SOCIO-ECONOMIC FEASIBILITY ANALYSIS OF A CARBON OFFSETTING SCHEME IN WEST NILE AND NORTHERN UGANDA

Final Report

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Environmental Conservation Trust of Uganda (ECOTRUST)
Plot 49 Nakiwogo Road, Entebbe
P.O. Box 8986 Kampala, Uganda
Tel: +256-312 266 419
www.ecotrust.or.ug

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Executive summary

The Environmental Conservation Trust of Uganda (ECOTRUST) has been implementing a carbon-offset scheme in Bushenyi district, Western Uganda, since 2003 and has expanded to Hoima and Masindi districts. The project referred to as the "Trees for Global Benefits project" mainly works with small-scale landholder farmers to access carbon finance through the Plan Vivo system. ECOTRUST and partners are in the process of expanding the Trees for Global Benefits carbon offset scheme to rural communities in Northern Uganda. A feasibility analysis aimed at providing reliable information to implement the project has been done. This proposed intervention targets the Treetalk-WILD project districts of Amuru, Adjumani, Moyo and Kitgum, and aims at promoting tree planting on private land owned by institutions such as schools, and individual members of community groups in the four districts.

As part of the project design procedures, socio-economic study to establish the feasibility of such a project and document pre-project conditions has been done. The objectives of the study were to:

- Assess land availability and ownership of interested producers;
- Analyse the status of land tenure security and its implications on development of a plan vivo carbon management project; and
- Carry out a detailed assessment of socio economic aspects related to a carbon management project.

The study based its investigation upon a detailed review of secondary data, rapid appraisal and formal survey among farm households, farmer groups and school environmental clubs with which TTF-WILD Project operated in the four districts. Data collection was conducted between January and March 2009.

Key findings of the study hinge heavily upon security as a major population determinants in West Nile and Northern Uganda regions. Urban settlements have developed in areas surrounding settlements camps mainly for security reasons. Land tenure is customary, most land is not titled but its administration is enshrined in cultural institutions. Ownership of land is transferred from one generation to another through inheritance, which follows a patrilineal system. Clan elders superintend over land affairs and command respect from virtually every member of the society. At household level, age grading and gender are noted to be key determinants of household members' access and control over the land estate. The average farm size of 9.1 acres (3.64 Ha) across the four districts is indicative of the general sparseness of population in the Northern Uganda.

The findings depict a generally middle-aged household headship (37 years). The survey data also reflected non-transitory settlements (27 years) which often encourage long-term investment on the land. More than ¾ of household heads had attained formal education up to Primary level (50.9%) or Secondary level (25.8%). Primarily, households depend on crop production (96.3%), local brewing (42.4%), charcoal burning (24.5%) and casual labor (18.1%) for income generation. Most households rely on family labor for farming activities in spite of a significant sway of young people away from agriculture into instantly rewarding enterprises like retail business, cross-border trade in Sudan and boda-boda transportation. The population suffers from a "hand-out syndrome" that presents serious challenges to community development. Household expenses address basic survival needs for food, medicine and clothing, with education as the rare

investment upon which income is directed. Short planning horizons attract farmers to initial carbon payments though long-term sustainability will not be guaranteed.

This study established that tree farming is mainly through retention of naturally growing trees as opposed to deliberate planting (except for *Tectona grandis*, *Eucalyptus spp*., *Azadrachta indica, Cassia samea* and an assortment of fruit trees like jack fruit and some mangoes). Tree management practices like pruning, weeding and coppicing are occasionally done, though in somewhat ad hoc fashion with the farmers' primary objective being acquisition of associated tree products (e.g. firewood and poles) rather than silvicultural discipline. The carbon management scheme therefore ventures into uncharted waters to get these rather laid-back tree farmers to adhere to strict technical specifications. Homesteads and croplands are suggested as appropriate niches for planting trees though problems of livestock browse, human damage and wild fires present a serious challenge. There is high preference for fruit trees especially Mangoes (*Mangifera indica*) and Oranges (*Citrus spp.*); while *Tectona grandis*, *Eucalyptus spp.*, *Pinus Orcarpa., Azadrachta indica, Milicia excelsa* ,*Vitellaria nilotica*, *Khaya anthotheca, K. senegalensis*. *Balanites eagyptica*, *Maesopsis eminii*, *Grevillea robusta* (Greavillea), *Terminalia Brownei* (Umbrella), Ebony, Cordia sp. Cashew nuts are the most highly preferred tree species

The study made the following recommendations:

a) Land availability and ownership by interested producers:
   - Target individual farmers who have already resettled in their villages of origin;
   - Target schools and other community institutions

b) Land tenure security and its implications for carbon management:
   - Solicit for clan leader endorsement of Carbon sale Agreements.

c) Other socio-economic aspects related to a carbon management;
   - Target middle-aged and elderly farmers with authority over land and control household decision-making;
   - Emphasize " transaction" rather than "hand-outs";
   - Promote a combination of fruit and non-fruit tree species;
   - Avoid the temptation to go for group nurseries where there is no commitment to sustain them;
   - Engage farmers as individual households not as groups;
   - Strengthen extension service delivery in schools; and
   - Establish vertical and horizontal linkages with relevant supportive institutions at community, sub-county, district and national levels.

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List of acronyms

ACDO	Assistant Community Development Officer
ACORD	Agency for Cooperation and Research in Development
AIDS	Acquired Immune Deficiency Syndrome
CDM	Clean Development Mechanism
CO_2	Carbon dioxide
DEO	District Education Officer
ECOTRUST	Environmental Conservation Trust of Uganda
FGDs	Focus Group Discussions
HIV	Human Immunodeficiency Virus
IDP	Internally Displaced Persons
KIIs	Key Informant Interviews
LCs	Local Councils
LRA	Lord's Resistance Army
Masl	Metres Above Sea Level
NFA	National Forestry Authority
NGOs	Non-Government Organizations
RA	Rapid Appraisal
S/C	Sub-county
SMCs	School Management Committees
SPSS	Statistical Package for Social Scientists
TIST	The International Small Group and Tree Planting Program
TTF	Tree Talk Foundation
UNFCCC	United Nations Framework Convention on Climate Change
UWA	Uganda Wildlife Authority
WILD	Wilderness, Landscapes and Development

1.0 INTRODUCTION

1.1 Carbon trade and climate change

There is increasing concern among the international community about the devastating effects of climate change and global warming. It is also widely accepted that these disastrous processes are closely linked to increased concentrations of atmospheric carbon dioxide (CO_2) that has resulted from human dependency on fossil fuel for energy and changes in land use cover that have seen vast forest territory converted to agriculture.

Several international conventions have addressed the problem of green house gases (GHGs), with emphasis put on CO_2 - the most abundant gas. The UN Framework Convention on Climate Change (UNFCCC) that resulted from the Rio Earth Summit in 1992 prepared ground for the development of carbon markets. The ratification of the Kyoto Protocol in 2005 spurred development of a robust market for carbon between nations through the Clean Development Mechanism (CDM). Inauguration of the CDM allowed companies, individuals and institutions to offset their carbon emissions by investing in compensatory reforestation or clean energy projects (Owen, 2006). In Africa, much of the activity in the carbon market to date, has involved sale of carbon offsets in the voluntary market by small-scale forest-based projects in developing countries to buyers that include individuals, organizations and companies as part of corporate social responsibility.

1.2 Carbon offsetting from a livelihood perspective

Globally, less developed regions of the world contribute less GHG emissions, yet may suffer more from the ensuing disastrous impacts e.g. growing natural hazards, shrinking arable land and dwindling crop yields (Prowse and Peskett, 2008). This threatens livelihoods of millions of the predominantly poor populations. The transfer of resources from the industrialized world to the vulnerable communities in the Third World through carbon credits, therefore, presents an opportunity for countering an eminent environmental and humanitarian crisis. It is in light of this that recent strategies stress the need to consider economic and social consequences of the problem on poor and marginalized communities.[1]

At national level, natural resources constitute the primary source of livelihood for Ugandans and form the backbone of the country's economy. The effects of climate change are already manifesting themselves in increased frequency of extreme weather events (floods, landslides and drought) which poses a severe threat to Uganda's social and economic development. The country has endorsed the Ugandan National Adaptation Plan of Action to address the serious threat that climate change poses to national poverty reduction programs like the PEAP and PMA (NAPA, 2007).

At project level, tree farmers are central to the success of any carbon-offsetting scheme given that they are directly responsible for delivering the ecosystem service. Either as individuals, groups or entire communities, farmers ought to be at the centre of land use planning processes if these are to be socially acceptable, economically viable and

[1] In 2007, the UN Climate Conference in Bali, Indonesia, drew a roadmap to guide negotiations for a new treaty to combat global warming, taking up where the Kyoto treaty leaves off. This "*Bali Roadmap*" set an agenda for negotiators working to find ways to reduce pollution and help poor countries adapt to environmental changes.

environmentally sustainable. An understanding of existing household and societal processes is therefore necessary to gauge local peoples' capacities to implement and sustain proposed land use systems.

1.3 Existing carbon offsetting initiatives in Uganda

The concept of carbon trading is in its embryonic stages in Uganda, though a study by CARE identified several initiatives to exist already (Owen, 2003). The Face Foundation (part of NV Sep – a Dutch Electricity Generating Board) has been supporting the regeneration of 27,000 ha of natural forests in Kibale and Mount Elgon National Parks since 1995 in conjunction with the Uganda Wildlife Authority (UWA). These forests are expected to sequester 7.1 million tC with a current market value of $85 million.

Another company, the Norwegian Tree Farms has been working in Bukaleba Forest Reserve in Mayuge District since 1996 and has facilitated the establishment of 4,300 ha of pine and eucalyptus plantations in conjunction with the then Forest Department (now NFA). A third company called the Norwegian Afforestation Group has also established 2,800 ha of plantations in Uganda since 1999 (Owen, 2003).

A scheme known as The International Small Group and Tree Planting Program (TIST) is operating in some districts of western Uganda. TIST focuses on reforestation and works with small groups of 6 to 12 farmers. This program rewards the small farmer groups for each tree that they plant and manage to keep alive.

The most renowned efforts, however, have been by the Environmental Conservation Trust of Uganda (ECOTRUST), which is implementing a carbon-offset scheme in Western Uganda (Owen 2003, Orrego, 2005). Piloted in Bushenyi district since 2003, the "Trees for Global Benefits" (TFGB) carbon sequestration project has assisted small-scale landholder farmers to access the voluntary carbon market through the Plan Vivo system.[2] Under this TFGB program, ECOTRUST has been able to develop systems and procedures for the management of carbon projects for different farming systems depending on the local environmental needs. Consequently, the program has now expanded to parts of western Uganda including Hoima and Masindi districts.

1.4 Proposed carbon offsetting project in West Nile and Northern Uganda

ECOTRUST is in the process of expanding the Trees for Global Benefits carbon offset program to rural communities in West Nile and Northern Uganda. This proposed scheme targets the Treetalk-WILD project districts of Amuru, Adjumani, Moyo and Kitgum and aims at promoting tree planting on private land owned by institutions such as schools and individual members of community groups in the four districts. The project will focus on trees with multiple purposes that besides carbon sequestration will provide multiple products to the farmers and schools, thereby improving their livelihood sustainability. As part of the Plan Vivo project cycle, the initial stage of this project involves, among other activities, compilation of baseline socio-economic and carbon data in the targeted area to establish pre-project conditions and identify strategic entry points. This report provides details of a survey that addressed the socio-economic aspects of the baseline.

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[2] The Plan Vivo system is a multi-institutional framework for managing voluntary carbon credits by combining carbon sequestration with rural livelihood improvements through small-scale afforestation initiatives.

1.5 Terms of reference for the consultancy

The task required the consultant to lead a team that conducted a socio-economic analysis of the proposed project. This analysis involved:

- An assessment of land availability and ownership of interested producers;
- An analysis of the status of land tenure security and its implications on development of a plan vivo carbon management project; and
- A detailed assessment of socio economic aspects related to a carbon management project.

This socio-economic analysis is intended to inform ECOTRUST and partner institutions involved in this carbon offset project of the socio-economic circumstances and livelihood options of farmers in the target farming systems and their implications for tree growing for carbon sequestration. The study also aims at compiling baseline data on targeted rural communities in Northern Uganda against which, livelihood impact arising from the carbon-offsetting scheme will be monitored.

The specific objectives of the study were:

1. To compile information on the types of income generating activities and levels of household income among members of target farmer groups;
2. To analyze the land tenure situation and its implications on implementation of tree growing activities for carbon-offsetting in the target communities;
3. To analyze land use dynamics and characterize existing agricultural practices in the project communities;
4. To compile information on socio-demographic characteristics of households that are likely to impact upon tree growing behavior;
5. To compile baseline information on current energy types used, sources and levels of availability;
6. To analyze institutional mechanisms in place that may be of importance to implementation of a Plan Vivo system in the different communities.

1.6 Methods

1.6.1 Geographic description of the project area

The region geographically referred to as "northern Uganda" covers an estimated 85,392.2 km^2 (about 35% of the total land surface of the country). Until recently, northern Uganda consisted of 13 districts of Arua, Gulu, Apac, Moroto, Nebbi, Adjumani, Lira, Moyo, Kotido, Pader, Nakapiripiti, Yumbe and Kitgum.[3] The proposed project intends to cover four districts of Moyo, Adjumani, Amuru and Kitgum. This section of the report highlights the climatic, socio-economic, demographic and socio-political characteristics of this region that set it apart as a peculiar compared to most other parts of the country.

Despite the large surface area, northern Ugandan is characterized by a low population density averaging 65 persons per km^2 far below the national average of 124 persons per km^2, according to the 2002 Population Census. The majority (91%) of the population in Northern Uganda live in the rural areas, while a minority (9%) residing in urban areas.

[3] Administrative boundaries are as of 2002 and therefore do not reflect recently established districts curved out of the original districts.

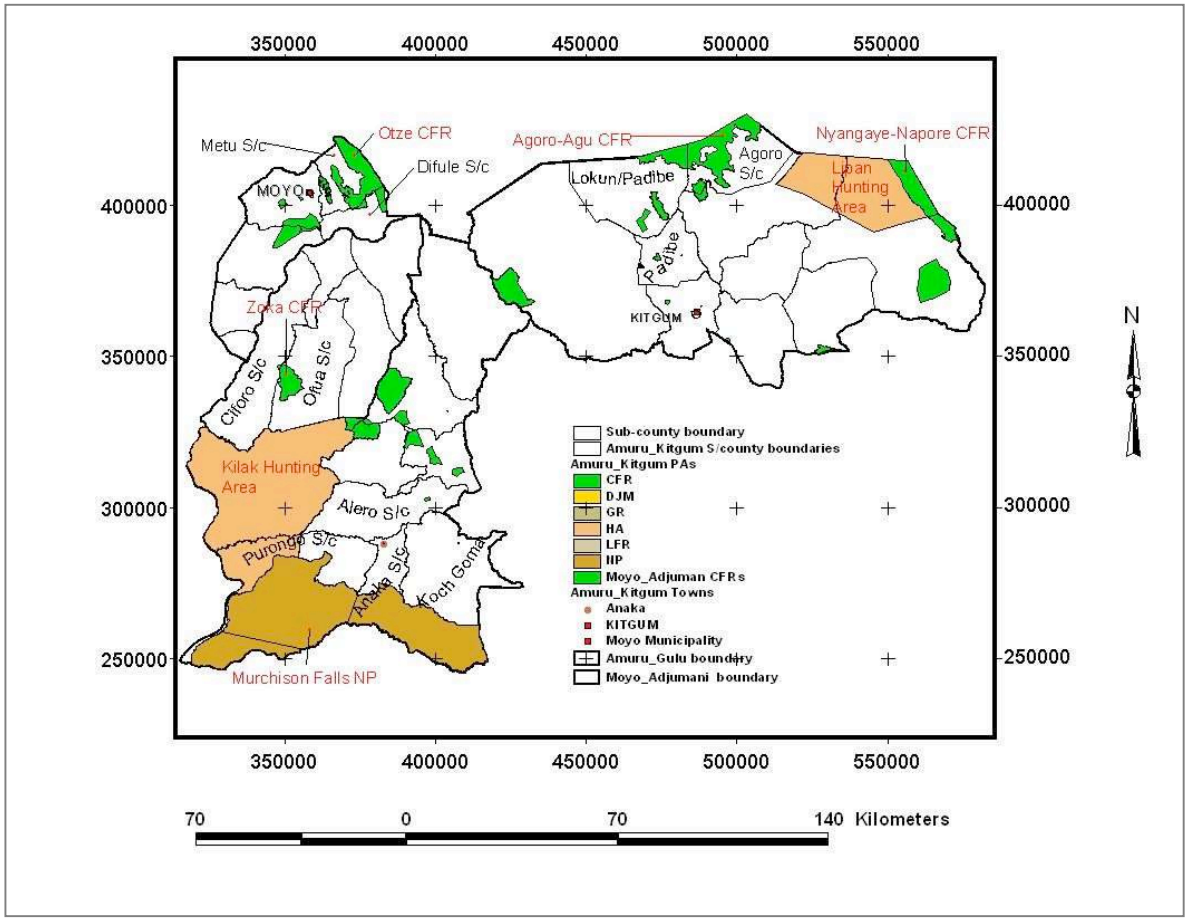
Peculiar to the region are refugees from neighboring countries, particularly Sudan and internally displaced persons (IDPs) living in camps (Stites et al, 2006; MFPED, 2002).

