responsibility (UBOS, 2012). Out of the 302 households included in the study, males headed 76.2%. However, in terms of respondents that participated in the baseline, 52.9% were males while 48.1% were females.

3.1.2. Household size

Household size is the average number of people living in a household (UBOS, 2012). This is usually a key determinant of household income, food security, and consumption/ expenditure patterns. In this survey, the average household size was 4.8 persons. This household size is very close to the national average of 4.7 persons. Within the enclaves (i.e. at <1 km from the forest), however, the average household size was 5.2 members. At longer distance from the forest i.e. 1-5 km, the average household size was 4.7 members (Table 2).

Table 2. Household size at different sampling strata

Distance (Km) from CFR	Average HH size	Number of Households
<1 km	5.16	82
1-2 km	4.65	110
3-5 km	4.74	110
Weighted mean	**4.82**	

The number of households living adjacent to CFRs increased by 31.3% i.e. from 48,268 households in 2002 to 63,374 household in 2014 (UBOS 2002, 2014; Table 3). The total population also increased by 27.6% over the years (2002-2014), that is, from a total of 63,374 people to 268,439 people in areas adjacent the six CFRs. Human population pressure is one of the principal causes of forest degradation and deforestation. Households living in and around Mabira CFR relied on the extraction of forest products to sustain their livelihoods (Nature Uganda, 2011). With increased human population, there is likely to be increased extraction of resources e.g. timber, firewood, poles and herbal medicines, which in effect may reduce the biodiversity of the CFRs.

Table 3. Trends in number of households and total population in sub-counties adjacent to the six forest reserves in the Mabira forest ecosystem over the period 2002-2014

Sub County	No. of Households		Total Population		% Change in No. of HHs	% Change in Total population
	Year 2002	Year 2014	Year 2002	Year 2014		
Kangulumira	9,453	11,889	43,703	53,339	25.8	22.1
Kimenyedde	6,869	8,429	31,081	35,871	22.7	15.4
Nagojje	6,996	8,468	28,482	34,606	21.0	21.5
Najjembe	6,559	8,165	27,233	33,410	24.5	22.7
Nama	8,035	13,865	33,004	54,999	72.6	66.6
Ntunda	3,025	3,296	13,412	15,182	9.0	13.2
Wakisi	7,331	9,262	33,397	41,032	26.3	22.9
Total	**48,268**	**63,374**	**210,312**	**268,439**		
Mean					**31.3**	**27.6**

3.1.3. Education level

Education status is usually associated with people's ability to access information, tap into employment opportunities and partake in community activities. The study indicated that 88.8% of the household members attained at least some formal education. However, half of household members (49.2%) had attained only primary level education, while 32.8% had secondary level education (Figure 3). The literacy rate of 88.8% in the Mabira communities is comparable to the national average of 72% (UBOS, 2014). However, given that majority of community members lack formal vocational training, there are limitations in vocational skills required for alternative income generating activities that would reduce pressure on the CFRs.

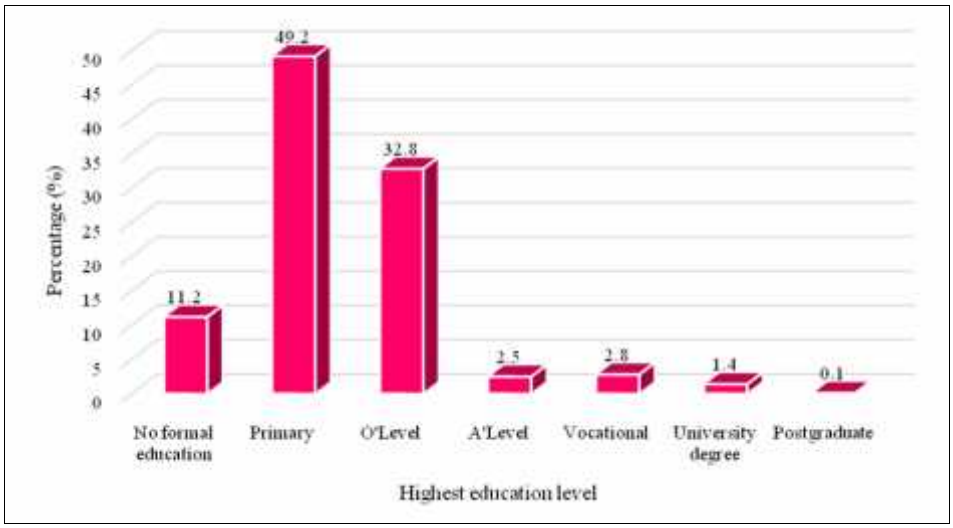


Figure 3. Education level of respondents in Mabira CFRs communities

3.2. Household income and sources

3.2.1. Perceived sources of household income

Crop production was reported to be the main source of income for 70.6% of households within and adjacent to Mabira CFRs while only 27.1% reported livestock as main source of income (Table 4). The main crops grown for income included coffee, bananas, maize, beans, sugarcanes and an assortment of vegetables. Livestock production on the other hand, includes rearing of cattle, goats, pigs and poultry. Other sources of income included casual labour (24.7%), trading in non-forest commodities (14.1%) and brick making (7.1%). It is worthwhile to note that the source of income varies with distance to the CFRs.

3.2.2. Income generated per source as proportion of overall household income

Primary sources of income generated an overall mean of UGX 2,440,333 annually representing 60.1% of household income. This means that primary sources of income contributed the highest amount of household income as a proportion of the overall household income earned in year 2015 (Table 5). For example, on average, crop production generated UGX 2,628,456 annually representing 57.8% of the overall household income from primary sources. In addition, harvesting/hunting and sale of forest products generated UGX 5,566,667 annually representing 79.3% of overall household income from primary sources. Trading in forest products generated UGX 1,298,889 annually representing 50.4% of overall household income from primary sources. Trading in other non-forest commodities generated UGX 1,885,526 annually representing 66.3% of overall household income from primary sources. Brick making crop production generated UGX 2,367,333 annually representing 77.6% of overall household income from primary sources. Casual labour generated UGX 1,239,688 annually representing 69.4% of overall household income from primary sources. However,

household income increased if a household engaged in secondary and or tertiary activities. As such, the annual household income would go beyond the average of UGX 2,440,333.

Although activities such as harvesting/hunting and trading in forest products contributed high percentages (i.e. 79.3% and 50.4% respectively) to overall household income, they might have significant effects on the CFRs if not well regulated.

Table 4. Sources of household income based on respondents' prioritization

Category of source of income*	**Actual source of income**	**% of respondents at different strata (distances) from edge of CFRs**			
		<1 km	**1-3 km**	**3-5 km**	**No. of HHs**
Primary	Crop production/peasant farming	17.8	25.0	27.7	206
	Harvest/hunt and sell forest products	0.7	0.3	-	3
	Trading in forest products	2.1	0.7	0.3	9
	Trading in other non-forest commodities	1.7	2.1	3.1	20
	Livestock keeping	1.0	0.7	1.4	9
	Brick making	1.7	2.7	1.0	16
	Hotel and restaurant business	0.3	0.3	0.3	3
	Civil service	1.0	1.0	0.3	7
	Casual labour	1.4	2.7	2.4	19
	Total	**27.7**	**35.6**	**36.6**	**292**
Secondary	Crop production/peasant farming	6.2	8.5	5.2	42
	Harvest/hunt & sell forest products	1.9	3.8	2.4	17
	Trading in forest products	0.5	1.4	0.5	5
	Trading in other non-forest commodities	2.4	5.7	5.7	29
	Livestock keeping	12.3	9.5	8.5	64
	Brick making	2.8	2.4	1.9	15
	Hotel & Restaurant business	1.4	1.9	1.0	9
	Civil service	2.4	0.5	-	6
	Casual labour	1.4	7.1	2.8	24
	Total	**31.3**	**40.8**	**28.0**	**211**
Tertiary	Crop production/peasant farming	4.7	7.1	1.2	11
	Harvest/hunt & sell forest products	2.4	1.2	1.2	4
	Trading in forest products	2.4	2.4	1.2	5
	Trading in other non-forest commodities	4.7	5.9	3.5	12
	Livestock keeping	8.2	14.1	4.7	23
	Brick making	3.5	3.5	-	6
	Hotel & Restaurant business	-	-	-	-
	Civil service	2.4	1.2	-	3
	Casual labour	8.2	5.9	10.6	21
	Total	**36.5**	**41.2**	**22.4**	**85**

* Sources of income were categorized as Primary, Secondary and Tertiary based on respondents' ranking according to importance. A source of income was considered Primary to a particular respondent if it was the main contributor to household income. Each respondent was required to mention three sources of income in order of importance i.e. primary, secondary and tertiary.

Table 5. Income earned per source as proportion of overall household income in year 2015

Source of income	Primary source (n=292)		Secondary source (n=211)		Tertiary source (n=85)	
	Average income (UGX)	% of total income	Average income (UGX)	% of total income	Average income (UGX)	% of total income
Crop production/ farming	2,628,456	57.8	612,865	20.9	259,556	11.9
Harvest/hunt/sell forest products	5,566,667	79.3	1,104,750	25.8	267,500	15.4
Trading in forest products	1,298,889	50.4	452,000	20.9	650,000	16.5
Trading in other non-forest items	1,885,526	66.3	1,464,483	29.2	2,890,545	21.2
Livestock keeping	2,986,667	41.5	1,065,755	23.7	374,783	18.3
Brick making	2,367,333	77.6	892,143	32.8	745,667	43.0
Hotel and restaurant business	1,173,333	49.0	1,243,500	35.4	-	-
Civil service	1,883,333	47.1	800,000	-	726,667	26.3
Casual labour	1,239,688	69.4	913,391	27.0	1,451,667	19.3
Weighted mean	**2,440,333**	**60.1**	**989,358**	**26.1**	**1030832**	**20.3**

3.2.3. Income generated from harvest and sale of forest products annually

The overall annual average income from harvesting and sale of forest products was UGX 2,312,972 (*Table 5b*). Specifically, harvesting and sale of forest products generated UGX 5,566,667 (USD. 1,740) annually representing 79.3% of overall household income for households that considered it as primary source. It also generated UGX 1,104,750 for HHs that considered it as a secondary source and UGX 267,500 for HHs that considered it as a tertiary source. Overall average annual income from the harvesting and sale of forest products decreased as distance from the edge increases implying that households located with 0km earned more income form forest products as compared to those located 3-5 km.

Table 6. Annual incomes from Harvest & sell forest products for HHs in year 2015

	Annual incomes from Harvest & sell forest products for Households				
Distance from forest edge	**Primary source UGX)**	**Secondary source (UGX)**	**Tertiary source (UGX)**	**Total Annual (UGX)**	**Mean annual (UGX)**
0km	8,000,000	229,250	400,000	8,629,250	2,876,417
1-2km	7,000,000	1,706,667	120,000	8,826,667	2,942,222
3-5km	0	1,050,000	150,000	1,200,000	400,000
Overall	**5,566,667**	**1,104,750**	**267,500**	**6,938,917**	**2,312,972**

3.2.4. Overall average income, ranking and proportion of household income per source

Households living within 3-5 km from the CFRs earned more income (UGX 4,506,645) from primary sources as compared to households living within <1 km (UGX 1,619,400) and 1-3 km (UGX 1,443,969). Given that crop production was reported as the main source of income at all levels (primary, secondary and tertiary) the reported differences in incomes could be attributed to the use of improved agricultural practices such as adoption of improved and or high value crops varieties and or engagement in contractual farming e.g. tea & sugarcane growing, and other IGAs e.g. fish farming and processing by households living within 3-5km.

