

# FINAL REPORT

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## Strengthening resilience through livelihood improvements and diversification

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*Front page photo: Sunflower field in Akokoro sub-county. Photo by the author.*

## List of abbreviations

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ABPP	African Biogas Partnership Programme
ADC	Apac District Council
ADFA	Apac District Farmers Association
ADLG	Apac District Local Government
AT	Appropriate Technology
BOSCO	Battery Operated Systems for Community Outreach
CAO	Chief Administrative Officer
CBFM	Community-Based Forest Management
CBO	Community-Based Organisation
CCA	Climate Change Adaptation
CBDRR	Community-Based Disaster Risk Reduction
CPDRR	Climate-Proof Disaster Risk Reduction
CSO	Civil Society Organisation
DDP	District Development Plan
DEFRA	Department for Environment, Food and Rural Affairs
DPU	District Planning Unit
DRC	Democratic Republic of Congo
DRR	Disaster Risk Reduction
ECN	The Energy Research Centre of the Netherlands
EIA	Environmental Impact Assessment
EMR	Ecosystem Management and Restoration
FAO	Food and Agriculture Organisation
FBO	Faith-Based Organisation
GHG	Greenhouse Gas
GoU	Government of Uganda
ICA	International Co-operative Alliance
ILO	International Labour Organisation
LC	Local Council
LEC	Local Environment Committee
LEMU	Land and Equity Movement Uganda
LRA	Lord's Resistance Army
LUMID	Lund University Master in International Development and Management
MAAIF	Ministry of Agriculture, Animal Industry and Fisheries
MASL	Metres Above Sea Level
MFPEd	Ministry of Finance, Planning and Economic Development
MLHUD	Ministry of Land, Housing and Urban Development
MoU	Memorandum of Understanding
MWE	Ministry of Water and Environment
MWLE	Ministry of Water, Lands and Environment
NAADS	National Agricultural Advisory Service
NEMA	National Environment Management Authority
NFA	National Forest Authority
NGO	Non-Governmental Organisation
NUSAF	Northern Uganda Social Action Fund
OPM	Office of the Prime Minister
PAG	Pentecostal Assemblies of God
PASUD	Pioneer Action for Sustainable Development

PES	Payment for Ecosystem Services
PfR	Partners for Resilience
PPP	Public Private Partnership
PPRR	Principles, Practices, Rights and Responsibilities
RCCC	Red Cross/Red Crescent Climate Centre
RCSD	Resources Centre for Sustainable Development
SACCO	Savings And Credit Co-operative
SNV	Foundation of Netherlands Volunteers
SSWM	Sustainable Sanitation and Water Management
UDBP	Uganda Domestic Biogas Programme
UCA	Uganda Cooperative Alliance
UGX	Uganda Shillings
UNFFE	Uganda National Farmers Federation
URCS	Uganda Red Cross Society
VCA	Vulnerability and Capacity Assessment
WHO	World Health Organisation

## Definition of concepts

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Ecosystems: Ecosystems are understood as both biophysical and socio-cultural systems (Leech et al. 2009:3). Ecosystems provide a number of goods such as food, freshwater, fuel and fibre, and services like flood regulation, water purification, carbon sequestration, temperature regulation, nutrient cycling and soil formation (del Rio 2012:335-336; Randhir & Hawes 2012:113-114).

Institutional framework: In this paper the term *institutional framework* is used to cover the number of governmental as well as non-governmental organisations that operate within a specific (thematic and/or geographic) area.

Legislative framework: In this paper the term *legislative framework* is used to cover the number of acts, regulations, policies and management plans set out from the government to govern and guide a certain area. This paper will focus on the legislative framework in the area of natural resource management.

Livelihoods: Livelihoods are defined as comprising of the capabilities, assets (stores, resources, claims and access) and activities required for a means of living. A sustainable livelihoods is moreover one that can cope with and recover from stresses and shocks, maintain or enhance its capabilities and assets, and provide sustainable livelihood opportunities for the next generation. (Krantz 2001:6)

Payment for ecosystem services (PES): PES is defined as payment to land managers or others who engage in activities that improve the quality or quantity of ecosystem services. The services can be beneficial to a specific group or the general public, and the beneficiaries are often remotely located. PES is intended to address negative externalities e.g. the use water upstream reducing the amount or quality of water downstream. (DEFRA 2010:3-4). PES schemes can be private, cap and trade or public schemes. All three types have in common that the transaction is voluntary and legally-binding, the ecosystem service to be delivered and the value of it are well-defined, and payments are conditional on continued provision of the service. (Greiber 2009:6-7)

Public services provision/delivery: The terms 'public service provision' or 'public service delivery' are used to cover services which normally (with or without user fee) are provided by the national and/or local government such as education, health care, water/sanitation and infrastructure.

## Acknowledgements

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The report is the result of a two-months placement at the Uganda Red Cross Society (URCS) branch office in Apac, Northern Uganda, as part of my six-months internship/junior researcher position with the Red Cross/Red Crescent Climate Centre (RCCC). The internship is part of my final year at the Lund University Master in International Development and Management (LUMID). The report seeks to highlight the livelihood challenges that communities in the Partners for Resilience (PfR) programme area face, and give recommendations on how URCS can support the communities in improving and diversifying their livelihoods. Furthermore, it can serve as point of reference for other stakeholders working in the area. The views expressed in the report do not necessarily reflect the opinion of RCCC and URCS.

I would like to thank the RCCC and URCS – especially Julie Arrighi, RCCC East Africa representative; and Shaban Mawanda, URCS Disaster Risk Reduction Programme Officer – for giving me the opportunity to carry out this research. Special thanks go to Odongo Daniel, DRR Focal Person URCS Apac branch, for facilitation and translation of focus groups and interviews, transportation and in general supporting my research. Moreover, I would like to thank Hilary Kupanjo, URCS Apac Branch Manager, and the volunteers at URCS Apac branch for their warm welcome and continuous support.

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## Executive summary

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The purpose of this report is to support the Uganda Red Cross Society (URCS) in the implementation of the Partners for Resilience (PfR) programme Climate-Proof Disaster Risk Reduction (CPDRR). The report will focus on the livelihood challenges of the communities in Apoi and Akokoro parishes, and how URCS can support the communities in improving and diversifying their livelihoods based on their own aspirations, the institutional and legislative framework as well as ecosystem and climate change aspects, with the overall aim of reducing risk of disasters.

The research for the report was conducted during the months of December 2012 and January 2013 through participant observation, interviews with local government officials, NGO staff and community members as well as through focus group discussions at community level. Moreover, a number of legislation, policies and management plans have been reviewed together with literature on ecosystem management, climate change adaptation and livelihood diversification.

The interviews and focus groups reveal a number of interrelated livelihood challenges for the communities. These include access to clean water, seasonal climate variations, natural resource degradation, low crop output, as well as dependency on middlemen for selling their products. Further, the ambitions and aspirations of the communities are related to addressing these challenges with public service delivery of water, education and health care being highest on the agenda, followed by provision of agricultural production inputs such as ox ploughs, fertilisers and improved seeds.

Furthermore, it is found that the legislative and institutional frameworks offer some challenges to the current livelihoods such as restrictions on fishing activities, wetlands cultivation, tree cutting as well as a temporary ban on charcoal burning. While a number of policies and management plans offer support for livelihood improvements and diversification, the support is often only of moral nature, not including financial support. Moreover, the commercialisation of extractive activities, which are currently practiced for domestic purposes, may require special permits. While this does not have to be a challenge, it can be so in the absence of clear and transparent government structures and administrative processes. Nevertheless, there are a number of initiatives – from both government and NGO side – to seek opportunities from, such as biogas projects, water harvesting programmes and irrigation schemes.

Based on the challenges and aspirations of the communities and guided by the principles of ecosystem management, a number of livelihood improvements and diversifications are suggested. First of all, it is suggested that people in the communities come together and establish cooperatives to overcome the dependency on middlemen, to coordinate the resource extraction and to increase finance options. The communities could for instance establish a cooperative focussing on agriculture and savings/credit, and, as it consolidates, expand it with other departments e.g. within the areas of fisheries, forestry, construction, water/sanitation, health, and education. These departments can then later on branch out as independent cooperatives as the cooperative solidifies. It is further suggested that the communities engage in community-based forest (and wetlands) management, to coordinate and control the extraction of forest (and wetlands) resources.

In addition to these management recommendations, it is suggested to improve the productive industries (agriculture, forestry and fisheries) through more technical solutions such as storage facilities and soil conservation techniques including cover cropping, strip cropping, multiple cropping, mulching, afforestation, agroforestry and conservation tillage, as well as through the application of local organic fertilisers such as compost manure. Moreover, food security can increase by established

finger-ponds, and the agricultural output can be enhanced through the application of simple irrigation methods such as pitcher or drip irrigation. Further, establishing a weather station to record weather data can strengthen the ability of predicting future weather scenarios in the long run.

In the domestic sphere, current livelihood can be improved through water harvesting, which will provide readily available water for the household throughout the year as well as for irrigation, and through household biogas installations, which, like the Lorena-stoves that are currently part of the CPDRR programme, will reduce the demand for fuel wood.

Suggested livelihood diversification strategies include the establishment of local processing plants for agricultural produce such as sunflower oil, dairy products and maize flour. Moreover, people can engage in the production of handicrafts such as mats, baskets, tableware, bags and utensils made from locally available material such as papyrus (though the harvesting of wetlands resources require a permit if used for commercial purposes) or from recycling materials. Finally, people can increase the engagement in service provision such as mobile charging, water purification, catering service, transportation, hairdressing, movie-screening as well as professions such as blacksmith, mechanics and construction worker.

In addition to the above tangible solutions, it is also suggested that the communities consider their vulnerability caused by dependency on external events and actors. In accordance with the ecosystems approach, a varied production, which is suited to supply the local market in several aspects, will reduce the demand for cash derived from the outside. This will in turn reduce the need for marketing goods outside the local area, and, thus, reduce the pressure on natural resources. As the production will be directly responsive to the consumer needs, and the consumption more responsive to the production limits, the local economy will be more adaptive and sustainable.

The role of URCS in pursuing the above is first of all to advise and train the communities within their areas of expertise such as disaster preparedness, ecosystem management and food security. This may involve expanding the CPDRR programme trainings to also include aspects of soil conservation, compost manure, manual irrigation, finger-ponds, water harvesting and biogas installations. Moreover, URCS, should function as a networking, coordinating and facilitating agent that connects the communities with other organisations, government programmes and professionals that have the expertise in these and other areas. Finally, it should be remembered that the communities are the primary actors, and to ensure sustainability of the programme they should be the main decision-makers.

The recommendations for how URCS can integrate the above findings into the CPDRR programme are outlined in the following.

## **Recommendations**

- Complement the current EMR/CCA trainings with trainings on community-based forest management, soil conservation techniques, organic fertilisers, compost latrines, finger-ponds, drip irrigation, water harvesting and biogas installations. Invite professionals to provide proper knowledge and training.
- Invite research centres and universities to conduct soil and water studies e.g. through an internship position.

- Link with research centres and government agencies to establish and run local weather stations.
- Network and cooperate with other organisations in Apac and beyond to investigate other opportunities for communities to pursue, e.g. in the area of agricultural development.
- Cooperate with local government to ensure output of programme activities are sustained beyond the programme period.
- Invite local religious leaders to participate in trainings and to promote their ecosystem management approach in their Sunday prayers.
- Encourage communities to form cooperatives in the areas of agriculture and savings/credit and provide platforms for learning about and setting up a cooperative.
- Ensure community ownership and decision-making in all aspects of the programme to enhance sustainability of programme outcomes.

## 1. Introduction

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### 1.1 Purpose of research

The purpose of this research is to support the Uganda Red Cross Society (URCS) in the implementation of the Partners for Resilience (PfR) programme, Climate-Proof Disaster Risk Reduction (CPDRR). The research will focus on how URCS can support the communities in Apoi and Akokoro parishes to improve and diversify their livelihoods based on their own aspirations, the institutional and legislative frameworks as well as ecosystem and climate change aspects, with the overall aim of reducing risk of disasters. This will be done through interviews with local government officials, community members and focus group discussions with different people of the communities. Moreover, a number of legislation, policies and management plans will be reviewed together with literature on ecosystem management, climate change adaptation and livelihood diversification. Based on this, a list of suggested livelihood improvements and diversification options will be presented with recommendations of how the communities as well as the URCS can incorporate it into their further work under the PfR programme. The findings will be shared and discussed with the communities for further input and feedback, before the final version of the report will be distributed.

### 1.2 Background

The frequency and impact of natural and manmade disasters have increased substantially in recent years. Disasters do not only cause immediate damage and loss of life, but also set back the communities from developments achieved over a long period of time as infrastructure and social and economic structures are eroded. (PfR 2011). As a response the Partners for Resilience (PfR) was formed to reduce the impact of disasters on a global scale. By combining their expertise in the fields of disaster risk reduction (DRR), climate change adaptation (CCA) and ecosystem management and restoration (EMR), the five PfR organisations are implementing the Climate-Proof Disaster Risk Reduction (CPDRR) programme to support communities around the world becoming more resilient to disasters. PfR is moving beyond conventional DRR by recognising that environmental degradation increase the vulnerability of communities at risk, while climate variation and extreme weather events increase the risk of hazards such as drought and flooding. (PfR 2011; RCCC 2012). Thus, PfR seeks to integrate ecosystem management and climate change aspects in the disaster risk reduction efforts.

In Uganda the CPDRR programme is implemented by URCS, Care Netherlands and Cordaid, and URCS is implementing the programme through its branches in Katakwi and Apac. In Apac, the CPDRR programme is implemented in Akokoro and Apoi parishes, under Akokoro sub-county.

As part of the inception phase of the programme, a Vulnerability and Capacity Assessment (VCA) was carried out for URCS by two external consultants. Based on the findings from the VCA, consultations with Julie Arrighi from RCCC and Shaban Mawanda, the URCS DRR Programme Officer, and a reconnaissance visit to the programme sites, the need to investigate alternative livelihood options for the communities became apparent. Moreover, a consultation with Lucy Iyango, Assistant Commissioner at the Wetlands Department, Ministry of Water and Environment, highlighted the need to also look into the aspects of adjusting existing livelihood options to the changing environment. Focussing on improving and diversifying livelihoods originates from the idea that adaptation measures are only successful if they also improve livelihoods (del Rio 2012:332), and is well in line with the CPDRR programme component 1: *Direct poverty alleviation*, and especially output 1.2: *'Communities are capable to protect and adapt their livelihoods in synergy with the natural environment'* (see CPDRR LogFrame in Appendix I).

These livelihood improvements and diversifications should first of all take point of departure in the aspirations of the communities. Moreover, they should be within the legal framework, and make use of the possibilities that policies and management plans offer for livelihood improvements and diversification. Finally, the livelihood improvements and diversifications should take ecosystem and climate change aspects into consideration i.e. ensuring sustainability from an environmental perspective.

In addition to the above the study builds on two guiding principles: 1) The inclusion of local government authorities is imperative to ensure sustainability of the programme efforts; and 2) The central actors are the communities; URCS and local government are only facilitating entities. This is in line with the CPDRR programme approach, where communities are motivated to take responsibility of the programme activities and organise themselves to reduce the risk and impact of disasters in the future.

## 1.3 Methodology

### 1.3.1 Data collection

Data collection took place during December 2012 and January 2013, when knowledge about the programme area was established and improvements and alternative livelihood options were explored through participatory observations, interviews, focus group discussion and literature reviews. Literature review included legislation, government policies and management plans and literature concerning ecosystem management, climate change adaptation and livelihood diversification. Observations were done through several visits to the programme sites as well as through the daily encounters in the district capital of Apac. Interviews were conducted with district officials including the areas of environment, forestry, water, agriculture and fisheries, sub-county officials and local council officials (LC1 and LC2s) from parish and village level respectively, as well as community representatives from the PfR programme (CBDRR members) and staff from other NGOs in Apac (see *Acknowledgements* for a list of respondents). Three focus group discussions were conducted in each of the two parishes consisting of men, women and youth respectively. All respondents were informed about the study and consented to participating. While focus group participants were secured confidentiality, as their names remain unknown to the researcher, almost all interviewees opted for the use of their full names and titles in the report.

During the month of January 2013 the findings were compiled, and a list of suggested livelihood improvements and diversifications was developed with recommendations on how the URCS can incorporate it into their further work under the PfR programme. The findings were presented to and discussed with the communities during two feedback sessions in each parish. Moreover, the draft report was shared with interview respondents for further input and feedback, before the final version of the report was developed.