Table 1.1 Demographic characteristics of study districts

District	Sub-region	Population (2002)	Persons per km^2
Adjumani	West Nile	202,290	68.9
Amuru	Acholi	176,733	41.2
Kitgum	Acholi	252,209	29.3
Moyo	West Nile	202,291	114.9

Vast areas of northern Uganda are semi-arid characterized by one wet season and long dry spells, which are very hostile to livestock and crop production, particularly in the northeastern parts. Rainfall is not only erratic but also low and unreliable ranging between 500 mm-1,000 mm on average. Land in some parts of the region is arid rangeland, fragile and less productive. However, there are other parts of the region such as in Moyo and Nebbi in West Nile, with very productive soils. Livelihoods in this region largely depend on subsistence farming.

Figure 1. Map of project area showing study sub-counties



1.6.2 Data collection

The socio-economic analysis involved a desk review, a rapid appraisal and a formal survey.

a) Desk Review
The consultant reviewed reports of previous livelihood and participatory poverty assessment surveys in the region, state of the environment reports, sub-county development plans and other relevant documents to compile information on physical characteristics, population characteristics, social and economic profiles, developmental priorities and critical environmental issues in the project area. This review also sought to understand the social set up and organization of community life as well as the drivers of land availability and tenure security in the West Nile and Acholi farming systems. Besides directly furnishing the study objectives, the desk review also informed the design of tools for the Rapid Appraisal and Household Survey.

b) Rapid Appraisal (RA)

The RA addressed the qualitative aspects of the consultancy and involved focus group discussions (FGDs) and key informant interviews (KIIs) with members of farmer groups, school environment clubs, district departments (community development, environment, forestry and education) and sub-county staff (chiefs, assistant community development officers). Checklists of issues guided the discussions with district and sub-county informants while semi-structured interview guides were used during consultations with representatives of farmer groups and school environment clubs. Data from the RA was largely qualitative focusing on the major environmental issues in the districts, farmer's group/school environment club profiles, land tenure dynamics and conflict resolution mechanisms and issues to do with community composition and social organization.

c) Household Survey

The study adopted a descriptive survey design purposely using structured methods to capture quantitative data on key demographic, socio-economic and agronomic variables. This include data on household socio-demographic characteristics, economic activities, nature of the household crop and livestock enterprises, seasonal and annual household income, land size, mode of land ownership, proportion of farmland under tree growing, tree species on farm and other issues regarding the household tree enterprise.

A structured questionnaire was administered to a sample of 385 heads of household by the Assistant Community Development Officers (ACDOs) trained as enumerators. Ten individual respondents were randomly selected from the list of members for each of 40 farmer groups that Tree Talk Foundation was working with. The study registered a recovery of 96.3%, due to unavailability of some household heads at the time of the survey, and unwillingness of others to participate in the survey without financial reward.

Figure 2. Distribution of respondents according to districts

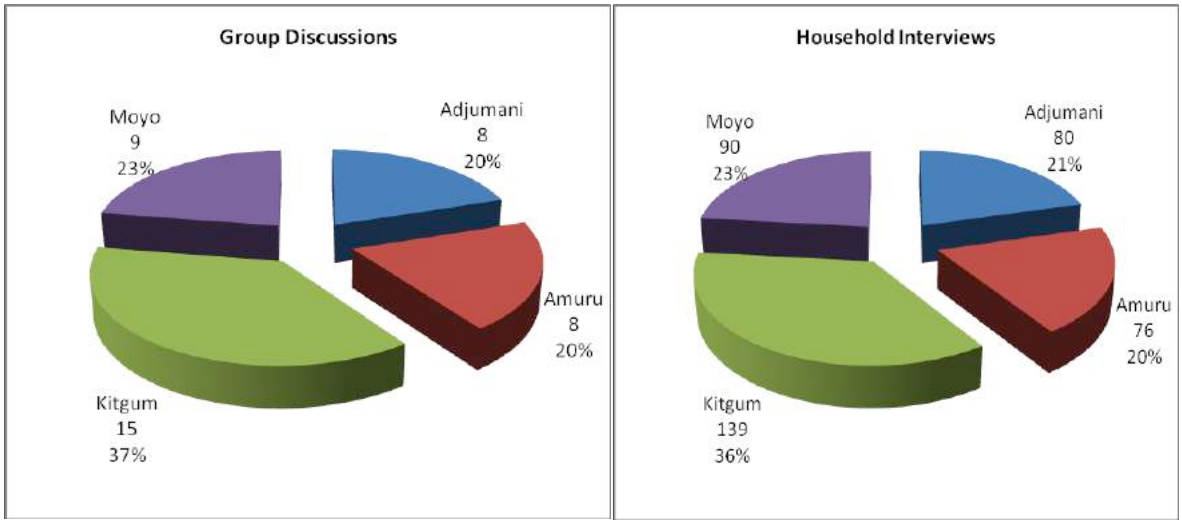


Table 1.2 Distribution of respondents according to sub-counties

District	Sub-county	Farmer Group Discussions	Household Interviews
Adjumani	Ciforo	4	40
	Ofua	4	40
Amuru	Koch Goma	4	40
	Alero	2	20
	Anaka	1	6
	Purongo	1	10
Kitgum	Agoro	3	27
	Lokung	5	50
	Padibe (East)	4	35
	Paloga	3	27
Moyo	Metu	4	40
	Dufile	3	30
	Moyo	1	10
	Moyo TC	1	10
Total		40	385

1.6.3 Data analysis

The narrative responses from the RRA were transcribed on computer and quotes manually sorted according to study themes. The information generated has been presented in paraphrased text, direct quotes and case studies. The consultant worked with two data entry assistants to enter the household survey data into an MS Excel data file. Subsequently, the data was cleaned using auto filter and pivot table functions of MS Excel before export to SPSS (version 12.0) for analysis. The analysis was descriptive and mainly involved cross tabulation and comparison of means across study districts. The results are

summarized in tables and figures.

2.0 STUDY FINDINGS

2.1 Social and demographic dynamics shaping community life

2.1.1 Historical determinants of development processes northern Uganda

Any development effort in targeting northern Uganda needs to take keen note of the region's social history. Only a brief account can be given here, though there is sufficient indication of how the region has been marginalized in development processes compared to the rest of the country. During the pre-colonial period (1770s-1880s), northern Uganda suffered immensely from slave trade compared to other parts of Uganda which resulted into loss of the most productive labor force (Beattie, 1971). During the colonial and post-colonial era (1890s-1990s), development of northern Uganda was put on hold as the region turned into a labor reservoir for the cash economy in the south, which was considered to have a comparative advantage in terms of fertile soils, ample rainfall and more organized farming and leadership systems (Mamdani, 2001). Despite introduction of tobacco and cotton in the 1920s-1940s, vast parts of northern Uganda retained their status as labor reservoirs, and the region generally continued to lag behind development in the rest of the country.

Militarization of this part of the country as early as the 1930s, to an extent also distorted local views about education and community development as advancement was often considered synonymous with wielding of gun power (Glen et al, 2001). A large part of the North has continued to be affected by conflict since the late 1980s perpetuated by civil strife and insecurity mainly perpetuated by rebel factions e.g. the Lord's Resistance Army (LRA) and the Sudan People's Liberation Army (SPLA). Because of the civil wars, large sections of the population remain internally displaced, and about 200,000 refugees from Sudan live in camps in Northern Uganda (Women's Commission, 2001). This has created tensions among the populations due to competition for resources such as land and the basic services (MFPED, 2002).

2.1.2 Population determinants in West Nile and Northern Uganda regions

Population estimates for the various districts based on 2002 figures when the last national housing and population census was conducted (Table 2.1). According to the census reports, the districts of northern Uganda represent some of the highest growth rates in the country; with populations in Moyo (7.7%), Adjumani (6.4%) and Kitgum (4.1%) increasing a lot faster than the national growth rate of 3.3% (UBOS, 2002). Although these figures reflected a fairly accurate picture then, and are referred to in most official documents, there have been significant demographic transitions since 2002 as a result of natural increase, internal migration and emigration during the conflict and post conflict periods.

The people live in grass-thatched houses, burnt bricks and mud walls with houses concentrated within the small areas of the IDP camps. A few permanent structures exist in the trading centres. Insecurity has also adversely affected the settlement pattern and social fabric across much of the northern region after a majority of the people were displaced from their villages into protected IDP camps (Amuru District Local Government, 2008). Many social problems are associated with this kind of settlement arrangement e.g. over crowding, domestic violence, alcoholism, redundancy, drug abuse, high HIV/AIDS prevalence, early marriage and child headed households (Refugee Law Project, 2006).

The region is currently experiencing relative stability and there are deliberate efforts by the government of Uganda to resettle people in their villages of origin and enable them engage in economically productive activities.

Table 2.1 Population distribution in the study area

District	Sub-county	Population in 2002		
		Males	Females	Total
Adjumani	Ciforo	22,226	22,142	44,368
	Ofua	18,196	17,888	36,084
Moyo	Moyo T/C	5,919	6,155	12,074
	Metu	13,140	13,225	26,365
	Moyo S/C	15,305	15,600	30,907
	Dufile	10,486	9,731	20,217
Amuru	Koch Goma	4,470	4,080	8,550
	Alero	6,345	6,877	13,222
	Anaka	6,112	6,485	12,597
	Purongo	3,312	3,329	6,641
Kitgum	Lokung	10,240	9,798	20,038
	Padibe East	6,097	6,570	12,667
	Agoro	8,427	8,116	16,543
	Paloga	4,930	5,024	9,954

Source: *UBOS, The 2002 Census Results Report Appendix Tables (C).*

2.1.3 Household size and composition

Age of household head: The average age of household heads of 36.9 years implies a generally middle-aged household headship. This does not reflect the commonly cited scenario of child headed households. Adult farmers are more suited for carbon trade schemes as they involve entering into agreements based on informed consent. Also, respondents' average duration of 27.3 years in their present villages of residence proposes a fairly stable settlement history. Non-transitory settlements as these encourage long-term investment on the land and therefore present an asset to any carbon-offsetting scheme.

Sex composition: Post conflict scenarios, commonly suffer from demographic distortions that result from the events of the preceding periods which may consequently engender constraints in labor supply and demand for various resources. There are slightly more females on average in each household (3.9) compared to males (3.1). This is a normal trend in the country and there is no likelihood of this characteristic influencing the carbon-offsetting project.

Education: Education is an element of human capital and contributes towards shaping livelihood strategies of rural households. The level of formal education attained by the household head is used as a proxy indicator for education in the communities. About half (50.9%) of the households heads had attained formal education up to primary level; and more than a quarter (25.8%) had secondary education. This is a critical mass to enable effective absorption of capacity enhancing packages and engagement into carbon trading agreements. However, project design should have build-in mechanisms for accommodating the 12% of households with no formal education, lest it risks being elitist.

Marital status: Marital status of farmers has implications on intra-household decision

making regarding use of household land estate and tree enterprise. Most heads of household were married (77.0%), with only a small proportion being single (11.1%), divorced (1.8%), widowed (7.9%) or others marital status (2.1%). Average number of spouses for married household heads of 1.3 is suggestive of a predominantly monogamous society. It may be necessary for the carbon agreements in the proposed carbon management schemes to provide for a spouse's endorsement of the land use arrangement and terms of the carbon transaction.

Table 2.2 Socio-demographic characteristics of sampled households

Characteristics	Districts				
	Adjumani	Amuru	Kitgum	Moyo	Overall
Number of households (N):	80	76	139	90	385
Sex of household head (%):					
Male	56.3	59.2	81.9	75.6	70.4
Female	43.8	40.8	18.1	24.4	29.6
Age of household head (years):	34.8	33.9	35.4	43.2	36.9
Education of household head (%):					
None	27.8	15.8	4.3	8.9	12.3
Primary	50.6	55.3	42.0	61.1	50.9
Secondary	13.9	19.7	40.6	18.9	25.8
Tertiary	6.3	6.6	12.3	10.0	9.4
Others	1.3	2.6	0.7	1.1	1.4
Time spent in village (years):	28.6	23.1	30.7	32.4	28.7
Marital status (%):					
Single	8.8	17.6	13.3	4.4	11.1
Married	82.5	54.1	83.7	81.1	77.0
Divorced	2.5	5.4	0.0	1.1	1.8
Widowed	5.0	13.5	3.0	13.3	7.9
Others	1.3	9.5	0.0	0.0	2.1
Average number of spouses:	1.2	1.4	1.4	1.2	1.3
Average household size:					
Males	3.0	3.6	3.5	3.2	3.3
Females	3.2	4.6	3.3	2.7	3.5
Total	6.2	8.2	6.8	5.9	6.8

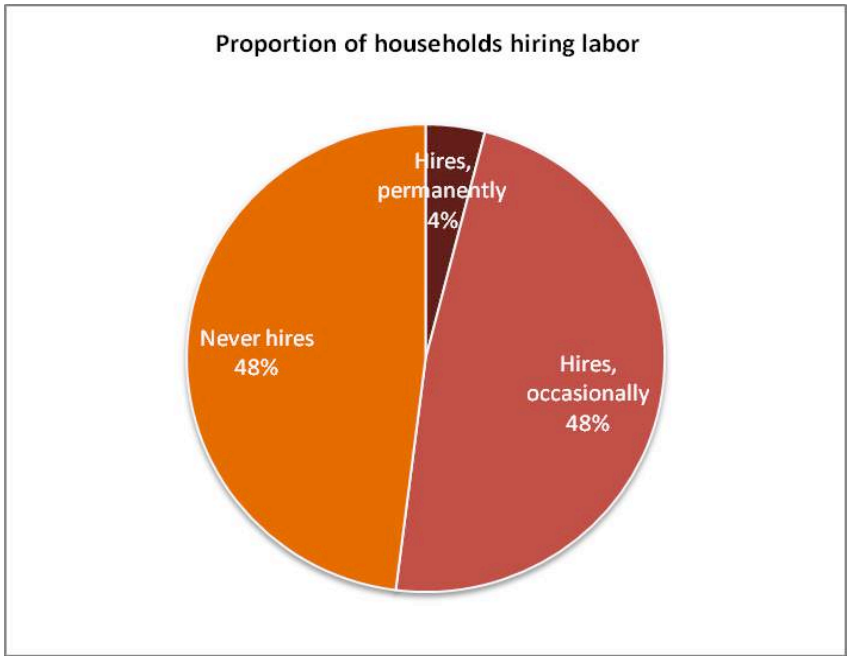
Age composition: There is a common twist in the relationship between farmers' age and their aptitude to undertake tree growing. As a long-term enterprise, tree growing would ideally have higher potential for uptake by youthful sections of the population whose life span is still unveiling. Social positioning, however, often denies youths control over land and decision making over household tree resources. Young people also tend to engage in income generating activities that offer immediate benefits as opposed long-term ventures. The average age of household heads of 36.9 years reflects a middle-aged target population whose livelihood strategies suit long-term tree growing under the proposed carbon-offsetting project.

Population structure: The age-sex composition in households depicts a normal population structure with the bulk of persons falling in the 0 – 10 and 11 – 20 years categories; steadily reducing inversely proportional to age levels (Figure 2.1). Population structure is a crucial dynamic of household labor status especially in contexts where family members supply the labor to undertake most of the farm production tasks. Despite the higher number of children (0 – 10 years) in households, their involvement in tree growing is below that of other age cohorts (Figure 3). Unlike the elderly, children seldom command any authority over household decisions making over tree and land resources. Nevertheless, this population structure suggests need for the carbon offset scheme to provide benefits that not only suit the active participants (household heads), but also spill over to the less "powerful" household and community members, if livelihood impacts are to be maximized.

2.1.4 Labor availability for farming activities

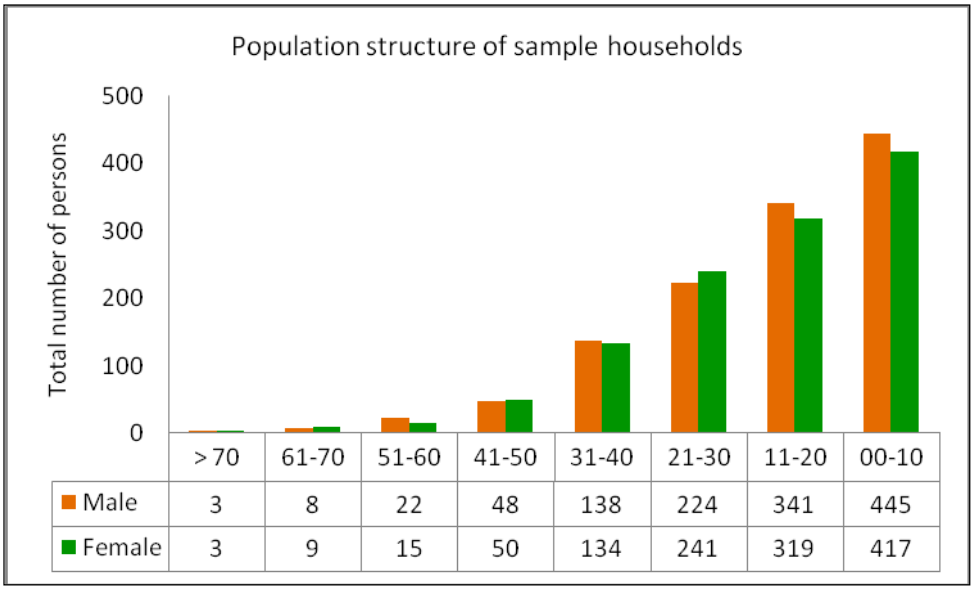
Most households rely on family labor for farming activities. About half (52.0%) of the households interviewed reported hiring of labor at some point during the year although in most cases (48%) this was done temporary arrangements. Labor is mostly hired in periods when there is high strain on household manpower resources to undertake time bound activities like land preparation at the beginning of a new cropping season, weeding, harvesting and transporting produce to the market (Table 2.3).