Table 7. Overall income and proportion of household income earned in 2015 per source

Distance from CFRs	Income source	Average income (UGX) earned in year 2015	No. of households (n)	Percentage (%) of total income
<1 km	Primary	1,619,400	75	61.0
	Secondary	895,839	62	27.0
	Tertiary	500,645	31	24.8
1-3 km	Primary	1,443,969	98	58.4
	Secondary	734,964	83	27.7
	Tertiary	765,471	34	18.3
3-5 km	Primary	4,506,645	76	61.2
	Secondary	1,581,818	44	22.3
	Tertiary	2,157,857	21	17.2
Overall	Primary	2,431,602	249	60.1
	Secondary	984,889	189	26.1
	Tertiary	1,010,012	86	20.3

3.3. Household asset ownership

Household assets are key indicators of people's wellbeing at household level. This study considered household asset ownership based on items used for housing, agricultural production, conservation and health status.

a) ***Type of housing***

Most of the respondents (72.2%) reported that they live in iron-roofed houses as opposed to use of forest resources like papyrus, palm leaves, reeds and grasses. Iron roofed structures are considered better housing structures, associated with good incomes and improved wellbeing.

b) Agricultural technology and post-harvest infrastructure

In the communities surveyed most (77.4%) of the household used hand hoes as their main agricultural tool for land preparation. The use of such rudimentary technology signifies low investment in agriculture that translates into low output on-farm. In addition, a few households (1.7%) owned post-harvest storage facilities. Therefore, there is room for adopting improving good agricultural practices and better post-harvest handling facilities.

c) On farm tree resources:

Ownership of woodlots is a common manifestation of willingness to invest in tree resources on farms (REFs). Households that invest in woodlot establishment usually target sale of tree products e.g. poles and timber. Such households tend to be more wood secure and are less likely to exert pressure on natural forests for tree products. In this study, 14.6% of households in the communities around Mabira CFRs had woodlots, mainly of *Eucalyptus* spp., *Maesopsis eminii* and *Terminalia* spp. This implies that the majority of households get their wood, herbal medicines and fruits, craft materials, etc. from off-farm, which has resulted into many of these resources gaining commercial value. Sourcing of tree products off-farm may also signify high prospects of dependency on CFRs for these resources.

d) Means of transport and communication:

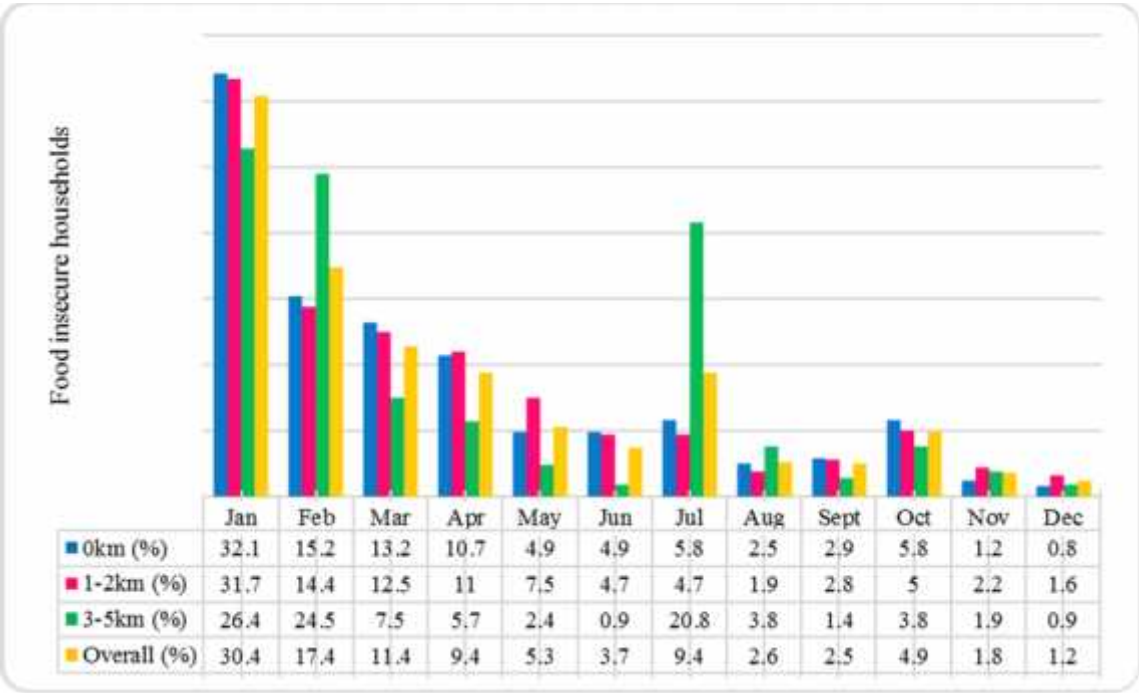
Mobility of persons, goods and information is a key aspect of community wellbeing as it supports trade, provides employment and enables access to opportunities within considerable distance from the locality (REFs). The means of transport and communication also indicates the level of economic advancement and wealth status of households and communities (REFs).

Household assets are a proxy indicator for the socio economic status and welfare of the household (UBOS, 2015). In this socioeconomic study, about a third (32.5%) of households owned bicycles, as compared to 32% UBOS 2015 national census values as the most common mode of transport. Three quarters (75.5%) owned radios as compared to the 59.6% UBOS 2015 national census values as the most common means by which the population received and shared information. Slightly over half of HHs (50.8%) owned mobile phones within 0-5km distance from the CFRs. Therefore, much as such high level of connectivity may be a basis for maintenance of networks that enable extraction and trade in forest products, they may also be vehicles for transfer of conservation messages.

3.4. Food security status

A household is considered food secure if it has adequate food from own production and/or purchases (FAO 2008; FAO 2006). In this study, all households surveyed reported experiencing situations of food inadequacy at some point during the year. Generally households around Mabira CFRs are food secure. The highest percentage of food insecure households was reported in January and the percentage reduced exponentially over the months of the year. The percentage of food insecure households varied with distance from the CFRs, with the household within 3-5 km registering a relatively lower percentage of food insecure households. The analysis also showed a significant difference *($t = 8.62$, $df = 272$, $p < 0.05$)* between household size and number of months households experienced food insecurity, with larger households being more food insecure than smaller ones.

It is important to compare the foregoing findings on food security with socio-demographic and resource use aspects of the study. Communities closest to the CFRs not only may posit higher populations, but are also more food insecure and rely more on the forest for their livelihood. It is likely that food insecurity is one of the key drivers of engagement in activities e.g. charcoal burning, brick making, logging that are destructive to the CFRs. Conservation efforts may consider incorporating strategies for agricultural intensification in forest enclaves and communities closest to CFRs, as a way of safeguarding households from food shortages.



	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
0km (%)	32.1	15.2	13.2	10.7	4.9	4.9	5.8	2.5	2.9	5.8	1.2	0.8
1-2km (%)	31.7	14.4	12.5	11	7.5	4.7	4.7	1.9	2.8	5	2.2	1.6
3-5km (%)	26.4	24.5	7.5	5.7	2.4	0.9	20.8	3.8	1.4	3.8	1.9	0.9
Overall (%)	30.4	17.4	11.4	9.4	5.3	3.7	9.4	2.6	2.5	4.9	1.8	1.2

Figure 4. Monthly trends of food insecurity of communities around the six CFRs

3.5. Livelihood strategies

During the reconnaissance visits and FGDs with the local community members and resource users, it was revealed that people living in communities around the Mabira ecosystem have had a long and intimate connection to the forest. Like many resource poor Ugandans, there is still dependency on environmental resources as the most readily available and accessible resource for household income enhancement (Obua *et al*, 2010). Strategies for management of the ecosystem therefore ought to be closely linked to peoples' livelihood systems if they are to be sustainable. This section bases on an analysis of current livelihood strategies to suggest alternative sources of livelihood that will enable harmonious coexistence of both local people and the forest resource within their vicinity.

3.5.1. Main livelihood activities

As for the main sources of income, crop farming (70.6%) and livestock keeping (27.1%) were reported as the main sources of livelihood; insinuating that the local people's livelihoods are agriculture-based (*See Table 4 above*). Agricultural production is smallholder, rain-fed and characterized by a wide assortment of crop enterprises. However, agricultural production is constrained by small farm size (2.4 acres), low inputs, pests and diseases and inadequate agricultural extension services. There is need for introduction of high value crops, improved crop varieties and improved livestock breeds as well as shifting to better methods of agricultural production to enable households realize optimal returns from their investment in agriculture, without necessarily encroaching on the forests.

Over 24.7% of households reported earning their livelihoods from small businesses. These mainly include sale of farm produce, retail shops and restaurants. Therefore, there is need to strengthen MSMEs to become more profitable, for example, through increased access to affordable credit and agricultural support through government programs e.g operation wealth creation, youth livelihood programs, women entrepreneurship fund, etc.

Most local based small businesses (MSMEs) barely break-even and can only enable households to survive (FSD Uganda 2015; MFPED 2011). This is attributed to poverty within the communities, inadequate capital, poor business management business skills, and competition among similar businesses. For such businesses to improve, there is need for attracting financial resources from outside the local context either through gaining access to novel markets or promoting in activities like ecotourism that increase disposable income within the local communities.

The other sources of livelihood are charcoal burning and brick making. Of the two, brick making carried out by 8.6% of the households is more pronounced. Although done on private land, some of the fuel wood requirements of these enterprises are reportedly addressed through illicit extraction of forest resources. It is apparent that involvement in charcoal burning and brick making activities is as a result of the quick returns that these enterprises provide even with minimal investment. With proximity to on-going construction boom and the rapidly urbanizing settlements in areas around Mabira CFRs e.g. Mukono, Lugazi and Kayunga, it is likely that the lure to partake in charcoal and brick business will increase even more. It will be necessary that alternative livelihood strategies are supported to offset the temptation for local communities to engage in overwhelming extraction of tree resources to sustain brisk charcoal and brick businesses.

