



**SUSTAINABLE LIVELIHOODS INTERNATIONAL UGANDA  
(SLINT-UGANDA)**

## **SOCIAL DIMENSIONS OF ADAPTATION TO CLIMATE CHANGE**

**Adaptation to Climate Change through Integrated Soil Fertility Management  
for Increased Crop Yields: The Case of Lira and Iganga Districts**



**A Collaborative Research Project in Partnership with Makerere University and the  
National Agricultural Research Organisation (NARO) supported by USAID LEAD**

**Phase I Report  
August 2010**

## Table of contents

1.0	Background and approach used .....	2
2.0	Exploring the farming system.....	4
2.1	Common crops grown.....	4
2.1.1	Most important cash and food crops.....	4
2.1.2	Changes among the crops grown .....	6
2.2	Animals kept and the changes.....	6
3.0	Major changes due to climate change over the past ten years .....	7
4.0	Local indicators used to time agricultural activities .....	9
4.1	Indicators that are used to predict onset of rains for planting season .....	9
4.2	Indicators used to predict good crop yield.....	10
4.3	Indicators used to predict end of rain season or beginning of the dry season ..	10
4.3	Indicators used to predict harvest time for crops .....	11
4.4	Indicators used to predict fertility of the soil .....	11
5.0	Deliberate efforts to improve soil fertility .....	12

## 1.0 Background and approach used

This first phase of the social component of the project on climate change that is aimed at understanding what farmers are locally doing to cope with the climate change effects was conducted in April 2010.

### Methodology – approach

The study was conducted in the districts of Iganga and Lira. Choice of these districts was mainly because of the presence of LEAD activities that had already organized the community into groups. LEAD is the funding organization of this study. The main data collection method used was the focus group discussion. Use of the FGD was to generate insights into the changes that have taken place as a result of climate change – as experienced and observed by the farming communities.

In each of the study districts, four communities were purposively selected with guidance from LEAD field personnel. Among the four communities selected per district, two were working with LEAD and two were not working with LEAD (non-LEAD) – Table 1.

**Table 1: Communities selected**

Category of community	Iganga District	Lira District
Lead communities	<b>Namable Initiative for Rural Development Organization (NIDO)</b> - Nambale 1 village, Nambale Parish, Nambale sub-county	<b>Per-Par farmers group</b> – Abolet village, Alebere Parish, Barr sub-county
	<b>Bakuseka Majja Producer Organisation</b> - Muiyira village, muiyira parish, Nambale sub-county	<b>Yesu akwero group</b> – Apiikongo village, Oilo Parish, Barr sub-county
Non-Lead communities	Nambale 2B village, Nambale parish, Nambale Sub-county	<b>Obed Omar women's group</b> – Okworokwor village, Akia Parish, Adekokwok sub county
	Kamira village, Muiyira Parish, Nambale sub-county	<b>Boke bor abora women's group</b> – Omar village, Boke parish, Adekokwok sub-county

In selecting the communities, priority was given to those that were cooperative, supportive, organized and willing to be part of the study. Convenience to the researcher in accessing the community members was also considered. Mobilization of the communities for the FGD was done with the help of LEAD field workers. Inclusion of

LEAD and non-LEAD communities in the study was aimed at generating information from a wider community about what has changed in attitude and behavior of the farming communities with respect to climate change.

For each community, utmost 20 participants were invited for the focus group discussion (although in some cases, the number doubled). Efforts were made to ensure equal participation of both the male and female farmers given that each of the gender may feel the climate changes differently and also adapt to the changes differently. A total of 8 FGDs were conducted in April 2010. Participants that turned up for each of the FGD were sub-divided into 2-3 groups – the discussions were conducted concurrently. Each of the sub groups was handled by two different persons: one person asking questions to guide the discussion and another person taking notes. The objective behind the subdivisions was mainly to generate as much information as possible with enhanced efficiency and effectiveness.

## Findings of Phase I – the FGD

### 2.0 Exploring the farming system

Farmers in the study sites (Iganga and Lira) cultivated crops and reared animals. Crop production was the main agricultural activity that served as a source of food as well as income generation. Although the two districts had the same crops grown, the main food crops and cash crops differed.

#### 2.1 Common crops grown

The most common crops cultivated included rice, cotton, simsim, soybeans, groundnuts, onions, cassava, sunflower, millet, beans, peas, sweet potatoes, maize, coffee, bananas, and vegetables (cabbage, tomatoes, egg plants, and bitter tomatoes). The same crops were also grown in Iganga. Water melon and sugar cane were mentioned only in Iganga district.