Figure 3. Proportions of households hiring labor



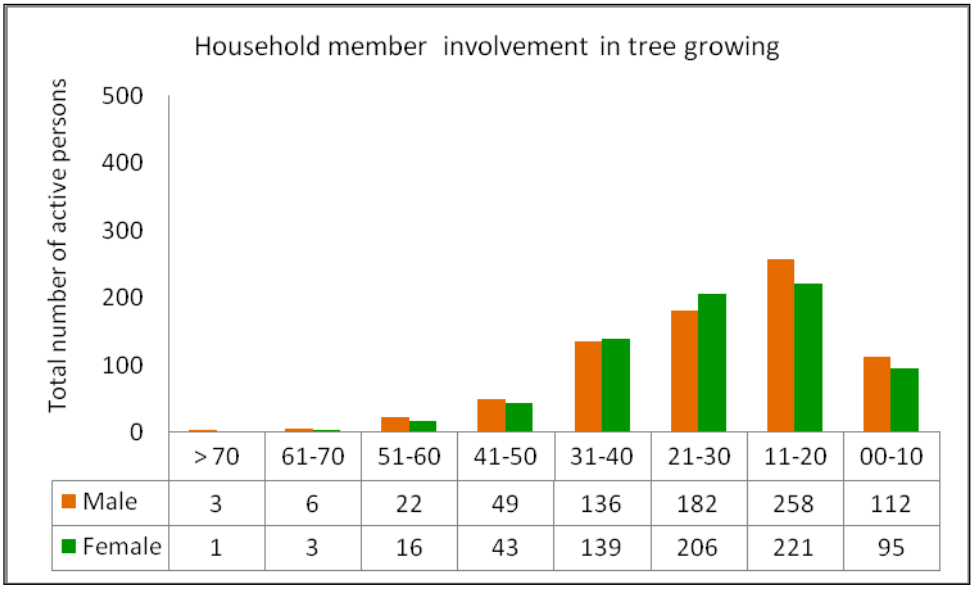
In such labor scenario, initial installments of carbon payments may not necessarily be used to offset expenses incurred in hiring labor for tree growing, but instead serve as reward for own labor invested tree growing. Ultimately, it matters little who is paid to plant the trees, although the introduction of additional tasks to family members as a result of the carbon offset project may project negative net outcomes on vulnerable sections of the population especially women and children.

Figure 4. Population structure within sample households



	> 70	61-70	51-60	41-50	31-40	21-30	11-20	00-10
Male	3	8	22	48	138	224	341	445
Female	3	9	15	50	134	241	319	417

Figure 5. Household member involvement in tree growing



	> 70	61-70	51-60	41-50	31-40	21-30	11-20	00-10
Male	3	6	22	49	136	182	258	112
Female	1	3	16	43	139	206	221	95

In many of the villages where the study was conducted, there is a significant sway of young people away from agriculture into instantly rewarding enterprises like retail business, cross-border trade in Southern Sudan and "boda-boda" transportation. In spite of tree growing not being a labor-intensive enterprise after the initial establishment stages, unavailability of labor in some seasons may put a strain on project activities. This concern though, is real in the earlier stages of the enterprise and carbon payments are a potential inducement for attracting labor from other activities into tree planting. The advantage of tree growing is that after establishment, the enterprise is more complementary rather than competitive to other livelihood activities.

Table 2.3 Activities for which labor is commonly hired

Activity	% of households
Land preparation	59.0
Harvesting crops/trees	16.0
General farming	16.0
Charcoal burning	9.6
Planting crops	9.0
Construction	6.4
Weeding	3.8
Planting trees	2.7
Transporting/Marketing produce	2.1
Cattle grazing	2.1
Raising seedlings	1.1
Watering crops	0.5
Cutting fire lines	0.5

Any carbon-offset project in the northern Uganda region, however, needs to be wary of the "hand-out syndrome" that besides lowering the level of community participation in self-help initiatives has also increased the price of wage labor. Generally, people do not want to toil and expect "projects" coming into the community to pay them for their "participation" in project activities. According to district officials, there have been instances in Kitgum whereby farmers have been given free tree seedlings, which though they hesitated to plant because the project had not paid for their (farmers') labor to undertake the task!

2.2 Community wellbeing and the nature of economic activities

Though poverty in Uganda declined rapidly the 1990s, from 56% of the population in 1992/93 to 35% in 1999/00, poverty levels remained high in Northern Uganda. In fact, between 1997 and 2000, poverty in the North rose from 60% to 66% and the share of people living in urban poverty in this region remains about 3 times higher than the average for urban Uganda (MFPED, 2002). Poverty in the northern Uganda context has been defined by local people as *"a situation of perpetual need for the daily necessities of life, such as food, shelter or clothing" and "…a feeling of powerlessness…"* (UPAP, 1999). This state of wellbeing compels people to pursue immediate survival objectives to sustain their lives rather than long-term development strategies. The possession of livelihood assets e.g. livestock, land, education, health and social status, is considered to be the key determinants of household well-being. Household food security is also considered an important criteria defining well-being in the North.

Table 2.4 Household income-generating activities

Economic activities	% of households dependent on activity (N=385)				
	Adjumani	Amuru	Kitgum	Moyo	Overall
Crop production	95.0	97.3	97.8	94.4	96.3
Local brewing	45.6	16.4	37.3	68.5	42.2
Casual labor	6.3	13.7	11.9	41.6	18.0
Retail trading	11.3	11.0	10.4	25.8	14.3
Charcoal burning	40.0	23.3	17.2	22.5	24.4
Firewood selling	8.8	13.9	11.9	28.1	15.4
Construction	2.5	2.7	7.5	5.6	5.1
Brick making	7.5	6.8	19.4	5.6	11.2
Boda-boda transportation	2.5	2.7	6.0	4.5	4.3
Craft making	6.3	1.4	1.5	18.0	6.3
Fishing	7.5	0.0	0.7	9.0	3.9
Salaried employment*	2.5	8.2	9.0	13.5	8.5
Local artisan*	0.0	1.4	0.0	1.1	0.5
Sale of livestock (products)	13.8	6.8	8.2	33.7	15.0
Group savings	8.8	20.5	15.7	73.0	28.6

Table 2.5 Level of household income generated from various activities

Economic activities	Average annual household income realized from activity (000' Ushs)				
	Adjumani	Amuru	Kitgum	Moyo	Overall
Crop production	171	340	658	291	407
Local brewing	224	304	417	384	352
Casual labor	120	206	267	395	192
Retail trading	425	267	1,825	2,018	1,485
Charcoal burning	260	395	450	335	346
Firewood selling	555	123	187	217	236
Construction	370	900	438	260	443
Brick making	483	470	500	566	502
Boda-boda transportation	120	1,380	1,509	720	1,166
Craft making	520	600	65	245	295
Fishing	575	-	30	930	728
Salaried employment	1,680	1,530	2,250	2,286	2,070
Local artisan	-	600	-	200	400
Sale of livestock (products)	203	120	124	234	191
Group savings	60	96	177	127	129

Data from the field survey indicate that most households depend on crop production (96.3%), local brewing (42.4%), group savings (28.6%), charcoal burning (24.5%) and casual labor (18.1%) for income generation (Table 2.4). Other income generating opportunities are pursued through off-farm activities like sale of firewood (15.5%), sale of livestock/livestock products (15.2%), retail trading (14.4%), brick making (11.2%), salaried employment (8.5%), craft making (6.4%), construction (5.1%), boda-boda transportation (4.3%), fishing (4.0%) and different forms of local artisan work (0.5%).

Tree growing for carbon sequestration needs to complement or at least fit into local people's existing livelihood strategies. Current livelihood activities are geared towards attainment of short-term survival rather than long-term development goals. Thus, the concept of "future benefits" may not be familiar to large sections of the target population. Farmers are likely to base their decisions on the carbon payments in the initial years of the agreements, and not on the terminal benefits from the sale/use of the trees or their products. A delicate balance of mid-term and long-term benefits needs to be considered in the prioritization of tree species and choice of forestry configurations.

Adverse poverty in northern Uganda presents serious challenges for any development activity targeting this part of the country. The devastating effects of decades of insurgency and deprivation has left a traumatized population and created a sense of hopelessness even among the potentially most productive cohorts of the population. Discriminative socio-cultural practices have further limited the capacities of some categories of society e.g. women, children and persons with disabilities to generate income, further aggravating the feelings of marginalization and helplessness. Livelihood impacts, it can be argued, are better manifested where projects deal with the poorest of the poor. However, experience has shown that a critical minimum of livelihood assets e.g. land, finances, knowledge, networks etc, are required for farmers to engage effectively in carbon transactions.

2.3 Nature of household expenditure

Tracking financial outflows in smallholder rural households is often problematic, as expenditures therein tend to be ad hoc and normally go unrecorded. In this study, we restricted our inquiry into household expenditures to establishing the proportion of households incurring expenses on broad expenditure items (Table 2.6); and relative importance attached on the various expenditure items by households (Table 2.7).

The main expenditures items on which most household incur financial resources are medical care (92.2% of households), food (89.8%), education (88.1%), clothing (83.3%), farm inputs (46.8%), fuel/energy (43.7%), hiring labor (31.8%), construction (22.1%), burial expenses (20.5%), transport (17.3%), alcohol (16.7%) and hiring land (1.3%). In order to establish the relative importance attached by households to various expenditures, respondents were requested to rank the items on which they spend in order of importance (Table 2.7). A comparison of cumulative scores across expenditure items suggested that household financial resources are mainly spent on clothing (3,446), food items (1,994), medical care (1,949), education (1,894), fuel/energy (730), farm inputs (541), labor hire (505), construction (337), burials (275), alcohol (183), transport (160) and hiring land (2).

Table 2.6 Distribution of households according to expenditure items

Expenditure items	Households citing expenditure item (%)				
	Adjumani	Amuru	Kitgum	Moyo	Overall
Medical care	92.3	81.1	94.6	97.8	92.2
Food	87.2	79.7	90.0	100.0	89.7
Education	82.1	85.1	91.5	91.0	88.2
Clothing	80.8	79.7	79.2	94.4	83.2
Farm inputs	64.9	50.0	21.5	65.2	46.8
Fuel/Energy	52.6	21.6	26.2	79.8	43.3
Hiring labor	44.9	9.5	26.9	46.1	31.7
Construction	11.5	0.0	18.5	55.1	21.9
Burial expenses	5.1	9.5	15.4	50.6	20.3
Transport	10.3	13.5	20.8	21.3	17.3
Alcohol	3.8	4.1	7.7	51.7	16.5
Hiring land	0.0	4.1	1.5	0.0	1.4

Table 2.7 Prioritization of items on which household incurs expenditure

Expenditure items	Cumulative score[4] based on magnitude of expenditure on item				
	Adjumani	Amuru	Kitgum	Moyo	Overall
Clothing	720	752	1,344	630	3446
Food	405	236	520	833	1994
Medical care	560	211	456	722	1949
Education	478	223	501	692	1894
Fuel/Energy	220	6	118	386	730
Farm inputs	308	-	28	205	541
Hiring labor	213	13	77	202	505
Construction	44	-	66	227	337
Burial expenses	20	-	58	197	275
Alcohol	10	-	24	149	183
Transport	36	-	32	92	160
Hiring land	-	-	2	-	2

[4] Respondents prioritized household expenditure items using cumulative scores derived from ranking exercises. An item ranked as one (1) was accorded ten (10) score points, while the item ranked two (2) received nine (9) score points etc. Items received points for only those respondents who mentioned them among their ten (10) major expenditures.

Figure 6. Relative importance of household income sources

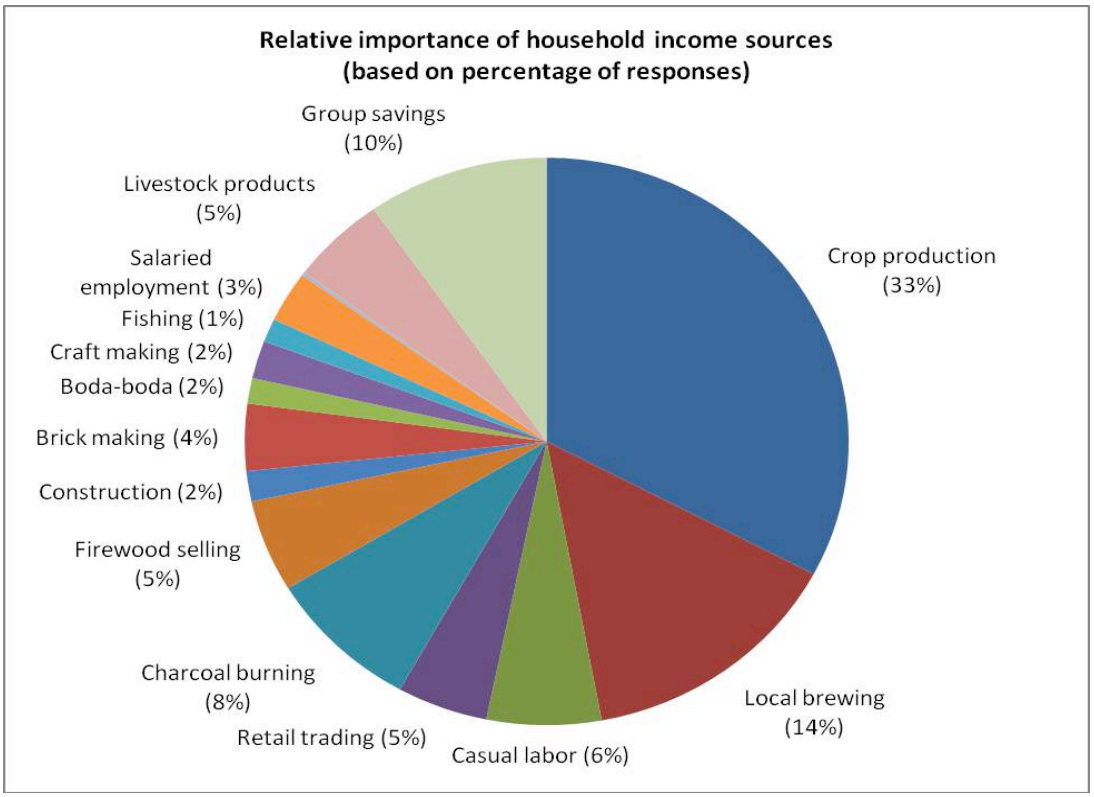
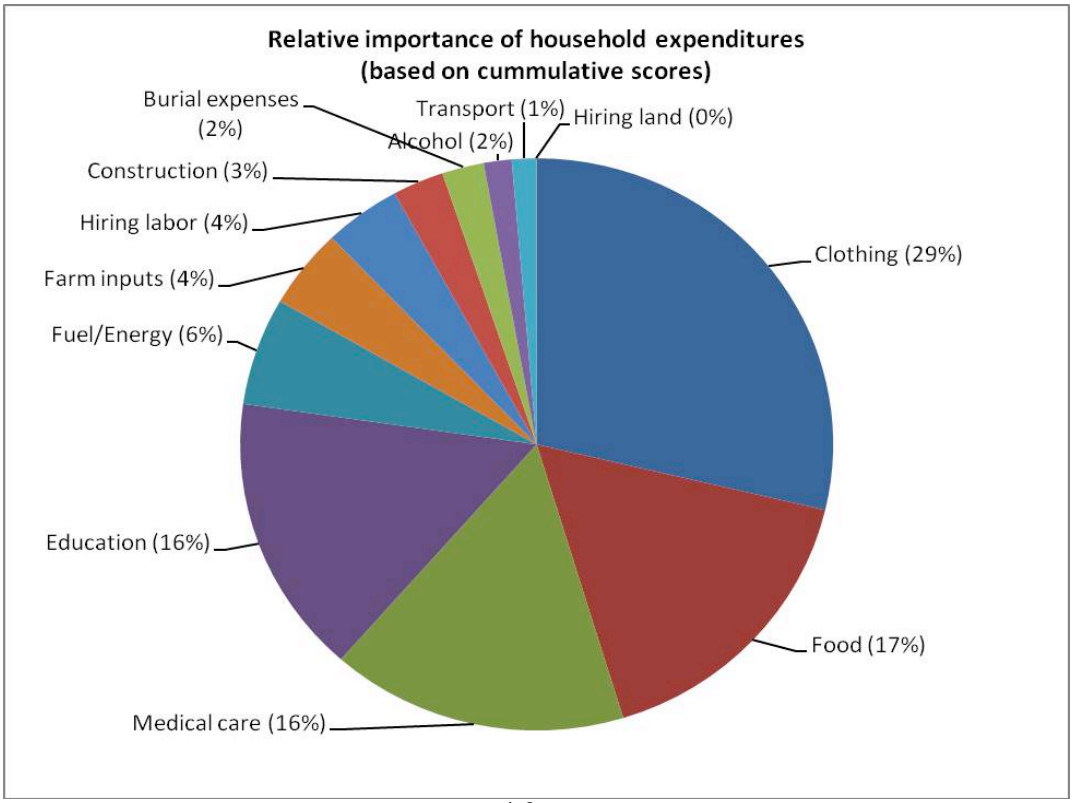


Figure 7. Relative importance of household expenditures



The analysis of household expenditures underlines the short-term and subsistence nature of household livelihood strategies as was indicative of the respondents' income generating activities. Households spend more on basic needs e.g. clothing, food, medicine and fuel in attempts to survive in the present as compared to expenditure on capital investments e.g. farm inputs, education and land.