### 1.3.2 Research topics

In accordance with the overall research question – *How can URCS support programme communities in improving their current livelihoods and developing alternatives based on community aspirations, the institutional and legislative framework as well as ecosystem and climate change aspects?* – the research has been structured around seven research topics, which have also guided the data collection and the questions for interviews and focus groups. The topics are as follows:

- The role of environmental resources in supporting local livelihoods – directly and indirectly

- Challenges to local livelihoods including changes in the environment
- Community aspirations for livelihoods improvements and/or diversification
- Legislative and institutional framework concerning environment and livelihoods, including enforcement/implementation status and challenges
- Ecosystem perspectives on livelihood improvements and diversification
- URCS role in supporting the development of livelihood improvements and diversification

### **1.3.3 Limitations**

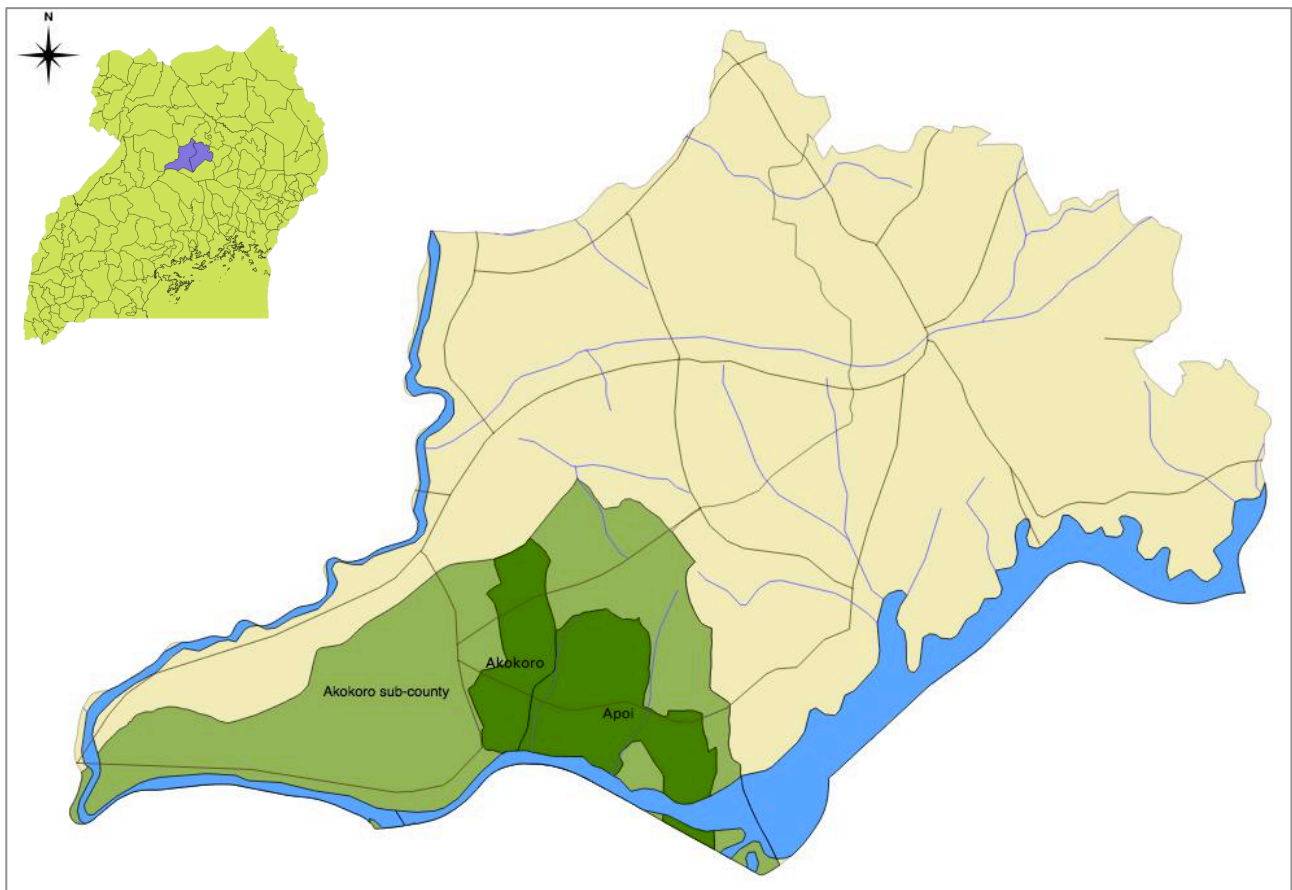
As present study is conducted by a foreign student with only two months in Uganda, the findings are subject to some limitations. There might be some socio-cultural and historical aspects that I am not aware of, and my limited experience in the field of development work may limit the comprehensiveness of the analysis. Moreover, as I am educated in the field of social sciences (International Development and Management), there might be some limitations to the natural science aspects such as climate change and ecosystem management. This said, I have had an interdisciplinary approach throughout my education, and I am finalising the last year of a well-recognised education (Lund University Master's programme in International Development and Management – LUMID). On this background the findings must be said to have a certain degree of validity and credibility.

Apart from the above, the difficulty in reaching all parts of the affected communities due to large distances within the parishes might have influenced the type of answers I have got. Moreover, the use of a translator, and the fact that not all words can be translated directly from one language to another might have influenced the data collection. These issues have been sought mitigated through triangulation of sources and methods, and are taken into account in the data analysis. The findings below represent the overall impressions from the focus groups and interviews and specific persons will thus not be quoted.

## 2. Description of programme area

### 2.1 Geographic features

The CPDRR programme is implemented in two of the eight parishes in Akokoro sub-county. The sub-county is located in the south-western part of Apac district, which is located in northern Uganda approximately 250 km north of Kampala. The district lies in an altitude of 1350-1500 MASL receiving an annual rainfall of 1330 mm. (DPU 2012). Akokoro sub-county is bordered by Lake Kyoga to the south, Ibuje sub-county to the northwest, Apac sub-county to the north and Chawente sub-county to the east (see figure 1). The area is characterised by wetlands, woodland, bush and grassland, which together with the lake provides vital sources of livelihoods for the large majority of the population. The sub-county is split between two zones: one that is dry characterised by high vegetation as trees, and a more wet with lower vegetation and fertile agricultural soil. The land is slightly sloping downwards towards the River Nile and the lakes, thus rainfall received in higher lying areas will run through the sub-county before reaching the water bodies.



*Figure 1: Apac district with the two programme areas, Akokoro and Apoi parishes.*  
Figure by the author. Data source: DIVA-GIS (2013).

### 2.2 Population characteristics

Akokoro sub-county is sparsely populated with large distances even within the villages. The population is estimated to be 33,952 (2010) sharing an area of approximately 678 km<sup>2</sup>, giving a population density of 50 per km<sup>2</sup> (ADC 2011:3). The CPDRR programme is implemented in two of the eight parishes in the sub-county, namely Akokoro and Apoi. Akokoro parish has a population of 2,748 distributed in 11 villages, while Apoi comprises 2,845 people in nine villages (Felix & Mayega 2011:15-

16). The population is in general very young, with 54.9 % below the age of 18 (Felix & Mayega 2011:11). Religion is considered to have great importance and it is estimated that 60% of the population in the sub-county are Catholics, while 30 % are Protestants, 8 % are Muslims and 2 % belong to the Pentecostal Assemblies of God (PAG/Born again) (Felix & Mayega 2011:12). The population belongs mainly to the Lango tribe with smaller representations from the Banyakole and Acholi tribe. Most people originate from around the district, though the people living along the landing sites are characterised as immigrants from other districts. The immigrants mostly originate from the insurgencies Northern Uganda resulting from the conflict between the government of Uganda and the Lord's Resistance Army (LRA) (March 2012:394-395). Though Apac district remained relatively unaffected by the insurgencies, it has indirectly been affected through the influx of refugees during years of insecurity in the north.

## **2.3 Administration and institutions**

The highest authority in the district is the District Council, which has the legislative and executive powers to enact district laws, while Sub-county and Village Councils have the power to make bylaws within their area of jurisdiction and in accordance with the Constitution. (Kasimbazi 2009:214). The district is headed by the Chief Administrative Officer (CAO) and administered through a number of departments. The sub-counties are lead by the LC3 and Sub-county Chief, and with considerable power in form of local tax collection. 65% of the collected taxes stay within the sub-county, while the remaining 35% are channelled upwards to the district. Below the sub-counties are the parishes, lead by LC2s, followed by villages/cells lead by LC1s. The LC1s are so to speak nearest to the communities and issues raised here will ideally be channelled all the way up to the district level. The Sub-county Council also includes a youth representative, which is to speak the case of the youth.

Apart from the government institutions several other institutions are or have been present in the sub-county. While NGOs/CBOs are very visible in the district capital of Apac, they were hardly recognised in the communities during focus groups or interviews. Apart from URCS, ActionAid Uganda has been working in the area during the 1990s and was widely recognised, while other organisations such as Caritas and Uganda Cooperative Alliance (UCA) were only mentioned once. However, the focus groups left the impression that some forms of CSOs, CBOs or FBOs are present at the community level, though they might not be very active. It was mentioned that some FBOs and URCS were active during disasters, and URCS was generally credited for its disaster response and DRR efforts.

## **2.4 Infrastructure**

Akokoro sub-county is sparsely connected by a few murram roads, which according to the population often get flooded during the rainy season, making transportation very difficult. There is no electricity in the two parishes, but a few solar panels are visible along the road. Radios are widely used, while TVs might only be available in the trading centres. Mobile phones are moderately used, but connectivity is restricted to certain areas.

According to the VCA carried out in the beginning of the CPDRR programme, there are four health centres in Akokoro sub-county, whereof one is located within Akokoro parish. The VCA also mentions four primary schools in Apoi, and according to the hazard and resource map developed during the VCA exercise there are two primary schools in Akokoro parish. According to a water survey carried out by Apac district local government with support from URCS in October 2012 there are 11 deep wells in Akokoro parish, whereof six are functional, and seven deep wells in Apoi, parish whereof five are functional. In addition there is a dam in each of the parishes, but none of them are working. (ADLG 2012)

## 2.5 Current livelihoods

The ecological features of the sub-county play a major role in the livelihood opportunities practiced in the sub-county. The majority of the population are engaged in agriculture followed by fisheries. Concerning agriculture the five main crops produced in the district are cassava, beans, sunflower, soybeans and groundnuts, but also crops like simsim (sesame), maize, sorghum, millet, potato and to a lesser extent cotton play a significant role. Banana used to be very important too, but the production was almost wiped out by diseases. Livestock rearing includes goat, sheep, cattle and pigs, while poultry is also widespread. Other livelihoods practiced include charcoal burning, hunting, brick-making and sand-mining/quarrying as well as small-scale businesses such as producing local brews, selling wood logs at the landing sites for smoking fish, making mats and baskets from papyrus, and running a small shop at the trading centre selling soaps, biscuits, sugar, cooking and soda. Lately tree-planting has been introduced to allow for fruit production of mangos and oranges as well as production of timber from pine trees. In the same way 'modern' beekeeping has been introduced, though traditional beehives have been present in the area.

On national level the agricultural sector provides livelihood to over 70% of the population (MWE 2011:2), and in Apac district the figure is estimated at 91% (DPU 2012). The majority, 85%, are involved in subsistence farming with a minimal excess output sold locally. A smaller part, 10%, is engaged in market-oriented farming e.g. subsistence farming with the excess being sold at the market locally. A small proportion, around 5%, is involved in commercial farming perhaps supplemented by value-addition and processing. While commercial farmers may have secured market access, the other two groups have limited access the market due to insufficient organisation, infrastructure, transportation means and storage facilities as well as limited access to information about market prices and demand.

Though many people are depending on farming alone, several households employ diverse livelihood strategies. For instance daytime agriculture can be supplemented by night-time fishing, or can be combined with wood log selling, charcoal burning, brickmaking or small-scale business. Similarly, some activities are seasonal, e.g. hunting is mainly practiced during the dry season (December-February), while brickmaking is at its highest at the end of the rainy season. According to the seasonal calendars developed during the focus group discussions agriculture has two annual seasons following the rainy seasons, with first season harvest in June-July, and second season harvest starting in late September and mainly taking place in October-November, but continuing until December.

Akokoro and Apoi parishes seem to be quite similar in the livelihood activities practiced, though it seems that fisheries used to be more important in Apoi. It is also emphasised that most livelihood activities are carried out by men and women alike, though with some exceptions. For instance fishing and hunting are mostly carried out by men, while brewing is mostly carried out by women. Moreover, men and women have traditionally engaged in different farm activities, but these differences seems to be on return, and now most farm work is shared. However, domestic work such as cooking, washing, fetching water and firewood is mainly carried out by women, while men mostly spend this time 'socialising' at the trading centre. It was noted, however, especially among the youth focus groups, that these gender roles are undergoing changes. E.g. women used to be in charge of weeding, now men and women do it together. There were also examples of men who are cooking, a role which has traditionally been prescribed upon the female household occupants.

## 2.6 The role of natural resources

From the above, it is evident that natural resources play an important role for the current livelihoods: Land and wetlands for agriculture, livestock rearing, hunting, brickmaking and sand-mining/quarrying; Forests and trees for wood logs (for domestic use and sales), charcoal burning and timber; Lakes and river for fishing and papyrus harvesting. Moreover, lakes and wetlands provide water for bathing, cooking and drinking – the wetlands during the wet season and the lakes during the dry season. The forests are also sources of medical plants and construction materials such as grass for thatching the houses.

Apart from direct livelihood support functions listed above, some indirect functions and ecosystem services were also acknowledged during the interviews and focus group discussion. First of all, it is widely recognised that trees play an important role in the formation of rain and regulation of climate, though the overall connection to climate change from global greenhouse gas (GHG) emissions might not always be well understood; e.g. it was often mentioned that *'trees attracts rain'*, and people have learned from the radio that *'cutting trees without planting new will stop the rain'*. Though trees might have an affect of influencing the microclimate, such as giving shade and retaining the water and nutrients in the soil, the direct impact on local rainfall can be doubted (del Rio 2012:336-343).

Other ecosystem services that were mentioned, include that trees give shade and are supplying windbreaks. The flood controlling and water purifying qualities of the wetlands as well as the CO<sub>2</sub> absorbing ability of trees (thus reducing GHGs in the atmosphere) were also emphasised – though statements like *'trees will reduce global warming'* might be a bit imprecise. Furthermore, it was recognised that trees assist in soil formation and improve the nutrients in the soil, hence enhancing the basis for agriculture. Finally, the role of forests and wetlands as habitat for wildlife was appreciated, though it was also noted that wildlife can pose a direct threat to human e.g. during hunting, or indirectly by destroying crops.

### 3. Livelihood challenges

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During the interviews and focus group discussions the respondents were invited to identify the main challenges in the district/sub-county/parish/community, and a wide range of challenges was listed. In the following I have tried to group these challenge into categories, though most of them are interrelated and it can be difficult to determine what is cause and what is the effect.

#### 3.1 Access to clean water

Firstly, all focus groups pointed at lack of clean drinking water as their main challenge. There are two main sources of water that people rely on interchangeably: 'natural' water from wetlands, streams and lakes, and water from the local boreholes. The lack of clean drinking water can partly be attributed seasonality, which during the dry season makes the wetlands, streams and lakes dry up, as well as some of the boreholes. Another reason is the low coverage of functional boreholes, which forces people to walk long distances to collect water. As mentioned above there are, according to a survey from October 2012, 11 deep wells in Akokoro parish, whereof six are functional, and seven deep wells in Apoi parish, whereof five are functional. (ADLG 2012). During the focus groups, however, it was stated that there are no functional boreholes in Apoi parish, while there is one functional borehole shared by four villages in Akokoro parish. Often the boreholes go out of function during dry season as the water table falls low, or they simply break down due to poor maintenance. Maintenance is, according to the regulations, supposed to be carried out but the Water User Committees, but often these do not succeed in collecting fees, or the fees have been used for other (personal) purposes.

In addition, while some treat the water by boiling it or filtering it through a handkerchief, others drink it as it is – '*like a cow*' as one focus group participant expressed it. Even clean water can become unclean if not handled safely, e.g. by using unclean tools to scoop the clean water or drinking from an unclean source. This can result in stomach-ache, which may reduce people's general well-being as well as the ability to work.

#### 3.2 Climate impacts

There is nothing that can upset farmers as much as the weather. Coming from a farmer's family I have all my life been listening to my father and brother complaining about the weather: too much rain, too little rain, too much sunshine, too little sunshine, too much wind, too little wind, too cold, too warm, etc. For a farmer, the ability to predict the weather is imperative for a well-planned production and a good output. This is just as true in Denmark as it is in Uganda, and the unpredictability of the seasons is posing a serious challenge to the farmers in Apoi and Akokoro parishes.

##### 3.2.1 Climate change/climate variation

From the focus groups and interviews it is very difficult to get a clear picture of the phenomenon of climate change. Some say there is a trend of more rain than in the past while others say there is less. As local weather data has not been systematically recorded, it is difficult to determine which is correct. Nevertheless, people agree that some changes are going on, the weather is less predictable as the inter-annual variation has increased. What is more important for present study is how the seasonal climate variations *affect* people, and how they can mitigate the negative impacts and possibly enhance the positive ones. Climate variability is a condition that people will have to adjust their livelihoods around. As one respondent noted: '*Climate is the most important natural resource, because it determines all the others*'. While some would claim that all the others (water, land, air, vegetation) also influence climate, i.e. that climate cannot be isolated from other natural resources, there might be some truth to the statement. We can cut the trees, drain the wetlands or plant the fields with maize or cassava, but we cannot start or stop the rain on demand. In the following, the way the seasonal climate

variation is influencing the communities in Apoi and Akokoro parish is highlighted together with the causes identified and the responses employed.

### **3.2.2 Changing seasons**

During the focus group discussion it was noted by several people that the seasons have changed. While the issue was not brought up during the development of the seasonal calendar (at least it was not translated), there was a lot of discussion going on during the construction of the seasonal calendar as to when it was the season for planting, weeding and harvesting. This can be caused by difference in preferences for planting and harvesting, but it might also be an indication that the seasons are changing and some people are trying to adjust accordingly. Though there are differences in the seasonal calendars produced during the focus groups some general observation can be made.