##### 2.1.1 Most important cash and food crops

The main cash crops and food crops varied across communities studied (Table 2 a and b) and districts (Table 3).

**Table 2 a: Major food and cash crops across communities in Lira**

Crop	Status or rank of the crops across the study communities/villages in Lira							
	Apiikongo village ranks		Okwor okwor ranking		Omar village ranking		Abolet village ranking	
	Food crop	cash crop	Food crop	cash crop	Food crop	cash crop	Food crop	Cash crop
Cotton		1						2
Sunflower		2		2		1		4
Rice		3						1
Soybean		4		1		2		3
Beans	1		1		2		3	
cassava	4		2		1		4	
Maize	3			4		4		
Millet	2		4		3		1	
Sorghum				3			2	
Sweet potatoes			3					
Simsim					4			
Groundnuts						3		

Whereas sunflower and soybean were important cash crops across the four villages, the ranking varied. Cotton was not a common crop in some areas in Lira (Adekokwok sub-county - Okwor okwor and Omar villages). Simsim and groundnuts were major crops in only Omar village

Table 2 b: *Major food and cash crops across communities in Iganga*

Crop	Status of the crop across the study communities/villages							
	Nambale 1 (NIDO)		Nambale 2B village		Muyiira ( <i>Bakuseka majja</i> )		Kamira village	
	Food crop	cash crop	Food crop	cash crop	Food crop	cash crop	Food crop	Cash crop
Rice	4	2		3		4		2
Beans			3		3	3	4	
cassava	3		2		2		2	3
Maize	2	1		1	4	1	3	1
Millet			4					
Sweet potatoes	1		1		1		1	
Groundnuts		3						
Water melon		4						
Tomatoes				4				4
Sugar cane				2				
Coffee						2		

Table 3: *Major crops across districts: Food and cash crops*

crop	Status or rank as Food crop		Status or rank as cash crop	
	Lira	Iganga	Lira	Iganga
Cotton			3	
Sunflower			1	
Rice			4	2
Soybean			2	
Beans	1	4		
cassava	3	2		
Maize		3		1
Millet	2			
Sorghum	4			
Sweet potatoes	5	1		

In Lira, the most important food crops were beans followed by millet, cassava, and sorghum respectively. Among the cash crops, sunflower was the priority crop followed

by soybean, cotton and rice. In Iganga, the situation was different. Sweet potatoes were the priority food crop followed by cassava, maize and beans

### **2.1.2 Changes among the crops grown**

Among the crops grown, rice (upland and paddy), soybean and sunflower were mentioned to be relatively new in the farming system – they were introduced in the system about 8-10 years ago. To some farmers, the crops were not really new but were just not popular – very few people were cultivating them before. The low popularity was mainly attributed to poor yields that were realized and poor market, hence becoming neglected and even abandoned by the farming community in favor of better yielding and selling crops. In order to revamp cultivation of the crops by the farming community, new/improved varieties were introduced by different agencies. To some farmers, taking to the new crops was because the current climate was more favorable for such crops – the crops perform well with the little rains.

Across all crops cultivated, varieties have been changing over time. Preference has been to varieties that have short maturity periods given the unreliability of the rains, higher yielding, higher marketability and acceptability by consumers. Some of the attributes used to either leave or continue with the different sweet potato varieties included yield, fibrousness of the root tuber, sweetness, and bitter taste, hard or milky nature, size of the tuber.

There are crops that have been abandoned e.g. *Amola*<sup>1</sup>, *Alodi*, *okwer*<sup>2</sup>. These crops were mainly growing wild though some few people were cultivating them. Reasons for leaving the crops included: being very labor demanding in processing e.g. *okwer* needed to be dried before cooking yet it takes long to dry, taking long to get ready when cooked thereby taking a lot of fuel which is increasingly becoming scarce, long maturity periods, and scarcity of seed. At the time this study was being conducted, a basin of *okwer* was costing 5000 U Shs. It was mentioned that these abandoned crops are mostly associated with old women – they are the only ones who can prepare it well.