The above expenditure patterns may have a two-pronged effect on the proposed carbon project. First, farmers are naturally bound to have overstated expectations from the project at the beginning and initial carbon payments could easily shroud people from appreciating the temporal realities involved in the transaction. To avert possible disillusionment and the damaging tensions it may precipitate, project implementers will have to spell out the rules of the game early and as clearly as possible. Carbon payments, it has to be emphasized, are simply a means to an end (a form of facilitation extended to people who already have intentions of growing trees) and not an end in itself.

Secondly, when tree growing for carbon introduces new option for offsetting major household monetary outflows, it stands higher prospects of being accepted by farmers. High value fruit and medicinal agroforestry trees for instance, may be preferred considering their potential contribution to household nutrition, income, health and capacity to fit into long-established agronomic practices in the farming system.

2.3 Land use dynamics and agricultural enterprises in farming communities

2.3.1 Characterization of crop enterprise

The nature of crop enterprise influences farmers' choice of tree species, their spatial arrangement in the farms and the management practices necessary for those trees to coexist with the crops without significant competition. The survey asked respondent to list five major crops they grow, the size of garden for each crop and an estimate of the seasonal yield realized. Simsim, cassava, maize and groundnuts are the most widely grown crops in the four districts (Table 2.8). Farmers in Amuru as compared to other districts more prominently grow groundnuts and beans; while a similar trend is depicted of simsim in Adjumani. Other major staples include millet, sorghum and sweet potatoes.

It is evident from the types of crops grown that the farming system is an annual cropping system. Farmers' production cycles therefore, are oriented towards planning for relatively short, seasonal rotations, as opposed to perennials. The long gestation period of tree enterprises is often cited as the foremost disincentive for farmers investing trees growing. Carbon payments present an opportunity for farmers to diversify production strategies by offsetting some of the short-term costs, thus rendering investment in tree growing more attractive.

Table 2.8 Major crops grown by farmers in the different districts

Crops grown	Percentage of households growing crop				
	Adjumani	Amuru	Kitgum	Moyo	Overall
Simsim	90.0	44.7	78.6	44.4	66.3
Maize	85.0	30.3	47.1	77.8	58.8
Cassava	86.3	56.6	29.3	67.8	55.5
Groundnuts	32.5	81.6	38.6	54.4	49.5
Sorghum	28.8	17.1	65.0	38.9	41.9
Millet	26.3	40.8	67.9	14.4	41.4
Sweet potatoes	52.5	18.4	12.9	61.1	33.5
Beans	-	72.4	27.1	7.8	25.9
Vegetables	2.5	3.9	47.1	30.0	25.3
Green grams	45.0	-	12.1	3.3	14.5
Cotton	-	-	25.0	-	9.0
Peas	2.5	19.7	5.7	4.4	7.5
Rice	5.0	19.7	2.9	-	6.0
Onions	-	-	3.6	4.4	2.3
Soya beans	-	1.3	4.3	1.1	2.1
Sunflower	-	-	4.3	-	1.6
Bananas	-	-	0.7	1.1	0.5

Table 2.9 Acreage covered by major crops grown

Crops grown	Average garden size (Acres)			
	Adjumani	Amuru	Kitgum	Moyo
Simsim	1.3	0.9	1.6	1.1
Maize	1.3	1.0	1.2	1.3
Cassava	1.6	1.1	1.3	1.4
Groundnuts	0.9	1.3	1.4	1.0
Sorghum	1.2	0.9	1.4	1.2
Millet	1.0	0.9	1.4	1.1
Sweet potatoes	0.7	0.6	0.4	0.6
Beans	-	1.3	1.1	1.4
Vegetables	0.5	0.5	4.1	2.4
Green grams	1.1	-	1.1	0.3
Cotton	-	-	1.4	-
Peas	1.3	1.0	0.8	0.6
Rice	0.9	1.1	2.0	-
Onions	-	-	1.2	0.4
Soya beans	-	0.5	0.9	-
Sunflower	-	-	2.3	-
Bananas	-	-	1.0	0.5

2.3.2 Characterization of livestock enterprise

Livestock used to be an integral part of the livelihood and farming system in northern Uganda and West Nile region. Cattle used to be a major form of household savings and a key role as a medium of exchange during marriage functions. Herd size has greatly reduced due to LRA insurgency and Karamojong raids, with goats and poultry now comprising the major livestock categories (Table 2.10).

Table 2.10 Types of livestock kept by households

Livestock types	Percentage of households rearing animal type (Number of animals per household)				
	Adjumani	Amuru	Kitgum	Moyo	Overall
Cattle	23.8 (7)	18.4 (5)	40.7 (4)	43.3 (4)	33.4 (5)
Goats	71.3 (6)	39.5 (4)	50.7 (4)	76.7 (5)	58.8 (5)
Sheep	12.5 (4)	11.8 (6)	12.9 (3)	25.6 (3)	15.5 (4)
Pigs	23.8 (3)	10.5 (5)	35.0 (4)	20.0 (2)	24.4 (3)
Poultry	81.3 (13)	43.4 (12)	72.9 (14)	68.9 (8)	67.9 (12)
Rabbits	-	1.3 (2)	1.4 (6)	-	0.8 (5)

Livestock are normally let to feed by free range. This may present a major threat to tree growing given eminent damage of trees due to animal browsing. Discussions with farmers and local leaders weighed several options to counter this problem, but none emerged as entirely foolproof, considering logistical and social costs that may come into play. Free ranging livestock graze rather impulsively and to demarcate no-go zones is difficult. Protecting individual trees with stick barriers will require high labor and material investment, especially where trees enterprise is on a large scale. Fencing off land is not a common norm and is likely to cause social tensions. Tree species that are less susceptible to animal browse may then be the more prospective candidates in this respect, at least in the short run. Nurturing local institutions and mechanisms for safeguarding trees from stray livestock in the medium to long term will allow farmers more freedom to widen their range of species and livelihood benefits.

2.3.2 Characterization of tree growing enterprise

Tree species diversity and strategies for species selection

An exhaustive inventory of trees existing on farms was beyond the scope of this socio-economic feasibility analysis. For our purpose, the inquiry into the tree growing practices based on farmers' submissions about the trees that commonly exist on their farms, the locations where most of the trees are located, and their experiences in tree growing. Table 2.11 outlines the tree species commonly existing on farms, prominent among which are mango (*Mangifera indica*), orange (*Citrus spp.*), Mvule *(Milicia excelsa*), Maza and Mai. Other common tree species include guava (*Psidium guajava*), teak (*Tectona grandis*), Opok, Awa (*Viterallia paradoxa*), jackfruit (*Artocarpus heterophylus*), neem tree (*Azadrachta indica*), Odugu, Munzu, Adugo, Avocado (*Persea americana*), Itubi, Morogilo, Pawpaw (*Carica papaya*) and Eucalyptus (*Eucalyptus spp.).*

This study learnt that tree growing is mainly through retention of trees naturally growing on their own as opposed to deliberate planting (except for Teak, Eucalyptus, Neem tree and a few fruit trees). Common tree management practices like pruning, weeding and coppicing are also done in somewhat ad hoc fashion with the farmers' primary objective being acquisition of associated tree products (e.g. firewood and poles) rather than silvicultural

discipline. The carbon management scheme may therefore have to venture into uncharted waters to get these rather laid-back tree farmers to adhere to strict technical specifications.

Table 2.11 Trees commonly existing on-farm

Common name	Botanical name	No. of respondents
MANGO	*Mangifera indica*	184
ORANGE	*Citrus spp.*	110
ELEU	*Milicia excelsa*	54
MAZA	*Piliostigma thorningii*	54
MAI	-	49
GUAVA	*Psidium guajava*	39
TEAK	*Tectona grandis*	38
OPOK	-	36
AWA	*Viteralia paradoxa*	32
JACKFRUIT	*Artocarpus heterophylus*	30
NEEM	*Azadrachta indica*	30
ODUGU	*Combretum collinum*	30
MUNZU	-	28
ADUGO	-	26
AVOCADO	*Persea americana*	26
ITUBI	*Combretum molle*	26
MOROGILO	-	26
PAWPAW	*Carica papaya*	26
EUCALYPTUS	*Eucalyptus spp.*	25
LODI	-	25
ENZU	*Grewia mollis*	24
ORYANG	-	24

Most trees grown are fruit trees although there is significant planting of *Tectona grandis* as well. The charts in Figures 5-8 depict minor differences in the tree species commonly found across the four districts. Markedly though, fruit trees do not feature highly in Adjumani as they do in other districts. This may be an opportunity for promotion of fruit trees in Adjumani to address nutritional constraints in households as well as exploit apparent market opportunities for income generation. Elsewhere, the quality of fruit is frequently not up to the market requirements as locally existing varieties (land races) are dominant. Introduction of improved varieties that manifest desirable market characteristic could enhance marketability of fruit produce. This is likely to reap bountiful livelihood dividends although the carbon sequestering potential of “grafted” fruit trees will have to be carefully considered.

Figure 8. Tree species common on farms in Adjumani district

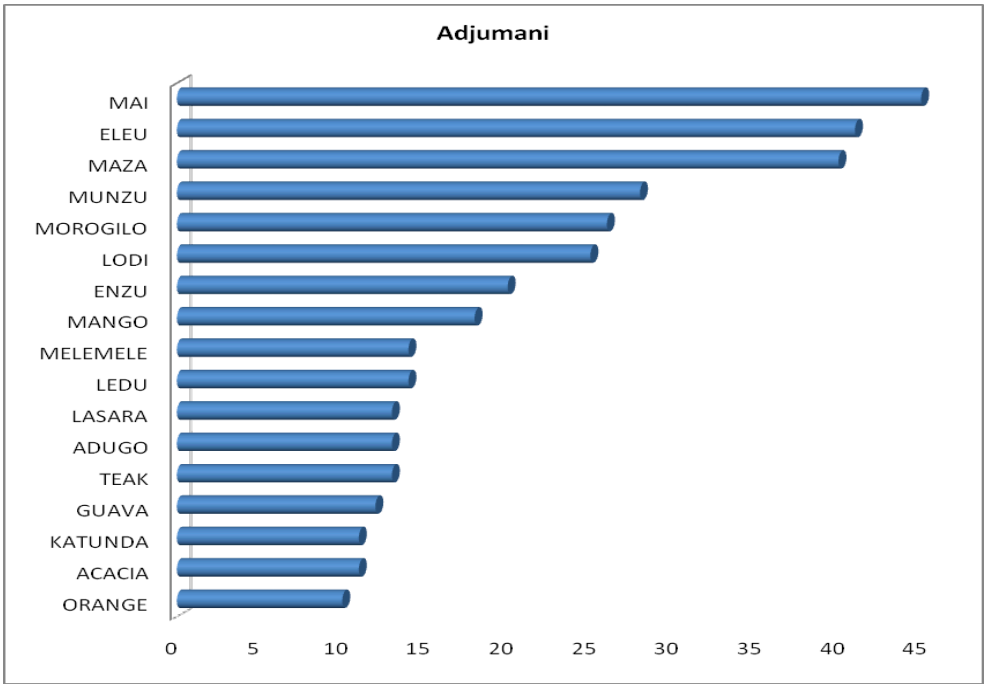


Figure 9. Tree species common on farms in Amuru district

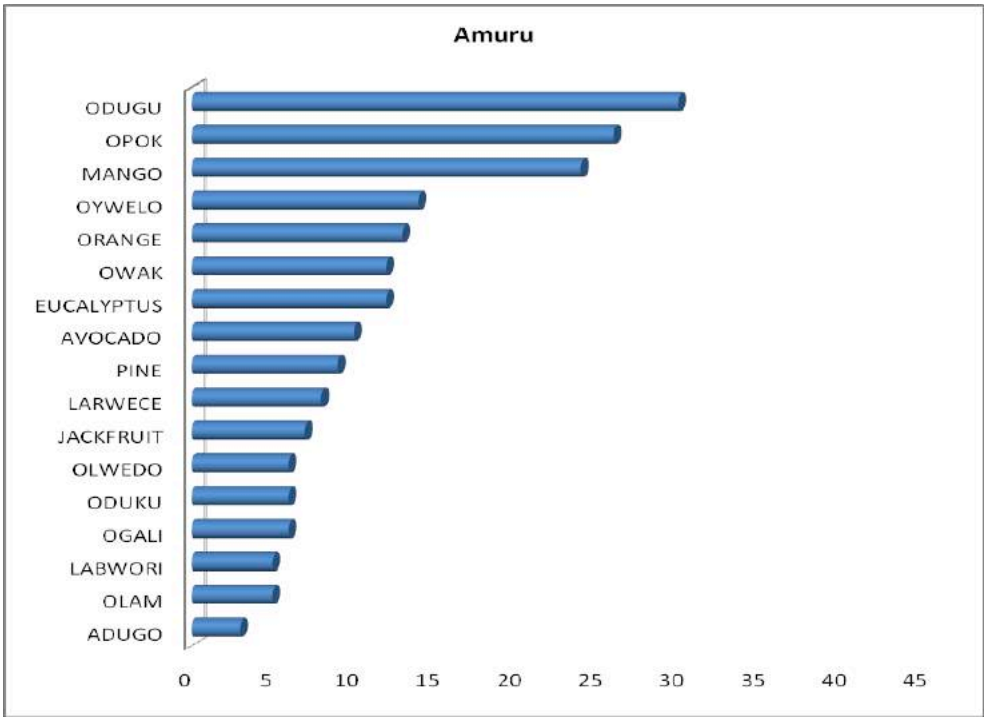


Figure 10. Tree species common on farms in Kitgum district

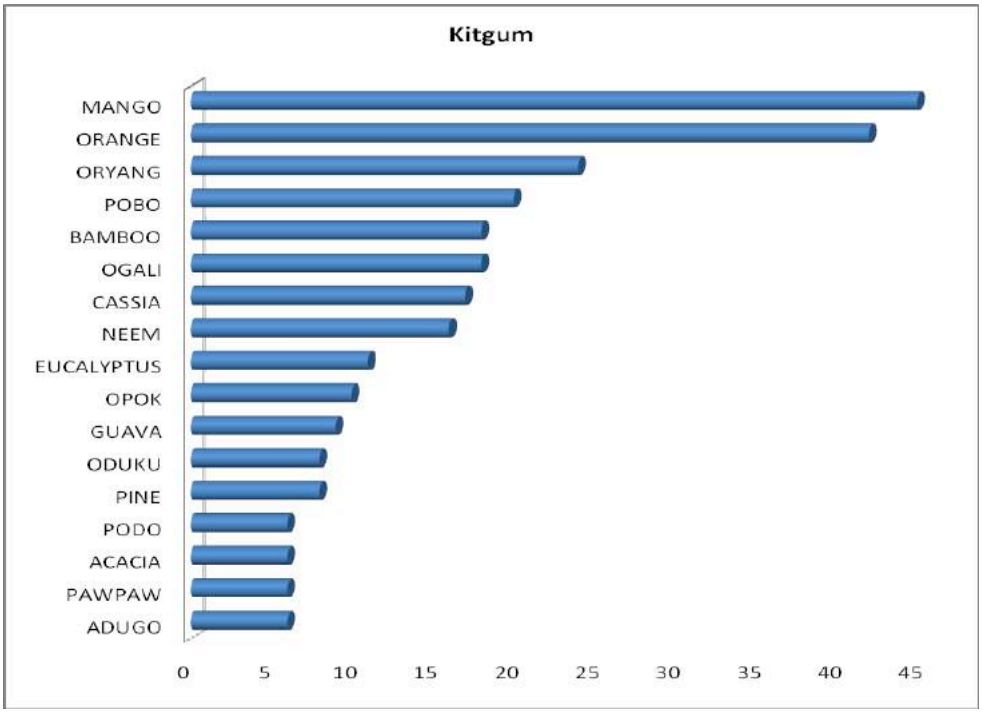
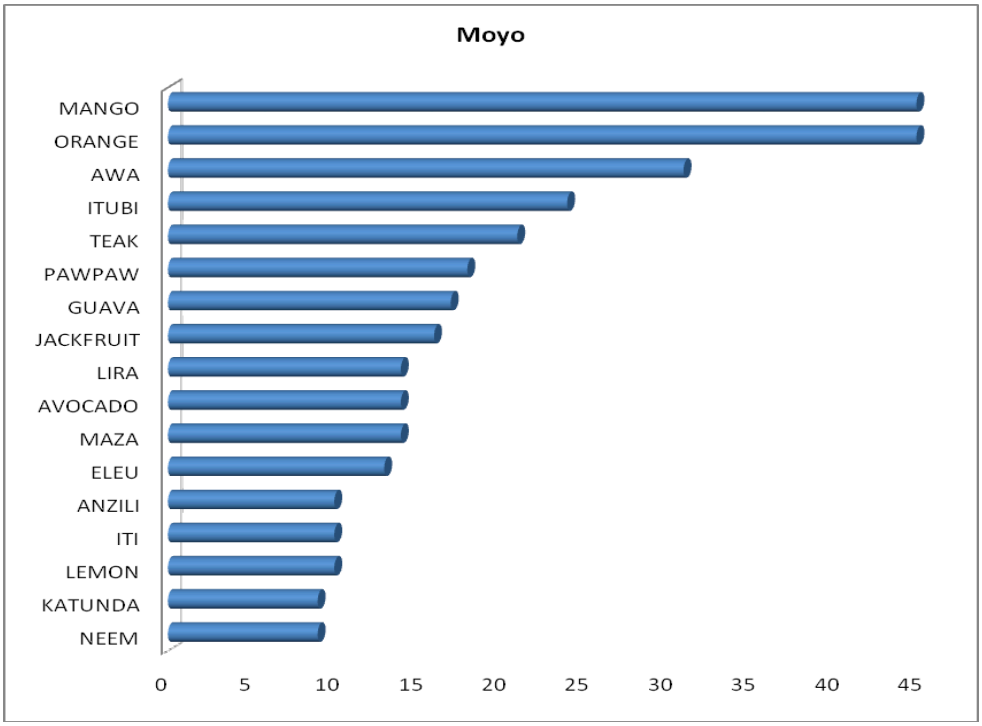


Figure 11. Tree species common on farms in Moyo district



A combination of indigenous species and naturalized exotics exist on most farms. This arises out of a blend of factors, among which may be natural selectivity and supply rigidities. Indigenous trees are famous for being hardy and adapted to stressful conditions e.g. extended drought periods, wild fires and termite attack. Naturalized exotics are not as resilient but are easier to propagate and tend to register faster growth. As a risk version strategy, farmers grow a little bit of both and it is highly probable that their preferences for the carbon management scheme will base on the similar thinking. The scarceness of quality of germ plasm for both indigenous and naturalized exotics is a major limitation even to the most devoted tree farmers. The project need not give farmers free seedlings, but should put in place mechanisms to ease farmers' access to quality germ plasm.