First of all, most agreed that the dry season runs from December to February. There used to be one heavy rain in February before the rainy season started in March. Now there is no rain in February, and sometimes the rainy season does not start until April. Some respondents noted that the rain in some cases does not arrive before May. Some claim that rain would normally reduce around May and June, while others noted that May and June are dry months. In July the second rainy season used to start, but now even July can be without rain. The second rainy season used to last until November, though some noted that the rain used to stop in October, and that it is unusual to have rain in November. This year there has even been rain in December and January, which is unusual. Some claim that there is now only one rainy season, though there is disagreement as to which one: Some said the only rainy season now is March-June, while others said that the second rain is more reliable than the first. In general most people agree that both rainy seasons arrive later, and the second rain lasts longer.

Though the weather pattern seem unpredictable, people seem to have found some kind of system, namely that if the rain lasts longer one season, the dry spell will be longer the next season, and if one harvest is bad, the next will be good. While these observations might not be very reliable, it does indicate that the seasons might have been 'pushed', i.e. rain from April-June instead of March-May, and again from August-December instead of July-November. However, it will need several examples before this new trend can be established.

There was general agreement that the changes in seasons have affected livelihoods, and agriculture in particular. While most pointed to the negative impacts, e.g. long dry spells and too much rain destroy the crops, a few pointed to the positive effects. First of all, more rain would reduce the risk of bushfire in the dry months, and secondly, make it possible to plant in October and have a successful harvest, i.e. having an extra season. Thus, some noted that the overall food production had increased and people are starving less. Others pointed to the fact that less rain makes the wetlands dry up earlier, and reduces the ground water recharge, and thus leading to dry wells. Furthermore, when the first rainy season is delayed, planting too early may lead to crop failure, and some people might be starving during the months of May and June.

The causes behind the change in seasons were largely attributed to the reduced number of trees in the area. People have observed that there used to be a lot of trees, but these have been cut down for charcoal burning and because of increased population in general. Moreover, they have through the radio been encouraged to stop cutting trees as they attract the rain. Only one respondent linked the change in seasons to global climate change.

To adapt to the change in rainy season many farmers have changed their farming seasons as well. However, since they find it difficult to predict when the rainy season will start, their approach is more or less 'wait and see'. While some are doing 'trial and error' where they plant several times a year and see which one is successful, others are continuously preparing the land and waiting for the rain to set in. Moreover, it was noted that as the dry season prolongs, some people adapt by going to the wetlands to cultivate. Others mentioned that people used to cultivate the wetlands, but are now using them for fishing and rearing livestock because the rain has increased. Others are diversifying their income through fishing or charcoal burning (though it is also mentioned that many people are turning away from fishing and back to farming due to government regulations, see 3.7).

### **3.2.3 Extreme weather events**

Apart from changing seasons the community livelihoods are also challenged by extreme weather events. This includes the long dry spells as mentioned above, and heavy rainfall resulting in flooding and crop destruction. Moreover, hailstorms are destroying constructions by blowing of roof and destroying crops in the fields. In addition, lightening has been striking houses and killing animals – and even people. Finally, as trees functioning as windbreaks have been cut down, the wind has become more violent and blowing of roofs. The heavy rain, hailstorm and lightning are very localised phenomena that hit one village but not the others. The hailstorms, flooding and long dry spells are not new phenomena, but the frequency in which they occur has increased.

The causes behind the extreme events were largely the same as above, adding that cutting down windbreak trees has increase wind, and wetland encroachment has decreased the ability of wetlands to absorb water and thus preventing flooding. The natural resource degradation was partly attributed to ignorance about the importance of ecosystem services, and partly caused by a need, as a last resort to obtain an income.

Responses to these extreme weather events are limited. In the case of destroyed crops or construction, some farmers seek compensation at the local government or NGOs/CBOs, and during times of flooding people might have to move away from flooded household for a while (as was the case during the flooding in 2011), and then return when flooding has retired. Apart from this it seems to be a general opinion that these event happen without people being able to influence it, and no measures are taken to reduce the impact next time.

## **3.3 Natural resource degradation**

A very related challenge, which was very prominent during interviews and focus group discussions, is the general degradation of natural resources. Natural resource degradation identified includes the encroachment of wetlands and reduced soil fertility, but especially the reduced tree cover was cited as a challenge. While natural resource degradation is rooted in a complex set of hazards created by historical and political processes such as population increase, poverty leading to a short-term perspective, agricultural intensification and commercialisation, high input prices reducing the incentive to replenish the nutrients in the soil e.g. via fertilisers, insecure tenure leading to reduced investment, administrative decentralisation, privatisation, etc. (Nkonya et al. 2004:6-19), it was during interviews and focus groups main attributed to human activity such as expansion of agricultural land, intensified cultivation and the cutting of tree for charcoal burning. The degradation was identified to result in lower agricultural productivity, risky agricultural production in wetlands – occasionally leading to crop failure –, and a changes microclimate with reduced rainfall. Other effects, which were not mentioned during the interviews and focus groups, include reduced ability of the ecosystem to

provide services such as flood regulation, water purification and mitigation of extreme weather events.

In response it was often cited that people should stop cutting trees and start planting instead. This viewpoint can largely be attributed a very effective campaign from the local governments, which through radio spots and other material encourage people to plant five trees for every one they cut.

### **3.4 Low crop yields**

One of the very cited challenges for crop farmer is the low crop yield experienced. Yields per farm may not be declining in absolute terms, but they may be perceived as very low compared to what is expected, what is seen on the neighbouring field, or what was gained from the same plot size earlier. Some underlying causes are outlined in the following.

#### **3.4.1 Decreased soil fertility**

Though decreased soil fertility was only mentioned explicitly by one respondent, the lack of tools and methods (to retain soil fertility) was a very cited challenge. First of all, most people use the hand hoe for tilling the fields. As one of the youths expressed it: *'Since 1962, my grandfather used the hand hoe, my father used the hand hoe, I use the hand hoe, and my children and grandchildren will also be using hand hoe.'* Using the hand hoe instead of the ox plough, which some farmers are able to use, allows for only a small layer of the soil to be turned, thus exhausting the soil much quicker. The lack of proper tools can be ascribed a lack of finance and saving/credit mechanisms in the community. In response some people resort to borrowing the ox ploughs from the neighbour, but the cost might be a later ploughing, thus delaying the entire farming cycle.

Moreover, it was also noted that while crop rotation is widely practiced and people are aware of its importance, very few have the option of fallowing the field, simply due to small land plots (2-5 acres). This is mainly attributed population increase and an ever-smaller plot size bequeathed to the children. Furthermore, though it has lead to short-term increase in output, the introduction of cash crops has also lead to reduced soil fertility. Finally, it was noted that the use of fertilisers is very low. This can again be attributed lack of finance and credit for the case of chemical fertilisers, while the reason for not using local organic fertilisers is attributed the tiresome work of collecting manure and spreading it over a large piece of land.

#### **3.4.2 Crop diseases and pests**

Another cause of decreased yields is the challenge of crop diseases and pests. The causes were by the focus groups identified to be the introduction of cash-crops and other crops that bring diseases that the indigenous crops cannot combat, climate change, and the fact that people are not able to practice fallowing. This is resulting in reduced output or even crop failure. As an example, banana used to be a very common crop, but the species was almost entirely wiped put by disease and is no longer present in the area. The response to diseases and pests is use of insecticide for those who can afford it.

### **3.5 Limited access to credit**

A challenge which is very related to the above is the limited access to credit. There are a few local saving mechanisms, where people for instance save 3000 UGX every month, and then the collected money are distributed for Easter and Christmas. Other types include a savings group mainly for women, where each member saves 6000 UGX, and every week a new person is selected to get the saving. However, common for the different types is that it is to possible to obtain a credit, i.e. withdraw more than you saved, and the saving mechanisms becomes simple 'cash storage' facilities. It was, though, mentioned that trustworthy persons with reasonable assets/security can obtain credit, but

people mostly use this for cases of emergency, i.e. for medical bills, and not for investments. Furthermore, very few people are using the banks in Apac town, as it is complicated to get there, a long procedure, and associated with high risk; in case the investment fails people may have to give up their land to the bank.

### **3.6 Low revenue from agriculture and dependency on middlemen**

One of the main challenges identified was the poor access to markets, where farmers can sell their agricultural produce. This has led them to be dependent on the so-called middlemen, who approach the individual farmer and offer a low price, which the farmer without other option is forced to accept. People feel cheated by the middlemen, who explain that prices have fallen e.g. in Sudan, where some of the crops are taken. In the following some underlying reasons for the limited market access will be presented.

#### **3.6.1 Poor road infrastructure**

The poor road infrastructure in the two parishes are one the most cited challenges. The causes may range from people settling in poorly connected areas, the lack of road development from community as well as government side, and the physiological conditions of the area, making roads prone to flooding during the rainy season, and thus complicating maintenance. The immediate effects are disconnectedness, and together with lack of proper transportation means complicated access to markets.

#### **3.6.2 Limited storage facilities**

Another crucial challenge in the communities in Akokoro and Apoi parishes is the lack of storage facilities. People used to store their produce in granaries, but this practice has been abandoned partly because the harvest is too small, and partly because thieves are stealing from the unlocked granaries. Moreover, the cooperatives used to have storage facilities, but as these closed down these facilities have disappeared. In effect many farmers are not able to store their crops apart from what they can save in their huts as seeds for the next season.

The lack of storage facilities and road infrastructure is also influencing fishermen, who cannot reach the market before the fish are rotten. As they do not have any cooling facilities due to lack of equipment and electricity, most people smoke the fish at the landing sites. Though the government encourages salting, people only use the technique for a certain fish, namely the tilapia, which is mainly sold to Democratic Republic of Congo (DRC).

#### **3.6.3 Individualised production**

A challenge, which underlies many of the other challenges, is the individualised production and lack of organisation among the farmers. Many have experienced the benefits of cooperatives, which were able to provide communal storage facilities and negotiate a fair price for the agricultural products. However, during the late 1980s the use of cooperatives was abandoned as part of the privatisation and decentralisation agenda. Though some people still form groups and help each other in the fields on a rotational basis, and the government programme Northern Uganda Social Action Fund (NUSAF) requires people to go into groups to be eligible to receive a project; there is no longer any collective action to negotiate fair market prices for agricultural outputs. As a consequence, the middlemen are able to pressure the farmers individually for a low price for their products. These are the same middlemen who approach the farmers in the beginning of the season with the so-called 'improved seeds'. These seeds are more expensive and might give a better yield, but as farmers are forced to sell their output to the same middlemen the prices that they get might only be enough to enable them to buy more seeds next season. In addition, the improved sunflower and sorghum seeds that some

farmers are able to employ can only yield one season, thus the farmers are not able to keep the seeds for next season, but are forced to buy new seeds from the middlemen each season.

### **3.7 Legal restrictions**

Some of the livelihood challenges mentioned were related to government regulations and policies concerning wetlands, fisheries and charcoal burning. First of all, wetlands encroachment is regulated from national level where it is stipulated that wetlands are public land vested in the state, and should be accessible to all citizens of Uganda. People are allowed to use wetlands, but in a sustainable way. This means that it is illegal to reclaim, drain, disturb, destroy or damage a wetland without a permit. The enforcement of the law is challenged by the seasonality of wetlands and the missing demarcation.

Concerning fisheries, regulations on fishing gear have been introduced to reduce overfishing and the number of fishermen. In an attempt to restore the depleted fish population, the government introduced certain requirements for the size of the nets, so small and young fish would stay in the lake and mature. In effect, while the fish population has increased, giving better yield to those who can afford the fishing gear, many small-scale fishermen are no longer able to fish, as they cannot afford the legal gear. Moreover, it is illegal to be in possession of such small fish; they need to be returned immediately if caught by accident. As a response, many fishermen have gone back to farming, while some continue their activities with illegal fishing gear.

Finally, as a response to the deforestation experienced in the district and especially Akokoro and Chawente sub-counties, the local government has introduced a bylaw banning charcoal burning in Akokoro and Chawente sub-counties, and charging a fee of 500.000 UGX on lorries transporting charcoal in the area. As a result of the ban there has been a reduction in the amount of trees cut for charcoal, though some people continue to burn charcoal, as is evident from the smoke detected here and there when driving through the area. The limited impact of the restrictions may be attributed to the nature of the charcoal burning business. While some locals burn charcoal as an additional income, it is sometimes performed by 'outsiders' coming to a homestead and offering a motorbike, a bicycle or roof sheets in return for the trees at a particular land plot. In this case, locals are not directly involved in charcoal burning, but they sublet a piece of land, which they might have wanted to clear for agricultural purposes anyway. The fees charged for transporting charcoal are apparently not high enough to discourage the trade, due to the high value of charcoal in the capital. It should be noted that charcoal is the main source of energy in the urban areas, and until a viable alternative is offered, the demand is most likely to increase.

### **3.8 Population increase and limits to growth**

Another challenge, which seems to underlie many of the other, is the population increase, which is confronted with the limits to growth both in terms of natural boundaries, but also in terms of government capabilities to provide public services for all. While population increase and limits to growth was not so outspoken, a number of challenges connected with this were identified.

#### **3.8.1 Land conflict**

While land grabbing by large-scale companies has not become an issue yet, local land conflict seem to be an increasing challenge. Land is mainly held by customary tenure, but owned by the individual family. As noted above, the plot sizes becomes smaller and smaller for each generation, in effect making it difficult to produce enough and survive on agriculture alone. Moreover, there has been an increase in fights over land, when neighbours may start arguing about the boundaries between their plot – sometimes the argument may be over very small pieces of land like 1m<sup>2</sup>. Some government officials claim that there is plenty of land, and it is just the way it is used that causes problems, but

from the communities' point of view land is scarce. As a response, people start cultivating the wetlands, abandon the practice of fallowing, or they diversify their livelihoods through for instance charcoal burning.

### **3.8.2 Human-wildlife conflict**

A challenge, which was not given much attention, but which might increase in the coming years is the human-wildlife conflict. The increased population and the encroachment into forests and wetlands have decreased the distance between humans and wildlife, and may force wildlife out of their natural habitat. Wildlife has started eating the crops in the field, such as maize and is in general destroying crops. Moreover, it was noted that women no longer go hunting because animals, like the wild boars, are attacking them.

### **3.8.3 Increasing living expenses**

During the focus groups it was mentioned that people experience increased living expenses. Some note that while the agricultural output and prices might have increased, the effect is not felt due to the increase in living expenses. This may explain the huge disagreement as to whether agricultural output and prices have reduced or increased in recent years (another explanation may be that both output and prices fluctuate every year). Moreover, when comparing to the past, people have to pay school fees and medical bills, which was not as common earlier. Some even claimed that people were not so sick earlier, and the increase in illnesses was attributed to the increased use of sugar and frying oil and the fact that people no longer eat wild fruits because the trees have been cut. In response to the increased living expenses, livelihood diversification has increased, and some remarked that having fewer children might be an appropriate response.

### **3.8.4 Increased demand for public services**

A very cited challenge is the limited access to public services. Apart from the challenge of access to clean water treated in depth above, it also includes long distances to health centres and poorly equipped health centres. Moreover, it was a general observation that the schools have too few teachers, too few classrooms and again no boreholes – making the kids go home for water and often not returning after lunch. Furthermore, it was noted that there is no nursery and secondary school nearby, thus reducing the likelihood that people will pursue secondary education. Finally, the provision of agricultural extension services is also listed as insufficient.

## 4. Suggested livelihood improvements and diversification

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In the following a number of suggested livelihood improvements and diversification are presented. The suggestions are selected based on an analysis of community aspirations, a review of the legislative framework, and guided by the ecosystem approach, which will briefly be presented in the following.

In short the community ambitions expressed at the focus group discussions were very down-to-earth and related to the challenges people face in their everyday life. Most people envision a future with more public services such as clean water, schools, roads and health clinics. Moreover, there was a wish to see more storage facilities for agricultural products, increased use of fertilisers and irrigation, more cattle rearing, poultry keeping and beekeeping, as well as a better environment. Apart from the physical changes there were also less tangible wishes that people should be respectable, have good manners and be able to bring about changes.

The legislative framework offers a number of challenges and opportunities for current and alternative livelihoods. Apart from the restrictions identified by the respondents and already mentioned under 3.7 *Legal restrictions*, the challenges mostly relate to permits required to perform certain extractive activities. This does not have to be an obstacle, but can be so in the absence of transparent regulation and long administrative structures. Moreover, the enforcement of laws (e.g. demarcation of wetlands) and the delivery of public services (water provision, agricultural extension services), which actually should be opportunities, can be hindered by financial limitations at the local government level. Thus, while a number of policies and development plans promote and support the use of fertilisers, irrigation schemes, value addition, agroforestry, etc., the support is often only in moral and not financial terms with limited impact on the ground. See Appendix II for more policy mapping.

The ecosystem approach takes point of departure in the view that ecosystems are both biophysical and socio-cultural systems. Ecosystem management is aiming at managing natural resources and biodiversity sustainably by maintaining ecosystem processes, functions and services (Clarke & Jupiter 2010:7). Ecosystem management build on the principles of: 1) Management along ecosystem boundaries (e.g. catchment area) instead of along administrative boundaries; 2) Focus on sustainability of the ecosystem, not of yields (e.g. crop or timber); 3) Continuously adaptive management since the environment is constantly changing; 4) Acknowledgement that people are part of the ecosystem and cannot be separated from it (Leech et al. 2009:4). Ecosystem management involves supporting the provision of ecosystem service e.g. through protecting wetlands, maintaining vegetation, using a variety of crops with different maturation periods, using native plants and preventing the spread of alien species (del Rio 2012:336-343; Sudmeier-Rieux & Ash 2009:16). See Appendix III for more about ecosystem management.