3.5.2. Alternative sources of livelihood

In order to realize a balance between livelihood and ecosystem values of Mabira CFRs, it is important, first, that processes are put in place that offset the multiplicity of disincentives that characterize existing non-forest based livelihood options especially in agriculture and agribusiness. In light of the small farm sizes, proximity to urban centres and population characteristics, a number of options have been suggested that involve strategies for boosting, land productivity, enabling agricultural intensification, introduction of new lucrative enterprises, value addition and enhancing supply of tree resources on farms.

a) Improved agricultural practices

The Mabira ecosystem supports the production of different kinds of food ranging from crops to fish, wild game and fruits. With the exception of sugarcane and tea plantations, most crops grown by communities around the forest ecosystem are on smallholder farmlands. The crop gardens are mainly permanent and perennial. The informants in this study indicated that crop yields are good during the rainy seasons and the reverse is true. Crop production, however is constrained by problems of vermin (e.g. monkeys, rats, etc.) as well as pests and diseases (e.g. coffee berry disease, stem borer and BBW). Fruits, obtained from on-farm trees, local markets and the forests (wild fruits), have additional importance in supporting household health. Given rising food shortages, there is increasing commercialization of even traditional food crops. Declining crop yields also imply farmers have to incur hefty investment in agricultural inputs. Therefore, farmers have to engage in improved agricultural practices in order to ensure sustainable livelihoods. These practices include:

i. Mulching

Mulching is usually practiced using crop residues (e.g. maize stovers, banana peelings, bean stovers etc.) and banana leaves. This practice contributes to enhanced yields through improved moisture retention in situations where precipitation is erratic or intense. In addition, the plant biomass/mulch absorbs the force of falling raindrops allowing rainwater to gently infiltrate into the soil. It also enhances recycling of plant nutrients and soil organic matter, which are important in soil fertility improvement. Although this practice is sometimes done subconsciously since many crop residues are usually left on farms, some crops such as bananas are deliberately mulched. In most cases, however, the quantities normally used are insufficient for the practice to be effective. Moreover, alternative uses of crop residues, for example, for fodder and fuel, create competition for the resources required for mulching. Mulching may also be potentially dangerous since the mulches can harbor pests and diseases, which can affect subsequent crops.

ii. Crop diversification

Farmers tend to intercrop annual and perennial crops to provide for various products including fodder, fruits, vegetables and coffee. This provides for alternative income as well as improving the function of nutrient recycling. Due to serious land fragmentation, intercropping has become a major livelihood strategy for the farming communities. This helps to diversify income sources and food requirements. Crop diversification reduces the risk of crop failure, thus adapting to any effects of climate change /variability. Although crop diversification is beneficial in itself, farmers seem to be unaware of the best crop combinations for optimum yield/benefits. Therefore, it is important to strengthen farmers' capacity to utilize these crop diversification interventions to maximum benefit through agricultural extension programmes.

iii. Improved crop varieties

Recognition of decline in crop yields is becoming clearer to farmers in the Mabira ecosystem. Farmers in the area who used to eat bananas (Matooke) as a staple have now resorted to other

foods, such as maize meal (posho) which is now the dominant food due to the growing of the drought resistant Longe series of Maize varieties. In addition, the prevalence of diseases and pests, especially in bananas and coffee, requires that farmers adopt improved crop varieties to enhance their livelihoods. In fact, some key informants for this study reported that some farmers are planting wild coffee from Mabira forest reserve that they believe is more disease resistant than that grown on farm. Improved crop varieties are therefore important as a strategy for disease, pest and drought tolerance. However, access to these varieties is impeded by their high cost and inefficient distribution chains.

b) Use of crop residues for energy

Firewood is one of the most sought after commodities in the forests of the Mabira ecosystem. Although energy saving technologies such as stoves and solar energy have been options suggested for promotion by many development agencies, their adoption of may be hampered by cost and lack of adaptability to local practices. For example, some energy saving technologies may not be amenable to traditional practices as warming oneself at the fireplace, roasting maize and other foodstuffs such as cassava and potatoes.

There is an apparent linkage between lack of energy sources and forest degradation, which has compelled people to deforest landscapes in pursuit of alternative sources of livelihood. In the face of fuel wood shortage, use of crop residues as fuel is increasingly common practice. In the communities around the six forest reserves in the Mabira ecosystem, there is no apparent use of crop residues for provision of energy. There are only a few instances of the use of banana peelings for making briquettes. Since bananas are a major food/cash crop grown in the area, there is high potential for the use of banana residues for energy provision.

It should however, be noted that the removal of plant residues, such as maize stovers from the gardens drains the soil of its vital nutrients. In addition, crop residues are only available after harvest. Crop residues are sometimes not available because of periodic burning during the dry season. The use of crop residues for energy is also disadvantageous in that it requires constant attention to the fire during cooking given their lower calorific value compared to firewood. This livelihood option may also be difficult to implement in the short run due to the availability of sources of wood energy in the nearby forests. It requires concerted efforts, especially by the private sector and civil society, to teach the communities in the use of crop residues for energy provision.

c) Community ecotourism

Ecotourism is a growing activity and contributes a potentially valuable non-extractive use of tropical forests. Mabira MPA has great potential for tourism extending from River Nile, Kalagala falls, Griffin falls, caves of Nakalanga, Kiwaala falls cultural heritage to the undulating hills and the wide valleys around the Lake Victoria crescent. A great deal of attachment still exists among locals to cultural values associated with the trees, falls and caves where they go to worship. There is high interest in ecotourism in Mabira due to the fact that it is the only tropical high forest protected area within the Lake Victoria shore crescent. Mabira is also close to the urban centres of Kampala (53km) and Jinja (21km) and is endowed with above average biodiversity richness.

Community eco-tourism potentials of Mabira would benefit from development and proper management of cultural sites e.g. Buwoola, Dangala, Kasokoso, Sese, Namusa, Namaganda, Nakalanga, Maligita, and Kiwaala. Community ecotourism involving communities participating in tourism activities like performing cultural dances, making crafts products for sale, offering guide services to visitors, putting up accommodation facilities such rain forest

lodges also has good prospects of expanding livelihood options. In addition, there is need to establish a linkage between the existing ecotourism sites with the local communities so that the tourists that visit these sites are encouraged to visit these communities to see their way of life, agricultural practices, cooking, housing, culture etc.

There are already ecotourism facilities e.g. Ecotourism Centre operated by the NFA, Ecolodges and MAFICO, which imply an accelerated growth in ecotourism in Mabira CFR. Part of Kalagala Falls CFR, located along the River Nile in Kayunga district has been licensed to Adrift for tourism development. Engagement of local guides in monitoring of tourists will not only safeguard the integrity of the forest resource but provide employment to residents of forest adjacent communities.

d) Agroforestry

Growing trees in combination with crops and livestock is an old practice. Several factors contribute to the increased interest in agroforestry including high pressure on existing natural forests, diversifying farming to guard against effects of crop failure and provision of household wood requirements. Several projects and institutions that have worked in the Mabira forest ecosystem have identified agroforestry as a major intervention area for alternative livelihoods. However, its impacts are not easily quantifiable despite the many projects and resources that have promoted it as a major livelihood option. Some of the agroforestry practices that enhance livelihoods include taungya, home gardens, growing multipurpose trees and shrubs on farmland, boundary planting, farm woodlots, improved fruit tree gardens, water conservation hedges, fodder banks, live fences, trees on pasture and apiculture with trees. Of particular importance in the Mabira ecosystem, however, is coffee agroforestry, since coffee is a major crop commodity of the area.

i) Integrated crop-livestock systems

Integrating crops and livestock on-farm can improve farm productivity and enhance household food security and income. This system is an important way of managing nutrients on the farm. In the Mabira ecosystem, farmers are becoming increasingly aware of the need to use some form of soil fertility enhancement if they are to realize the expected yields. Manure is a valuable input but is often neglected in livestock and mixed farming systems. Application of farmyard manure is practiced in some homes in the Mabira ecosystem. While this system offers immense benefits, it is often a source of conflicts in the communities arising from inadequate management, especially of livestock. For example, domestic animals may stray and destroy crops on-farm and neighbors' farms causing serious misunderstanding among households. In addition, there is a limit to the number of livestock that can be accommodated on a particular farm. Large animals such as cattle cause soil compaction, even for zero grazing units in the plots where they are located.

ii) Shaded-coffee agroforestry

Coffee is a major cash crop in the central region of Uganda, and has been grown by farmers for generations. Robusta coffee is more common in the Mabira landscape, where it has traditionally been grown under the shade of a variety of trees like *Ficus natalensis*, *Cordia africana*, *Maesopsis eminii* and fruit trees such as mangoes and avocadoes. In addition to providing shade to the coffee, the trees also provide farmers with various products such as fuel wood, poles, food and timber. A shaded coffee system permits integration of other crops grown as under storey, allowing for intensification of production, and thus increasing overall farm productivity.

Whereas there is high demand for tree products in the coffee growing areas, land shortage rarely permits allocation of land specifically for tree growing. Shaded coffee agroforestry thus presents an opportunity for realizing both environmental and livelihood benefits through integrating trees on coffee farms.

Coffee being one of the main cash crops for Uganda, already has well established marketing systems. The liberalization of the coffee sub-sector brought on board many private actors, thus improving the efficiency of production and marketing of coffee and its products. Uganda is considered a first-line supplier to the world's coffee industry. To maintain this status, the Uganda Coffee Development Authority (UCDA) and the Ministry of Trade and Industry (MTI) work to ensure sustained production of high quality coffee and promoting Uganda's coffee to the outside markets. International importers have paid a premium for shaded coffee because of its good cup quality.

Nonetheless, coffee is a bulky product and its transportation requires a good road network for easy access by traders or buyers from the farmers. Coffee producers around Mabira stand to benefit from their relatively close proximity to urban bulking points in Kampala, although streamlining market access further eliminates disincentives to the enterprise. There is also need to revive and strengthen farmer cooperatives to enable bulking of their product and ease the buyers' accessibility to their products.

e) Smallholder dairy

Smallholder dairy can be a means to household wealth creation and agriculture-led economic development. The enterprise gaining popularity due to increasing demand for milk by consumers and milk processing plants, better herd management, adoption of improved breeds and the improved animal health and support services. A major improvement to the practice involves introduction of improved fodder shrubs. Integration of fodder shrubs on farms assures livestock farmers of a reliable and easily accessible source of quality fodder for the livestock, which improves livestock health and enhances milk production. Animals fed on legume shrubs also produce high quality manure, since their leaves are rich in Nitrogen. With increased pressure on the land as is characteristic of the Mabira landscape, and grazing areas are rapidly diminishing, smallholder dairy enables the inevitable shift to the use of more intensive production strategies.