Tree growing niches

It is discernible even from direct observation that trees in the landscape are mainly situated in woodlands located at considerable distance from the homesteads. However, when farmers were asked about the common trees on their farms and their locations, most respondents indicated homesteads and cropland among the locations with the highest tree cover. Table 2.12 presents locations where trees commonly grow. Retaining trees on homesteads and croplands is a widespread practice as indicated by 84.4% and 68.5% of respondent households respectively.

Table 2.12 Locations where trees are commonly growing

Trees on farm	Households (%)				
	Adjumani	Amuru	Kitgum	Moyo	Overall
Homestead	79.2	78.5	84.9	93.1	84.4
Cropland	81.8	78.5	55.8	67.8	68.5
Farm boundary	67.1	55.4	35.6	18.6	42.1
Grazing land	55.8	15.4	32.7	46.0	37.2

Apparently, targeting these niches (homesteads and croplands) for planting trees under the carbon management project will not be against the norm. Boundary planting is another option which though is likely to require negotiations between various concerned parties to avoid conflict over rights to carbon payments. Alternatively, internal farm boundaries provide a less contested niche that may be proposed to farmers. The need for technical recommendations not withstanding, the ultimate decisions on where to plant the trees will have to be left to the individual farmers to make. Table 2.13 summarizes responses on locations most convenient for farmers to grow trees.

Homesteads are the most frequently preferred location for tree growing as indicated by 66% of respondents. Trees planted near the home are easier to water, weed and protect from wild fire and thieves compared to those in other farm locations. One respondent said that "any defect on the trees e.g. pest or disease can easily be detected by one of my household members and is reported." Besides the ease of management trees around the homestead also offer a range of services e.g. provision of shade for humans and livestock, windbreaks to protect grass thatched houses from strong winds, as well as reinforcing the land holders claim on ownership over the land.

Table 2.13 Locations most convenient for farmers to grow trees

Trees on farm	Households (%)				
	Adjumani	Amuru	Kitgum	Moyo	Overall
Homestead	84.6	29.6	67.9	76.8	65.9
Cropland	56.4	49.3	40.5	22.0	41.2
Farm boundary	59.0	22.5	13.7	9.8	23.9
Grazing land	16.7	1.4	6.1	0.0	5.9

There are some reservations nonetheless, about investing in trees within homesteads. Farmers, especially in Amuru district cited high susceptibility of trees planted in homesteads to damage by children, livestock browse and visitors picking fruits prematurely. Home gardens were also reported to be "congested" which does not permit proper growth of some trees. Chances of pest and disease attack were also reported to be higher near the homestead compared to other parts of the farm.

Croplands represent an alternative location for tree growing suggested by 41.4% of respondents. Most households are endowed with large expanses of cropland and identify these areas as most suitable for tree growing. Farmers indicate that the soils on cropland are relatively more fertile that other farm locations which favors trees planted there. Such trees also benefit from farm management practices along with companion crops e.g. weeding and protection. Problems of wild browse and fire are less likely in situations where trees are interspersed with crops.

Tree growing on croplands are, however, more susceptible to theft, wild animals, bush fires and accidental damage. Due to long distances from the homestead, chances of monitoring and protecting the trees on garden are low compared to trees located in homesteads. As such, croplands may be better suited to timber trees than fruit trees that are highly vulnerable to thefts and damage by wild animals. Bushfires are another major menace to trees on croplands especially during the dry post-harvest period. Generally, it is widely believed too that trees compete with crops for light and nutrients, and that specialist agroforestry skills are required to forge a co-existence of the two components. Trees on cropland are in addition at risk of damage especially when ploughing the gardens for a new season; especially where hired laborers or plough oxen are hired to speed up this task before the onset of the rains. Project design and implementation strategies need to be alert of these issues before passing croplands as the appropriateness niche for tree growing for carbon management.

Farm boundaries and *grazing lands* were the other locations considered by 24.3% and 6.1% of respondents respectively. Boundary planting enables farmers to demarcate their land and lessen possibilities of land conflicts with neighbors and clan members. It is also a strategy to draw attention to a landholder's claim on a piece of land, both in the present and future generations. Tree planting on grazing land is also geared towards making optimal use of vast stretches of unproductive communal lands; while the trees, in addition provide shade for grazing livestock.

Boundary plantings, however, ought to content with the need to gain the consent of neighbors. Respondents intimated to the study team that misunderstandings between neighbors are common over boundary trees shading or extending roots to on adjacent crop gardens. Such tensions at times result in uprooting of seedling or cutting down of

already established trees. Grazing land are not as contested, but trees grown there are considered communal resources and could easily succumb to the "tragedy of the commons", if community institutions are not nurtured to regulate their use. Further still, both boundary and rangeland trees are probably the most susceptible to bush fires.

Photo 1. *Boundary planting is an option that farmers may negotiate.*

Problems faced by farmers in tree enterprise

Challenges faced by farmers in growing trees in particular locations need to be taken into account by project designers and implementers. Besides spatial considerations, interventions need to target the particular stages of the tree enterprise that farmers find most challenging. Farmers were asked which stages of the tree growing they found most problematic, and the responses are summarized in table 2.15.

Table 2.15 Most challenging stages of tree growing

Trees on farm	Households (%)			
	Adjumani	Amuru	Kitgum	Moyo
Planting	82.2	23.6	35.8	85.7
Management	60.3	69.1	67.5	10.7
Marketing	19.2	12.7	10.8	2.7

The majority of farmers indicated planting (56.0%) and management (52.9%) as the stages in tree enterprise that they find most challenging. Tree planting was especially problematic to farmers in Adjumani (82.2%) and Moyo (85.7%); while challenges in tree management were faced across all districts except Moyo (10.7%). Generally, farmers did not report experiencing problems in tree marketing (11.1%) as they do not often engage in it as a day-to-day livelihood activity.

Planting: Challenges encountered at this stage include lack of technical skills (e.g. on

nursery practice, farm layout, spacing, pitting etc.), inadequate labor to undertake tasks (e.g. land clearance, pitting and watering), lack of quality planting material/ transportation of seedlings), low germination and survival rates, slow growth due to poor soils and stray livestock browsing on young trees. Prolonged drought periods experienced in the region also require that farmers meticulously time their planting to coincide with onset of the rains, in order to avoid incurring hefty costs of watering.

Tree management: The main problem in management of trees is ensuring their safety from human and environmental destructive agents. Damage of trees by children, wild fires, pests and diseases, stray livestock or prolonged drought is often eminent. Farmers' financial capacity to undertake mitigation measures like spraying, watering, fencing etc. is quite limited. Farmers also claim inability to carry out tree management practices (e.g. pruning and spraying) without technical guidance. There is general laxity though towards management of trees, a perception that the proposed carbon management project will have to offset though aggressive forestry extension.

Photo 2. *Seasonal bush fires pose a serious threat to tree growing efforts.*

Marketing: Lack of a reliable market for tree products is a major challenge to tree growing. Respondents cited low demand, which many attributed to the poor quality of tree products. Most farmers are constrained by inability to afford appropriate harvesting equipment and skilled labor to guarantee market-worthy products. For many products, farmers have to move long distances on bicycles and bad roads to access markets. Alternative means of transport e.g. hiring of small trucks exist but are not affordable for the average tree farmer. Regulations restricting harvesting and trading in timber products are also considered prohibitive to local investment in the tree growing enterprise.

2.4 Land tenure situation: implications for a carbon management

2.4.1 Traditional foundations to the current land tenure arrangements

Generally, there is still a substantial portion of under-utilized land in the North resulting from low population densities in some districts, insecurity and failure to expand cultivation due to labor, capital, market and social infrastructure constraints (MFPED, 2002). The loss of oxen during the insurgencies has hampered the extent to which people can open up land and expand cultivation.

Land tenure in most parts of northern Uganda and West Nile is customary. Under the customary land tenure system, most land is not titled and its administration is enshrined in cultural institutions. In this arrangement, ownership of land is transferred from one generation to another through inheritance, which follows a patrilineal system. Historically, clan elders have manifested the capacity to superintend effectively over land affairs and still command respect from virtually every member of the society. As result, the region has experienced relative stability of tenure over land, although the post-conflict resettlement is unveiling new challenges.

Age grading and gender are the key determinants of household members' access and control over the land. According to most traditions in this region, young men are allocated portions of land by their fathers or the clan heads in case the father has died. Women and girls seldom control any land, which leaves them entirely dependent on men for vital livelihood support resources.

> "Although the customary land tenure system is predominant in the region, where it is assumed that land is available and accessible to all members of society, this does not necessarily guarantee access to marginalized groups, particularly the women" **(MFPED, 2002).**

Disparities in access to and control over land may therefore not be easily solved at farm of household level as they are deeply rooted in the cultural fabric of the various societies. A source in Moyo district, for instance, described Madi tradition as:

> "… one of the traditions in which gender inequality is so much expressed, in fact the society is patrilineal in the sense that land as the main productive asset is passed from father to son. As such, men have overwhelming control over the land. This aside, in laws in many occasions grab off land from a widow in the event that she loses her husband" **(Metu Sub-county three-year Development Plan, 2008-2011).**

Any attempts at quick fixing such "distortions" in social relations are likely be futile given the complexity of deconstructing longstanding cultural paradigms. The proposed project is better placed investing efforts and resources in seeking to understand implications of such inequalities, rather than dismantling them. In line with this, the carbon-offsetting project ought to abstain from making "blanket" assumptions about farmers throughout all stages of the project cycle. Most importantly, technical recommendations e.g. on tree species, agroforestry systems, management regimes etc, as well as administrative strategies will require inbuilt mechanisms for accommodating marginalized household and community members.

2.4.2 Household land size and mode of ownership

The size of a household's land estate and the mode of ownership exercised over the land are key functions of the land use strategies of the household members. Table 2.15 summarizes data on land ownership in sample households.

Table 2.15 Land ownership characteristics of households

Characteristics	Districts				
	Adjumani	Amuru	Kitgum	Moyo	Overall
N (number of households)	80	76	139	90	385
Average farm size (acres)	13.5	10.3	7.1	6.9	9.1
Mode of land acquisition (%)					
Inherited	87.5	93.2	98.5	95.3	94.4
Given	5.0	2.7	1.5	3.5	2.9
Borrowed	1.3	-	-	-	0.3
Rented	-	4.1	-	-	0.8
Purchased	6.3	-	-	1.2	1.6
Mode of land tenure (%)					
Customary	93.8	90.5	98.6	96.4	95.5
Leasehold	6.3	1.4	0.7	2.4	2.4
Public	-	-	0.7	0.3	0.3
Others	-	8.1	-	1.9	2.0
Ownership of land titles (%)	20.3	25.7	13.1	-	14.0

The average farm size of 9.1 acres across the four districts is indicative of the general sparseness of population in the Northern Uganda region which in spite of territorial vastness, accounted for barely 22% of the 24.4 million Ugandan population (UBOS, 2002). Considering average farm size, there is ample land for farmers to engage in tree growing for carbon offsetting and still effectively undertake other livelihood activities. Intensive tree growing strategies like agroforestry, may be necessary Kitgum and Moyo where on average, farms are smaller (7 acres) compared to those in Adjumani (14 acres) and Amuru (10 acres).

In light of the customary system under which land is held, most of it is acquired through inheritance (94.4%). It is only in a few instances that farms reported the land they occupy having been given (2.9%), purchased (1.6%), rented (0.8%) or borrowed (0.3%). A large majority (86.0%) of the 385 farms surveyed do not have titles to their land. This study further investigated the existing mechanisms for ascertaining land ownership (Table 2.16).

Table 2.16 Confirmation of ownership over land

Proof	% of households
Clan elders bear witness/Inherited	80.0
LCs/Neighbors/Communities bear witness	14.4
Current occupancy/use of land	12.3
Have stayed for long	6.0
Planted trees on boundary	5.3
Legal documentation	2.8
Sub-county land committees	1.8
Fenced off	0.7

Generally, it is uncommon in the study area for landholders to be required to confirm ownership of their land, as traditional mechanisms for its acquisition are well known. For most households (80.0%), any need for confirmation of ownership would be referred to the clan elders, since the land was acquired through the cultural institutions. Respondents explained this issue thus:

> *"This land has been demarcated long ago by our fore fathers."*
> *"It is a land that has been inherited from generation to generation."*
> *"The land has been allocated the children by the elder parents and it is culturally done."*
> *"No body will claim the land because it is a traditional/ancestor land."*
> *"The land belongs to the owner, so there is no way one will claim ownership of that land."*
> *"Parent, brothers, sisters, neighbors and clan all know about my ownership of this land."*

Other options for ascertaining ownership of land include seeking the intervention of the local community members especially the LCs and neighbors. A farmer can also refer to his/her current use of the land and longevity of occupancy on the land to justify his/her claim on the land. This may be reinforced by planting of trees or in quite a few instances fencing off. Legal procedures may also be pursued through the sub-county land committees.

2.4.3 Household control over land use options and resource utilization

Decisions regarding tree growing are often cognizant of the size of land holding and the entire package of rights that the farming household has at its disposal over the land and tree resources on it. This study thus investigated the nature of rights farers have regarding the choice of crop enterprise, land use activities, tree species preferences and use of on-farm tree resources (Table 2.17).

Table 2.17 Households control over land use decisions

Characteristics	Households with control over decisions on land and tree resource use (%)			
	Adjumani	Amuru	Kitgum	Moyo
N (number of households)	80	76	139	90
Right to choose crops to grow	98.7	97.3	99.3	98.9
Right over which land use activities	98.8	98.6	97.1	97.7
Right over which tree species to grow	97.5	98.6	97.8	98.9
Right to use on-farm trees	100.0	100.0	96.4	90.8
Right to sell on-farm trees/products	52.5	100.0	92.7	89.4

Over the board, farmers enjoy limitless access and control over the land and tree resources on their farms. Virtually all respondents enjoyed infinite rights over land use activities to undertake (97.9%), crops to grow (98.7%), tree species to grow (98.2%), and use on-farm trees (96.6%). There are apparent restrictions on the sale of on-farm trees and tree products, with a relatively lower proportion of households (84.8%) reporting complete control. The high level of control households have over land and tree resources is an incentive for carbon trading. This not only implies less bureaucracy in negotiating consent over committing land to tree growing, but also greater possibilities of farmers benefiting directly from their investment.

2.5 Household consumption and marketing of tree products

2.5.1 Consumption of tree products by households

Tree growing for carbon offsetting stands to generate various livelihood benefits to farming households and entire communities. The impacts are more likely to be realize at household level through improved availability of tree products as well as outcomes of tree services. A detailed description of household parameters for tracking these impacts is beyond the scope of this study but Raintree (1991) provides useful guidelines for further analyses. It will suffice here to consider household consumption of major tree products (e.g. firewood, poles, posts, timber, charcoal etc.) as indication of local demand for tree products.