Based on the above a number of livelihood improvements and diversification have been identified and presented in the following. Eight of the livelihood improvement suggestions are mainly focussing on agricultural, forestry and fisheries production: cooperatives, community-based forest management, storage, soil conservation techniques, finger-ponds, weather station, fertilisers and irrigation; while two are more related to improvements in the domestic sphere: water harvesting and domestic biogas. Finally, three categories of livelihood diversifications are identified: processing/value addition, handicraft production and services. It should be noted that the suggestions do not offer solutions to all the challenges mentioned above. They take point of departure in solutions that can be applied on community or even household level, and solutions that will require involvement from local government side, like schools, roads, boreholes and health clinics are not mentioned here.

In relation to the release of the draft report, the suggestions were presented to and discussed with the communities. Overall, the feedback was positive, though there were a lot of concerns over financial constraints, but also limited information and general laziness in the communities were seen as challenges. However, the communities also encouraged cooperation and highlighted the need for individuals to make sacrifices such as offering land for a demonstration farm. Further, implementation through community labour based project, where everyone works for the project rather than hiring external labour, was mentioned as a good implementation method. In the following, more specific feedback is presented under the relevant suggestions.

#### **4.1 Livelihood improvements**

As indicated above, the most common livelihood occupation is farming. The overall efficiency, resilience and adaptive capacity of farming systems can be enhanced through improvements of the various components such as production, storage, processing and marketing (FAO 2010:1). The following suggested livelihood improvements are mainly focused on agriculture, but can also be relevant to forestry, fisheries and other livelihoods.

##### **4.1.1 Cooperatives**

To address the challenges of individualised production and dependency on middlemen the first suggestion is to establish cooperatives. When farmers work together they gain collective strength and have a better bargaining power vis-à-vis middlemen and other traders (Birchall & Simmons 2009:13). Moreover, by pooling resources people can invest in storage facilities and transportation means, and even create saving and credit mechanisms.

Many respondents expressed the need for working together in groups. There have been cooperatives in the area before, but as the current government has focused on privatisation, the cooperatives have more or less disappeared from the area. While the number of cooperatives in Apac district has decreased from 123 in 1996 (ADC 1997:98-99) to 65 in 2011 (whereof most are inactive) (ADC 2011:113), there has been an increasing number of cooperatives on national level up from 554 in 1995 to 7,500 in 2009 (ILO 2011:1). Moreover, the government is through the programmes from National Agricultural Advisory Services (NAADS) and NUSAF encouraging people to form groups, however, these groups seem not to persist beyond the specific project. People are used to work together on each other's fields on a rotational basis, but this is only used when tilling. If these efforts can be more systematised and scaled up to form cooperatives, there might be great potential for the farmers to gain collectively.

Cooperatives have been defined as an '*autonomous association of persons united voluntarily to meet their common economic, social and cultural needs and aspirations, through a jointly owned and democratically controlled enterprise*' (ICA 1995 in Birchall & Simmons 2009:14). Cooperatives are both an enterprise and as a membership-driven organisation part of civil society (Smith 2004:18). The International Co-operative Alliance (ICA) outlines seven principles for cooperatives (Birchall & Simmons 2009:13-14):

- Voluntary and open membership
- Democratic member control
- Member economic participation
- Autonomy and independence
- Education, training and information
- Cooperation among cooperatives
- Concern for community

Cooperatives are based on values of self-help, self-responsibility, democracy, equity, equality and solidarity. They provide employment, and while competitive on the market they do not focus on profit, but on the welfare of the community and the individual households in the community. (ILO 2012:1). They are resilient to crisis as shown by the increase in assets, volumes of lending and members that cooperatives have experienced during the on-going financial and economic crisis. (ILO 2011:1)

Overall, four main types of cooperatives can be identified: consumer co-operatives, producer co-operatives, worker co-operatives and financial co-operatives (Birchall & Simmons 2009:13-14). Agricultural cooperatives are producer cooperatives that provide economic benefits for their members as these are sharing and pooling resources, gaining improved access to markets and increasing their bargaining power. They also allow for engagement in processing of raw materials, thereby increasing the local value addition and offering alternative employment to farming, in turn reducing the pressure on land. (ILO 2011:2-3)

A type of financial cooperatives, savings and credit cooperatives (also known as SACCOs) provide financial services in areas where banking services are not readily available. Apart from providing loans for agricultural investments, they also provide access to finance for farmers to cover their costs between harvesting seasons. (ILO 2011:2-3)

Cooperatives are particular appropriate in rural areas where private businesses are reluctant to go and where the government does not succeed in providing basic services. Cooperatives can therefore complement the government efforts in public service provision, such as electricity, infrastructure, water, health and consumer supplies. (ILO 2012:1).

Thus, there are many types of cooperatives, many of which are relevant in Akokoro and Apoi parishes. Apart from addressing the challenge of dependency on middlemen and limited access to credit, cooperatives can also be used to organise trainings for farmers, coordinate production and resource extraction in line with the ecosystem approach to allow some areas to lie fallow, and complement the public service provision e.g. by strengthening water user committees and facilitating maintenance and repairs.

Given the size of the area it may be desirable to establish one cooperative in each parish focussing on agriculture and saving/credit, and then as the cooperatives settle, expand with different committees e.g. fisheries, forestry, construction, water/sanitation, health and education. Cooperation with local government is of course imperative to coordinate the service delivery and avoid overlaps. As the cooperatives grow in members and assets the different committees may branch out and establish independent, but cooperating, cooperatives.

However, as the cooperative model is rarely well understood, the business model is often hampered by policies and legislation (ILO 2012:1). Therefore, if the communities should decide to establish a cooperative they must be well informed by the provisions in the Cooperative Societies Act as well as other relevant legislations. Nevertheless, both central and local government support the strengthening of cooperatives and farmers' organisations, promote SACCOs and seek to increase the capacity for collective marketing, and communities should seek to take advantage of this support (ADC 2011:114-116; MAAIF 2010, 2011). Moreover, a number of NGOs work with farmer group and collective marketing such as ADFA, PASUD, etc. Furthermore, 2012 was the International Year of Cooperatives,

and the renewed focus on cooperatives may offer venues for further support and resources to establish and run a cooperative (UNDESA-DSPD 2013).

Finally, when establishing a cooperative it is important that people are committed, so that it does not become 'just another community group'. The cooperative needs to be relevant and valuable to its members, and emerge as a wish and an idea from the communities themselves. As mentioned earlier, many respondents pointed to the establishment of groups or cooperatives as a way forward. The feedback from the communities was also generally positive, with people acknowledging the need for cooperatives, but a bit reluctant when it comes to implementation. Therefore, more information and training about cooperatives is needed to kick-start the process and for people to be committed to the project.

#### **4.1.2 Community-based forest management**

To address the challenges of decreasing soil fertility, human-wildlife conflict and natural resource degradation as well as to reduce the impact of climate change, community-based forest management (CBFM) can be arranged to manage forest resources and coordinate the extraction in a holistic manner. Extraction of forest resources is not harmful in itself, but when it is done by several individuals in an uncoordinated manner it can have adverse impact on the ecosystem.

CBFM is basically any situation where local people are engaged in forest activities. Most CBFM arrangements are upheld by a contract or Memorandum of Understanding (MoU) between the forest service and the communities, with the communities as the main managerial and decision-making body. (Odera 2004:16-18). It is based on democratic decision-making where communities are involved in the management of the income-generating opportunities in forests. Apart from the harvesting of forest products such as timber, fuel wood, fibres, grass and medicines, CBFM also provides income opportunities through employment in processing industry (see 4.2.2). However, since environmental concerns are one of the main pillars in CBFM, the extraction of these resources must take place in an environmentally sound and coordinated manner. (Odera 2004:28-32)

The principles behind CBFM could also be transferred to wetlands management. Extraction of wetland resources is in itself not a problem, but when it is done in an uncoordinated and unsustainable manner it can have adverse impact on the ecosystem. Therefore, with an overall wetlands management plan and a community organisation to regulate and monitor the extraction, the periodically cultivation of wetlands can help increase food security in the area (Abbot & Hailu 2001:1). Employing multiple uses on a rotational basis (e.g. cultivation, fallow, grazing) would help maintain the socio-economic and environmental functions (Dixon & Wood 2003:124-125). What should be noted in this connection is that a permit is required if more than 25% of the total wetland area is employed, or if the resources extracted are used for commercial purposes.

CBFM is here presented as a livelihood improvement and not as a diversification. Thus, it is not considered a direct source of income in itself, but indirectly it can contribute to increased incomes and quality of life as the maintenance of forest cover in the area helps improving soil fertility (and thus yields), increasing the flood regulating capacities of the ecosystem, providing shade and windbreaks, improving the local micro-climate, reducing the incidents of human-wildlife conflicts and providing fuel wood and timber in the future. While CBFM is an ideal way of coordinating natural resource extraction, using conservation as income-generation such as through Payment for Ecosystem Services (PES) is not encouraged in this report. PES often involves a transaction from remotely located receivers of ecosystem services to the managers (in this case communities) of the natural resources

for conserving the natural resources, and thereby improving the quality or quantity of ecosystem services (Odera 2004:16-18). Since the receivers are located far away, the relation between the service provider and the beneficiary is weak, and the transaction becomes insecure. Moreover, since the ecosystem service often involves conservation, the communities are not able to extract resources and engage in productive activities such as food production. Since this can lead to lower food security and dependency on external actors and factors, this report does not recommend the communities to engage in PES, carbon trade and similar schemes.

There is already a lot of awareness in the communities about the need for managing forest resources in a sound manner. The local government has succeeded in increasing awareness through a public campaign e.g. with radio spots, conveying the message of '*cut one, plant five*'. While people understand the message, many find it difficult to implement due to the lack of seeds in the area. While this is already being addressed through the CPDRR programme, there may be more support to get from the government side. Both central and local governments encourage tree planting and promote forestry-based industries (DEFRA 2010:3-4). There are currently no community forest reserves in the district, but the local government encourages new initiatives in this direction. Furthermore, the government is to provide forestry extension and advisory services to support farmers, communities and organisations in conservation and sustainable management of forest resources and farm forestry (ADC 2011:189-196; GoU 2003). The communities can make use of this training opportunity and even engage the cooperative in the establishment and coordination of the community forest reserve.

#### **4.1.3 Storage facilities**

To address the challenge of dependency on middlemen and enhance the post-harvest lifespan of crops, the use of storage facilities could be increased. Along with mobilisation, communal pooling and diversification storage is one of the most common ways of adapting to climate change (Agrawal & Perrin 2008:6-7). Storing crops is a buffer as an extra food supply in case of harvest failure due to unfavourable weather conditions or pests/diseases. Moreover, it enables the farmer to wait for good market prices, as he/she is no longer forced to sell to the first, the best middleman. Finally, it enables the farmer to store crops for later sale as an unexpected cost arises e.g. medical bills or school fees.

When constructing storage facilities one needs to ensure that aspects such as air and ground moisture, ventilation and temperature are appropriate for the crop stored. Some crop may even not be appropriate for storage at all, and these features should be investigated on beforehand.

While storage facilities can be created by the individual farmer, the cooperatives mentioned above would be an excellent platform for constructing and managing storage facilities. Being in a cooperative can help overcome the challenges of the individual farmer such as lack of appropriate location and capital for the investment. Being together in a cooperative might give more options for appropriate location and allow for the pooling of resources for the investment. Moreover, the central government is promoting the use of storage facilities to improve marketing (MAAIF 2011), hence, the communities may seek support there through the local agricultural extension workers.

The idea of storage facilities came mainly from the respondents themselves, hence the suggestion was well received. A few storage facilities are already in the area; they are constructed by local materials but only used to store maize, sorghum and millet. Some of the challenges for further dispersion include the need for training, access to proper materials and limited land, since a communal storage may require an individual give up a productive piece of land for the facility. These challenges can be

addressed by organising a training through the cooperatives and offering compensation for the person who donates land for the facility.

#### 4.1.4 Soil conservation techniques

To address the challenge of natural resource degradation and low crops yields a number of techniques and methods can be applied. Apart from combating pests and diseases through the use of herbicides, soil fertility can be improved through a number of soil conservation techniques and the application of fertilisers. Soil conservation techniques can also help reducing the impact of climate change (FAO 2010:5), enhancing water quality, and, by increasing the agricultural output, help diminishing the pressure on land and hence land conflicts.

Continuous agricultural production on soil will inevitably lead to nutrient loss, and maintaining the availability of nitrogen and other nutrients is essential to enhancing crop yields (FAO 2010:1). Soil erosion, which increases nutrient loss, is a natural process and cannot be avoided, but it can be reduced to an acceptable level through different measures (Morgan 2005:152). A number of techniques like crop rotation, fallowing, intercropping and agroforestry are already practiced on a small scale in the area, but their benefits could increase by expanding their use. Meanwhile a number of additional techniques can be considered. Conducting a thorough study of the land unit type, slope and soil type and training farmers on different techniques will enable them to make informed choices about the most suitable technique (Morgan 2005:163,172-173).

Soil conservation techniques can be categorised as agronomic measures (using vegetation to protect soil against erosion), soil management (preparing soil to promote plant growth and increase resistance to erosion) and mechanical methods (physical methods manipulating surface topography). Agronomic measures are always preferred as they are less expensive, easy to integrate into existing agricultural systems, more appropriate to restore biodiversity and have a direct impact on soil erosion. Mechanical measures such as terracing are only effective as a supplement to agronomic measures and used to control excess water and wind. (Morgan 2005:152-153)

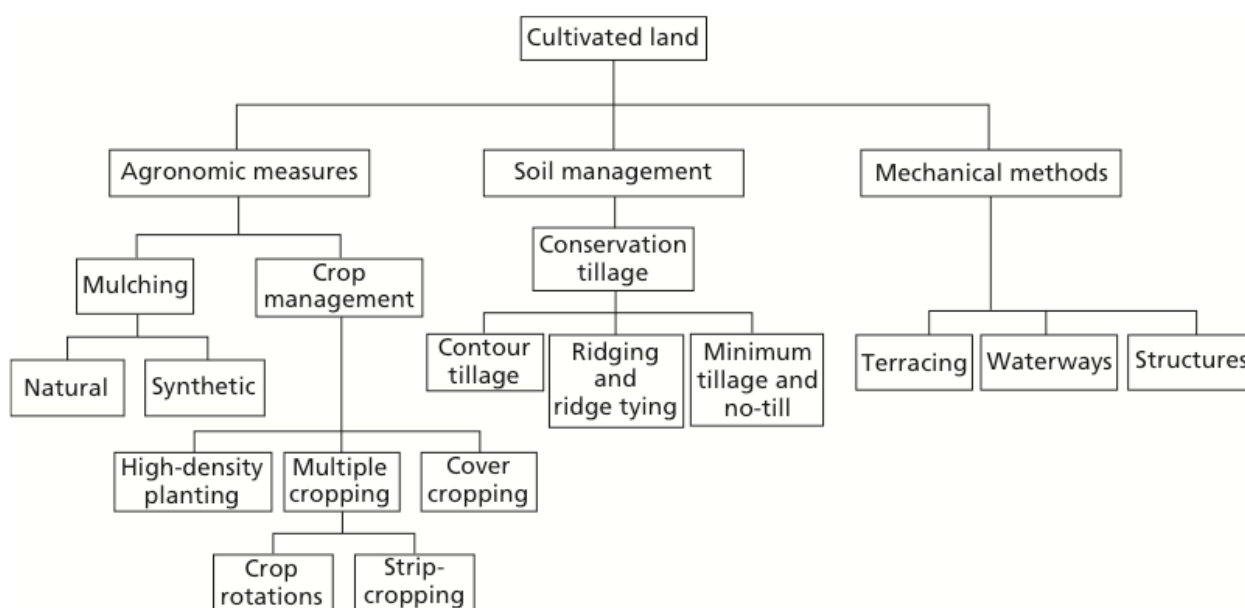


Figure 2: Soil conservation strategies

Source: Morgan (2005:161)

### *Cover cropping*

Cover cropping is mainly used to protect the soil from rain-splash erosion. This can be during off-season where the cover crops are planted to protect the soil and then later are turned into green manure prior to planting the main crop, or it can be ground protection under trees. Cover crops must be short, have broad leaves, establish quickly, provide an early cover, be able to suppress weeds and provide a deep-root system. (Morgan 2005:180-181)

### *Strip cropping*

Strip cropping serves to protect from wind-erosion and/or down-slope erosion. It consists of primary crops and protection-effective crops grown in alternating strips along the contour of the slope to protect against down-slope erosion or perpendicular to the wind to protect against wind erosion. The protection crop is mostly grass, and the strips are around 4.5 meters wide, but can also be as little as 1.5 meters. The width of the primary crop varies but can be up to 30 meters. The protection crop can also be another crop used in rotation. Strip-cropping is best in well-drained soils, as low level of run-off can result in waterlogging – therefore it should be used with caution in areas close to wetlands. Strip-cropping is highly compatible with manual agriculture, while the small plot size complicates the use of machinery. The disadvantage for smallholders is the amount of soil taken up for protection crops of limited value. Therefore, the added value of soil protection in form of higher yields should outweigh the loss from taking out a strip for protection. (Morgan 2005:181-185)