## **2.2 Animals kept and the changes**

The animals kept include cattle, goats, pigs, sheep, chicken, ducks and turkeys. Some farmers (Apiikongo village) also kept guinea fowls as domestic birds. The pigs are becoming more popular these recent years especially after the restocking exercise that was mounted by the Government after the cattle rustling in late 1980s (1987-88). The number of chicken being kept and the number of people rearing chicken (local) is steadily increasing. The increase in chicken is mainly attributed to the financial value attached. ‘It is very easy to convert chicken into money’ because of very ready market. Though the number of turkeys is also increasing owing to the commercial value attached, the number

---

<sup>1</sup> *Amola* and *Alodi* look like simsim (sesame) but have different colors – red and yellow

<sup>2</sup> *Okwer* creeps like pumpkin but is smaller than the pumpkin.

of people raising them is still low. The ducks are reducing in number mainly due to low market value attached. According to some farmers, “ducks are not kept by many people because they are not clean animals”.

### **3.0 Major changes observed by farmers due to climate change over the past ten years**

**Change in planting time (change of seasons):** The rain patterns/season has changed and consequently the planting time for the different crops. Rains now come late and cannot be accurately predicted/forecasted. This does not only lead to longer periods of drought but leaves farmers to guess and use probability, which often fails them because the crops do not get adequate moisture/water/rain. The seasons, according to some farmers, seem to have (delayed) shifted in front by about two months. In Aboret village (Lira), rice that used to be planted in April is now planted between May and July depending on when one sees the rains – the right timing keeps changing though. Millet used to be dry sowed in December-January expecting rains in January – February. Currently most farmers dry plant in March. The planting time of cassava has not changed much because it can do well with limited moisture.

**Presence of improved varieties of crops** – there are a number of new crop varieties that are increasingly being introduced to the farming communities. These varieties especially of maize, soya, millet and sorghum are early maturing or drought/pest resistant

**Change in planting method:** Farmers used to broadcast most of the small seeded grain seeds ranging from legumes (e.g. groundnuts, beans), oil crops (simsim) to cereals (e.g. maize, millet, sorghum, rice). Currently the planting method has shifted from broadcasting to planting in rows especially rice, maize and legumes. The very small seeded crops like simsim, millet and sorghum that are laborious to plant are still broadcasted. Planting in rows was mainly a practice encouraged by agricultural extension workers. Farmers using row planting have found it very convenient in carrying out agronomic practices in the field. It was also reported that moisture conservation is better in crops planted in rows. Row planting method reportedly leads to better crop yields.

**More planting in the swamp:** Crops (like maize, sweet potatoes, tomatoes and beans) that used to be cultivated only on the up-land are increasingly being cultivated in the swamps too besides the paddy and upland rice. According to the farmers, the yields of upland crops cultivated in the swamps are higher than those of the same crops cultivated on the uplands. This implies that the water in the swamps are decreasing

**Size of the herds and type of animals reared:** The number of farmers having herds of cattle is decreasing. The kraals are almost not there. Many people now keep few (3-4) heads of cattle mainly due to land shortage, scarcity of pasture and drinking water. It is easier to manage the few heads of cattle: during the wet season when grass is available in abundance, the animals are put in open places to graze. During the dry season especially after harvesting, the animals are driven in the fields to feed on the crop remains e.g. maize and millet stover, beans straws, etc. People have taken to tethering animals around

their yards. Water and grass is available around swamps during the dry season but not enough to feed the animals in the area effectively given that people from other villages too bring their animals in the same swamps.

It was reported that some farmers have resorted to rearing more of the goats than any other type of livestock because goats are easier to manage than cattle. “Cattle have to be moved from place to place in search of grass and water but goats can be tied in one place for a whole day”, explained one farmer. “Goats do not demand much time and labor. They too are easier to buy and sell” he added as he expressed his preference of goats to cattle.

**Housing:** The housing is shifting from grass thatched houses (reducing) to corrugated iron roofed houses (increasing). Thatch grass has become more scarce and expensive due to long droughts and limiting land. People have settled and cultivated in most of the land that used to be left to the thatch grass. One farmer also added that although thatched houses are cooler and more comfortable to live in as compared to iron sheet roofed houses, they have a higher risk of being burnt especially during the dry season. Sometimes it may be the children as they play with fire and sometimes the fire is spontaneous.

**Low yields and low fertility of the soil:** farmers have reported an increase in poor yields in almost all crops. Poor or reduced soil fertility, increased pest and disease pressure, and poor crop varieties were mentioned to be some of the causes of the low crop yields being realized. Laziness with no will to work but expecting to be given by others was also mentioned to be a reason why some people/homes get low yields or do not have adequate food. Some people have just lost hope in cultivating crops given the limited land and unreliable/unpredictable rainfall.

