

**Loss &
Damage**

Loss and damage from flooding in Budalangi District, Western Kenya

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December 2013



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This report should be cited as:

Opondo, D.O. (2013). *Loss and damage from flooding in Budalangi District, Western Kenya*. Loss and Damage in Vulnerable Countries Initiative, case study report. Bonn: United Nations University Institute for Environment and Human Security.

Layout: Miquel Colom

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List of Acronyms

ACPC	African Climate Policy Centre
BUCODEV	Budalangi Community Development Organization
CDKN	Climate and Development Knowledge Network
CIESIN	Centre for International Earth Science Information Network
COP	Conference of the Parties
FAO	Food and Agricultural Organization of the United Nation
FDG	Focus Group Discussion
GoK	Government of Kenya
IGAD	Intergovernmental Authority on Development
IPAC	Intergovernmental Climate Prediction and Applications Centre
IPCC	Intergovernmental Panel on climate change
LDC	Least Developed Countries
MWI	Ministry of Water and Irrigation
NGO	Non-governmental organizations
SIDS	Small Island Developing States
UNECA	United Nations Economic Commission for Africa
UNFCCC	United Nations Framework Convention for Climate Change
UNU-EHS	United Nations University Institute for Environment and Human Society

Acknowledgements

I would like to thank Dr. Tom Owiyo of the United Nations Economic Commission for Africa (UNECA) African Climate Policy Centre (ACPC) for bringing my attention to the call for concepts for this study and also for providing invaluable insights in many aspects of the study. Secondly, I would like to thank the United Nations University in Bonn, Germany, and in particular Dr. Kees van Der Geest and Dr. Koko Warner, for their inspiration, technical guidance and support during the entire project. This study was part of the Loss and Damage in Vulnerable Countries Initiative coordinated by the United Nations University – Institute for Environment and Human Security (UNU-EHS) in Bonn, Germany and was funded by the Climate and Development Knowledge Network (CDKN).

I also wish to thank my colleagues at Maseno University, George Oduol Anyona and Denis Masika who helped with literature search, supervision of field work and data collection and analysis. I am grateful to Moses Odalo, my field supervisor, all the enumerators and Erick Okwaro, the project driver, for their contribution toward the completion of the field work component. My gratitude goes to all the participants in the household survey, focus group discussions, key informant interviews and in-depth interviews in Budalangi District for their willingness to share their perceptions on climate change, as well as their personal stories of experiences with flood impacts that made the success of this work a reality.

Executive Summary

Climate change is one of the most serious threats to sustainable development globally. Increasing frequency and intensity of extreme weather events and progressive slow-onset climate-related threats will worsen the vulnerability of poor households and communities in developing countries, particularly in Least Developed Countries (LDC's), many of which are situated in Sub Saharan Africa. Their capacity to cope with the impacts of extreme weather events and adapt to slow-onset climatic changes is often limited. The impact of climate change despite mitigation and adaptation efforts has come to be known as 'loss and damage' in the past few years (Sarner and van der Geest, 2013). In 2010, during the 16th Conference of the Parties (COP 16) of the United Nations Framework Convention on Climate Change (UNFCCC) in Cancun, it was recognized that joint international efforts were needed to better understand and address such losses and damages.

'Loss and damage' refers to the impact of climate change despite mitigation and adaptation efforts

This report looks at loss and damage associated with adverse effects of flooding in Budalangi District, Kenya. The Kenyan case study investigated impacts of flood events, particularly the December 2011 flood, on the livelihoods of rural households in Budalangi District of Western Kenya.

The main objective was to study losses and damages from floods that rural households incurred despite or as a result of the coping and adaptation measures they adopted. Specific objectives were to assess impacts of floods on crop production, livestock keeping and fishing; to examine the coping and adaptation strategies used by households and communities; to study to what extent these measures were successful in avoiding loss and damage; and to make policy recommendations for addressing future loss and damage.

The objective was to study losses and damages from floods that households incurred despite the coping and adaptation measures they adopted.