Strip-cropping can also be used to protect water bodies from pollution and sediments by planting them along lakeshores, riverbanks and reservoirs. These riparian barriers are often 5-10 meters. When the sediment accumulates over time, the barrier must be removed by tillage and re-established. (Morgan 2005:181-185)

### *Multiple cropping*

The aim of multiple cropping is increased production and protection from soil erosion. It can either be sequential, where one crop follows the other, or intercropping, where several crops are grown at the same time – or a mixture of the two. Often it consists of fruit trees such as banana and mango in combination with vegetables, especially root crops such as potato, but also tomato, groundnuts and pepper. The mimicking of the natural multi-layered system has proven very successful, especially in kitchen gardens. Also intercropping of cassava and maize, groundnuts and pepper has proven useful in reducing soil erosion, but the method needs to be combined with other practices. (Morgan 2005:185-186)

### *Mulching*

Mulching is covering soil with crop residues to protect the soil from rain-splash and wind erosion. It is useful as an alternative to cover crops during dry periods before the onset of heavy rains or strong winds. It also reduced the soil temperature and increases soil moisture, which may in turn increase yields. The direct spreading of mulching on the ground can, however, lead to problems concerning drilling and planting through the mulch. Straws are effective as they provide a large quantity of individual mulching elements, while maize stalks have a poor record due to their limited contact with the soil. Around 70-75% of the soil surface should be covered. When using mulch to protect from wind erosion, it is necessary to use standing stubbles to avoid the mulch be carried away in the wind. (Morgan 2005:187-188)

### *Afforestation*

Afforestation is used to reduce soil erosion and to re-establish the flood regulating capacities of the ecosystem. When re-vegetating an area such as a forest area that has been cleared, a range of information is needed before the vegetation is selected. First a soil test should establish the pH value, nutrient levels, soil moisture and salinity levels. Next, climatic conditions and topography should be established to determine the flow of water through the area. The selection should prioritise a mix of species including grasses, forbs and woody species, and favour rapid-growing plant species and native species. Pine trees are generally a good choice, while cypress can sustain the risk of soil erosion and eucalyptus can result in the drainage of wetlands. (Morgan 2005:190-193)

### *Agroforestry*

Agroforestry is the deliberate integration of trees and crops, tree and animals, or both crops, trees and animals. The integration of trees help preserve fertility of the soil, improve soil structure and help maintain high infiltration rates, water-holding capacity, and thus reduces soil erosion. Simultaneously trees provide fuel, fodder and fruits and thus provides for a diversified income. Moreover, trees can function as windbreaks, boundary markers and shelterbelts, and they diminish the effects of extreme weather events such as heavy rains, drought and windstorms. They also works are carbon sequestration, and are thus an efficient mitigation strategy. (FAO 2010:9)

Agroforestry can be combined with other methods such as multi-cropping systems, contour grass strips or contour-aligned hedgerows in intercropping. The latter has for instance proven successful for reducing erosion from cassava and maize. Agroforestry requires careful selection of trees and crops, as the practice has before resulted in reduced yields. Depending on the space between the tree alleys it might take 10-20 years before yield begin to decline. (Morgan 2005:196-197)

### *Conservation tillage*

Soil tillage is an important soil management technique as it controls weeds and provides a suitable seed bed for plant growth. It is intended to cut and open compact soil and to invert and mix it to smooth and shape its surface. (Morgan 2005:202). Conservation tillage is any practice that leaves at least 30 % cover on the soil surface after planting. This includes the following types (Morgan 2005:204-207):

- Conventional tillage: Standard ploughing practice involving ploughing, cultivation, harrowing and planting.
- No tillage: Tillage is restricted to what is necessary to plant the seed. Drilling is directly on the previous crop, and weeds are controlled by herbicides. 50-100% of the surface is covered by crop residue. Due to few residues, the technique is not always effective the first year, and it is not appropriate on compact soil.
- Strip tillage: The soil is prepared for planting along narrow strips, while the rest of the land remains undisturbed. Approximately one third is tilled, and weeds are controlled by herbicides or cultivation.
- Mulch tillage: Tillage is done before the planting, and 30% of the surface is covered by residue. Weeds are controlled by herbicides or cultivation.
- Reduced/minimum tillage: Chiselling or disking is used to prepare the soil, leaving 15-25% of the surface covered by residues. As the soil is not broken up it leads to an increased risk of run-off and erosion.

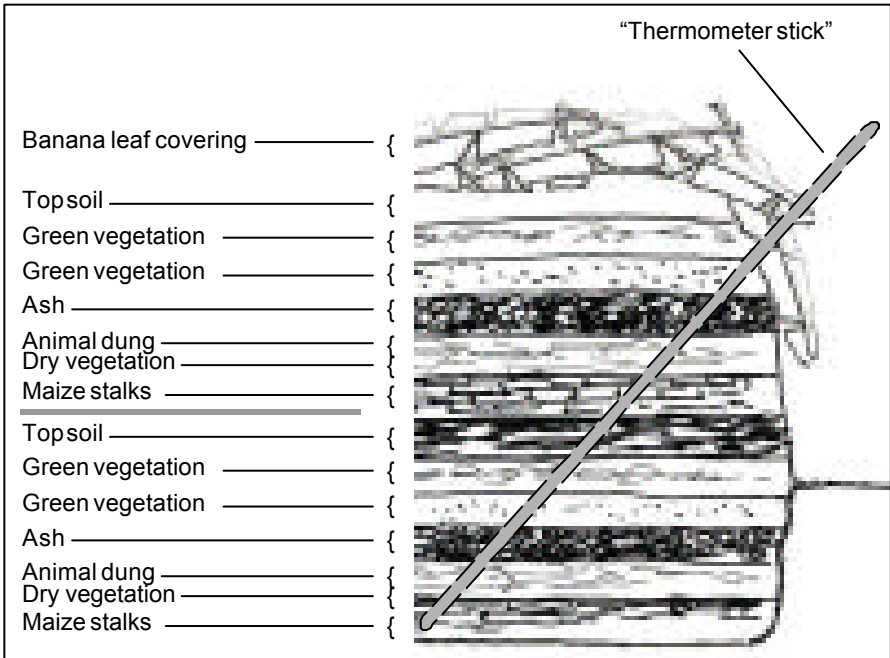
Many of these techniques overlap and it is ideal to employ two or more of them in combination. The success of the different techniques also depends on how well weeds, pests and diseases are controlled. (Morgan 2005:205-206). The likelihood of farmers to adopt new techniques depends on a number of factors such as security that the costs involved are recovered, practical aspects of implementation such as the level of fragmentation of land plots of the individual farmer, as well as access to credit for investment in inputs (Morgan 2005:155-158). During the feedback session one farmer expressed concerns about the possibility of using the techniques on larger scale. This should, however, not be any hindrance since many of the techniques have been used on both large and small-scale. They are labour intensive rather the machinery-intensive, hence reducing the need for investment in inputs.

The application of the above techniques requires initial training and information. Some NGOs such as ADFA and PASUD are already engaged in trainings on different agricultural methods, and could be a starting point for learning and sharing experiences. Moreover, a number of policies in the agricultural sector promote and support the use of improved agricultural methods to reduce soil erosion hazards and siltation (MLHUD 2007; OPM 2010). However, none of the respondents in the focus groups had been in contact with an agricultural extension worker, and it was mentioned from both sides that farmers have to proactively seek assistance at the sub-county headquarters. If the communities decide to establish a cooperative, seeking assistance becomes a less overwhelming task, and the cooperative may provide an ideal venue for trainings and information sharing.

Difficult used soil management techniques on larger scale

4.1.5 Organic fertilisers

To properly address the challenge of reduced soil fertility, the above soil conservation techniques need to be combined with the application of fertilisers. Chemical fertilisers are often scarce, expensive and increasing the dependency on middlemen, while organic fertilisers in the form of livestock manure is



locally available and contains the essential plant nutrients such as nitrogen, phosphorous and potassium (Muhereza et al. 2011:1). Using organic fertilisers is more climate-smart, as the efficient treatment of manure also reduces carbon emissions and lower the emissions potentially needed for producing inorganic fertilisers (FAO 2010:7).

Figure 3: Compost manure  
Source: AT Uganda (2010)

Organic fertilisers can be produced as compost manure. It can be prepared in different ways depending on capability of the farmer, climatic conditions and the type and amount of residues available. There are basically three methods: in boxes, in pits or on the surface of the earth. In regions with adequate water, compost manure is mainly prepared on the ground. Regular amounts of compost can be made from household organic waste, crop residues and livestock manure. (AT Uganda 2010;

BOSCO Uganda 2013). The processing of preparing compost may take some weeks, so using several pits allow for overlapping and continuous availability of compost.

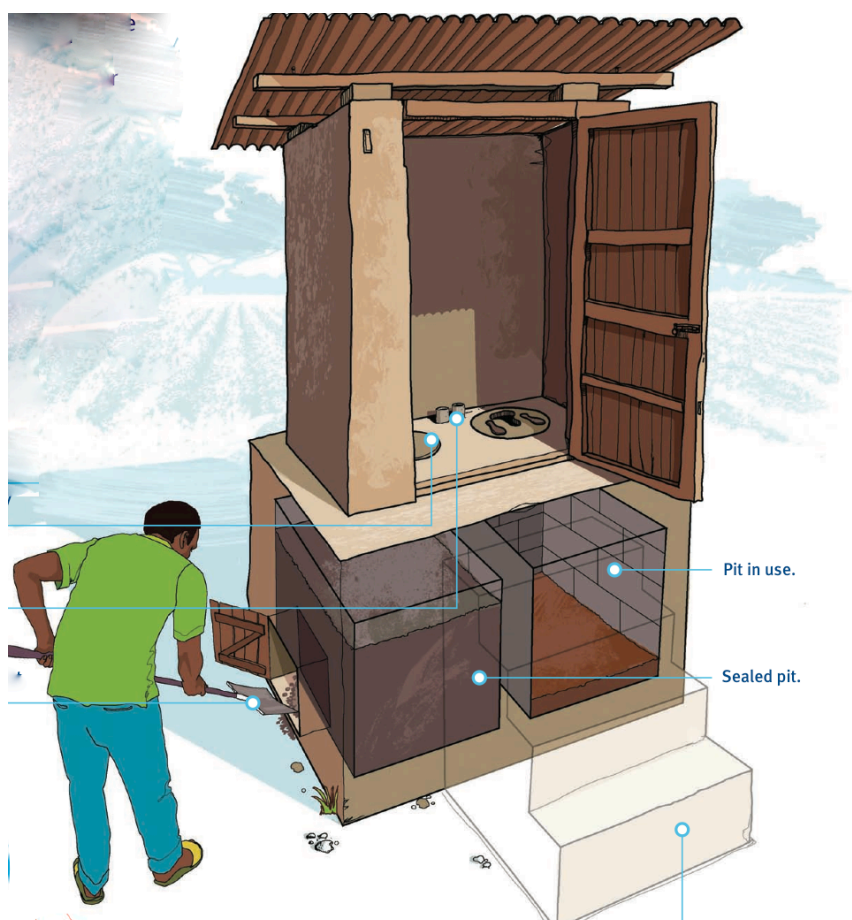
The application of compost manure is challenged by the heavy and bulky nature of cattle manure, insufficient amounts of manure, and high transportation and application costs (Muhereza et al. 2011:2). Moreover, information about soil fertility status and appropriate levels of application is needed to avoid adverse effects. Finally, it was mentioned during the feedback sessions that there is need for guidance concerning the timing of application. Nevertheless, some noted that the technique is already used in the area, and there is a good potential for expanding the use.

Another way of generating organic fertilisers is to install compost latrines. These are specifically applicable in waterlogged areas (such as near wetlands) where pit-latrines can cause contamination of soil and water. Compost latrines can be built using local materials, produces good compost and protects the soil and water from contamination. There are different types and design, but they are all built on the ground surface, or even slightly raised in areas prone to flooding. They are often built with two chambers, which are used alternately. Before using the latrine each chamber is filled with straw, twigs and dry leaves. After each use a spoonful of dry cooking ash or sawdust is added, and occasionally straw may be added. Once the chamber is full, it is sealed and left for composting. The chambers are designed to have an accumulation time of about nine month to allow the content to be thoroughly composted. Each chamber has its own opening for removing the odour-less compost. (Practical Action 1999; WaterAid 2013)

*Figure 4: Compost latrine.*  
Source: WaterAid (2013)

The compost latrine thus serves to address more than just the challenge of reduced soil fertility. It also helps reduce the impact of extreme weather events such as flooding, complements the public service delivery of sanitation facilities, and reduces the risk of water contamination.

Like compost manure, the compost latrine requires proper education about the use and maintenance. This can be organised through the cooperative, if the communities decide to establish a water and sanitation committee. Moreover, though it can be built from local material, the latrine requires some initial investment, which can be generated through the saving and credit mechanisms in the



cooperatives. In general the compost latrine was well received by the communities during the feedback sessions.

#### 4.1.6 Finger-ponds

To address and mitigate the challenges of low crop yields and seasonal climate variability as well as environmental degradation, the concept of finger-ponds can be introduced. A finger-pond is an ecosystem friendly method combining agriculture and aquaculture that takes advantage of fish stock and nutrients in seasonal wetlands. It is a combination of fishponds and ridge-and-furrow agriculture, to increase food security and diversity. (Kasiime et al. 2006:1-3)

Normally a few ponds are created together and extend like fingers into the swamp – therefore the name finger-ponds. The ponds are dug in the seasonal wetland area during dry season when the water table is low. The nutrient-rich soil removed is spread between the ponds to create raised bed-gardens. When the water levels rise during the dry season fish and natural fish food flows into the ponds, and when the water contracts again, the fish are trapped in the ponds. When the bed-gardens are dry then can be planted with fruit and vegetables. (Kasiime et al. 2006:1-4)

During the season chicken manure and organic kitchen waste are added to the pond to provide additional food for the fish. As the fish grow and the water level falls, the fish are gradually harvested – first the larger ones, allowing the smaller ones to grow. Once all fish are gone and the ponds have dried out, the mud on the bottom can be dug up and used as fertiliser in the bed-gardens. (Kasiime et al. 2006:4)

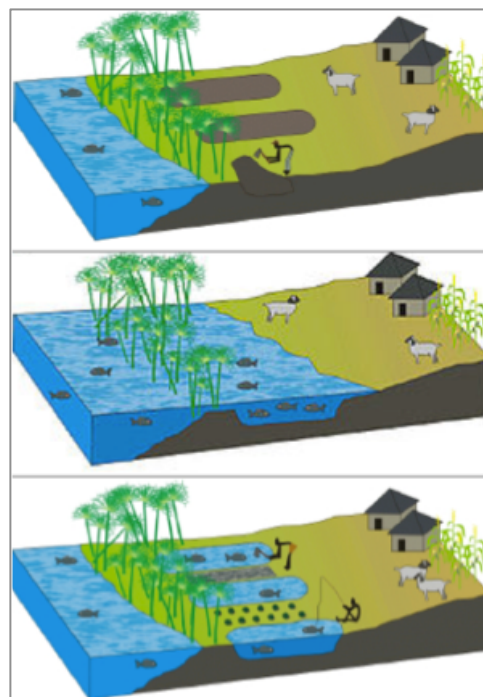


Figure 5: Stages in the finger-pond cycle.

Source: Akvopedia (2013)

Before engaging in constructing a finger-pond, the land ownership and user-rights should be investigated to ensure that the practice is legal. If the land is not individually owned, the community



Figure 6: Counting fish in finger-pond.

Source: UNESCO-IHE (2013)

may agree on communal finger-ponds if they are entitled to do so. Moreover, the location should be carefully selected and the soil type investigated (mixed clay-loam soil is the best to hold water for the pond). Further guidelines and advice on how to establish, manage and maintain the finger-ponds can be found in the folder *Practical Guidelines for Constructing and Operating Fingerponds in East Africa*, which is published by the Wetlands Inspection Division, Ministry of Water, Lands and Environment (Kasiime et al. 2006).

With the right location available finger-ponds are cheap to establish and maintain, and provide a n excellent option of improving cultivation in seasonal wetlands to ensure high productivity in the bed-gardens and a diversified and nutritious source of food. It requires, though, some training and is labour intensive during the construction period, but if the communities are organised in groups or cooperatives trainings can be organised and the tasks are manageable. Since the idea was not part of the first draft of the report, the suggestion was not included in the feedback sessions. However, since the method is relatively simple and with several benefits, it is highly recommended that the communities look into the technique.

#### **4.1.7 Weather station**

Seasonal climate variability may not be avoided, but can be mitigated in the long run. One way is to start recording weather and climate data in a systematic manner to be able to detect any patterns that may occur. Logging data on weather events will not increase scientific knowledge about climate change and climate variation, but may also raise awareness about climate change among farmer and increase their adaptability and resilience to extreme weather events in the long run.

Since the community radios are centrally located in two programme areas attaching the weather stations to these locations would be an ideal option. The operators of the radios are already connected with the nearest weather station in Lira via URCS Apac, which provides weather forecast for the communities. While the communication system is still in its initial phase, it could be strengthened by systematic daily communication between the URCS Apac DRR focal person and the radio operator, e.g. based on the newspaper weather forecast. In the long run, the forecast system could be enhanced by direct communication between the radio operator and the weather station in Lira.