**Hiking food prices** – this was mainly raised in Nambale

**Higher response to training** – there are more training programs being prepared for the farming community and the number of people responding to the trainings is increasing. This is mainly in search of new knowledge and skill on how best to produce higher crop yields for both income generation and food security in the homes.

**Tree planting** - More people planting trees especially pine

**More pests and diseases:** this was in crops, animals and people. Disease and pest incidences are on the increase and all creatures are as susceptible. Susceptibility to diseases and pests was mentioned to be on increase. It was mentioned that even crops like maize and cassava that never used to be sprayed were being sprayed too as result of increased pest/disease pressure.

**Deaths** of people were equally mentioned to be more rampant these days

**More frequent storms:** the storms and hails stones are more frequent these days. “It is even strange that we get them at night!” exclaimed one farmer in Nambale

**Disappearance of some plants** – there are wild plants that used to be readily seen but such plants are becoming difficult to use yet the people mainly use them for medicinal value. Examples include *kayaala* and *mukasa* in Nambale

**Higher incidences of weeds** – it was mentioned that striga infestation (the witch weed) is increasing in many fields

**Early marriages** – this was mainly mentioned in Nambale. There are more young people getting married at the age as low as 13 (especially girl children). This could be the reason why the *population size* is increasing

**Commercialization of crops** – there are crops especially fruits that never used to be sold, people would just pick them. These days, every thing is sold

**Increasing use of ox-plough** – this is mainly in Nambale – Iganga district. Use of the hand hoe has created a hard pan, which has rendered the soil less productive. The hard panned soil cannot be broken with the traditional hand hoe, and needs a stronger machine – ox-plough. The hard pan of the soil was attributed to striga, too much sun that leaves the soil dry, high population that is limiting bush fallowing, continuous cropping.

#### **4.0 Local indicators used to time agricultural activities**

In as much as climate change has changed the rain patterns and predictability, farmers have some indicators that they used to foretell the presence of some events. They had indicators that they used to tell the onset of rains, end of the rains or beginning of the dry season, yield (high or low), time to harvest, as well as the fertility level of the soil.

##### **4.1 Indicators that are used to predict onset of rains for planting season**

Farmers used different indicators to foretell the likely hood of on set of rains and hence the planting periods. These indicators were mentioned to have been used over time and chances of them being accurate were reportedly high. The indicators included the following.

- Appearance of dark clouds and actual heavy rains experienced for two consecutive days– these
- Direction and strength of winds – it was mentioned that when winds are relatively stronger, more frequent and blowing the direction opposite the movement of the sun. However, some farmers (Okwor kwor village) differed with this. They mentioned that the movement of wind in unpredictable direction was a stronger indicator of the rainy season than wind blowing in a definite direction (Iganga and Lira)
- Very high temperatures – too much sun shine and very hot temperatures at night
- Flowering of specific trees (e.g. one locally called *wilakot*)

- Singing of some specific birds (locally called *olwit* in Langi – *mpa ntoigo and buutu in Lusoga*) and movement of swallows
- When cattle especially the cows become aggressive or stubborn, running around
- Lightening and thunder at night without rain
- Frogs croaking during day time
- When ducks take water and beat their breasts down
- When the moon is just appearing and when it is just disappearing
- Less dew on the grass or other plants in the morning
- Sprouting of young shoots of *muvule* tree

#### **4.2 Indicators used to predict good crop yield**

- Fruiting of mango trees (the local small sized and fibrous mangoes) – it was mentioned that presence of many fruits on a mango tree was a sign of poor yields (what they commonly referred to as famine). Presence of many wild fruits in the bush (mangoes, guavas, shear nuts etc) was a sign of bad harvests – likely hunger.
- Rains coming early, regular and being prolonged but in adequate quantities – people plant early. When rains are moderate and regularly punctuated with the sun shining
- Presence of glow worms signify high crop harvest
- Stage of the crop Vs pest/disease attack: If the crop e.g. maize grows well before striga or disease infests it
- Presence of migrating birds locally called *ensugaali* in Lusoga
- Warm water in the pots – it was mentioned in Nambale that when water in the pot feels warm instead of the expected cold then one expects the rainy season to be soon
- Presence of brown-orange like larvae (locally called *endoboozi*)

#### **4.3 Indicators used to predict end of rain season or beginning of the dry season**

The signs that farmers used to predict end of the rains included the following:

- The noise of an insect locally called *ajiri* in Langi (or *enziira* in Lusoga). This insect is commonly found in places that have many trees. Some people roast it and give it to children who wet beds. It was mentioned that the making of noise of this insect signifies end of the rains
- When doves (locally called *awele* in Langi, or *amawemba* in Lusoga) make noise
- Too much lightening when it is raining is a sign that the rains are ending
- When lightening strike many people or when there are many cases of lightening sticking people
- Appearance of a lot of mist especially in the morning and at night
- Very cold mornings and evenings
- Hot nights
- Very clear clouds/sky

- Many stars in the sky during the night
- Many mosquitoes
- Mild temperatures of the day – not too hot
- More frequent drizzles and rain disappearing when expected
- Relatively longer intervals of rain
- Appearance of the moon with no rain

#### **4.3 Indicators used to predict harvest time for crops**

- Most of the indicators that farmers used to tell maturity of crops in the field and their readiness for harvest mainly depended on appearance of the plant (drying and yellowing). For rice and millet, the leaves become yellow - brown, for cotton the balls burst and the cotton is exposed, for beans the leaves and pods become yellow and withered.
- Bending of the rice/sorghum fluorescence signified maturity of the crop and readiness to harvest
- Drying and sometimes bursting of pods
- Loss of leaves from the plant
- Cracking of the mounds (for tubers – sweet potatoes and cassava in some cases)

#### **4.4 Indicators used to predict fertility of the soil**

It was unanimously mentioned in all study sites in Iganga and Lira that soil had lost its fertility. The soil's water holding capacity was increasingly reducing over time. The signs that farmers locally used to tell the level of fertility of a given soil included the following:

- **Type of vegetation:** The presence of *panicum maximum*, *cynodon dactylon* (star grass), commelina (the one with bluish flowers), and *impereta cylindrica* was mentioned to be a sign of fertile soil. Presence of new weeds (especially striga) that never used to colonize the field was mentioned to signify loss of fertility of the soil too. Presence of *sporobolus pyramidalis* was a sign of overgrazed or exhausted soil
- **Soil color and texture:** The darker the color of the soil (towards grey-black) the more fertile the soil was expected to be. However, the lighter the color the less fertile the soil was. In terms of texture, the more clayey the soil, the more fertile it was believed to be. The more stony and sandy the soil was, the less fertile it was. Loose and more workable soil was said to be more fertile. Soil that was hard was mentioned to be less fertile
- **Appearance of the plants:** The shorter or stunted the plants in a given soil, the less fertile the soil. The taller, vigorous and greener the plants, the more fertile the soil.
- **Yield realized:** the lower the yield, the less fertile the soil and the higher the yields, the more fertile the soils.
- **Presence of small mounds of soil** locally called *adedek* in Langi was a sign of fertile soil

- *Presence of many earth worms* was an indication of fertile soil – this had implications with the workability of the soil. The more workable the soil, the more the earthworms present as opposed to hard soil.

## 5.0 Deliberate efforts to improve soil fertility

Some of the efforts that some farmers deliberately made to improve upon fertility of the soils so as to get better yields included:

- Use of animal manure (cow dung) especially in kitchen gardens (tomatoes and cabbage) – farmers just threw dry cow dung in their gardens
- Deep ploughing – especially use of ox-plough
- Burying some type of grass (spear grass) in the field to rot
- Some use fertilizers especially in commercial fields of beans, rice, sun-flower, maize though fertilizers are believed to ‘spoil’ the soil as.
- Inter-cropping – this is mainly to make use of the limited land. Land has become more limiting these days than it was before. The most common intercrops are a cereal (especially maize as the main crop) with a legume (beans, G.nuts, soya)
- Crop rotation – the rotation patterns used included cotton-millet/peas-maize-millet; cotton - simsim- maize – millet; soya – maize – cassava; beans – sorghum – cassava – simsim – millet – soya/beans/sweet potato; maize – sweet potatoes – beans – G.nuts. Most of the farmers in Iganga district mentioned that many times they plant maize after maize because the land lords do not allow panting crops that will take longer in their pieces of land (sweet potatoes, cassava).
- Inclusion of sweet potatoes in the rotation pattern (Iganga) was believed to increase fertility of the soil

The crop rotation patterns used by the farmers in the rotation have more to do with limited land and the need to plant something every season other than improving soil fertility. Some patterns promoted build up of pests and diseases especially when the plants that share similar pests and diseases followed each other e.g. cereals following each other

**Remarks:** data from this first phase generated insights into what was happening among the communities in terms of coping with the climate change. The second phase will be conducted to get the quantitative data linked to the number of farmers using given coping strategies and the rationale behind the strategies (at individual level).