The purchase and proper management of improved livestock is the major financial requirement in this enterprise. Requisite infrastructure for the success of the enterprise is an efficient marketing system for milk, which is the main product. Good prices for milk are also a precondition for the success of the practice. Cooling facilities are necessary in order to reduce milk losses. However, these facilities are costly and require that value chain actors pool resources to purchase them. This may require that milk producers or traders are organized into dairy cooperatives.

f) Zero grazing

Zero grazing is a system of feeding cattle or other livestock in which forage is brought to the animals that are not allowed to graze freely. This practice is an important adaptation in situations of scarce pasture or where grazing lands have been converted to croplands and human settlements. Zero grazing usually involves the rearing of improved livestock breeds which, compared to local breeds, are an opportunity for better prices from livestock products. Fodder is an important input in this practice. Indigenous grasses such as Kikuyu grass are the main type of fodder, although a few farmers have planted Napier grass (KSOER, 2004). These are often supplemented with crop residues e.g. maize husks, maize leaves and banana

stems. However, zero grazing is hampered by the high investment cost, especially in procuring the improved livestock breeds as well as their feeding and veterinary care. This makes zero grazing inaccessible to the poorest of the poor.

g) Production pharmaceutical farming

Medicinal extracts from plants play an important role in the health of millions of people in Uganda. The importance of production pharmacy is more evident today, considering the fast receding populations of medicinal plant species. This presents various challenges that justify investment in production pharmacy in communities adjacent to CFR in the Mabira ecosystem. Salient among these are: i) drug resistance to synthetic medicines, ii) lack of medical remedies for some illnesses, such as cancer, HIV/AIDS and various chronic conditions; and iii) growing human population which puts pressure on available medical resources.

Unfortunately, certain plant species known to be medicinal (e.g. *Prunus africana*, *Spathodea capanulata*, *Warburgia ugandensis* etc.) are being indiscriminately harvested and are becoming increasingly threatened. There is need to domesticate medicinal plants so that forest dependent communities can grow their own medicinal plants outside the natural forests. In addition there is need for investment in efficient methods of propagating, harvesting, processing and marketing of the selected medicinal plants. There is also a wealth of indigenous knowledge on medicinal plant species, which if properly documented can earn patent rights to its originators.

Investment into production pharmacy development in Mabira ecosystem should target value addition to the various tree and plant products and extracts. There is need for building capacity to extract plant derivatives for human and livestock medicine, botanicals and beauty products. The increased use of forestry/biodiversity in pharmacy provides justification for not only conservation, but also community investment in high value medicinal plants as a source of livelihood.

h) Fruit processing

Tropical fruit trees, especially citrus, mangoes and avocados grow well in most parts of central Uganda. Unfortunately, farmers in communities around Mabira forest have not explored this potential and mainly depend on traditional sources of income especially sale of crop and livestock produce. Due to lack of access to improved germplasm, there is also a mismatch between the types farmers grow and those demanded by the market.

Promotion of improved and highly marketable mango, avocado and citrus germplasm into the agroforestry systems in farming communities around Mabira forest is a potential area for investment. The enterprise supports livelihoods through improved food security, nutrition and income of the farmers and other actors along the value chain.

Development of the fruit processing enterprise relies heavily on farmers' capacity to realize sufficient volumes to sustain investment therein. This therefore demands that production constraints are addressed, especially by enhancement of farmer's knowledge and skills on grafting and management of improved fruit trees. There may also be lessons to draw from Kayunga, one of the target districts for fruit industry development under the Ministry of Agriculture's Agricultural Sector Strategic Plan (ASSP). Although focus there is on pineapples, similar advancements can be embarked upon for other horticultural products.
Improved livelihoods (enhanced nutrition, increased income, and more robust risk mitigation)

i) Tree planting

Establishment of forest plantations and woodlots by communities in the Mabira ecosystem is a very profitable venture if taken up by people in the communities. Tree planting as a livelihood option however faces the problem of acceptability as it usually involves drastic

change of land use, especially in view of the small landholdings (0.5 – 2 acres). Growing of trees on such meager pieces of land inevitably requires careful assessment of various trade-offs as are usually involved in an agroforestry system. The cost of acquiring tree seedlings is an additional encumbrance to prospective tree growers.

j) Avoided deforestation

Avoided deforestation involves any measure that prevents loss of forests. Avoided deforestation in the Mabira ecosystem should be promoted by curbing encroachment, finding alternative land for expansion especially of the sugar cane as well as tea companies, reforesting formerly degraded areas of the forest and allowing neighboring communities to harvest herbal medicines, firewood and other minor forest products. The National Forest Authority has entered into Memoranda of Understanding (MoU) with communities allowing them to harvest these products on certain days of the week. In addition, the NFA has also entered into agreement for Collaborative Forest Management that is involving neighboring communities in the conservation and management of selected compartments of the forest. It is therefore possible to provide alternative livelihoods through avoided deforestation.

However, avoided deforestation is a costly measure to implement since it requires enforcement and maintaining natural forest cover in areas of high population density such as Mabira ecosystem can be viewed as anti-people. For example, arrests of forest encroachers in the six forest reserves in Mabira ecosystem, is always a major cause of apprehension in local communities towards NFA staff. This measure may also be a challenge to extend to private lands given its close association with protected areas.

CHAPTER 4: LAND USE AND CROP PRODUCTION

4.1. Land use

4.1.1. Land size

Land is one of the major primary factors of agricultural production. Landholdings in the Mabira ecosystem are characterized by small pieces of land per household. The average land ownership by households in and around Mabira forest ecosystem is 2.4 acres (Table 7). Households within enclaves (<1 km from forest) own an average of 2.8 acres, while those 3.5 km away from the forest owned 2.2 acres. This implies that apart from SCOUL, the small landowners have less opportunity for investment and can accommodate only a few enterprises to support their households. This compromises conservation efforts of the nearby forests, as inadequate land drives the quest for alternative sources of livelihood.

Table 8. Household average land size by distance from CFRs

Distance (Km) from CFR	Average	95% Confidence interval	
	Land size (Acres)	Lower bound (Acres)	Upper bound (Acres)
0 Km	2.8	2.0	3.5
1-2km	2.4	1.8	3.1
3-5km	2.2	1.4	3.0
Overall	**2.4**	**2.0**	**2.9**

4.1.2. Land tenure

Land tenure refers to the way land is owned, occupied, used and disposed of within a community (EPRC, 2000). The main land tenure systems in the Mabira ecosystem are registered freehold, leasehold and 'Kibanja' (Tenants). Within the enclaves and some areas adjacent to Mabira CFR, mailo land comprises the main form of land tenure system. Only a few households have leasehold status on land in the study area. The majority of the farmers in the area has no land titles and therefore do not enjoy security of tenure. Land resource and tenure rights are sometimes overlapping promoting conflict and impeding development. Insecure land tenure poses a threat to conservation of neighboring forests given the uncertain rights of occupants. Tenants on kibanja land do not even have security of tree planting as this may be prohibited by the bonafide land owners.

4.1.3. Land use

Land use refers to a series of activities or operations on land, carried out by humans, with the intention to obtain products, and/or benefits through using land resources. The Mabira forest ecosystem consists of Mabira forest CFR, as the main forest block together with five smaller forests. These constitute the largest portion of land in this area that is forested, and is surrounded by agricultural land, which is utilized for small-scale as well as large-scale plantation agriculture (sugarcane and tea). The Sugar Cooperation of Uganda Limited (SCOUL) is the largest agricultural estate in the area, utilizing over 15,000 hectares as nucleus estate and 3,000 hectares from small out growers (Nature Uganda, 2011).

4.2. Crop production

4.2.1. Major crops cultivated by households

Crop cultivation is land demanding and their cultivation is mainly for home consumption, household income and food security. Households adjacent to CFRs are highly dependent on crop production as their main source of livelihood. The households

cultivate both perennial and annual crops for both income and food security. Based on proportion of farm area, banana/coffee intercropping is the most prevalent (22.5% of total farm area). This is followed by sugarcane from out growers at 20.8% and coffee at 18.4%. Whereas bananas are the most popular staple food, cultivation of this crop as a monoculture takes up only 16.8% of total farm area. While sweet potatoes and cassava take up only about 13% of total farm area, they are cultivated by a relatively large number of farmers, 78% and 74% respectively. The above statistics clearly indicate a food security and income generation strategy by farmers. Sugarcanes have ready market at the nearby SCOUL and Lugazi sugar factories. Coffee on the other hand, is a very lucrative source of income and is widely grown together with bananas.

4.2.2. Crop production constraints

Crop production in the Mabira ecosystems is characterized by several challenges that limit yields. Households reported facing significant challenges in agricultural production. The main challenges include insect pests, crop raiding by vermin, poor soils, inadequate land for agriculture, lack of access to markets for agriculture produce and post-harvest losses.

There are several strategies that farmers are attempting to use to cope with these challenges. These include spraying of chemicals to control pests and diseases, application of fertilizers and use of improved varieties. Vermin are usually controlled by chasing them away and sometimes by trapping and killing them. Many farmers solve the problem of land shortage by renting land for agricultural production. There are also several roadside stalls and kiosks where agricultural produce are sold to enhance marketing opportunities.

CHAPTER 5: ACCESS, UTILISATION AND MARKETING OF FOREST PRODUCTS

5.1. Access to forest products

Access to forest products is a fundamental policy issue in multiple use forestry. Access and ownership rights result from historical, traditional/cultural and institutional developments and reflect, among other things, existing land use patterns and availability of forest resources. There are several forms of access and property regimes ranging from open access, to more secure and regulated forms. Within the Mabira ecosystem, access to the six CFRs is strictly regulated. Outside the CFRs, the landowners may regulate access to forest products on people's land. In this study, 55.3% of households (n=167 HHs) reported having direct access to forest products (Table 8). Of these, about 100% are located within or less than one km from the forest. About 55% of the households located 1-2 km and 23% of households located 3-5 km from the forest reported having direct access to forest resources. In terms of gender, a larger proportion (50.13%) of male-headed households reported having access to forest resources as compared to 43.06% of female-headed households. These results suggest that, notwithstanding the type of access (permitted or not permitted), communities living adjacent to Mabira CFRs depend on the forest to some degree for their livelihood. This suggests that dependency levels are localized and higher in communities within 3 km distance or less from the forest reserves.

Table 9. Access to the forest reserves

Distance to the forest edge	**% of households (cases) within category**	**Number of Households (n)**
<1 km	100	82
1-2km	54.55	110
3-5km	22.73	110
Overall	**55.30**	**302**
Gender of Household head	**% of households (cases) within category**	**Number of Households (n)**
Male	50.13	230
Female	43.06	72
Overall	**55.30**	**302**

Forest products accessed from the forests include firewood, timber, poles, rattan canes, charcoal, water, climbers (for basket), medicinal herbs, fruits and wild yams. The most important forest products in order of mention by respondents are firewood, water, poles, timber and fruits. In the case of some forest products, such as water, government has constructed water sources for community access (Figure 5). Access to these forest products, however, varies depending on distance from the forests. Except for grass and clay/bricks, which were reported by households over 3 km from the forest (these activities are conducted outside the forest reserves), the rest of the other forest, products are more accessible to households closer to the forests. Over 36% of households located <3 km from the forest reported having access to firewood for either domestic or commercial use. This is significantly different (χ^2=6.36, p<0.05) compared to 14% of households situated 3-5 km from the forest. A similar pattern was reported for access to poles and other forest products (Table 9). This implies that households located up to 3 km from the forest have more access to (or have higher dependence on) forest products compared to those further away.