The main task in connection with operating the weather station would be to record and log weather data such as temperature, precipitation, atmospheric pressure and wind on a daily basis. One or several persons could be in charge of the task, while ensuring that it is done in a uniform and consequent manner. Thus, apart from investment in equipment for measuring the data, establishing a weather station would also require basic training in data management.

Both central and local governments are promoting long-term weather forecasting systems and early warning systems to enable a quick response to flooding and drought, and support the generation of knowledge concerning the impact of climate change (ADC 2011; MLHUD 2007:48-52; OPM 2010). Linking with local and natural governments as well as research centres and universities would allow for long-term and systematic use of the data generated as well as support from the initial stages. Since the suggestion was not included in the draft report, it has not received feedback from the communities, but early warning is already an integrated part of the CPDRR programme and can be expected to gain acceptance in the communities.

#### **4.1.8 Irrigation**

To address the challenge of seasonal climate variability and unpredictable rain-patterns, irrigation can be applied. Irrigation can be used to counter for delays or absence of rain, as well as to prolong the growing seasons and thus increase agricultural output (FAO 2010:1). The potential for expanding irrigation in Uganda is immense (MWE 2011:iii), and there are many different forms of irrigation, one of them being manual irrigation.

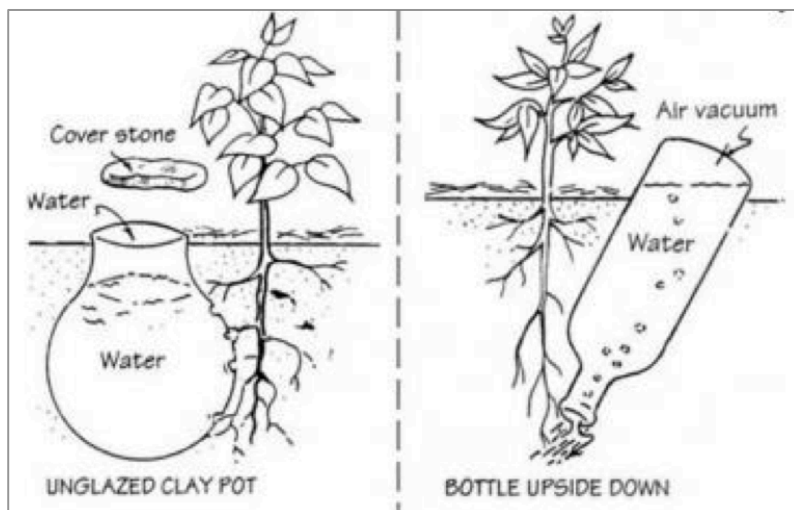


Figure 7: Pitcher and bottle irrigation  
Source: SSWM (2013)

Manual irrigation does not require technical equipment and is generally cheap. On the other hand it requires a lot of labour. The most simple form of manual irrigation is the use of watering cans, where water is applied directly to the plant. Another simple method is the use of pitcher irrigation, which is a basic sub-surface method. It consists of placing

porous clay jars or pots in small pits dug for the purpose next to the plants. The jars can be made locally and can be any size or shape. As the bottle is filled with water, the water will gradually seep into the soil around the plant. A similar method is the bottle irrigation, where a bottle is turned upside down filled with water and placed in the soil next to the plant. (SSWM 2013)

The feedback from the communities revealed that some have already applied a similar bottle irrigation system to trees, only with the bottle tied along the plant or with only the tip in the ground. Others expressed the concern that the pitcher does not go well with the soil, and cannot be applied to every plant. Overall, the simple techniques were though well received, and considered easy to apply for certain plants such as trees.

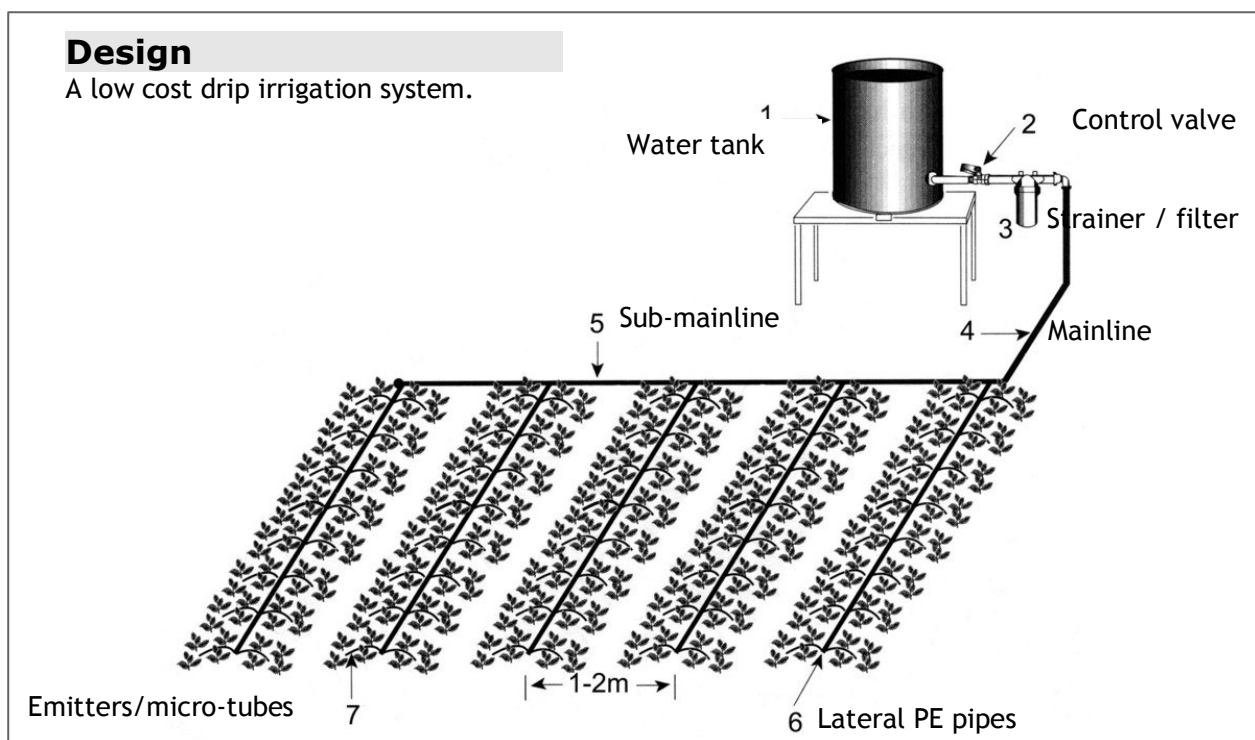


Figure 8: Simple drip irrigation system  
Source: RCSD (2008)

A more complex, but still relatively simple, form for irrigation is drip irrigation. Drip irrigation is very water efficient and is less labour demanding than for instance watering can irrigation. It requires a

small initial investment for water storage tank, water filtration, conveyance, application lines and valves. Simple drip irrigation is mostly used for vegetable gardens with a size of 10-20 m<sup>2</sup>, but can be scaled up for larger plots with larger storage tanks and longer pipes. (Bekele et al. 2009; RCSD 2008)

When presented to the communities, the main concerns were that the materials may be too expensive, the challenges of implementing on larger pieces of land (3-4 acres), and the large amount of work required to transport water to the fields if these are far from dams. Moreover, the challenge of water scarcity was highlighted – an issue which will be addressed in section 4.1.9.

Since the simple drip irrigation system requires a minor investment, it can be a good idea to use the cooperative for obtaining credit, as a venue for training and education, as well as for procuring the necessary material for the installation. To increase awareness of the method, the tree nursery beds established by the DPCRR programme in both Akokoro and Apoi parishes could be used as demonstration sites, and meanwhile reduce the work associated with the daily irrigation.

In the 5-year District Development Plan (DDP) the local government is supporting the development of water sources for irrigation. Moreover, the government has formulated a National Irrigation Master Plan covering 2010-2035 to increase the use of irrigation in Uganda. The plan paves the way for the formulation of an irrigation policy. It sets out to increase irrigation to cover 220,000ha wetlands and 9750ha other soils. 75% of the increased irrigation is set out to target subsistence and small-scale market-oriented farmers (MWE 2011:iv-v). While the plan is for the government to invest in infrastructure for irrigation development such as dams, bulk irrigation service infrastructure, grid connections, institutional capacity building and public infrastructure in the start-up phase, the producers/farmers are expected to pay the majority of the costs the rest of the time (MWE 2011:ix). The irrigation plan can, however, only proceed when the minister has finalised and publicised the draft policy. This is still underway. In the meantime the communities can mobilise a critical mass to encourage the local government to pursue some of the expected investments.

#### 4.1.9 Water harvesting

To address the challenge of water scarcity both for domestic consumption and for irrigation purposes, water harvesting can be employed. Rainwater harvesting is an ideal solution in areas with heavy downpour in some seasons and long dry periods.

Rainwater harvesting is a relative simple technology where water is collected, conveyed and stored for later use. It can be done using a roof, land surface or rock catchment. Roof catchment is the cleanest source and can be used for domestic supply. Other sources can also be used for livestock and small-scale irrigation. (Khoury-Nolde 2001)

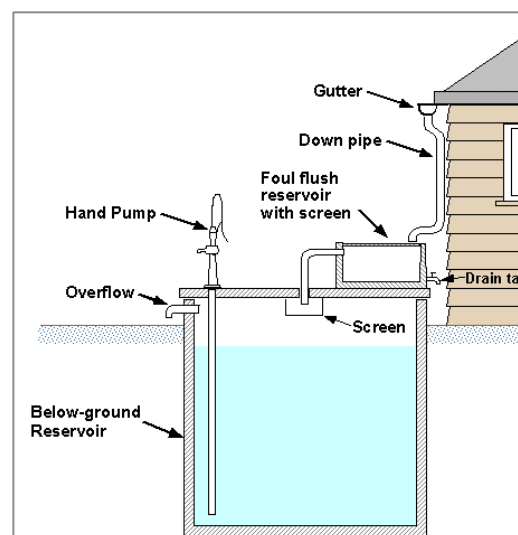


Figure 9: Rooftop catchment system  
Source: Khoury-Nolde (2001)

A rooftop catchment system consists of a catchment area, a conveyance system with gutter and pipes, a storage facility and a delivery system. Roofs for catchment should be constructed of materials like

wood, plastic, aluminium or fibreglass. The storage tank can be placed on the ground or under the surface of the ground. The size of the storage tanks depends on the demand for water and the length of the dry season. The amount collected from a shower depends on the surface and the number of mm rain received ( $x \text{ mm rainfall} = x \text{ litres/m}^2$ ). (Khoury-Nolde 2001; Åkerman 2012)

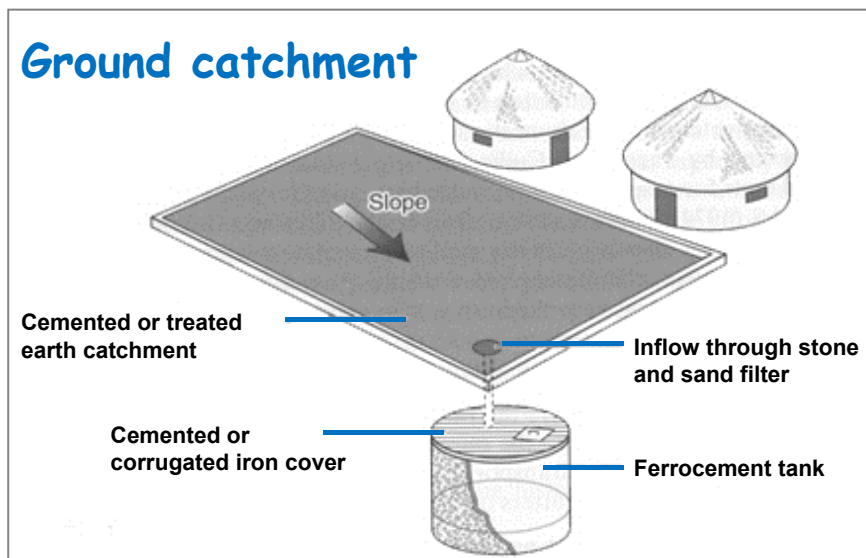


Figure 10: Ground catchment  
Source: Åkerman (2012)

A ground catchment system requires a cemented or treated catchment on the surface of the ground with a small slope to direct the water. The water will flow through a stone or sand filter to an underground tank, which is covered by a cemented or corrugated iron cover. The challenge here is to keep the catchment area clean and to ensure that the

underground tank is properly constructed to not allow contamination to seep in. (Åkerman 2012)

Rainwater harvesting is already practiced in Apoi and Akokoro parishes. A few dams have been constructed, and roof catchment systems are used especially in schools and health clinics. The technique was well received in the communities, and there is a great potential for expanding the use. While the costs associated may be overwhelming for the individual, financing opportunities could be created through savings and credit mechanisms in the cooperatives. Moreover, the district government is planning to expand the use of water harvesting at primary schools, community and households in the district, including in Akokoro sub-county in 2013, so the communities should keep an eye out for this and make sure their local LCs are on their toes.

#### 4.1.10 Domestic biogas installations

Tree cutting for charcoal burning and fuel wood is an underlying cause of challenges such as reduced soil fertility and human-wildlife conflict (through encroachment in wildlife habitat). Moreover, it reduces the ecosystem services such as flood regulation and mitigation of extreme weather events. 99% of the households in Apac district depends on fuel wood and charcoal as source of energy for cooking (ADC 2011:xiv). Reducing tree cutting has already been pursued through the CPDRR programme with the introduction of improved cooking-stoves and cooking baskets. To increase the alternative energy options, simple domestic biogas installations can be introduced.



Figure 11: Biogas installation  
Source: ECN (2012)

Domestic biogas technology provides clean cooking energy, contributes to an improved health and reduces time needed for wood collection. It works by converting livestock manure or sugarcane and maize ethanol by-products into combustible methane gas. Through a process of anaerobic digestion, the manure/ethanol by-product is converted into slurry with 95% water and fed into a digester. The resulting biogas can be used for simple gas stoves as well as for lighting. The residue can be collected in a separate tank and used as fertiliser. The size of the digester can be anything from 1m<sup>3</sup> to 10m<sup>3</sup> for a household/farm, and minimum 20 kg of manure is required on a daily basis to feed the biogas plant. The plant can also be attached to a toilet to make use of human excrement as well. (ECN 2012; FAO 2010; SNV 2012)

*Figure 12: Domestic biogas use*  
Source: SNV (2012)

The idea of biogas was well received in the communities, though there were some reservations concerning costs and training. Installing the biogas plant does require some initial investment as well as training for maintenance. It may be a good idea to conduct training on the installation and maintenance of the plant, so that communities are able to make repairs when needed. This can again be facilitated through the cooperative if not through the CBDRR programme.



While the local government promote alternative energy such as biogas and supports research in alternative energy sources (ADLG 2004:70), there might also be an option of attracting funding from the African Biogas Partnership Programme (ABPP)/Uganda Domestic Biogas Programme (UDBP). ABPP/UDBP has constructed biogas installations in Uganda since 2010, and is planning to increase the coverage to around 20,000 installations in 2013. (ABPP 2013). The installations have so far been in Western, Eastern and Central Uganda, but with effective lobbying it may be possible that Northern Uganda is included as well.

## **4.2 Livelihood diversification**

Livelihood diversification is a very common way of adapting to climate change and seasonal climate variation. It is a way of spreading risk in case of crop failure e.g. due to long dry spell or flooding. Moreover, it is a way to overcoming the seasonal income gaps in agriculture and securing income throughout the year. Diversifying livelihoods also allows for increased practice of fallow and thus reducing natural resource degradation and improving soil fertility, since the farmer has other options than intensifying and expanding cultivation. Finally, as labour is moved away from agricultural practices, diversified livelihoods may reduce the pressure on land and reduce land conflict.

In the following a number of livelihood diversification options are presented in three main categories: processing/value addition, handicraft production and services.

### **4.2.1 Processing/value addition**

With the great variety in agricultural product available and harvested in the area, there is a great potential for developing a simple foodstuff processing industry. Processing prolongs the lifespan of

surplus production and ensures food availability throughout the year and allow for storage to years with low production. Moreover, it provides job opportunities either as fulltime or part-time occupation. (FAO 2010:3). Local food processing plants can for instance be a maize mill, an abattoir, a small-scale dairy processing plant (collecting the milk produced in the area, treat and store it communally), a sunflower-oil processing plant, etc. Local production of these goods will make the local community self-sufficient in these goods, reduce the expenses of buying them from elsewhere, hence reducing the dependency on middlemen and other traders.

As the costs of initiating a processing plant can be overwhelming to the individual, the cooperatives suggested in 4.1.1 would be an excellent starting point. Moreover, government policies in the area of agriculture support and promote value addition (MAAIF 2010; MAAIF/MFPED 2001), yet it is unclear if this lead to concrete funding opportunities.

#### **4.2.2 Handicraft production**

The abundance of natural fibres and other plant material also provide raw material for non-food items. Mats and baskets are already produced locally from papyrus for domestic use, and this production could be increased to cover commercial purposes. Moreover, the production could be expanded to include pottery, paper, notebooks, toys, table service, bags as well as medical products. If short of inspiration, people can look at things made of plastic, which can be substituted by local handicrafts. Handicrafts can also be produced from the recycling of materials such as plastic bottles, plastic bags and plastic straws. This will also reduce the amount of inorganic waste in the area, which otherwise could threaten to contaminate water source and destroy biodiversity and wildlife habitat.