Table 2.18 Levels of household consumption for various tree products

Tree products	% of households consuming product			
	Adjumani	Amuru	Kitgum	Moyo
Firewood	98.8	96.7	92.0	97.7
Building poles	83.8	49.2	59.0	79.5
Fencing posts	7.5	11.5	18.9	32.6
Timber	7.5	23.0	22.8	44.3
Charcoal	25.0	54.1	32.5	56.5
Oil	7.5	31.1	4.1	81.8
Nuts	1.3	21.3	9.0	17.2
Fruits	22.5	70.5	90.3	79.5

Table 2.18 presents the level of household consumption of tree products. It can be deduced from the analysis that firewood (95.8%), fruits (68.8%), poles (68.1%), charcoal (40.4%), oil (29.0%), timber (24.7%), posts (18.3%) and nuts (11.4%) are the major tree products consumed by households.

2.5.2 Marketing of tree products by households

Ultimately, tree growing for carbon is intended to enable households generate income through sale of tree products. Current market scenarios for various tree products may not be the fundamental determinants of the degree to which such a strategy is viable, but can offer useful insights into the selection of candidate tree species and development of technical specifications. Table 2.19 summarizes the extent to which households are involved in the marketing of various tree products in the four districts.

Table 2.19 Extent of household involvement in marketing of tree products

Tree products	% of households marketing product			
	Adjumani	Amuru	Kitgum	Moyo
Firewood	26.3	44.7	36.7	42.2
Building poles	10.0	17.1	23.0	11.1
Fencing posts	-	6.6	11.5	8.9
Timber	2.5	3.9	8.6	1.1
Charcoal	47.5	30.3	22.3	21.1
Oil	1.3	-	1.4	20.0
Nuts	-	15.8	6.5	5.6
Fruits	10.0	39.5	55.4	56.7

Largely, there is limited marketing of tree products by farming households. The sale of fruits (especially mangoes and oranges) and firewood were the most frequently reported in 43.1% and 37.4% of households respectively. A significant proportion of households are also involved in the charcoal business (28.8%) and sale of building poles (16.4%). Marketing of other tree products is minimal, reported in only a few households. This includes selling of fencing posts (7.5% of households), nuts (6.8%), oil (5.5%) and timber (4.7%). Generally, there is little variation in the prices of various tree products in the different districts (Table 2.20).

Conflicts usually arise regarding control over tools and children's labor. The patron handles most misunderstandings between pupils and these commonly involve disagreement over tools, or disgruntled pupils complaining about agriculture considering it a punishment. Parents' occasionally express grievances over children loss of farm tools borrowed from home, as well as teachers' use pupils labor to dig personal gardens. Issues in the latter category are usually solved through the intervention of the head teacher. In most schools, there are "disciplinary committees" to mediate the conduct of pupils and staff, which may be called upon to intervene.

Table 2.20 Market prices of tree products in different districts

		Price of product in Ushs per unit			
Product	Units	Adjumani	Amuru	Kitgum	Moyo
Firewood	Bundles	2,000	2,000	1,500	2,000
	Trip[a]	-	80,000	-	-
Building poles	$Piece^{small}$	-	500	-	500
	$Piece^{big}$		2,500	2,000	2,000
	Bundle	5,000	-	-	6,000
Fencing posts	Piece	-	2,000	2,000	10,000
Timber	Piece	8,500	9,000	8,000	12,000
	$Piece^{12x1}$	-	5,000	12,000	20,000
	$Piece^{2x4}$	-	2,500	-	-
Charcoal	Bag	15,000	15,000	12,000	15,000
	Basin	3,000	-	-	2,500
Oil	Litre	-	4,000	3,000	4,000
Nuts	Bag	-	60,000	-	-
	Basin	-	-	12,500	12,000
	Mug	-	-	700	-
Fruits	Heap	500		500	500
	Basin	-	-	1,000	5,000

[a] 1 trip=500 bundles;

Evidently, the current scenario backs promotion of fruit and timber trees in proposed carbon management scheme. In Adjumani, impediments to effective generation of income from sale of fruits need be explored further. Tree growing for fuel wood production (i.e. firewood and charcoal) is not only uncharacteristic of this farming system, but also inappropriate for carbon offsetting as it offers minimal additional environmental impacts. When compared to posts and building poles, timber seems to be the most viable of the other wood products. The small number of households currently engaged in the marketing of timber is attributed to constraints on the supply side rather than low of demand for the product. The carbon payments may therefore assist farmers address some of these constraints and benefit from the ever-increasing demand for timber products. Building

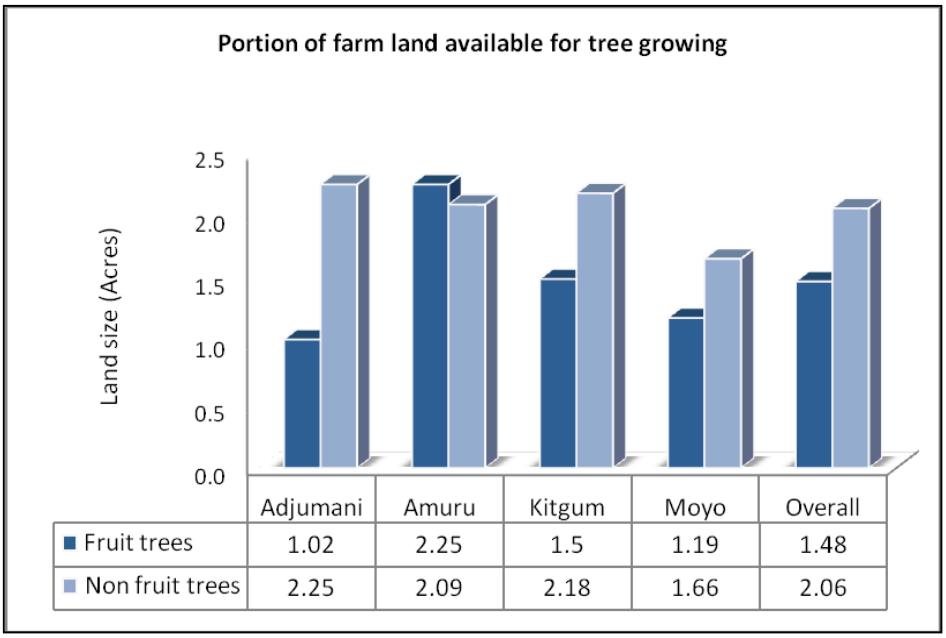
poles have a vibrant market but their relatively short growing rotation will have to be considered when opting for them as a terminal benefit from the carbon-offsetting project. The market for fencing posts is small due to the communal land ownership that discourages the practice of fencing off pieces of land. This is said to deny other community members access to traditionally shared resources like herbal medicines, fruits and firewood.

2.6 Farmers' species preferences

2.6.1 Fruit trees versus non-fruit trees

The choice between promoting fruit or non-fruit trees need not be regarded as hard and binding as the two options are not mutually exclusive. However, a comparison of the two is vital for guiding decisions on which types of trees to propose for which project site. In most contexts, a mix of both is often workable though emphasis may vary according to the specific priorities of project implementers and beneficiaries. In this study therefore, we used proportion of land farmers are willing to commit to either option as a proxy indicator of relative preference across sites rather than a measure of whether to adopt or drop either option.

Figure 14. Proportion of land available for growing different types of trees



	Adjumani	Amuru	Kitgum	Moyo	Overall
Fruit trees	1.02	2.25	1.5	1.19	1.48
Non fruit trees	2.25	2.09	2.18	1.66	2.06

Figure 5 shows the proportion of farmland that farmers are willing to allocate to fruit and non-fruit tree growing. Generally, the average size of land farmers are willing to commit to tree growing was higher for non-fruit trees (2.1 acres) than fruit trees (1.5 acres). Contrastingly, farmers in Amuru indicated willingness to commit more land to fruit tree growing than other districts. On the other hand, farmers in Adjumani were willing to commit slightly larger portions of land for non-fruit trees compared to their counterparts in other districts.

The area of land allocated to both is also indicative of the availability of land for tree growing. Project design for the carbon-offsetting scheme ought to fit its technical specifications into the amount of land declared as available for either category of trees.

Strategies of integrating trees into other land use activities will greatly enhance optimal utilization of farmland. Scattering fruit trees on farm or planting non-wood trees along farm boundaries would be some of the strategies to pursue. Nevertheless, the success or failure of whatever system is to be adopted depends as well on the careful selection of tree species to be promoted.

2.6.2 Farmers' tree species preferences

Determining appropriate species for growing on a carbon-offsetting scheme requires a delicate balance between "participation" and "technical guidance". To ask farmers "what tree species are on high demand locally for various products" has its limitations as farmers tend to list prized woodland species unwary of their long commercial rotations (Owen, 2003). This study sought to avoid this by instead asking farmers for the trees they would wish to plant and though felt would do well in their farming conditions. Table 2.21 gives an outline of the tree species farmers' suggested for planting.

Table 2.21 Farmers' preferred tree species for planting

Common name	Botanical name	% of households
MANGO	*Mangifera indica*	63.1
ORANGES	*Citrus spp.*	55.7
TEAK	*Tectona grandis*	52.2
EUCALYPTUS	*Eucalyptus spp.*	35.2
PINE	*Pinus spp.*	31.1
NEEM	*Azadrachta indica*	28.4
AVOCADO	*Persea americana*	21.6
ACASIA	*Acassia spp.*	13.7
MVULE	*Milicia excels*	12.6
JACK FRUIT	*Artocarpus heterophyllus*	12
CITRUS	*Citrus spp.*	8.2
ARBOREA	*?*	4.9
GUAVA	*Psidium guajava*	4.6
PAWPAW	*Carica papaya*	3.3
LAWIWIU	*?*	2.7
GREVILLEA	*Grevillea robusta*	2.7
LEMON	*Citrus spp.*	2.2
MELIA	*Melia azedrach*	2.2
MALAINA	*?*	1.9
SAMBIA	*Markhamia lutea*	1.9

There is general preference for fruit trees with Mangoes (*Mangifera indica*) and Oranges (*Citrus spp.*) being the most frequently mentioned species preferred in 63.1% and 55.7% of households respectively. Other fruit trees were given lower priority and included Avocado (*Persea americana*), Jackfruit (*Artocarpus heterophylus*), Guava (*Psidium guajava*) and Pawpaw (*Carica* papaya). The carbon offsetting potential of these fruit species, however, raises questions especially considering that in most instances farmers indicated preference of improved or grafted varieties that are fast maturing. These trees

tend to put on little woody biomass and their precocity has been debatable, raising possibility of farmers benefiting only for a limited number of years and having to contend for long with fruit trees that have gone beyond their productive span.

Teak (*Tectona grandis*), Eucalyptus (*Eucalyptus spp.*), Pine (*Pinus spp*) and Neem (*Azadrachta indica*) are the most highly preferred non-wood tree species. Others include Acassia (*Acassia spp.*), Mvule (*Milicia excels*), Arborea, Grevillea (*Grevilea robusta*) and Sambia (*Markhamia lutea)*.

It is important that a biophysical carbon baseline establish the growth rates of these candidate species before recommendations to farmers. Farmers rated exotic and naturalized species highly as opposed to indigenous species. The project implementers will have to ascertain whether this augurs well with the demand side of the carbon transaction. Where farmers' species preferences are not in harmony with carbon buyers premiums, tradeoffs may be have to be made and deliberate effort made toward explaining to farmers why their preferences were not availed. As aforementioned, selecting the right tree species for the carbon-offsetting project requires a careful balance between farmer preferences and technical standards.

2.6.3 What farmers consider in choosing particular tree species

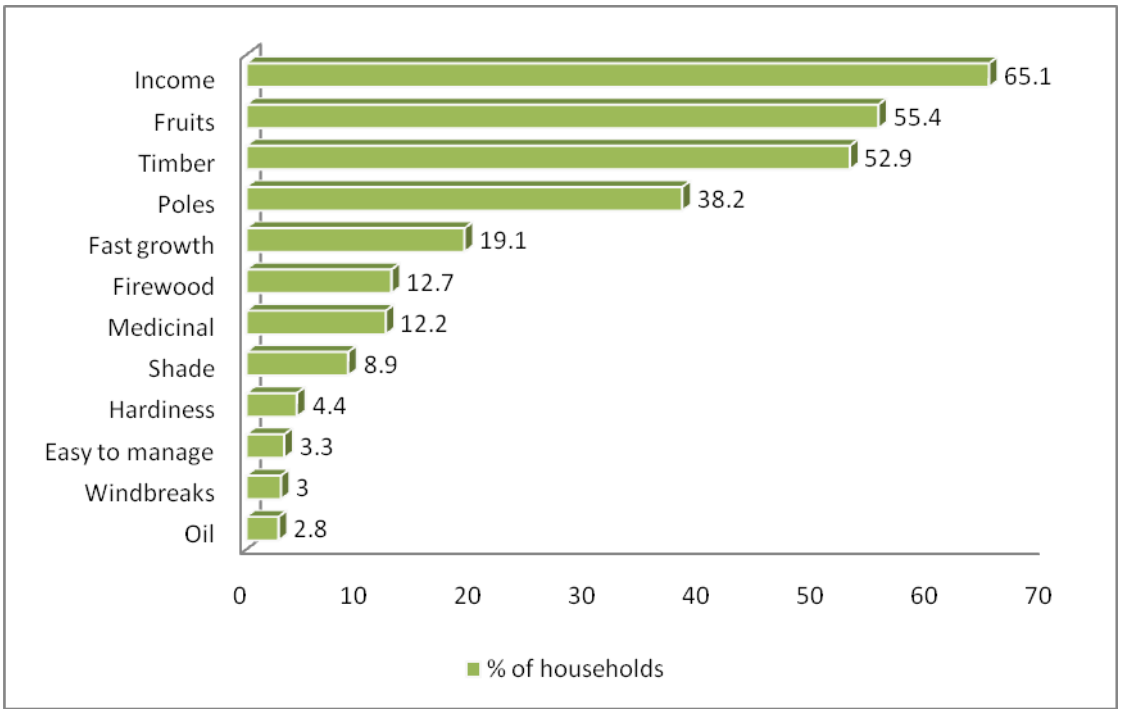
Farmers' reasons for preferring particular tree species are important for project design as they provides a basis for seeking alternative species to those that farmers prioritized but are wanting in other technical aspects of carbon sequestration. Figure 10 gives an illustration of the strategic considerations behind farmers' species preferences. Apparently, income generation, household subsistence, agronomic suitability and environmental outcomes represent broad categories of key driving factors.

Income generation: Nearly 2/3 of farmers (65.1%) reported a direct link between the species chosen and need to generate income. The other major intended benefits e.g. fruits, timber and construction poles command good market value and their high priority may have financial underpinnings. Marketability of tree species is thus critical; and tree species selection and management practices needs to maintain a close connection with market preferences for intended products.

Household subsistence: In most farming households, home consumption is a secondary objective as far as tree growing is concerned. It is quite familiar for farmers to market good quality tree products and use the low-grade yield for household consumption. Nevertheless, farmers mentioned fruit production, increased firewood availability, provision of medicines, shade and improved crop yields as outcomes intended to benefit their daily subsistence.

Agronomic suitability: Tree species ability to adapt to farmers' conditions and day-to-day practices is a key consideration as reflected in preference of species for their fast growth, hardiness (resilience against stress) and ease of management. Trees that complement other components of the farming system through apiculture, soil conservation, fodder provision and windbreaks also stand high chances of being appreciated by farmers.

Figure 15. Reasons for preferring selected tree species for planting



Environmental conservation: Other factors considered reflect environmental connotations e.g. provision of shade, windbreaks, soil conservation and improvement of the microclimate. Resource constrained land users are seldom motivated by long-term, global scale environmental impacts (e.g. mitigating global warming). Environmental outcomes at a micro level (e.g. shade, windbreaks, soil conservation etc.) may be more inspiring as they relate closely to farmers' short-term survival strategies.

2.7 Institutional setup for implementation of a carbon offset scheme

In this section, an analysis is given of the institutional mechanisms in place that may be of relevance to implementation of a Plan Vivo system in the different communities. The Tree Talk-WILD program has undertaken tree growing among schools and farmer groups in the four districts of Adjumani, Amuru, Moyo and Kitgum. According to project records, the Tree Talk-WILD activities in the region covered a total of 19 sub-counties by the time this study was conducted; of which six were in Adjumani, four in Amuru, four in Moyo and five in Kitgum district. The project was working with 50 farmer groups and 175 schools, 160 of which are primary schools. This study weighs the capacity of the participating institutions (i.e. schools, NGOs and farmer groups) to undertake a carbon management project and identifies additional prospective contributors to such a scheme.

2.7.1 School Environment and Tree Planting Clubs

Club profiles: Broadly, tree planting clubs were initiated in schools for educational, economic and environmental reasons. These clubs, formed primarily to serve as learning aids for pupils during science and agriculture lessons also equip pupils with life skills and instill a spirit of self-reliance. Schools also initiate tree-growing activities e.g. establishment of woodlot for timber production, in order to provide an additional income generation option for the school in future. Besides, the trees planted by the environment clubs enhance

environmental conservation, acting as wind brakes to protect school buildings, providing shade for pupils and improving the scenery in the school compound.