Table 10. Access to forest resources relative to distance from the reserves

Forest resource & Total No. of HHs that responded (n)	Distance from edge of Forest and HHs that accessed the resource[1]			Overall	Test statistic	
	<1 km	1-3 km	3-5 km	0-5km	Pearson Chi2 (df=2)	*Pr-value*
Firewood (n=143)	91.07% (n=51)	88.14% (n=52	71.43% (n=20)	86.01% (n=123)	6.3629	0.042*
Timber (n=108)	16.28% (n=7)	5.26% (n=2)	7.41% (n=2)	10.19 (11)	2.9797	0.225
Poles (n=108)	34.88% (n=15)	10.53% (n=4)	7.41 (n=2)	19.44% (n=21)	10.9708	0.004*
Rattan canes (n=105)	7.14% (n=3)	2.78% (n=1)	3.7% (n=1)	4.76% (n=5)	0.9042	0.636
Grass/Thatch (n=104)	2.44% (n=1)	2.78% (n=1)	14.81% (n=4)	5.77% (n=6)	5.4927	0.064**
Charcoal (n=107)	19.05% (n=8)	23.68% (n=9)	22.22% (n=6)	21.5% (n=23)	0.265	0.876
Clay brick making/pottery (n=99)	2.56% (n=1)	3.03% (n=1)	7.41% (2)	4.04% (n=4)	1.096	0.578
Sand (n=99)	0.0% (n=0)	0.0% (n=0)	3.7% (n=1)	1.01% (n=1)	2.694	0.260
Water (n=112)	100% (n=45)	55.0% (n=22)	40.74% (n=11)	69.64% (n=78)	34.3402	0.00*
Game meat (n=100)	0.0% (n=0)	2.94% (n=10)	3.7% (n=1)	2.0% (n=2)	1.3494	0.509
Climbers (for basket) (n=101)	0.0% (n=0)	11.43% (n=0)	0.0% (n=0)	3.96% (n=4)	7.8539	0.02*
Herbs/herbal medicine (n=108)	29.55% (n=13)	27.78% (n=10)	14.29% (n=4)	25.0% (n=27)	2.3473	0.309
Fruits (n=105)	16.28% (n=7)	14.29% (n=5)	0.0% (n=0)	11.43% (n=12)	4.7656	0.092**
Wild yams (n=99)	5.13% (n=2)	3.03% (n=1)	0.0% (n=0)	3.03% (n=3)	1.4279	0.49
Eco-tourism (n=94)	2.63% (n=1)	6.9% (n=2)	0.0% (n=0)	3.19% (n=3)	2.217	0.330

***** significant at 5% level; ******significant at 1% level; ******* significant at 10% level.

Figure 5. Collection of water from the Mabira forest, along the main Kampala – Jinja highway

Figure 6. Collection of water from the Mabira forest, along the main Kampala – Jinja highway

[1] Data were analysed out of 100 percent within each distance from the CFR.

Overall extraction of timber (or logging for timber) and harvesting of poles are not permitted in the CFRs (Table 10). Unlicensed loggers, however, continue stealthily cutting trees illegally.

Table 11. Summary of access control on forest products

Product/activity	Permitted	Not permitted	Other remarks
Fuel wood	Domestic/ community use	Commercial use	Domestic/ community use allowed /controlled by firewood days[2].
Timber/logging	-	Domestic /Commercial/Community/ Institutional	• Only permitted through licensing. • Private tree planters can harvest timber within their licensed areas.
Building poles	-	Domestic /Commercial/Community/ Institutional	• Protection /Law enforcement against illegal access carried out by NFA • CFM communities are permitted to use what has been planted within their allocated area. • Private tree planters can harvest poles
Craft material	Small scale users/Artisans	Commercial	• Resources are very rare, almost non-existent. Collectors cover long distances to sources. • Commercial extraction is only permitted through licensing.
Charcoal	Post-harvest conversions	Commercial/ Institutional	• Under CFM arrangements between COFSDA and NFA. • Can be authorized as a post-harvest activity and after assessments by CFM communities.
Clay	-	Domestic /Commercial/ Community/ Institutional	Regularizing of this activity to facilitate CFM process with EIA and restoration plans under pilot by NFA
Water	Domestic use	Commercial use	Small-scale commercial activity may be allowed if methods of extraction are sustainable.
Climbers	Domestic use	Controlled commercial use	Commercial use is based on a license obtained from NFA after establishing adequate quantities through an inventory.
Herbal medicines	Domestic use	Controlled commercial use	Commercial use is based on a license obtained from NFA after establishing adequate quantities through an inventory.
Wild fruits	Domestic use	Controlled commercial use	Commercial use is based on a license obtained from NFA after establishing adequate quantities through an inventory.
Traditional worship	Cultural	Commercial	Right of worship. Cultural sites recognized by NFA to promote tourism. May be regulated if the motive for worship if profits.
Eco-tourism	Domestic use	Commercial	Permitted with locals serving as guides.

There are several uses to which the various forest products are put, including:

Charcoal: Charcoal is the most heavily consumed energy source that is used for cooking in

[2]The firewood day are decided and agreed upon between the communities and NFA

the urban areas of Uganda. Charcoal is also used as a fuel in several industries and institutions. Charcoal business has for long provided employment and income to youthful sections of the local population. Charcoal burning is the main and often only source of cash income used to support their families. Sometimes, trees are cut from inside of the forest and logs are either burnt stealthily in the middle of the forest where one cannot be easily seen by passersby and forest rangers, or transported and burnt on private land – *bibanja*, where it is less risky. However, most charcoal burning was on private land.

Charcoal burners mainly work as individuals and are usually assisted by household members. Occasionally, casual laborers are hired to fell and cut the trees into logs, after which family labor takes over the other tasks (e.g. keeping guard over the kiln and transporting the finished product). In most cases, charcoal burning is done due to lack of alternative sources of livelihood. For example one of the community members noted that:

"……charcoal burning is the easiest way to make money, because you do not need a lot of capital"……. A resident of Kimenyedde Parish, Kimenyedde S/C in Buikwe district.

From the forest reserve, the charcoal is then transported to their homes where it is stored or directly taken to the urban markets for sale. The quantities produced and transacted in vary widely depending on the scale of operation. Information obtained from FGDs indicated that approximately 5-7 bags are produced per kiln (Figure 6) from each burning expedition. The charcoal burnt by the local people near the forest was mainly sold directly for income. Charcoal burning activities are significantly affected by seasonal variations in weather, with business most profitable during the rainy season when prices tend to shoot upwards. This is attributed to difficulty involved in accessing the charcoal from the forest due to the slippery roads and scarcity of charcoal on the market. In Kampala, a fully packed sack of charcoal costs between UGX60,000-UGX70,000.

Figure 7:Charcoal kiln in Buvuunya, Compartment 176 of Mabira

Firewood: Firewood is the most important source of energy for domestic cooking in the community. In the past, firewood used to be collected from the forest by gathering dead branches without necessarily cutting down the trees. Firewood gatherers could also make preference between tree species, opting for those with strong and hard fuel wood e.g. Muvule (*Milicia excelsa*), Musizi (*Maesopsis emnii*), Emikebu (*Cordia millenii*) and Ntasesa (*Prunus africana*).

There are two categories of firewood collectors, i.e. domestic users who fetch small amounts on a regular basis for household cooking, and commercial users who cut large amounts for sale (Figures 7 and 8). To date, there are no restrictions on the collection of firewood for domestic use. Unlike domestic consumers who are not restricted, commercial collection of firewood is restricted and requires authorization from forestry officials

Figure 8. Firewood on sale at roadside in Mukono

Figure 9. Children carry firewood for domestic use

Harvesting and sale of firewood involves various individuals depending on the quantity of firewood required. One local firewood dealer in Najjembe pu it thus:

"…… …Most of the work is done by an individual although some firewood dealers hire laborers to assist them. Three categories of personnel are usually involved, i.e. the investor ('Omugagga') who owns of the business, the casual laborers ('Kanyamas') who load the firewood, and the transporter of the firewood. Firewood business takes place all year round, but peaks around the onset of the school terms and in the dry season when many brick burning activity is high……" ….Local community and firewood dealers around the MCFRs

Herbal medicine: The diversity of medicinal plant species in the forest has attracted many herbal medicine collectors from other parts of the country. Some of these harvest large quantities of medicinal products compared to local collectors. Commercial collection of medicinal herbs therefore presents a major concern on the biodiversity of the forest, considering that it only requires a permit from an organization to which you are affiliated (e.g. NACOTHA, Uganda n' Eddagala Lyayo) for one to engage in this highly extractive business. Information from local herbalists during FGDs indicates that many medicinal species are becoming scarce.

The locally based herbalists interviewed are involved in this activity on a small scale, only collecting small quantities of herbs for domestic use and for supplementary income generation. Many of the herbalists in the local community have alternative sources of income e.g. crop cultivation and small scale retail business from which they derive most of their livelihood. Besides supplementary income generation, herbal medical practice is also done for purposes of self-medication and also as a social obligation.

The local community and resource user groups also mentioned other forest products accessed and used from the Mabira CFRs (Figures 9 – 12).

Figure 10. Roasted chicken and meat mounted on sticks for sale at Najjembe, Mabira forest

Figure 11. Poles and timber on sale in Lugazi

Figure 12. Processed timber on sale in Lugazi

Figure 13. Grass harvested from the Mabira forest

5.2. Marketing of forest products

5.2.1. Trade in forest products

A majority of households that have access to the forests do not sell the products. Only 14% of households reported selling forest products. Of these, 69% reported selling the forest products to other households in the community, while 18% reported selling to retail traders. Brick makers were singled out by about 5% of the respondents as the buyers of their products, especially firewood. However, the majority of the households apparently access forest products for their subsistence use.

5.2.2. Prices of forest products

Over the last two years the demand for forest products such as timber, charcoal, poles, and fuel wood have more than doubled (New Vision, Aug 13, 2016). Because of the high demand, prices of the forest products in the destination markets (e.g. Kampala, Mukono, Lugazi, Jinja, etc.), the prices of forest products were highly varied depending on the type of the product harvested/accessed. Tables 11, Table 12 and Table 13 indicate a general synopsis of the prices of selected forest products around Mabira and compares them with those of Kampala.