The study used a descriptive survey research design that entailed a cross-sectional view of the situation in Budalangi District. A mixed method approach of household survey, focus group discussions, in-depth interviews and key informant interviews was used to collect data to show the perceptions and experiences associated with the adverse effects flooding. The household was the unit of analysis and a pre-determined sample of 400 households was used.

In December 2011, River Nzoia broke its dykes and flooded the Budalangi flood plain, leaving massive destruction in its wake. Crops washed

away, livestock drowned, and houses and property were destroyed. There was an outbreak of water borne diseases such as cholera. Many affected residents were moved to emergency camps set up by public and private organizations. However, emergency assistance was inadequate and insufficient. To deal with flood impacts, such as the loss of harvest and subsequent lack of food, households had to adopt their own coping strategies including reliance on help from relatives, engaging in extra income-earning activities to earn money to buy food, modification of food consumption, sale of property and migration or relocation to higher grounds.

Crops washed away, livestock drowned, and houses were destroyed after River Nzoia broke its dykes in December 2011

In addition to the coping strategies that households adopted, many had previously adapted to increasing flood risks, for example through the construction of physical barriers to protect land and houses, diversification of food and income sources to become less vulnerable to flooding, and permanent migration. The study finds that existing coping and adaptation measures were not (effective) enough to avoid loss and damage. Moreover, the measures often had costs either directly or in the longer term. This was especially true for coping measures that – despite short-term merits – had had erosive effects on livelihood sustainability in the longer term.

Households relied on emergency relief and adopted coping measures, but this was not enough to avoid loss and damage

Households in the study area face many livelihood stressors including high poverty levels, rapid population growth, increased pressure on land and water resources, limited livelihood opportunities, and low educational levels. This constrains their capacity to cope and adapt in the face of extreme weather events and slow-onset climatic changes. Vice versa, impacts of these climatic stressors make people in the study area even more vulnerable and undermine sustainable development.

Impacts of climatic stressors make people even more vulnerable and undermine sustainable development.

More research is needed to understand what combination of policy interventions and autonomous adaptation is most effective in reducing loss and damage from flooding. To do this well, there is a need to integrate traditional and scientific knowledge of what adaptations work best. This should be taken into account in policy design. This report does not provide a national outlook on loss and damage but shows how climate change impacts result in loss and damage when they hit vulnerable people.

1. Introduction

1.1 Project background

The increased risk of floods due to climate change and increased climate variability such as El Niño in poor developing countries has been recognized (IPCC, 2007; IGAD and ICPAC, 2007). Climate change will cause more frequent severe weather and climate events that will threaten sustainable development globally. Studies have demonstrated that about 90% of all natural disasters that afflict the world are related to severe weather and extreme climate events (GoK, 2010). Today, there is increasing awareness in academic and policy circles that not all impacts of climate change are or can be addressed by current and future mitigation and adaptation efforts. Vulnerable populations in developing countries suffer disproportionately from the adverse impacts of climate change and their capacity to cope with extreme weather events and adapt to slow-onset climatic changes is often limited. The impact of climate change beyond coping and adaptation has come to be known as 'loss and damage' in the past few years (Warner and van der Geest, 2013).

Not all impacts of climate change are or can be addressed by current and future mitigation and adaptation efforts

In 2010, the 16th Conference of the Parties (COP 16) of the United Nations Framework Convention on Climate Change (UNFCCC) in Cancun

recognized the need for joint international efforts to better understand and address such losses and damages.

Climatic changes, including rising temperatures and increasingly variable rainfall patterns, have resulted in increased frequency of extreme weather events such as floods and droughts. For example, it has been reported that the last two decades have recorded six years with the warmest temperatures and rainfall variability in sub-Saharan Africa (SSA). Decreases in rainfall have been recorded in the Sahel region and increases in the East and Central African region. Consequently climate-related disasters such as floods and droughts have doubled in these regions within the last quarter century and Mozambique, Malawi, Kenya, Madagascar and Ethiopia are examples of SSA countries likely to experience unexpected extreme climatic events (World Bank, 2009).