Environment clubs are often the initiative of support from NGOs (e.g. ACORD, Tree Talk Foundation) who provide seedlings and technical support. The clubs are exclusive to pupils of particular school; and in some schools, membership is restricted to upper primary classes (P3 to P7). Membership varies with annually enrollment of pupils though a balance is often maintained between the number of boys and girls. Most school clubs had been established in recent years (2006-2008) and not much can be said of their sustainability at this stage.

Photo1: *School environment clubs are guaranteed of sustained membership through annual enrollment.*

<u>*Demonstrated interest in tree growing:*</u> Tree planting activities by school clubs mainly involve establishment of school woodlots, fruit orchards, avenue plantings along alleys in the school compound, as well as ornamental plantings. Schools contribute land and labor while projects / NGOs support the clubs with planting material and tools. Species grown include neem tree (*Azadratcha indica*), teak (*Tectona grandis*), umbrella tree (*Terminalia spp.*), moringa (*Moringa oleifera*), eucalyptus (*Eucalyptus spp.*), pine (*Pinus spp.*) and an assortment of fruit trees e.g. mangoes (*Mangifera indica*), oranges (*Citrus spp.*), jackfruit (*Artocarpus heterophyllus*), pawpaw (*Carica* papaya) and guava (*Psidium guajava*). In addition to the tree planting on school compounds, pupils are also encouraged to grow fruit trees in their homes, integrating trees on croplands and planting flowers around compounds. During environmental club activities, pupils are also taught about environmental conservation as well as dissemination of environmental messages through poster development and drama.

> *"Through the club, we have planted 200 Teak trees, 500 Casia and 500 Luceana. We have also grown vegetables like eggplant (200), tomatoes*

and watermelon. The club has also sensitized pupils on environment protection and taught them about record keeping." **(Head teacher, Etejo P.S, Adropi S/C, Adjumani).**

"Pupils are involved in preparing the field for tree planting and tending the trees. The club also composes songs and acts plays with environmental conservation message" **(Head teacher, Dibonyek P.S, Lokung S/C, Kitgum).**

The will to engage in environmental management activities among schools, however, is often counteracted by logistical problems e.g. unavailability of seed, seedlings and farm implements. Lack of inputs (e.g. planting material, polythene tubing) is a major challenge facing school environment clubs. Efforts by NGOs (e.g. ACORD, TTF) represent encouraging signs though there are widespread concerns about untimely delivery of seedlings, which usually leads to enormous losses due to drought. As is the case with other tree growers, stray livestock, bush fires, termites, theft and malicious damage of seedlings often frustrate tree-growing activities of school environment clubs. Some teachers are not enthusiastic about activities of the environmental clubs considering this a domain for their colleagues in charge of science and agriculture.

Land ownership and tenure security: Most schools are endowed with stable land ownership. In many instances, a community member gives the land to schools either permanently or on a temporary basis. Where the control is temporary, an agreement is written between the individual, his clan members and the school management, specifying the number of years the school will occupy the piece of land in question. School land is widely regarded as institutional land and encroachment provokes the retribution of the entire community.

Table 2.22 Land ownership characteristics of schools

Characteristics	Schools in various districts				
	Adjumani	Amuru	Kitgum	Moyo	Overall
N (number of schools)	1	4	5	6	16
Willing to commit land to trees	1	3	5	5	14
Average land size (acres)	4.0	8.5	14.0	16.8	12.8
Mode of land ownership					
Individual	-	-	2	-	2
Communal/Institutional	1	4	4	5	14
Years spent occupying land	-	56	26	19	33
Total number of parcels	2/1	30/4	15/5	34/6	81/16
Temporary ownership	-	-	10	-	10
Permanent ownership	2	30	5	34	71
Current use of the land					
Cropland	1	4	3	4	12
Tree growing	1	3	2	5	11
Fallow/Grazing land	-	-	4	2	6
Brick making	-	-	1	-	1

Figure 16. Indicators of school club sustainability

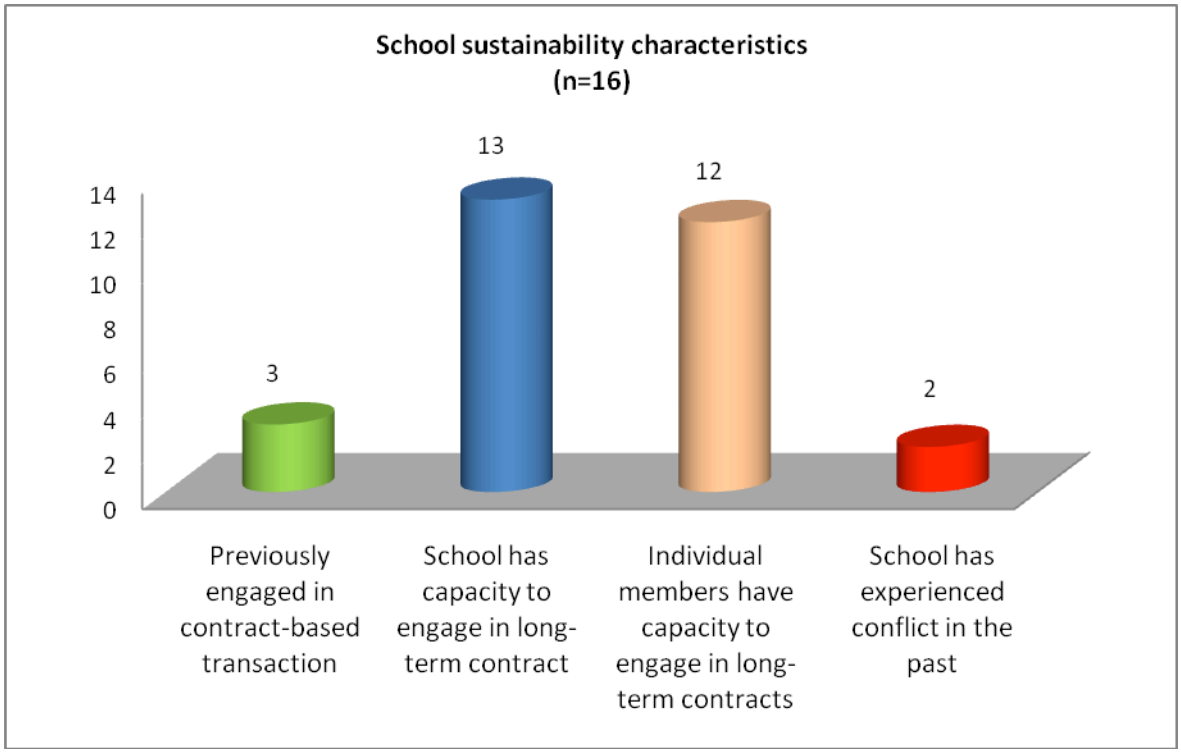


Figure 17. Indicators of farmer groups sustainability

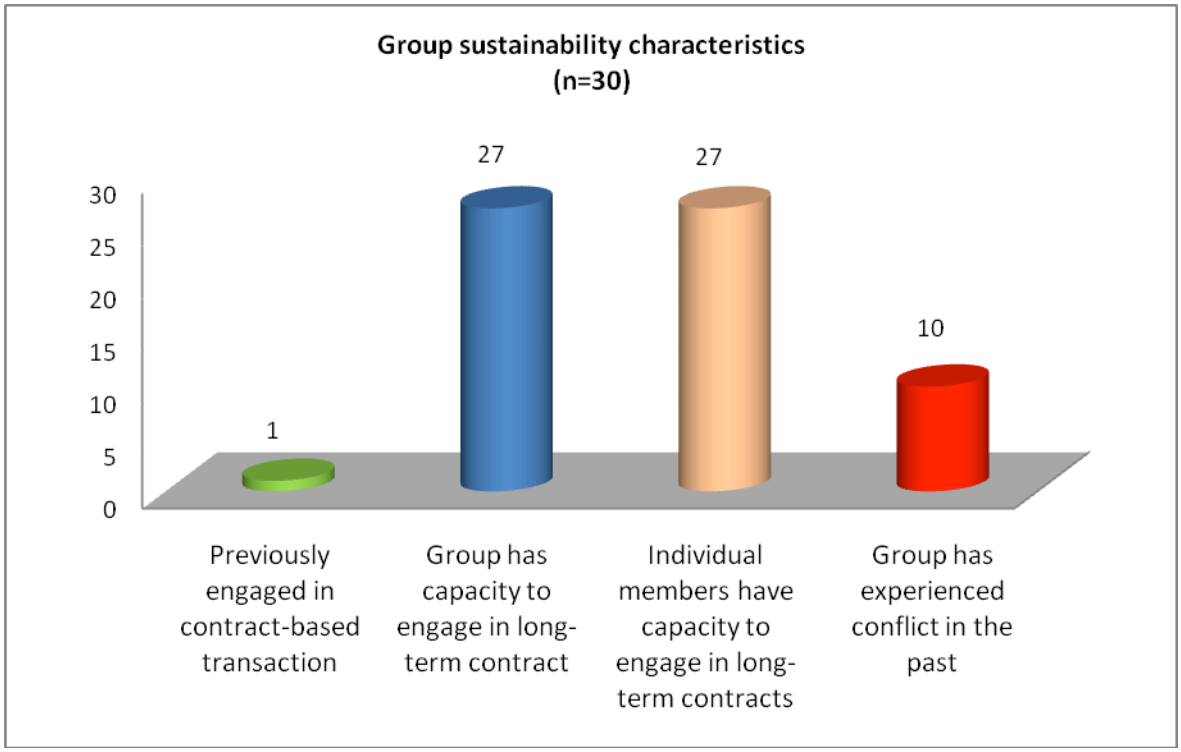


Table 2.22 summarizes land ownership characteristics of sampled schools. Most schools indicated willingness to commit land for tree growing for carbon management. Average size of land available for this purpose was about 13 acres; though schools in Adjumani and Amuru had relatively small areas compared to those in Moyo and Kitgum. The land is mainly institutional land over which schools have permanent control. On average, schools had occupied the land identified for tree growing for about 33 years. Schools in Amuru had stayed comparatively longer periods on the land than schools elsewhere, which may imply more security of ownership.

Current land use is predominantly crop cultivation and tree growing. The land being in active use safeguards it further from encroachment and possible conflict, though this creates need for careful integration of tree growing into crop production strategies. In most schools, land is occupied by teachers' gardens and their genuine consent needs to be got before the change in land use. Where land is currently under trees, the temptation to clear existing stands for new establishments should be resisted, if not outright discouraged as this will compromise additionality of the carbon management efforts.

Sustainability issues: Overall, school clubs provide a reliable foundation upon which activities on the proposed carbon management project can base, considering their land ownership status and institutional durability. As public institutions, schools are durable partners whose contract with the project can outlast the gestation period of the trees planted.

> *"The school is a permanent institution in the place . Some woodlots have long maturity period. The project encourages environmental conservation."*
> **(Head teacher Kangole P.S, Palogo S/C, Kitgum).**

Although less than ¼ of schools (3/16) had had prior exposure to contact-based transactions, over ¾ expressed confidence about their capacity to enter into long-term agreements either as individual or as institutions. Only 1/8 of the schools reported having encountered any past conflict as far as the clubs' conservation activities are concerned. The ability to manage conflicts effectively is a major determinant of sustainability of group activities. As training institutions, schools have clearly defined systems of communication and conflict management through a hierarchical structure linking the environmental club patron to the head teacher, school management committees (SMCs) and the district education office (DEO).

2.7.2 Farmer Groups and Community Environment Management Initiatives

Group profiles: Farmer groups are mostly initiated in pursuit of livelihood improvement strategies. The groups provide a mechanisms for reinforcing farmers financial, human, social, physical and natural capital assets. Farmers for instance indicated having formed groups strategically to lobby for financial support from development partners and government programs. In other instances groups have been formed to enable farmers acquire skills for enhancing productivity in an effort to reduce poverty and be in better position to educate and provide health care for family members. The rationale of using a group is based on a need for building social capital to help each other fight poverty. Some groups were formed with a direct intent of enhancing the natural resource base by discouraging tree cutting and supporting tree planting efforts. Farmers reported having formed groups:-

"Because united we [farmers] *can stand and help each other".*
"To unite to improve on our business in order to reduce poverty"
"To reduce poverty-enable us pay for school fees and medicine."
"To acquire skills for the reduction of poverty, to foster self reliance".
"To de-campaign tree cuttings".
"Because it is easy to lobby funds from NGOs, Government etc."
"Because a group can easily access support than individual".

Group membership is often restricted to individuals who at least satisfy the minimum requirements e.g. payment of registration/membership and subscription fee; belonging to a particular age bracket, gender and occupational category; residing in the group's area of operation or proven interest in tree growing. The fees paid by members vary from one group to another, but registration/membership fees range between 1,000/= to 3,500/= per year; while monthly subscription ranges from 500/= to 1,000/=.

Demonstrated interest in tree growing/environmental conservation: A common characteristic of all farmer groups sampled is their involvement in tree growing of some sort. Some groups had embarked on tree growing own of their own initiative though most had their plans still on shelf due to logistical constraints. Commonly group members grow fruit and non-fruit trees on individual rather than communal basis. The most common plantings are of grafted mangoes though other species e.g. oranges, teak, sour sop , jack fruit, and avocados are also grown widely. Group members have also attained training, either as individuals or as a group, in tree nursery management and tree planting. Active engagement in tree growing remains on smallholder individual scale in anticipation of external support.

> *"Since formation, the group has not received any support to practice tree growing activities. We hope with the support from Tree Talk we will be able to begin soon. Otherwise indigenous trees like mangoes, acacia, oranges etc are available at individual levels"* **(FGD with Ocheba Group, Dufile S/C, Moyo).**

Similarly, groups have not ventured aggressively into communal plantings in spite of widespread experiences of operating communal / group tree nurseries raising seedlings for sale and planting by individual members. One group had plans of planting trees as wind brakes in the local market area. Several groups reported having plans of establishing group nurseries, one particularly with an interest in raising indigenous trees.

Other environment-related group undertakings include sharing labor for farming activities like opening land for growing of crops (e.g. groundnuts, green vegetables, maize, cassava, beans and millet); sensitizing the community on the danger of destroying environment (e.g. cutting trees, killing wild animals, bush burning) and creating awareness about the importance of tree growing.

Many groups are yet to realize intended benefits from their tree growing efforts having started only recently. Members have acquired knowledge, however, on tree growing and nursery practice acquired through group trainings. Working together has also had a bonding effect within groups and enhanced bridging social capital of individual members.

> *"Group got seeds from women M.P Amuru and an ox and plough for animal traction from World Vision International"* **(FGD with Tic Ber Farmer Group,**

Alero S/C, Amuru).

Sale of seedlings and fruits has enabled groups and individual farmers to generate income in the short run. Other livelihood outcomes realized from individual tree growing efforts include increased availability of construction material and shade for domestic animals. Natural stands were also reported to provide people with firewood, shade, windbreak and amelioration of the microclimate.

Land ownership and tenure security: Nearly all farmer groups in Adjumani, Amuru and Kitgum expressed willingness to commit land for tree growing under the carbon management project. Four of the nine groups in Moyo indicated having in accessing land for the same purpose. On average, each group is wiling to put aside about 10 acres of land for tree growing under the project. Groups in Adjumani and Amuru had also spent longer on the land identified for project activities which may imply more security of tenure compared to groups in Kitgum and Moyo.

Sustainability issues: Carbon management involves entering farmers into long-term agreements on the land use arrangements to undertake on their farms. Contracts signed between individual landowners or groups of land users and the implementers of the project need to build upon local institutional capacities, while at the same time remain wary of potential shortfalls. Before making bold decisions on whether to engage farmer as collectivities or as individuals, it is important to consider: i) for how long the farmer groups could possibly be in place; ii) whether these groups' have internal mechanisms for resolving conflict; and iii) what their experience in managing contracts has been.

Table 2.23 Land ownership characteristics of farmer groups

Characteristics	Groups in various districts				
	Adjumani	Amuru	Kitgum	Moyo	Overall
N (number of groups)	1	7	13	9	30
Willing to commit land to trees	1	7	12	5	25
Average land size (acres)	15.0	10.0	10.7	9.1	10.4
Mode of land ownership					
Individual	-	5	8	3	16
Communal/Institutional	1	1	5	3	10
Years spent occupying land	50	32	5	7	16
Total number of parcels	15/1	162/7	213/13	75/9	465/30
Temporary ownership	-	50	88	7	145
Permanent ownership	15	112	125	68	220
Current use of the land					
Cropland	1	7	8	3	19
Homesteads	-	1	-	-	1
Tree growing	-	1	-	1	2
Fallow/Grazing land	1	1	5	3	10
Swamp	-	-	-	1	1

The field team asked representatives of farmer groups for any guarantee of their groups' long-term existence as indication of their ability to see through lengthy contracts under the carbon scheme. Responses centered on neighborliness or common residence as a uniting factor that is expected to engender collective participation. *"The group members live in one area and know one another well"*. The environmental conservation orientation of some

groups furthermore suggests long-term, collective, ecological strategies as opposed to immediate individual goals. *"The group has in its objectives the zeal of conserving the environment for the next 50 years".* In addition, groups registered with their respective local administrations, with constitutions are not as vulnerable to extinction as those that are not. In the on-going post conflict resettlement, people going back to their original homeland are embarking on permanent livelihood strategies as opposed to survival strategies pursued in the IPD camps.