Table 12. Market prices for some timber species in Mabira Central Forest Reserves

Tree Species	Timber Dimensions	Price (UGX)
MUSIZI (*Maesopsis eminii*)	3" X 2" by 11 to 12 ft	3,000
KALITUNSI (*Eucalyptus grandis*)	3" X 2" by 11 to 12 ft	3,000
MUSIZI (*Maesopsis eminii*)	12" X 1" by 7 ft	7,500
MVULE (*Milicia excelsa*)	12" X 1" by 7 ft	12,000
MUGAVU (*Albizia coriaria*)	12" X 1" by 7 ft	12,000
MVULE (*Milicia excelsa*)	4" X 2" by 7 ft	7,000
MUGAVU (*Albizia coriaria*)	4" X 2" by 7 ft	7,000
MVULE (*Milicia excelsa*)	6" X 2" by 7 ft	10,000
MUGAVU (*Albizia coriaria*)	6" X 2" by 7 ft	10,000

Table 13. Indicative prices of fuel wood in Mukono town

Units of sale	Description	Price (UGX)
Truck load	Elf	100,000
Pile	3 ft wide by 3 ft high	20,000
Bundle	5 pieces	2,000

Table 14. Relative prices of forest products around Mabira CFRs

Forest resource	Access (% households)	Mabira Price (UGX	Kampala Price (UGX)	Units
Firewood (n=140)	87.14	2,000	4000	Bundle
Water (n=112)	69.64	500	1000	Jerry cans
Herbs/herbal medicine (n=108)	25	5000-7100;	15,000	Sack
Herbal (*Warubugia ugandensis*)		150000-170000	>450,000	Sack
Charcoal (n=107)	21.5	20,000	70,000	Sack
Poles (n=108)	19.44	1,250	6,000	Pole
Fruits (n=105)	11.43	9,000	12,000-15,000	Basket
Timber (n=108)	10.19	18,725	40,000-80,000	Piece (length 10-12 feet)
Grass/Thatch (n=104)	5.77	1,250		Bundle
Rattan canes (n=105)	4.76	1,500		Bundle
Clay (for pottery/brick making) (n=99)	4.04	7,550		Wheelbarrow
Climbers (for basket) (n=101)	3.96	500		Bundle
Game meat/fish (n=100)	2	5,000-7,500	20,000	Kg

5.3. Value addition

For the purposes of this study, value addition was defined as economically adding value and consumer appeal to the forest product. This can involve addition of time, place and or form utility to the product in order to meet the tastes/preferences of consumers. Value addition aspects for selected products such as firewood, charcoal, herbal medicine (*Warbugia ugandensis*) and timber were looked at. This was informed by the fact that these are some of the most commonly traded products from the reserves. Several actors in the value chain, such as private individuals, dealers/owners, hired people, retailers/wholesalers and institutions, were identified during the survey. The

main value addition activities were harvesting, packaging and transportation of the respective forest products to destination markets, which are located in the rural and urban trading centres in the surrounding areas to Mabira CFRs. Other specialised value addition activities include pit sawing of logs to produce timber/lumber and eventually various types of furniture according to the desires and preferences of the clients.

The general observation that can be made on the various value chains is that they are not developed. However, there are opportunities to develop the value chains on the assumption provided that there is sustainable production of forest resources from the reserves. Such opportunities include enhanced production, increased product value addition and higher prices for the products. Enhanced production may be achieved through improved silvicultural and harvesting techniques, while increasing product values may be achieved through conversion and processing. On the other hand higher prices for products could be obtained through formation of groups for collective marketing that has a potential for decreasing transaction costs and improving profits.

5.4. Regional markets

Most of the products obtained from the Mabira forests are either bought by households living within or adjacent to the CFRs or sold within the local markets. Access to regional markets was very low. Only 34 households (11.3%, n=302) reportedly sold products to regional markets, mainly within Uganda (Table 14). The main products sold to Kampala and other regional markets included timber and herbal medicines. Other regional markets of interest included South Sudan and the border areas like Busia (Uganda) and Kenya.

Table 15. Regional markets exploited and desired

Regional market currently accessed	**% Reporting Access**	**Regional market desired**
	No. of HHs	
Kampala	3.6 (n=11)	Kampala
Central Uganda	3.6 (n=11)	Masaka, & Entebbe Mukono,
Eastern Uganda	2.3(n=7)	Busia, Iganga, Kenya
Northern Uganda	0.7 (n=2))	Gulu
Western Uganda	0.3 (n=1)	None
Kigali/Rwanda	0.7 (n=2)	Rwanda
South Sudan	1(n=3)	South Sudan

CHAPTER 6: REGULATORY POLICY AND INSTITUTIONAL FRAMEWORKS FOR MANAGEMENT OF MABIRA FOREST RESERVES

6.1. The Policy Framework

The policy framework for the management of the six forest reserves of the Mabira ecosystem is principally premised on the National Forest Policy (2001) and related policies. At the national level, there are quite a number of policies, strategies and legal frameworks for sustainable natural resource management in general. Furthermore, forestry issues outside protected areas (in this case the areas surrounding the six forest reserves) have been decentralized to district local governments, which can formulate and implement area specific ordinances, byelaws and regulations to enhance management and utilization of forest resources and tree resources. The National Forestry Authority therefore has the mandate to coordinate and supervise all forestry activities in gazetted forest reserves all over the country while the District Forestry Services are charged with the management of forestry and tree resources outside the forest reserves in their districts.

i). The Forest Policy (2001)

The Forest Policy (2001) forms the framework for the forest sector in Uganda. This policy aims at a sufficiently forested, ecologically stable and economically prosperous Uganda. The policy is cognizant of the fact that Uganda's forests and woodlands are central to the three pillars of sustainable development - the economy, society and the environment; and that forest resources provide energy, forest and tree products, employment, livelihoods support, government revenues, business opportunities, environmental functions and services, and they maintain ecological integrity. In addition, the policy specifically recognizes that a very wide range of people have a stake in the forest sector, including forest resource producers (farmers, commercial tree growers and forest owners); forest resource users (both commercial consumers, and the majority of the urban and rural poor who depend on firewood and other forest products for subsistence); forest resource processors (charcoal makers, pit sawyers, saw millers, artisans and traders); the concerned general public, government and non-government organizations; and individuals involved in providing services of management, training, research and production.

Given the diversity of stakeholders and the range of issues for which the policy aims to address, there is a focused direction in the management of forestry resources in Uganda (see legal frameworks below) for the sustainable development of Uganda. As will be seen later, the improvement in the regulatory framework for forestry in Uganda has seen the following achievements:

- A proper definition of central and local governments' roles and responsibilities,
- A greatly increased role for the private sector and non-government organizations in forestry service delivery,
- Improved regulation of the sector,
- New approaches to the development and strengthening of civil society through local community institutions and associations (such as Collaborative Forest Management groups in Buvunya, MAFICO at Najjembe, etc),
- Redefined relationships between organizations in the forestry sector, and the establishment of a better legal basis for these through contractual or service agreements, tendering, and partnership (e.g. Mabira eco-lodges at Najjembe).

In order to drive changes within the forestry sector, the Forest Policy (2001) is assisted by a range of other related policies from sector government ministries, which reflects a

multi-stakeholder and multi-objective approach to forest sector development. These include Uganda Land Use Policy (2007), Uganda Land Policy (2013), National Environment Management Policy (1994), The National Water Policy (1999), National Gender Policy (1997), Uganda Wildlife Policy (1999), National Policy for the Conservation and Management of Wetland Resources (1995).

ii). The National Environment Management Policy (1994)

The National Environment Management Policy aims at sustainable social and economic development that maintains or enhances environmental quality and resource productivity on a long-term basis, and that meets the needs of the present generations without compromising the ability of future generations to meet their own needs. The key policy objectives include the enhancement of the health and quality of life of all people in Uganda and promotion of long-term, sustainable socio-economic development through sound environmental and natural resource management and use; and optimizing resource use and achieving a sustainable level of resource consumption.

The policy seeks to promote improved land stewardship by rural and urban land users by better defining and strengthening land and resource tenure rights through, inter alia, requiring that new leases of public lands carry conditions that prohibit environmentally unacceptable behavior. Other areas addressed by the policy include: (1) sustainable management of the Uganda's biological diversity through the establishment and maintenance of protected areas and local community involvement in the management of these areas and sharing the benefits derived from such areas, and (2) sustainable management and development of water resources and conservation of wetlands.

Since agriculture is the backbone of the country, the policy also provides for the promotion of farming systems and land use practices that conserve and enhance land productivity in an environmentally sustainable manner. The policy emphasizes the importance of enhancing and strengthening environmental concerns in the agricultural extension system through research and training for extension workers, NGOs and land users.

iii). The National Land Use Policy (2007)

The Land Use Policy aims at achieving sustainable and equitable socio-economic development through optimal land management and utilization in Uganda. Specific policy goals include the reversal and alleviation of adverse environmental effects at local and national levels; and the promotion of land use activities that ensure sustainable utilization and management of environmental, natural and cultural resources for national socio-economic development. The policy acknowledges that (1) land is scarce; (2) land ownership has a significant bearing on land use. One of the strategies pointed out by the policy is community based land use planning in order to combat encroachment, unregulated discharge of effluent, land degradation, mining and related activities.

iv). The National Land Policy (2013)

The National Land Policy aims at transforming Uganda through optimal use and management of land resources for a prosperous and industrialized economy. This policy was enacted to address salient issues that were not properly covered by the National Land Use Policy, such as tenure and protecting the constitutional principle of sanctity of property. The Land Act explicitly prohibits the central or local government from leasing out or otherwise alienating the country's natural resources, such as natural lakes, rivers, wetlands, forest reserves, game reserves and national parks, except by way of a

concession, licence or permit. The Policy therefore clarifies issues of land ownership, natural resources and transfer of ownership under the different tenure regimes.

v). Agriculture Policy (2003)

The Agriculture Policy recognizes land as a natural resource for agriculture, and that land use has implications on biodiversity conservation through direct impacts on soil, water and living organisms, which farmers depend on for agricultural production.

vi). The National Water Policy (1999)

The Water Policy lays the framework for the management of water resources in Uganda. The policy aims at promoting an integrated approach to manage the water resources in ways that are sustainable and most beneficial to the people of Uganda. The approach is based on the continuing recognition of the social value of water, while at the same time giving much more attention to its economic value. The policy recognizes that water must be conserved and equitably utilized for the benefit of the people of Uganda and any developments or use of water in a manner that may affect the environment must be subjected to an environmental assessment. In respect to Water Resources, the Water Policy sets the guiding principles, strategies (enabling environment, institutional development, planning and prioritization, data collection and dissemination), management functions and structure, roles of the private sector and NGOs, as well as data and information.

vii). The National Policy for the Conservation and Management of Wetland Resources (1995)

This policy (also referred to as the Wetlands Policy) aims at the promotion of the conservation of wetlands in Uganda in order to sustain their ecological and socio-economic functions for the present and future well being of the people. All proposed modifications and restorations on wetlands are now subject to an Environmental Impact Assessment (EIA), the result of which determines whether such restoration or modification may proceed and to what extent.

viii). The Uganda Wildlife Policy (1999)

This policy aims at promoting the long-term conservation of the Uganda's wildlife and biodiversity in a cost effective manner that maximizes the benefits to the people of Uganda. The government therefore encourages a range of participatory approaches such as empowering the people to participate in the conservation and management of the country's natural resources, and related decision-making processes that affect their livelihood. This ensures that wildlife protected areas are effectively managed so that the biological diversity of Uganda is conserved based on sound conservation principles.

ix). The National Gender Policy (1997)

The overall goal of this policy is to mainstream gender concerns in the national development process in order to improve the social, legal/civic, political, economic and cultural conditions of the people of Uganda, in particular women. Thus, in the context of Mabira forest ecosystem, this policy is very relevant given the contribution of women in livelihood activities such as craft making, agriculture, firewood collection, etc. Obviously, there are imbalances and gender inequalities in communities which require redress, especially by promoting the participation of women, the elderly, men and the physically handicapped in eking a livelihood within the Mabira forest ecosystem. This may involve equal or equitable access to and control of social and economic aspects of resources and benefits arising out of them.