From an ecosystem perspective it is of course important that the harvesting of handicraft materials is done in a sustainable and coordinated manner. Furthermore, it requires a permit to harvest forest reserve and wetland resources for commercial purposes. To address these challenges people can form groups or establish a cooperative to coordinate extraction/harvesting and collectively apply for a permit. Other challenges identified during the feedback sessions include the competition with the factory, which produces mats that are considered of better quality. In the same way, locally produced goods are perceived as 'homemade' and thus of simple design and poor quality. Furthermore, as local incomes are seasonal (at least until livelihood diversification becomes more widespread), handicrafts will also only be bought in certain periods. The latter may not pose a significant challenge if people engage in handicraft production as a supplementing income option, or are able to market their goods outside the local area. Moreover, handicrafts will not lose their value from being stored and sold when incomes in the area are high. Concerning the perception of 'homemade' goods, it requires a change in attitude, which might take some time, but can be facilitated if the goods have high quality and are branded well as specifically beneficial to the environment and to the community.

#### **4.2.3 Service provision**

Finally, a third livelihood diversification category is the provision of services. This could for instance be services such as mobile charging through solar panels, hairdressing, catering services, movie screening and water purification/filtration. Services such as bicycle repairs, transportation of people and goods, and construction of houses and roads could be more professionalised and offer a full-time occupation, thus reducing the pressure on agricultural land. Often provision of services does not involve extraction of natural resources, other than what would have been extracted anyway, and when it does it is often in a more efficient and coordinated way, e.g. catering services concentrating the use of cooking-energy in an optimal way.

Many of the services listed are small-scale and can be provided by an individual or a small group of people. The start-up phase may require an initial investment in tools, for which the saving and credit mechanisms in the cooperatives may be convenient. The only concern expressed during the feedback sessions was that when services like bicycle repair are performed locally, it is not considered a service that people are willing to pay for. This is again something which require a change in attitude and can only occur gradually.

### **4.3 Need for social change and a new development path**

Many of the above suggestions are driven by a philosophy that sustainable resource use starts and ends with the consumer. This means, that when resource extraction, processing and consumption are separated too much, the use can easily become unsustainable, since the immediate effects of overexploitation are not felt by the consumer. Thus, by making the local community more or less self-sustaining in foodstuff, construction materials, daily utensils and services, the need for exporting raw materials will be reduced, and the pressure on the natural resources will diminish.

This is of course in contrast to the liberal market economy, which is build on the premises that through comparative advantage and market exchange everyone will prosper. While it is widely recognised that the system is subject to externalities or market failures, such as undervalued public goods (Kakuru 2011:36), the responses have been limited. This undervaluation has now accumulated, and the consequences are felt by those with least bargaining power. The market has not managed to offer prosperity to all, and with the limits to growth that are now felt locally and globally, it is difficult to see that it should be able to do so in the future. What is needed is a more integrated perspective on the relation between humans and the ecosystem, and this requires social change (Folke et al. 2010:1-2).

While many management and adaptation strategies have focused on changes in technology, institutions and managerial systems, so-called 'technical fixes', without considering that there might be a need for a change in the development path (Eriksen et al. 2011:10). Social change challenges the way our society is structured and seeks to find new ways of organising our livelihoods, production systems and social relations. Resilient communities have not only adapted to the current situation, but are also able to transform into new and more sustainable situations. They are not a step behind, but a step ahead. While this transformation is likely to costly, undesirable and socially unacceptable at large scale, it can be easier to achieve on small-scale when it is deliberate and not forced. (Folke et al. 2010:5)

This need for change is already recognised in the communities. While the limits to growth have become more and more apparent at the local level with land conflicts and declining soil fertility, some of the respondents were during the focus group discussions asking for 'alternative ways of development'. Thus, there is a recognition that the current way of doing things is not sustainable, and new ideas have to come to the table.

## 5. Role of URCS

As mentioned earlier, the livelihood improvements and diversifications suggested above are intended to be implemented at community or household level. The role of URCS is thus first of all to provide information about the different possibilities, and support in the areas where URCS already has some expertise such as disaster preparedness, ecosystem management and food security. Moreover, the CPDRR programme activities for 2013 include *Ecosystem based livelihood trainings for communities*, which could for instance involve trainings concerning community-based forest management (4.1.2), soil conservation (4.1.4), organic fertilisers (4.1.5), finger-ponds (4.1.6), weather station (4.1.7) irrigation (4.1.8), water harvesting (4.1.9) and domestic biogas installations (4.1.10). As URCS staff may not have the required expertise in these areas, external professionals from research centres or other organisations could be in charge of the trainings, and the CBDRR members could be trained to train others in the different techniques. Further activities in these areas could be supported by the budget lines '*Support to micro projects initiatives linked to risk assessments on food security*', '*-/- agroforestry*', '*-/- energy saving*' and '*-/- WASH*'. As some of the techniques require prior investigations of soil, water and weather conditions, it could be an option to link with research centres and universities to conduct proper studies e.g. through internships.

Apart from the above, URCS should be proactive and link the communities to other organisations, government programmes and professionals in areas where they lack the expertise. For example if the communities are interested in starting a cooperative, URCS could arrange a start-up meeting and training by inviting experts from existing cooperatives in the district or beyond. Moreover, many organisations in Apac are focussing on agriculture and agriculture related activities, and cooperating with them would be an excellent way for the communities to see new opportunities. E.g. Pioneer Action for Sustainable Development (PASUD) is promoting the use of farmer groups, group marketing and communal saving. PASUD is reaching 200 households in the district, focussing on Cegere and Aduko sub-counties, and is together with seven other organisations part of the Lango Food Security and Nutrition Cluster. Likewise, Apac District Farmers Association (ADFA), which is part of Uganda National Farmers Federation (UNFFE), is promoting farmers' groups and training them in crop husbandry, marketing, sustainable environmental management. It also promotes village savings and support bulk marketing. Comprising 6,800 members, ADFA covers all sub-counties in the district. Furthermore, Land and Equity Movement Uganda (LEMU) is working with land rights, demarcation of land plots (including wetlands), and solving (wet)land disputes, which there were more than 30 of in Akokoro sub-county in 2012. Moreover, the organisation has developed a set of regulations for land management in the Lango Sub-region, *Principles, Practices, Rights and Responsibilities* (PPRR), which are widely accepted at community level (the document is available online (LEMU 2013)). Connecting and cooperating with these organisations will strengthen the impact of URCS and enhance the knowledge base in the organisation.

To increase the impact and reach of the ecosystem-based livelihood trainings, religious leaders could be invited as 'ambassadors' of the CPDRR programme. While they might not have the technical expertise, they have a very important position in society, and people listen to what they say. Thus, if URCS can mobilise religious leaders to participate in training and promote the ecosystem management approach in their Sunday prayers it would have a great impact in the communities.

In addition, continuing the cooperation with the local government officials is imperative in securing the sustainability of the programme activities. While it should be considered that the government may not have the needed finances to support continuous training and other activities, their backup and support is crucial for the continued effort from the communities.

Finally, while URCS should act as a networking, coordinating and facilitating agent, communities are still the main actors. By ensuring they are the main decision-makers, the feeling of ownership and responsibility will increase, and the programme activities will have sustainable outcomes.

## 6. Conclusion

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This report set out to investigate how URCS can support the communities in Apoi and Akokoro parishes to improve and diversify their livelihoods based on their own aspirations, the institutional and legislative framework as well as ecosystem and climate change aspects.

Through participatory observation, interviews, focus group discussions and document reviews, a number of livelihood challenges have been identified together with community aspirations for the future. The livelihood challenges identified by the communities include access to clean water, seasonal climate variations, natural resource degradation, low crop output, as well as dependency on middlemen for selling their products. The ambitions and aspirations of the communities are related to addressing these challenges with public service delivery of water, education and health care being highest on the agenda, followed by the provision of agricultural production inputs such as ox ploughs, fertilisers and improved seeds.

Furthermore, it is found that the legislative and institutional framework offer some challenges to the current livelihoods such as restrictions on fishing activities, wetlands cultivation, tree cutting as well as a temporary ban on charcoal burning. While a number of policies and management plans offer support for livelihood improvements and diversification, the support is often only of moral nature, not including financial support. Moreover, the commercialisation of extractive activities, which are currently practiced for domestic purposes, may require special permits. While this does not have to be a challenge, it can be so in the absence of clear and transparent government structures and administrative processes. Nevertheless, there are a number of initiatives – from both government and NGO side – to seek opportunities from, such as biogas projects, water harvesting programmes and irrigation schemes.

Based on the challenges and aspirations of the communities and guided by the principles of ecosystem management, a number of livelihood improvements and diversifications are suggested. First of all, it is suggested that people in the communities come together and establish cooperatives to overcome the dependency on middlemen, to coordinate the resource extraction and to increase finance options. The communities could for instance establish a cooperative focussing on agriculture and savings/credit, and, as it consolidates, expand it with other departments e.g. within the areas of fisheries, forestry, construction, water/sanitation, health, and education. These departments can then later on branch out as independent cooperatives as the cooperative solidifies. It is further suggested that the communities engage in community-based forest (and wetlands) management, to coordinate and control the extraction of forest (and wetlands) resources.

In addition to these management recommendations, it is suggested to improve the productive industries (agriculture, forestry and fisheries) through more technical solutions such as storage facilities and soil conservation techniques including cover cropping, strip cropping, multiple cropping, mulching, afforestation, agroforestry and conservation tillage, as well as through the application of local organic fertilisers such as compost manure. Moreover, food security can increase by established finger-ponds, and the agricultural output can be enhanced through the application of simple irrigation methods such as pitcher or drip irrigation. Further, establishing a weather station to record weather data can strengthen the ability of predicting future weather scenarios in the long run.

In the domestic sphere, current livelihood can be improved through water harvesting, which will provide readily available water for the household throughout the year as well as for irrigation, and

through household biogas installations, which, like the Lorena-stoves that are currently part of the CPDRR programme, will reduce the demand for fuel wood.

Suggested livelihood diversification strategies include the establishment of local processing plants for agricultural produce such as sunflower oil, dairy products and maize flour. Moreover, people can engage in the production of handicrafts such as mats, baskets, tableware, bags and utensils made from locally available material such as papyrus (though the harvesting of wetlands resources require a permit if used for commercial purposes) or from recycling materials. Finally, people can increase the engagement in service provision such as mobile charging, water purification, catering service, transportation, hairdressing, movie-screening as well as professions such as blacksmith, mechanic and construction worker.

In addition to the above tangible solutions, it is also suggested that the communities consider their vulnerability caused by dependency on external events and actors. In accordance with the ecosystems approach, a varied production, which is suited to supply the local market in several aspects, will reduce the demand for cash derived from the outside. This will in turn reduce the need for marketing goods outside the local area, and, thus, reduce the pressure on natural resources. As the production will be directly responsive to the consumer needs, and the consumption more responsive to the production limits, the local economy will be more adaptive and sustainable.

The role of URCS in pursuing the above is first of all to advise and train the communities within their areas of expertise such as disaster preparedness, ecosystem management and food security. Moreover, URCS can expand the CPDRR programme trainings to also include aspects of soil conservation, compost manure, manual irrigation, finger-ponds, water harvesting and biogas installations. Moreover, URCS, should function as a networking, coordinating and facilitating agent that connects the communities with other organisations, government programmes and professionals that have the expertise in these and other areas. Finally, it should be remembered that the communities are the primary actors, and to ensure sustainability of the programme they should be the main decision-makers.

In the following a number of recommendations for how URCS can integrate the above findings into the CPDRR programme are outlined.

## **6.1 Recommendations**

- Complement the current EMR/CCA trainings with trainings on community-based forest management, soil conservation techniques, organic fertilisers, compost latrines, finger-ponds, drip irrigation, water harvesting and biogas installations. Invite professionals to provide proper knowledge and training.
- Invite research centres and universities to conduct soil and water studies e.g. through an internship position.
- Link with research centres and government agencies to establish and run local weather stations.
- Network and cooperate with other organisations in Apac and beyond to investigate other opportunities for communities to pursue, e.g. in the area of agricultural development.
- Cooperate with local government to ensure output of programme activities are sustained beyond the programme period.
- Invite local religious leaders to participate in trainings and to promote their ecosystem management approach in their Sunday prayers.

- Encourage communities to form cooperatives in the areas of agriculture and savings/credit and provide platforms for learning about and setting up a cooperative.
- Ensure community ownership and decision-making in all aspects of the programme to enhance sustainability of programme outcomes.

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## **Appendices**

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Appendix I: LogFrame CPDRR programme

Appendix II: Policy mapping

Appendix III: Ecosystem management

## Appendix I: LogFrame CPDRR programme

<b>1. Direct Poverty Alleviation</b>	1.1. Communities are capable to implement risk reduction measures based on climate risk assessment	1.1.a. # Communities conducted climate trend risk mapping (2015 = ....)	1. Communities are more resilient to climate (change) induced hazards	1.a. # mitigation measures have been implemented per community (2015 = 3 per community on average)
		1.1.b. # communities developed collective risk reduction plans based on climate trend risk mapping (2015 = ....)		1.b. Environmental sustainability of 100% of community mitigation measures is validated by PfR staff on basis of preset criteria (2015 = 100% )
		1.1.c. # of community members covered by risk plans (2015 = ....)		1.c. # community members reached with DRR/CCA/EMR activities (2015 = .....of which ..... men and ..... women)
	1. 2. Communities are capable to protect and adapt their livelihoods in synergy with the natural environment	1.2.a. # Community members trained in ecosystem services management (2015 = ....)		
		1.2.b. # community members have undertaken actions to adapt their livelihoods (2015 = ....)		
<b>2. Civil Society Strengthening Southern Partners/CBOs</b>	2.1. (Partner)NGOs/CBOs are able to apply DRR/CCA/EMR approaches in their work with communities and government institutions	2.1.a. # (Partner) NGO/CBO staff trained on DRR/CCA/EMR(2015 = ....)	2. (Partner) NGOs/ CBOs apply DRR/CCA/EMR in assistance and advocacy	2.a. # of communities where Partner NGOs/CBOs have facilitated access to knowledge on disaster trends, climate projections, ecosystem data(2015 = ....)
		2.1.b. # (Partner) NGO/CBO have established cooperation with knowledge & resource organizations (e.g. meteorological institutes, universities, etc.) (2015 = ....)		2.b. # Network/umbrella organisations, developed and active (2015 = ....)

	2.2. (Partner)NGOs/CBOs advocate the DRR/CCA/EMR approach with peers/other stakeholders in their networks	2.2.a. # Organisations (including non-PfR) involved in DRR/CCA/EMR coalitions (2015 = ....)		2.c. % of Partner NGOs/CBOs engaged in structured dialogue and government on DRR/CCA/EMR (2015 = %)
		2.2.b. # of times DRR/CCA/EMR related topics on agenda of platforms/networks (2015 = ....)		
<b>3. Advocacy of CSOs/CBOs on Governments/ Institutions</b>	3.1. Government institutions at local, national, international level endorse PfR approaches	3.1.a. # Governments/ institutions reached with advocacy activities by Civil Society and their networks and platforms (2015 = ....)	3. DRR/CCA/EMR-conducive budgeting & policy planning in place at local, national and international level	3.a. # of processes started to reduce identified national and local institutional obstacles to DRR/CCA/EMR activities in the communities (e.g. non-communication between departments, obstructive laws, concessions to private parties) (2015 = ....)
		3.1.b. # (local) government institutions actively engage in activities (meetings/field visits/training) (2015 = ....)		3.b. % of increased local government budgets in target areas on either early warning, mitigation of natural hazards and/or natural resource mgmt on community level (2015 = 100% increase)
		3.1.c. # of countries, where the connection between DRR, CCA and EMR has explicitly been mentioned in official government documents (2015 = )		3.c. # of regional and international lobby trajectories towards international governance bodies and donors started to undo adverse impact for DRR/CCA/EMR (2015 = ....)

## Appendix II: Policy mapping

A number of policies and laws guide the area of environmental management and livelihoods in Uganda. These have been reviewed to identify legal restrictions/challenges and opportunities concerning livelihood improvement and diversification. The following section will present some of the main findings restricting current livelihoods i.e. agriculture, fisheries, forestry, water abstraction and extraction of plants, fibres and other construction/production material. The laws, policies and plans reviewed are:

### Acts and regulations:

- Fish (and Crocodiles) Act 1951
- The Agricultural and Livestock Development Fund Act 1976
- The Agricultural Seeds and Plant Act 1994
- National Environment Act 1995
- Water Act 1997
- Land Act 1998
- National Environmental (Wetlands, river banks and lake shore management) Regulations 2000
- National Forestry and Tree Planting Act 2003
- Land (Amendment) Act 2010
- District level regulations

### Policies and plans

- National Environment Management Policy 1994
- National Policy for the Conservation and Management of Wetlands 1995
- National Environmental Action Plan 1995
- National Water Policy 1999
- Uganda Forestry Policy 2001
- Plan for Modernisation of Agriculture (PMA) 2001
- National Fisheries Policy 2004
- National Land Use Policy 2007
- Agricultural Sector Development Strategy and Investment Plan (DSIP) 2010
- The National Policy for Disaster Preparedness and Management 2010
- Uganda National Land Policy 2011
- National Irrigation Master Plan for Uganda 2011
- National Agriculture Policy 2011
- District and sub-county development plans

Based on a review of the above legislation, plans and policies a number of challenges and opportunities concerning livelihood improvements and diversifications have been identified. Apart from the restrictions identified by the respondents and already mentioned under 3.7 *Legal restrictions*, the challenges mostly refer to permits required to perform certain activities. This does not have to be an obstacle, but can be so in the absence of transparent regulation and administrative structures that facilitates the way through the system. Difficulties may arise due to the long administrative chain, and the lack of knowledge among community members about the content of the different laws and how to obtain permits.