Figure 12 illustrates characteristics of sampled farmer groups according to selected sustainability indicators. Of the 30 farmer groups interviewed, only 1 had previously engaged in contract-based transaction. It will thus require the proposed project to sensitize the farmers on the implications of entering agreements, let alone long term contracts as those required of carbon management arrangements. The majority of farmer groups (27/30) reported having the capacity, however, to engage in long-term contracts both as groups and as individual landholders. One third of the groups had experienced conflict in the past; and this was mainly associated with nonattendance of meetings, sharing of revolving fund, rumour mongering and cheating in group competitions:

> *"Lazy members have left the group (irregular attendance of meetings and group work). The remaining ones are all dedicated members"* **(FGD with Otzi Women Group, Metu S/C, Moyo).**
>
> *"Non compliance on meeting on meeting days. Untimely repayment of revolving fund. Some members fled to Sudan"* **(FGD with Madri Mani Farmer Group, Metu S/C, Moyo).**
>
> *"The conflict wasn't so serious; the issue of rumour mongering among few member which was solved by counseling and advising them"* **(FGD with Opikojo Farmer Group, Moyo T/C, Moyo).**
>
> *"Follow up conflicts, we have monitoring team A,B,C. "A" teams do follow up on "BC", "BC" does on "A". One time it brought a problem and it was resolved that "A" team were punished twice by weeding the group garden"*. **(FGD with Alero Youth Group, Alero S/C, Amuru).**
>
> *"Fighting and use of bitter language against some group members"* **(FGD with Yele Ber Orphans Care Youth Group, Padibe East S/C, Kitgum).**

Several strategies are in place to prevent or resolve misunderstandings among group members. Most commonly, these strategies involve instituting a code of conduct or constitution to regulate behaviors of individual group members. According to members of Tic Ber Agroforestry Group in Alero S/C, Amuru district for instance, "*there is a bye law (constitution) in place that spells out measures for resolving conflict and carrying out general disciplinary action including imposing fines.* In Kila Community Forestry Group, Agoro S/C, Kitgum district, conflict resolution authority has been bestowed upon an 85 year old elder whose decision is never questioned." Extreme cases of indiscipline are punishable by expulsion from the some groups.

2.8 Implications of key findings on carbon management project

i) Socio-demographic characteristics

The average age of household heads of 36.9 years reflects a middle-aged target population whose livelihood strategies suit long-term tree growing under the proposed carbon-offsetting project. Intra-household population distribution also depicts a normal pattern which generally guarantees labor availability. Dependency on aid has, however, destroyed the work ethic especially among youths and consequently raised the cost of labor. Carbon sale payments are likely to be a motivation for farmers to commit prized household labor into tree growing.

ii) Nature of livelihood strategies

People's livelihood strategies are geared towards short-term survival objectives rather than long-term development goals. As such farmers' propensity to participate in the project may be low considering the short-term nature of their livelihood strategies. Naturally, there is bound to be high expectation from the project at first and interest in reaping the initial carbon payments could easily shroud people from appreciating the temporal considerations in the transaction. Project implementers will therefore have to put the rules of the game on the table early, to avert possible disillusionment and the damaging tensions it may precipitate.

iii) Contribution to household incomes

Tree growing option that presents opportunities for offsetting major household monetary outflows stand higher prospects of being accepted by farmers. High-value fruit and medicinal agroforestry trees for instance, may be preferred considering their potential contribution to household nutrition, income, health and capacity to fit into long-established agronomic practices in the farming system.
The carbon payments may also assist farmers address some of the supply side constraints that deter farmers from exploiting the ever-increasing demand for timber products.

iv) Fitting into existing production systems

Crop production cycles are oriented towards planning for relatively short, seasonal rotations, as opposed to perennials. The long gestation period of tree enterprises is further disincentive to investment in trees growing. Carbon payments, nevertheless, present an opportunity for farmers to diversify production strategies by offsetting some of the short-term costs, thus rendering investment in tree growing more attractive.

v) The problem of stray livestock

Livestock are largely left to feed by free range creates a serious concern to tree planting initiatives. This is likely to affect selection of species and farm locations for tree growing. Tree species that are less susceptible to animal browse are thus prospective candidates in this respect.

vi) Tree growing practices

Tree growing is mainly through retention of naturally existing trees as opposed to deliberate planting. Trees are managed in somewhat ad hoc fashion with the primary objective being acquisition of associated tree products (e.g. firewood and poles). The carbon management scheme will therefore have to put efforts into instilling silvicultural discipline and enabling farmers to adhere to strict technical specifications though aggressive forestry extension.

vii Prospects of fruit tree growing

There is high preference for fruit trees intended to address nutritional constraints in households as well as exploit apparent market opportunities for income generation. Introduction of improved varieties that manifest desirable market characteristic could enhance marketability of fruit produce. This is likely to reap bountiful livelihood dividends although the carbon sequestering potential of "grafted" fruit trees will have to be carefully considered.

viii) Varied access to land resources

Existing disparities in access to and control over land might not favor full participation of women and youths. Such relations are deeply rooted in the cultural fabric of the respective societies and attempts at quick fixing them will definitely be futile given the complexity of dismantling longstanding cultural paradigms. The proposed project should be wary of social inequalities and abstain from making "blanket" assumptions about farmers throughout all stages of the project cycle.

ix) Land availability and tenure security

Generally, there is enough land that farmers can set aside for trees under the proposed carbon-offsetting project. Intensive tree growing strategies like agroforestry, may be necessary for farmers in Kitgum and Moyo where on average, farms are relatively small compared to those in Adjumani and Amuru. Most land is not titled but its security is vested in the customary system of ownership. High authority entrusted upon traditional clan systems in managing land use may require their endorsement of carbon selling agreements.

x) Institutional mechanisms within school structures

School clubs provide a reliable foundation upon which activities on the proposed carbon management project can be based, considering their land ownership status and institutional durability. As public institutions, schools are durable partners whose contract with the project can outlast the gestation period of the trees planted.

3.0 RECOMMENDATIONS

3.1 Land availability and ownership by interested producers

i) Target individual farmers who have resettled in their villages of origin

There is ample land for tree planting especially in areas away from the settlement camps where population is relatively low. Livelihood strategies of resettled communities are also more long-term oriented as compared to those of camp communities. In some locations especially in Amuru district, however, the vegetation cover has regenerated into closed forest over the two decades of insurgency and additional tree planting may not be a popular land use per se. Innovative options of rewarding land users for conserving these regenerated areas could be adopted in such contexts, while new plantings are encouraged elsewhere. The proposed project is guaranteed of land availability for interested individual farmers in resettled villages, and concern should shift to the tenure restrictions, rather than spatial considerations.

ii) Target schools and other community institutions

Schools in most cases, have sizeable areas of land, which they are willing to commit to tree growing. There are also huge possibilities of expansion if need be as individual community members endowed with vast areas of unutilized land have demonstrated willingness to "lease out" or donate part of that land to community schools. Such an exchange seldom generate conflict as the intention is towards a noble cause. The project should aim at riding on this good will to access sizeable land area for tree growing, while at the same time benefitting from reliable security of ownership.

3.2 Land tenure security: its implications for carbon management

iii) Solicit Clan Leader endorsement of Carbon Agreements

Land ownership and transfer is regulated under the customary land tenure arrangement through the clan system. Most land, under this system is not titled but authority over its access and use is bestowed in the clan leaders. Land use decisions are also shaped by cross-generational considerations that may be a crucial consideration for a project intending to enter landholders into long-term land use agreements.

3.3 Socio-economic aspects related to a carbon management

iv) Target middle-aged and elderly farmers with authority over land and control household decision-making

Adult farmers are more suited for carbon trade schemes as they involve entering into agreements based on informed consent. The average age of household heads (32 years) suggested a predominantly middle-aged household headship. Elderly farmers also have firm control over land and their livelihood strategies are often more accommodative of altruistic goals like environmental protection. The carbon payments will be vital in offsetting critical labor constraints that put elderly farmers at a relative disadvantage. In contrast, young generation of the population have loose attachment to the land and their livelihood strategies are geared towards immediate survival (e.g. through retail trading, boda-boda transportation, local brewing etc.).

v) Emphasize " transaction" rather than "hand-outs"

The proposed carbon-offset project in the northern Uganda should be wary of the "hand-out syndrome" that is likely to draw down the level of community participation. People do not want to toil and expect "projects" coming into the community to pay them for their "collaboration" in project activities. This "commercialization of collaboration" has also increased the price of wage labor and thus the cost of labor-intensive production. Going "hand-out" is often unsustainable. Rigor has to be taken, therefore, in identifying genuinely interested farmers willing to invest own resources into tree growing. Carbon payments should then benefit the cause of such farmers as opposed to being passed on as relief aid.

vi) Promote a combination of fruit and non-fruit tree species

Farmers have high preference for fruit trees and their exclusion from the project is recipe for disillusionment. The carbon offsetting potential of fruit trees, however, needs to be determined and explained to farmers. A combination of fruit and non-fruit trees is, however, suggested as it ensure both livelihood and environmental outcomes in the medium and long term. Currently few farmers are engaged in the marketing of timber largely due to constraints on the supply side rather than low of demand for the product. The carbon payments may therefore assist farmers address some of these constraints and benefit from the ever-increasing demand for timber products. Building poles have a vibrant market but their relatively short growing rotation may require emphasis on multiple rotational plans.

vii) Avoid the temptation to go for group nurseries where there is no commitment to sustain them

There is a popular craze today about "group nurseries", probably rooted in the participatory action research and development school of thought. Good as it may sound, sustaining group nurseries is not practically easy and evidence abounds on unsuccessful schemes that have attempted to tow this line. The collapse of many group nurseries has often been attributed to lack of enthusiasm among group members to commit resources (especially labor and finances) to the operation of the group nurseries. This study proposes, therefore, that the carbon management project identifies private nursery operators to supply farmers with quality planting material, and avoid the managerial load that comes along with attempts to foster communal nurseries.

viii) Engage farmers as individual households not as groups

Tree Talk Foundation has used a group approach to involve farmers in tree growing activities. Indeed, it is "easier to work with communities that have some existing organizational capacity" (Orrego, 2005). However, there working with groups may lock out individuals with high potential of growing trees under the carbon management scheme. Many groups are recent establishment, probably formed in anticipation of TTF-WILD project facilitation. While their utility in the mobilization farmers for sensitization, training and monitoring progress is unquestioned, existing farmer groups do not provide reliable basis for engaging farmers into communal land use agreements. Save for situations when a group is identified that has been in place for long, has a well-established structure for sharing communally owned resources (land, labor and finances), and has demonstrated interest in environmental conservation as well as exposure to contract-based transactions, the individual farmer approach is recommended.

ix) Strengthen extension service delivery in schools

Prior collaboration with some of the institutions should help TTF build and strengthen partnerships necessary for the success of the carbon management project. While it was not the aim of this study to evaluate the TTF-WILD Project school outreach activities, it was noticeable that extension service delivery needs to be strengthened. This may require more field work force and subsequently more contact and visibility of the project in the schools than is currently the case. Carbon trading is largely about mutual trust and reciprocal obligations. The quality of cooperation from school clubs will therefore be determined by the effort the project puts into satisfying it part of the bargain.

x) Establish vertical and horizontal linkages

There are several institutional bottlenecks to tree enterprise that may be overcome through establishment of vertical linkages with local government structures at the sub-counties and the districts. A case in point concerns the issue of bush fires that apparently requires landscape-wide intervention. Putting in place preventive by-laws as well as collectively overseeing their actual implementation, involves political maneuvers that largely depend on the social capital embodied in the communities' linkages with various institutions within and beyond the local context. Deliberate efforts thus need to be invested in linking the project to any relevant supportive institutions at the local community, sub-county, district and national levels.

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Appendix 1 Terms of Reference

Carbon Management Scheme for Rural communities in Northern Uganda (Districts of Amuru, Adjumani, Moyo and Kitgum)

Background

The Environmental Conservation Trust of Uganda (ECOTRUST) is a Non Governmental Organization (NGO) established[5] to provide long term sustained funding for the conservation of biodiversity and environment management in Uganda. ECOTRUST is implementing a carbon-offset scheme which started in Bushenyi district - Western Uganda since May 2003 and has now expanded to Hoima and Masindi districts. This is a carbon sequestration project, code-named Trees for Global Benefits and has been assisting small – scale landholder farmers to access the voluntary carbon market through the Plan vivo system[6]. Under the Trees for Global Benefits programme, ECOTRUST has been able to develop systems and procedures for the management of carbon projects for different farming systems depending on the local environmental needs of the different project areas.

ECOTRUST is in the process of expanding its Trees for Global Benefits a carbon offset scheme to rural communities (communities and school groups) in Northern Uganda. The Treetalk-WILD project targets the districts of Amuru, Adjumani, Moyo and Kitgum. One of the specific objectives for the project is to Carry out a socio-economic baseline survey in the targeted area.

The intervention is meant to support the establishment of a carbon sequestration scheme targeting schools and community groups in the TreeTalk operational districts of Amuru, Adjumani, Moyo and Kitgum in northern Uganda under the WCS/WILD programme. The proposed project will undertake a baseline survey as well as develop technical specifications for a proposed carbon management project amongst the rural communities in Northern Uganda. The average net accumulated carbon uptake for the rotation age of the proposed trees in a specified farming system will be quantified. This information will be generated in the first stage of the project (baseline survey and technical specifications). Furthermore, the project will design a carbon transaction management system as well as develop local capacity to implement the system in the targeted area.

Targeted carbon offset activities

The targeted carbon offsets will be achieved through afforestation/reforestation activities in Northern Uganda. The project is targeting tree planting, focusing on trees with multiple purposes. The proposed intervention aims at promoting tree planting on private land owned by institutions such as schools and individual members of community groups. While working towards establishment of tree stands for carbon sequestration, the trees will at the same time provide multiple products to the farmers/schools thereby improving their incomes and livelihood security. The contribution of trees and tree products to the livelihood security of farmers cannot be overemphasized.

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[5] ECOTRUST was founded in 1999 from the then Grants Management Unit of the USAID

[6] A system of managing voluntary carbon credits by combining carbon sequestration with rural livelihood improvements through small-scale afforestation/reforestation projects while reducing pressure on natural resources

Specific tasks

ECOTRUST would like to sub contract services of socio-economist to lead a team that will carry out a socio-economic analysis of the proposed project. Eligible consultant should submit a concept to ECOTRUST by 15th December 2008

The socio-economic analysis will include an assessment of land availability and ownership of interested producers. Security of land tenure is one of the key considerations for development of a plan vivo carbon management project as there should be long-term commitment by the landowner to have land under a forestry system for a number of tree rotations.

In addition, it will include a detailed assessment of socio economic aspects related to a carbon management project. The consultant will use a combination of approaches that will involve but not limited to Questionnaires, focus group discussions and informal interviews to collect data from the farmers (at the household level).

Appendix 2 Schedule of activities

Activity	Date
Field Reconnaissance Trip to Northern Uganda	12 January 2009
Finalizing of the data Collection tools	31st January 2009
Reconnaissance to Amuru District	29th - 31st January 2009
Testing of data collection tools	31st January 2009
Data collection	February – March 2009
Data entry, cleaning and analysis	March – April 2009
Report write up	May – June 2009

Appendix 3 Institutions visited and persons met during consultations

District	Sub-county	Schools
Amuru	Purongo	Purongo Hills
Amuru	Purongo	Olwiyo
Amuru	Kochgoma	Wilacic
Amuru	Alero	Mwoya
Adjumani	Adropi	Etejo
Moyo	Metu	Abeso
Moyo	Metu	Elegu
Moyo	Metu	Kolokolo
Kitgum	Agoro	Agoro P/S tree planting project
Kitgum	Paloga	Kangole P/S
Kitgum	Padibe West	Padibe Girls comprehensive
Kitgum	Lokung	Dibonyec P/S
Kitgum	Agoro	Loromibenge P/S tree planting

District	Sub-county	Farmer groups
Amuru	Purongo	Taliban
Amuru	Kochgoma	Wugwok lee Tim
Amuru	Alero	Tic Ber Agroforestry
Amuru	Kochgoma	Can Oweko Adoko Laming
Amuru	Kochgoma	Dwog Cen Paco Women
Amuru	Alero	Youth group
Amuru	Kochgoma	Amuru youth association
Adjumani	Ciforo	Amaria
Moyo	Metu	Otzi women
Moyo	Metu	Amauuleku
Moyo	Metu	Madri Mani
Moyo	Metu	Atidrira
Kitgum	Padibe East	Umoja Youth
Kitgum	Padibe East	Yele Ber Orphans care youth
Kitgum	Padibe East	Plant for the future
Kitgum	Paloga	Kangole former youth abducties
Kitgum	Paloga	Lobiluka
Kitgum	Paloga	Loyoro Youth Development Association
Kitgum	Lokung	Pancura United
Kitgum	Lokung	Lelapwot
Kitgum	Lokung	Kakawa –Pee
Kitgum	Padibe West	Ang Nono Pe Nange
Kitgum	Lokung	Alworo Toyo
Kitgum	Agoro	Kila Community forestry
Kitgum	Padibe East	Inenokwene HIV /AIDS