6.2. The Legal and Strategic Framework

The legal framework for the management of the six central forest reserves in the Mabira ecosystems derive their authority from the Constitution of the Republic of Uganda (1995), the National Forestry and Tree Planting Act (2003) and related regulations as well as various legal instruments from sister ministries.

i). The Constitution of the Republic of Uganda (1995)

The national objectives (Objectives XIII and XXVII) and directive principles of state policy of the Constitution of Uganda provide that the State shall protect important natural resources, including fauna and flora on behalf of the people of Uganda. In objective XXVII, the State commits itself to promote sustainable development and the rational use of natural resources to safeguard and protect the biodiversity of Uganda. The right to a clean and healthy environment is enshrined in Article 39 and Chapter 15 that deals with Land while Article 245 requires Parliament to pass laws for the protection and preservation of the environment.

ii). Uganda's Vision 2040

Uganda's Vision 2040 presents the country's medium-term development strategy that is drawn from the Constitution and is premised on realizing the vision of "a transformed Ugandan society from a peasant to a modern and prosperous country" by 2040. The Vision emphasizes sustainable development through preservation of natural resources such as forests and wetlands while ensuring access to basic needs such as education, health services, food, housing and the equitable distribution of incomes among all citizens shall be promoted. The Uganda Vision 2040 has set a target to increase forest cover in the country from 14% in 2013 to 24% in 2040. The Vision lays ground to restore and add value to ecosystems including forests through re-forestation and afforestation by promoting tree planting on both private and public land. In addition, the Vision aims to restore degraded ecosystems through implementation of a catchment approach. The Vision recognizes that conservation and wise use of natural resources for the present and future generations can only be done through effective partnerships and cooperation with related agencies, such as civil society and development partners while recognizing the role of women in natural resource management.

iii). National Development Plan (NDP) II (2016-2021)

The NDP is a national short-term strategy that aims at directing Uganda's development based on the overriding theme of "Strengthening Uganda's competitiveness for sustainable wealth creation, employment and inclusive growth". The NDP emphasizes "…sustainable development through preservation of natural resources such as forests and wetlands …". In paragraph 522, the NDP points out that the environment and natural resources sub-sector targets, in the short run, to increase forest cover in the country from 14% in 2013/2014 to 18% in 2019/2020. The Plan also notes that the focus of the country for the next 10 years is "increasing national forest cover and economic productivity of forests" by increasing "afforestation, reforestation, adaptation and mitigate deforestation for sustainable forestry".

iv). National Forest Plan (NFP) (2011/12 – 2021/22)

The Forest Policy (2001) provides for the adoption of a national forest programming approach through sector wide planning and the development of a National Forest Plan (NFP). The NFP is therefore a strategic framework for turning the Forestry Policy into action, with short-, medium- and long-term goals and programmes for sub-sectors and

regions, which address critical issues in forestry. The NFP is a sector-wide national instrument for managing and utilizing forestry resources in Uganda. It aims at contributing to the forest sector vision and goal enshrined in the Forestry Policy, and putting into action the policy statements contained therein. The strategic objectives are to: (1) increase economic productivity and employment through forest production, processing and service industries, (2) raise incomes for households through forest-based initiatives; and (3) restore and improve ecosystem services derived from sustainably managed forest resources. In particular, the NFP proposes investment into the (a) development of commercial forest plantations; (b) promotion and intensification of tree growing on-farm; (c) restoration and conservation of natural forests; (d) forest product processing and value addition; and (e) promotion of urban forestry.

v). The National Forestry and Tree Planting Act (2003)

This Act seeks to provide for the conservation, sustainable management and development of forests for the benefit of the people of Uganda as well as the promotion of tree planting. The purposes of the Act (section 2) includes (1) the creation of an integrated forest sector that will facilitate the achievement of sustainable increases in economic, social and environmental benefits from forests and trees; (2) sustainable management of forests; and (3) reflection of environmental benefits, costs and values in strategies and activities relating to forestry. Section 5(1) of the Act charges the central as well as local government with the responsibility of holding in trust for the people and protecting forest reserves for ecological, forestry and tourism purposes for the common good of the citizens of Uganda. The Act also provides for the preparation of a management plan, in consultation with local communities, specifying the uses of forest produce, activities carried out in the forest, as well as measures for sustainable management of the forest.

The Act in Section 39 supports tree planting and growing for any purposes of interest to the tree grower/planter. Also stipulated is the availability of a Tree Fund in section 40 to promote tree growing/planting by the interested even though this fund has not yet been operationalized. Section 22(2) gives full ownership of any forest produce from a private forest to the owner. It further gives liberty to the owner of the plantation to use the forest in any manner that the private forest owner may determine in line with the well-laid forest management plan. Such a clause therefore protects the tree farmers of their ownership right to any trees that may be planted on their land. On the other hand, the Act also protects any person who enters into a contractual or other arrangement with the tree(s)/ forest owner as a holder of an interest in a private forest, with the right to harvest, purchase or sell all or any part of the forest produce (timber, bark, leaves, roots etc.) in the private forest.

vi). The National Environment Act, Cap 153

This Act may be referred to as a framework law that provides for the sustainable management of the environment. The act provides for the careful consideration of all development activities for their impact on the environment, requiring that an EIA be conducted before the activity is implemented.

vii). The Land Act, Cap 227

The Constitution of the Republic of Uganda (1995) stipulates that land in Uganda belongs to the citizens of Uganda and shall vest in the citizens in accordance with the land tenure systems in Uganda. Accordingly, the Land Act stipulates that all land in Uganda vests in the citizens of Uganda and shall be owned in accordance with the customary, freehold, mailo and leasehold tenure systems. Environmental issues are

taken into account in various provisions of the Land Act. A person who owns or occupies land shall manage and utilize the land in accordance with the Forest Act, Mining Act, National Environment Act, the Water Act, the Uganda Wildlife Act and any other law [section 43, Land Act]. Environmentally sensitive areas like natural lakes, rivers, ground water, natural ponds, natural streams wetlands, forest reserves, national parks and any other land reserved for ecological and touristic purposes for the common good of the citizens of Uganda shall be held by Government or a local government in trust for the people. The Government or local government shall not lease out or otherwise alienate any natural resource referred to above but may grant concessions or licenses or permits subject to any law concerning the natural resource [Section 44]. Any use of land shall conform to the provisions of the Town and Country Planning Act and any other law [Section 45].

viii). The Water Act, Cap 152

The Water Act, Cap 152, provides for the use, protection and management of water resources and supply. Its objectives include the promotion of the rational management and use of the waters of Uganda; the promotion of the provision of clean, safe and sufficient supply of water for domestic purposes to all persons. The Act provides for the orderly development and use of water resources for purposes other than domestic use such as the watering of stock, irrigation and agriculture, fishing, preservation of flora and fauna; and seeks to control pollution and promote the safe storage, treatment, discharge and disposal of waste which may pollute water or otherwise harm the environment and human health [section 4].

ix). The Uganda Wildlife Act, Cap 200

The Uganda Wildlife Act, Cap 200, was enacted to make provision for the conservation of the biological diversity of Uganda for the benefit of all Ugandans, establish a mechanism through which local populations would participate in and benefit from the biological diversity in their locality. In sustainably managing the wildlife resources of Uganda and protecting the interests of the community, the Act requires that any development in a protected area be preceded by an environment impact assessment in accordance with the EIA provisions under the National Environment Act and any regulations made thereunder. Activities may take place in wildlife-protected areas if the EIA study findings recommend that the activity will not have an adverse effect on wildlife.

x). The National Environment (Environment Impact Assessment) Regulations (S.I. 153-1)

The EIA Regulations provide that an EIA must be undertaken for any activity that aims to change the land use of any area and if the activity has no significant effects on the environment or if it provides sufficient mitigation measures, it may be approved. The EIA is supposed to specifically take ecological issues including biological diversity, sustainable use of renewable resources and ecosystem maintenance into consideration.

xi). The National Environment (Wetlands, Riverbanks and Lakeshores Management) Regulations (SI 153-5)

These regulations provide for the use and management of wetlands, riverbanks and lakeshores, which have been deemed environmentally fragile. The use of these areas is regulated except for instances of use for (1) traditional purposes, (2) harvesting papyrus, (3) collecting of water for domestic use, and (4) fishing using traditional fishing methods. The regulated activities include brick making, sand mining, dredging,

drainage, sewerage filtration and construction of transport, electricity and communication facilities like roads, railways and telephone lines.

xii). National Environment (Mountainous and Hilly Areas Management) Regulations (SI 153-6)

These regulations provide that mountainous and hilly areas should be managed in a sustainable manner to ensure the sustainable utilization of resources for the benefit of the people and communities living in the area. Even outside protected areas, every land owner or occupier of mountainous and hilly areas is enjoined to use the best available technologies to minimize significant risks to ecological and landscape aspects, maintain such vegetation cover as may be determined by the local authorities, and carry out soil conservation measures.

xiii). The National Environment (Access to Genetic Resources and Benefit Sharing) Regulations (2005)

These regulations prescribe the procedure for access to genetic resources for scientific research, commercial purposes, bio-prospecting, conservation or industrial application; provide for sharing of benefits derived from genetic resources; and promote the sustainable management and utilization of genetic resources. The regulations apply to access to genetic resources or parts thereof, whether naturally occurring or naturalized, whether in-situ conditions or ex-situ conditions, including genetic resources bred for or intended for commercial purposes within Uganda or for export. Where access to genetic resources is likely to have a significant impact on the environment, an environment impact assessment is supposed to be carried out.

xiv). The Guidelines on the Management of Land and other Related Issues Under the Land Act, 1998

These guidelines indicate that natural resources such as natural lakes, rivers, ground water, natural ponds, natural streams, wetlands, forest reserves, national parks and other land reserved for ecological and tourist purposes are vested in the central government, which holds these resources in trust for the people for the common good of the citizens of Uganda. A local government may request the central Government to transfer ownership of a natural resource to it. Until such a request is granted, the natural resource still vests in the central Government. The central Government or a local government shall not lease or otherwise alienate such natural resource described above.

xv). The Local Government Act, Cap 243

This Act was enacted to give effect to the decentralization and devolution of functions, powers and services; and to provide for decentralization at all levels of local governments to ensure good governance and democratic participation in and control of decision making by the people. A local government council, whether district or sub-county, has the duty of performing the functions prescribed under the Constitution and this Act; and ensuring the implementation and compliance of Government policy. The district councils are therefore responsible for provision of crop, animal and fisheries husbandry extension services while the lower local government councils are responsible for the provision of agricultural ancillary field services; the control of soil erosion and protection of local wetlands; and the provision of measures to contain food shortages including relief work, the provision of seed and the storage of foodstuffs

6.3. International Instruments/Obligations for Uganda

Uganda is a signatory to several international instruments on environmental management, which are very relevant to the management of the forests around Mabira

ecosystem as well as the surrounding communities. These are summarized in the Table below.