These regulations mentioned in 3.7 concerning wetlands, fisheries and charcoal, are intended to ensure the sustainable use of natural resources, and are thus intended to benefit the communities in the long run. However, when these regulations limiting the livelihood options are not complemented

by alternative option for pursuing livelihoods, people are left in a desperate situation. People may be willing to take the risk of breaking the law to be able to provide for themselves and their families, or they may engage in other environmental degrading activities, where the local government consequently will have to set in to regulate. This results in a spiralling trend, where the regulators are always a step behind. Instead, a proactive approach could counter this trend by offering alternative livelihood options when introducing restricting livelihood regulations. While the government has formulated a number of policies and development plans that promote and support the use of fertilisers, irrigation schemes, value addition, agroforestry, etc., the delivery of these services is often hindered by understaffed and/or underfunded public service institutions. The support and promotion advocated for in many policies are thus only of moral nature, and do rarely involve actual funding for implementation. In other words, all the policies and legislation can be well-intended, well-formulated and well in place, but without human and financial capacity to implement and enforce them, their influence is limited.

Thus, while this limited financial capacity necessitates an incremental process, where small interventions are secured step-by-step, it should also be recognised that regulation in one sector influences another, and it is important to have a overall goal with for the different policy interventions. This is well in line with the ecosystem approach, where a holistic approach is needed to address the various challenges encountered across the administrative units.

In the following the legal restrictions and institutional challenges for improving agriculture, fisheries, forestry, water abstraction and extraction of plants, fibres and other construction/production material, respectively, are outlined together with opportunities for diversifying livelihoods.

### **Agriculture**

As described in 3.7 there are some legal restrictions concerning wetlands that influence the prospects of cultivating wetlands. Wetlands are public lands held in trust by the government for the people. Wetlands on land plots privately owned prior to the wetland regulations can be maintained under private ownership, but demarcation has not been properly implemented, and it is difficult to enforce the law. (GoU 1995). According to the National Land Policy (2011) the government is taking initiative to counter the insecurities concerning wetland tenure, where individuals have legal and valid titles over wetlands, which at the same time are vested in the state. The government will accordingly take measures to compensate all landowners whose lands stretches into wetlands and develop a legislative framework that provides incentives to protect natural resources (MLHUD 2011:46).

Concerning the use of wetlands resources, it is illegal to reclaim, drain, damage or disturb any wetland without a permit, but individuals and communities have the right to use wetlands resources sustainably for certain purposes e.g. subsistence farming, as long as the cultivation does not exceed 25% of the total wetland area. Larger cultivation and activities such as drainage, resource extraction for commercial purposes and introduction of exotic or introduced plants or animals require a written permit from NEMA (GoU 1995). Local Environment Committees (LECs) can make further bylaws concerning wetlands, and the Minister can declare a wetland for specially protected (GoU 2000). Likewise, farmers should be aware that no activities are permitted without written authority of Executive Director of NEMA within 30m from the highest watermark of rivers (100m for River Nile). Likewise, no activity is allowed within 200 meters from Lake Kyoga and Lake Kwanja (100 meters from other lakes) without permission. After consultation with LECs, the local government can make further bylaws concerning lakeshores and riverbanks. (GoU 2000)

As mentioned earlier, a number of development plans and policies from central and local government set out to promote and support agriculture in different ways. These include improvements in the areas of the overall management of the sector, the farming methods, the marketing of goods and climate change adaption. Some initiatives are listed below:

- Sector management:
  - o Decentralisation of agricultural extension service provision through NAADS (MAAIF 2010; MAAIF/MFPED 2001)
  - o Promotion of the private sector (MAAIF/MFPED 2001)
  - o Promotion of research and technology development (MAAIF/MFPED 2001)
  - o Promotion of research in pest resistant crops (OPM 2010:15-16)
  - o Promotion of zonal agricultural production and processing for export (Akokoro Sub-county is categorised as north-western savannah grasslands with production focus on poultry, beans, coffee, cassava, citrus and fish as strategic priorities distributed across the years 2010-2013) (MAAIF 2010:115-118; 2011)
- Farming methods:
  - o Skills and knowledge training (MAAIF 2010, 2011)
  - o Promotion of modern farming practices that reduce soil erosion hazard (MLHUD 2007; OPM 2010)
  - o Promotion of increased irrigation, with 220,000ha wetlands intended for publicly funded irrigation development (ADC 2011; MWE 2011; MAAIF 2010)
  - o Improvement of access to finance (MAAIF 2010)
  - o Increased access to productive inputs e.g. through cash for work (MAAIF 2010)
  - o Promotion of agroforestry (OPM 2010)
  - o Promotion of proper post-harvest crop treatment (OPM 2010:15-16)
  - o Provision of animal vaccination services (MAAIF 2011)
- Marketing:
  - o Promotion of improving market access and value addition (MAAIF 2010; MAAIF/MFPED 2001)
  - o Rehabilitating rural infrastructure (MAAIF 2010)
  - o Strengthening farmers' organisations for collective marketing for groups and cooperatives (ADC 2011; MAAIF 2010, 2011)
  - o Promotion of SACCO (Saving and Credit Co-operative Societies) and UCA (Uganda Cooperative Alliance) as some of the existing cooperative mechanisms (ADC 2011; MAAIF 2011:37)
  - o Promotion of agricultural enterprises, agro-processing and storage facilities (ADC 2011; MAAIF 2011)
  - o Improve linkages to local and export markets (ADC 2011; MAAIF 2011)
  - o Development of market information system (MAAIF 2011)
- Climate change adaptation
  - o Promoting long-term weather forecasting to enable a quick response to flooding and drought (MLHUD 2007:48-52)
  - o Establish weather stations and early warning systems (OPM 2010)
  - o Gazette disaster prone areas identified through risk, hazard and disaster profiles and maps (people living in very risky areas will be assisted to resettle under voluntary arrangements) (OPM 2010:69)
  - o Promote pasture conservation for dry seasons (MAAIF 2011)

As seen in the list above, there are many options of seeking government support for different areas in the agricultural sector. To follow the implementation of the different initiatives, communities can actively consult the local NAADS coordinator and agricultural service provider at the sub-county level

to be updated on relevant opportunities. However, since the financial resources are limited, much of the promotion and support above is 'moral support' without specific budget allocation. However, an active approach from communities' side will highlight the need for service provision and support in Akokoro sub-county, and may attract further funding later on.

In addition, the Agricultural and Livestock Development Fund was established in 1976, with the aim of providing funding and credits to farmers, as well as advise and support concerning financial administration, sound agricultural practices and production, processing and marketing of products (GoU 1976). It is, however, unclear if the fund is offering funding and credits today.

### **Fisheries**

As highlighted in 3.7 there are some restrictions on fishing gear used in Uganda, and only nets of a certain size are allowed. Some fishing methods require written permission from the District Fisheries Officer, and the introduction of fish species e.g. for fish farming or aquaculture require written permission from the Chief Fisheries Officer. Fishermen should also be careful when catching immature fish and ensure they are returned immediately. Fish dealers can likewise be prosecuted for selling or possession immature fish. (GoU 1951)

Concerning opportunities the National Fisheries Policy (2004) provides for a participatory approach to fisheries and encourages the participation of communities in fisheries management. The policy promotes the use of aquaculture, post-harvest value addition, marketing and trade, human resource development and research (MAAIF 2004:vii). The strategies for reaching the objective of sustainable management and development of fisheries include (MAAIF 2004):

- Establishing funds for conservation of rare species
- Initiating stocking programmes
- Enacting local ordinances to counter concerns
- Licensing fishing activities
- Promoting credit schemes to encourage investment in fisheries
- Promoting community-based enterprises
- Supporting public-private partnerships (PPP)
- Supporting local infrastructure development plans
- Promoting investment in intensive aquaculture

Like the agricultural sector, the fisheries sector is also challenged by budget constraints. Communities should actively seek the influence encouraged in the National Fisheries Policy and keep an eye out for any funding opportunities that may arise.

### **Forestry**

Forest resources are mainly used for charcoal, fuel wood, and timber, and the extraction of these resources is regulated by the National Forestry and Tree Planting Act (2003). Four types of forest reserves can be identified in Uganda: central forest reserves, local forest reserves, community forest reserves and private forest reserves. Central and local forest reserves can be declared for the purpose of scientific interest, protecting the ecosystem or for recreational purposes, and require an Environmental Impact Assessment (EIA) and consultation with the local community. All forests require the declaration of a responsible management body and a management plan spelling out the uses and purpose of the forest. While it is strictly prohibited to cut and take dry wood and bamboo in nature reserves and sites for special scientific interest, community members are allowed to do so free of charge for domestic use in forest reserves and community forests in accordance with the management plan. (GoU 2003:§33). It is prohibited to start a fire in a forest except upon permission from authorised person (GoU 2003:§§34-35). Any revenue from the management of a community

forest shall vest in the local community and be used for the sustainable management of the forest and the welfare of the local community. The local government may make bylaws in connection to community forests. A private person can register a private natural forest or a plantation forest as a private forest reserve, and the products from such a forest belongs to him/her. (GoU 2003)

Local communities, organisations and individuals can apply for technical service concerning forest management from the Minister, NFA or the local government, though the authority may charge a fee for such services. These services include training and advice, establishment of tree nurseries, material or financial assistance, promotion of seeds production and agroforestry, etc. (GoU 2003:§26). The Forest Policy (2001) promotes forest plantation business through financing mechanisms, fiscal incentives, seed sources and planting stocks and encourages small and medium scale plantations. The private processing industry is likewise promoted through competitive bidding for harvesting concessions in government plantations, measures to combat the market failures by applying royalty rates, and encouraging new forest products (MWLE 2001:17-18). Farm forestry is also promoted through capacity development, increased awareness of ownership of planted trees, integration of agro-forestry to schools and adult literacy curricula, and promotion of indigenous seeds and knowledge (MWLE 2001:19). Moreover, a Tree Fund shall be established with the purpose of promoting tree planting of non-commercial purpose. (GoU 2003:§§39-40)

Based on the above, there are many types of support that can be sought for the establishment of community forest reserves or even individual forest reserves. Again it should be noted that the financial part of the government support may be limited, and while communities should activities pursue the opportunities above through their local government representatives, the forest reserve should mainly be considered a coordinating mechanism, which may not generate additional income in the short run.

### **Water abstraction**

The abstraction of water for irrigation and for domestic purposes (e.g. through the service of water purification/filtration) is regulated by the Water Act (1997) and the National Water Policy (1999). The Act stipulates that natural water flowing in streams, rivers and wetlands can be accessed for free for domestic and subsistence farming purposes. However, water works such as boreholes require a permit from the Director of Water Development. (GoU 1997). Likewise, a permit is required for water abstractions over 400m<sup>3</sup> per day for commercial irrigation, livestock or fisheries activities (MWLE 1999:24-26).

At local level, water user groups can manage, operate and maintain water sources. (MWLE 1999:14). Operation and maintenance costs of water points should be fully covered by the users, unless an unreasonably high cost of supplies and chemicals necessitate subsidy from outside. A Water Source Committee should be established at village level, and at least two people appointed and trained. The Committee should collect funds and ensure maintenance (MWLE 1999:18-19). No new installations should be made without establishing the ownership and responsibility of the management (MWLE 1999:20).

The National Water Policy (1999) aims at providing hygienic sanitation facilities and safe water sources within easy reach to 75 % of the population in rural areas (MWLE 1999:15) The public water points in rural areas should as a basic level supply 20-25 litres per person per day and be located within a reach of 1.5 km of the household. A water point should not serve more than 300 persons. Water quality should meet the standards set by WHO. (MWLE 1999:16-17)

From district level there are intentions of expanding the water supply partly from restoration and construction of new boreholes and partly from expanding the use of water harvesting (ADC 2011). The plan is to increase the coverage from 68 % to 70 % by the end of the year and from that increase with 4 % per year. The activities will also involve software in form of training and capacity building about maintenance and hygiene.

Based on the above there are plenty of opportunities for addressing the challenge of access to water. Water abstraction from natural sources for irrigation and for selling purified/filtered water for domestic use can be practiced without costs as long as it does not exceed 400 m<sup>3</sup> per day. Moreover, the communities can advocate for local government officials to ensure the standards for water provision set out in the Water Policy are met.

### **Extraction of plants, fibres and other production/construction material**

The extraction of plants, fibres and other production/construction material e.g. for handicrafts is regulated by the National Environment (Wetlands, Riverbank and Lakeshore Management) Regulations (2000) as well as the National Forestry and Tree Planting Act (2003). Harvesting papyrus, medical plants and trees in wetlands for domestic purposes do not require any permit, but activities like brickmaking and commercial exploitation do. (GoU 2000). As mentioned above it is strictly prohibited to cut and take dry wood and bamboo in nature reserves and sites for special scientific interest. However, this is allowed (for domestic use) in forest reserves and community forests in accordance with the relevant management plan. (GoU 2003:§33)

Hence, when extracting natural resources for the production of handicrafts and construction of houses, huts, etc. people should be aware that it may require a permit, depending on the local and on the intended use (commercial or domestic).

### **Appendix III: Ecosystem management**

Ecosystem management is aiming at sustainable management of natural resources and biodiversity by maintaining ecosystem processes, functions and services (Clarke & Jupiter 2010:7). Ecosystems are understood as both biophysical and socio-cultural systems. Ecosystem management is challenging the conventional separation of natural resource management into different sectors (agriculture, fisheries, forestry, water), which encourages an exploitative approach as each sector seeks resource maximisation. (Leech et al. 2009:3)

Ecosystem management has four main characteristics: Management is along ecosystem boundaries (e.g. water catchment) instead of along administrative boundaries; Focus is on sustainability of the ecosystem, not of the yields (e.g. timber); Continuously adaptive management since the environment is constantly changing; Acknowledging that people are part of the ecosystem and focus is on managing people (Leech et al. 2009:4).

#### **Ecosystem services**

Ecosystems provide a number of goods and services. Ecosystem goods include food, freshwater, fuel and fibre, while services include flood regulation, water purification, carbon sequestration, temperature regulation, nutrient cycling and soil formation as well as social and cultural services (del Rio 2012:335-336; Randhir & Hawes 2012:113-114). While the provision of goods and services is effected by climate change, the ecosystem is also providing climate change adaption mechanisms such as flood regulation and temperature regulation. The service of regulation is sometimes replaced by engineering solutions, but the natural solutions are more available, more flexible, adaptive and cost-effective; and hence crucial to incorporate in adaptation measures. (del Rio 2012:335-336)

Supporting the natural adaptation processes can be done for instance by protecting wetlands, floodplains and lakes to retain their ability to absorb precipitation and reduce flooding. Moreover, maintaining vegetation supports the temperature regulating functions, and an increased tree cover will reduce wind-based topsoil erosion and increase the ability of soil to hold water. In addition, using a variety of crops with different maturation periods, using wild and native plants while preventing the spread of alien species, and applying the techniques of cover crops, crop rotation, fallow crops and crop residues are all ecosystem-friendly practices. (del Rio 2012:336-343; FAO 2010:2; Sudmeier-Rieux & Ash 2009:16)

Determining whether a practice is ecosystem-friendly can sometimes be difficult to determine. For instance constructing a dam may increase water availability for agricultural irrigation and control floods, but may also alter the ecosystem and thus increase risk in the long run. Moreover, it is often a trade-off between economic and ecological objectives, and the task is to find the balance between economic development and conservation to ensure both poverty alleviation and sustainable development. (Randhir & Hawes 2012:116-120)

#### **Holistic approach**

A central element of ecosystem management is to apply a holistic approach. Often challenges are defined in narrow terms, and the response will only focus on solving that problem only. Often narrowly defined problems lead to a technological approach with specific actions with a short time-horizon. (Adger et al. 2011:762-763). As an example there is a lot of awareness concerning deforestation in the CPDRR programme areas, with the response being stop cutting and start planting more trees. However, many other factors influence deforestation, and focussing on a single stressor might undermine the ability of communities to adapt to other stressors (Adger et al. 2011:757-758;

Eriksen et al. 2011:8-10). Moreover, many responses have social and environmental implications for other groups and places, now or in the future, and it is necessary to understand how poverty and unequal terms of trade, water scarcity, education level, household structures, etc. influence the outcome of specific adaptation measures. Therefore, understanding environmental challenges more broadly will lead to long-term solutions with action across the board. (Adger et al. 2011:762-763; Eriksen et al. 2011:11-16)

Finally, adaptation from an ecosystem perspective should be understood a process rather than a list of measures. A long-term approach will involve increasing the capacity of the communities to be able to prepare for new risks. The adaptive capacity of communities can be strengthened if decision-makers and implementers are the same people, as decision-making is immediately turned into action, and feedback/result of that action will reach the decision-makers instantly. Consequently, the action can quickly be adjusted and communities have through a learning process improved their adaptive capacity. (Adger et al. 2011:762-763; Agrawal & Perrin 2008:5; Eriksen et al. 2011:11-16)