Instrument	Purpose
The Sustainable Development Goals 2030	To ensure environmental sustainability
The African Convention on the Conservation of Nature (1968)	To encourage individual and joint action for the conservation, utilization and development of soil, water, flora and fauna for the present and future welfare of mankind, from an economic, nutritional, scientific, educational, cultural and aesthetic point of view.
Convention on Wetlands of International importance especially as Waterfowl Habitat (1971)	To halt the worldwide loss of wetlands and to conserve those that remains through wise use and management, ensuring that they do not lead to loss of biodiversity or diminish the many ecological, hydrological, cultural or social values of wetlands.
The Protection of World and Cultural Heritage Convention (1972)	To establish an effective system of collective protection of the cultural and natural heritage of outstanding universal values.
The Convention on the International Trade in Endangered Species of Wild Flora and Fauna (CITES, 1973)	To protect certain endangered species from over-exploitation by means of a system of import/export permits.
The Convention on the conservation of migratory species of wild animals (1979).	To protect those species of that migrate across or outside national boundaries
Convention on Biological Diversity- (CBD 1992)	To promote diversity and sustainable use and encourage equitable sharing of benefits arising out of the utilization of genetic resources
The Trade Related Aspects of Intellectual Property Rights (TRIPS) agreement of the World Trade Organization (1995)	To encourage free trade through regulation and reduction of tariffs as well as provide an international framework for the protection of plants, animals and microorganisms including the *sui generis* options of plant variety protection.
United Nations Framework Convention on Climate Change (UNFCCC, 1992)	To regulate the levels of greenhouse gases concentration in the atmosphere so as to avoid the occurrence of climate change on a level that would impede sustainable economic development, or compromise initiative in food production
The United Nations Convention to Combat Desertification (UNCCD)	To strengthen Sustainable Forest Management to prevent soil erosion and flooding, to increase the size of atmospheric carbon sinks, and to conserve and sustainably use biodiversity and promote the rehabilitation of degraded forests.
The International Treaty on Plant Genetic Resources for Food and Agriculture (IT-PGRFA) (2001)	To guarantee food security through the conservation, exchange and sustainable use plant genetic resources for food and agriculture (PGRFA), as well as the fair and equitable benefit sharing arising from its use.
The East African Community Treaty	The EAC Protocol on Environment and Natural Resources Management provides, inter alia, for the "protection and promotion of the use of indigenous knowledge that is compatible with conservation or sustainable use of biological resources".
Lake Victoria Fisheries Organization (LVFO) (1994)	To regulate and enhance fisheries in Lake Victoria covering Uganda, Kenya and Tanzania.

Lake Victoria Environnent Management Programme (1994)	To improve the management of the environment in the Lake Victoria region by addressing water quality, land use, wetlands, fisheries and control of water hyacinth
The Technical Cooperation Committee for the Promotion of Resources Development and Environmental Protection of the Nile Basin (1992)	To promote Basin wide cooperation for the integrated and just development, conservation and use of the Nile Basin water and to determine the equitable entitlement of each state of the Nile
Lusaka Agreement on Cooperative Enforcement operations directed at Illegal Trade in Wild fauna and flora (1994)	To reduce and eventually eliminate illegal access to trade in wild fauna and flora and to set up a permanent Task Force for this intention.
The Inter-Government Authority in Development (1986)	To improve environment management particularly early warning system and food security and reduce conflict in Sudan, Eritrea, Djibouti, Ethiopia, Kenya, Uganda and Somalia

6.4. Institutional Framework

At sectoral level therefore, policy and technical guidance on issues of forest management is provided by the Water and Environment Sector Working Group (WESWG), which comprises of representatives from all key sector institutions (Government, Development Partners and NGOs). The forestry subsector is composed of six institutions, i.e. Forestry Sector Support Department (FSSD) of the MWE, National Forestry Authority (NFA), District Forestry Services (DFS) in district Local Governments, Uganda Wildlife Authority (UWA), the Civil Society Organizations (CSOs) and the Private Sector. The FSSD has a role of formulation and oversight of appropriate policies, standards, legislation, planning, and coordination, provision of support services and assessments and monitoring of the forestry sector. The NFA is for sustainable management of the 506 Central Forest Reserves (CFRs 17% of the country's forest estate) in partnership with private sector and local communities; provision of advisory, research or commercial services on contract; supply of improved seeds; and national forest inventory and other technical services. The DFS on the other hand are for sustainable management of the 191 Local Forest Reserves (LFRs) in partnership with communities and private investors as well as provision of forestry extension services to the private sector (64% of Uganda's forest estate). Uganda Wildlife Authority (UWA) manages Central Forest Reserves (CFRs) in National Parks (NPs) and Wildlife Reserves (WRs), constituting 18% of Uganda's forest estate. The CSOs play a key role in advocacy, promotion of government accountability, public education and information dissemination, training of local communities, action research, advisory services and mobilization of communities, among others. The Private Sector on the other hand is engaged in forest management and commercial forest plantation investments on private land, forest investments in CFRs on rented land, collaborative forest management of CFRs and running wood and non-wood forest products industries, among others.

The institutional mechanism for the management of the six forest reserves in Mabira ecosystem as well as the natural resources within the neighboring communities is contained in the laws that establish the main institutions involved – NFA, DFS and NEMA as described above. These institutions belong to an institutional setup referred to as the Water and Environment sector, in which coordinated planning, and implementation at sectoral level takes place.

However, in order for the policy initiatives to succeed, there must be collaboration with related entities like NAADS – now Operation Wealth Creation (OWC) and the local governance structure. All the main laws mentioned above recognize the need to collaborate with other institutions both public and private in undertaking their mandates. It is imperative in the management of the ecosystem within and around these forests that each participating institution effectively performs their role in realizing the objectives and purpose of forest management and conservation as well as community livelihoods.

6.5. Limitations in application of regulatory policies and laws

Although the forests in the Mabira ecosystem are protected by various existing policies and legal frameworks, limitations are encountered while attempting to enforce these laws. There are challenges to the protection of six forest reserves of the Mabira ecosystem due to factors such as lack of clear descriptions of forest boundaries (in some areas) in terms of location, extent, composition and criteria for various levels of protection, community lack of awareness of the laws and policies that regulate the use of forest resources, and inadequacies in the laws and policies regarding tree growing.

At community level, it should be noted that while there is a conducive policy and legal framework for tree growing, tree management regimes and planting are strongly influenced by the land tenure system. Tree tenure rights especially for the more widespread mailo land system are unclear with the tenants usually restricted to usufruct rights over particular tree species. While the National Forestry and Tree Planting Act (2003) provides for tree ownership by private individuals, it assumes that all tree planting by private individuals is done on their own land or under license on public land. There are no legal remedies for tree planting by tenants or squatters as far as ownership is concerned, especially in areas such as those around the Mabira forest reserves where there are several forms of land ownership. It may therefore be necessary to ensure that tree planting and management regimes are compliant with the respective land tenure of the area.

CHAPTER 7: CONCLUSIONS AND RECOMMENDATIONS

7.1. Conclusions

The following were drawn regarding socio-economic status of the households and factors exerting pressure on the forest reserves:

i). Level of education among the survey households is extremely low; suggesting the need for aggressive sensitization campaigns to sensitize and educate the communities on matters related to the management and conservation of the forest resource

ii). Most of the households are depending of agricultural production (crop farming and livestock rearing) for their livelihoods

iii). Pest and disease infestation as well as crop damage by wild animals/vermin are the major challenges faced by farming households within the MFCR.

iv). There is ample evidence of food insecurity among local communities within and outside the Mabira forest reserve. This must be addressed to avoid further encroachment of the forest reserve.

v). There has been a significant decline in the Mabira forest cover over the years; mainly attributed to encroachment, charcoal burning, harvesting of poles mainly attributed to charcoal burning, increased use of fuel wood and construction, deforestation and population growth.

vi). There is lack of awareness on the laws and policies governing conservation of forests under the Mabira Management Plan Area.

vii). Value addition of forest products is virtually nonexistent; and level of marketing of forest products is very low; with no or limited exploitation of regional markets outside Uganda.

viii). There is limited participation of the communities in the forest management activities; including monitoring and participation in conservation activities

ix). Local communities perceive encroachment, fire and grazing as the major threats to the forest reserve.

x). Eco-tourism provides the single most important option for future sustainable management of CFRS in Mabira MPA.

7.2. Recommendations

The study recommends the following to be undertaken in ensuring sustainable coexistence of the forest resources and community livelihoods:

1) Community interactions with the forest resource in terms of entitlement, access, use, conflicts and regulatory policy and institutional frameworks

i). Strengthen enforcement of laws, policies and regulations governing the six CFRs. Monitoring of illegal activities is not undertaken with due diligence partly due to lack strong structures on ground which in turn is attributed to inadequate funding. NFA and district officials should be facilitated adequately to monitor the CFRs and enforce the laws. For example, conduct periodic, preferably, annual re-opening of forest boundaries and evict encroachers. This will also help discourage potential encroachers.

ii). Strengthen sensitization of the local communities on the existing laws governing the CFRs, and the importance of conserving the CFRs through community dialogues especially with lesser receptive communities e.g. in Sii Sub County. In addition, strengthen engagement with communities around CFRs to participate in the monitoring and prevention of threats to forest health.

Volunteers to serve as focal points to help in simple actions for monitoring health- and pest-related developments in the forest can be designated.

2) Demand and supply dynamics for value addition and marketing of key forest resources

i). Conduct a detailed value chain analysis of all main forest products from the CFRs. Investigating the sequence of forest production and marketing in all their facets – including research and development, the regulatory framework, raw material supplies – is a key to any systematic improvement. It enables policy makers to create favorable framework conditions that promote competitive enterprises, sustainable jobs and income for local people. Furthermore, it allows impact-oriented monitoring of initiated policy actions.

3) Livelihood strategies of households and local communities adjacent to the Mabira forest ecosystem

i). Strengthen the functionality of CFMs through increased access to funding, skills development and adoption of appropriate production and value additional technologies to CFM products.

ii). Strengthen adoption of effective modern farming practices including introduction of better crop production technologies. MWE in partnership with key stakeholders (NFA and NaFORRI) should liaise with appropriate research institutions to introduce high yielding; drought resistant; and early maturing crop varieties to increase food production by households adjacent to the CFRs.

iii). Strengthen agriculture production on-farm by increasing adoption of modern farming methods, including agroforestry, agronomic practices, and soil conservation practices in order to enhance agriculture production, food security and incomes to relieve pressure from the CFRs. Support households to diversify to other sustainable IGAs, e.g. planting of Cocoa as buffer around CFRs.

iv). Strengthen adoption of appropriate technologies for post-harvest handling and values addition to agriculture produce at household level. This will attract high prices at farm-gate level and marketed produce. Promote planting of indigenous and conservation of indigenous tree species on-farm, e.g. *Maesopsis eminii, Prunus africana, Warbugia ugandensis, Cordia milenni*, etc.

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