This report is part of a series of nine case studies that empirically assesses loss and damage among in Africa, Asia and Oceania (Warner et al., 2012, 2013). These case studies are part of the Loss and Damage in Vulnerable Countries Initiative, which was initiated by the Government of Bangladesh (GoB) and funded by the Climate and Development Knowledge Network (CDKN). The United Nations Institute for Environment and Human Security (UNU-EHS) coordinated the case studies. Other partners in the consortium are

German Watch, the International Centre for Climate Change and Development (ICCCAD) and Munich Climate Insurance Initiative (MCI). The African Climate Policy Centre (ACPC) of the United Nations Economic Commission for Africa (UNECA) funded research in three African countries.

Vulnerable populations in developing countries suffer disproportionately from the adverse impacts of climate change

The case studies aim to support Least Developed Countries (LDCs) in the climate negotiations by providing scientific insights about real-life experiences of loss and damage in vulnerable countries. Currently, there are still large knowledge gaps on the impacts of climate extremes and slow-onset processes that communities in LDCs are facing, and the effectiveness of autonomous and planned adaptation measures. The case studies took place in nine countries: Bangladesh, Bhutan, Micronesia, Nepal, Kenya, the Gambia, Ethiopia, Burkina Faso and Mozambique. They examined different climate stressors, such as droughts, floods, glacier retreat, cyclones, sea-level rise, salinity intrusion and coastal erosion. An overview of key findings of the case studies is presented in Warner et al., 2012, 2013 and Warner and van der Geest, 2013).

The Kenyan case study looks at loss and damage associated with adverse effects of floods on the livelihoods, mainly crop production, livestock keeping and fishing, of people living in Budalangi District. This is in the context of a history of

periodic floods which affect different parts of the country, particularly Western and Nyanza Provinces and Tana River District in the Coast Province. The floods cause major disturbances, destruction of property, displacement and loss of life. (GoK, 2009a).

This study looks at loss and damage associated with adverse effects of floods on rural people's livelihoods

Future rainfall projections for Kenya up to the year 2030 broadly indicate that there will be increases in annual rainfall, with the highest amounts expected in western parts of Kenya around Mount Elgon, Elgeyo Escarpment and Cherangani Hills (which form the catchment of River Nzoia that drains through Budalangi District) (GoK, 2012). If these projections are accurate, then there are likely to be far-reaching effects on the intensity and frequency of floods in the region (Mango et al., 2007; GoK, 2009a). As a result, thousands of people living in the lowlands will be forced to move to higher ground and adopt various coping strategies to survive (GoK, 2009a).

Floods in the region are expected to increase in frequency and intensity

While these coping strategies may be successful in the short term, they often have severe implications for longer-term livelihood sustainability when people are unable to recover from flood impacts. The resulting 'loss and

damage' due to inadequate and unsustainable coping mechanisms occasioned by floods pull people into an ever-more vicious cycle of poverty.

Loss and damage is a new concept in climate change research. According to the working definition used in this study, the concept refers to "the negative effects of climate variability and climate change that people have not been able to cope with or adapt to" (Warner et al., 2012: p.20). This includes the inability to respond adequately to climate stresses (adaptation limits and constraints) and the costs associated with existing coping and adaptive strategies (erosive coping strategies and mal-adaptation). These costs can be either monetary or non-monetary and vary across households and communities according to levels of vulnerability, resilience and poverty.

Loss and damage refers to negative effects of climate variability and change that people have not been able to cope with or adapt to (Warner et al., 2012)

It may sometimes be difficult to separate coping from adaptation but the two are not synonymous. Warner, *et al.*, (2012) define coping as "generally short-term actions to ward off immediate risk, rather than to adjust to continuous or permanent threats or changes." Adaptation responses are long-term adjustments aimed at avoiding or overcoming the destructive impacts of disaster events. The UNFCCC (2007) defines adaptation as processes through which societies make

themselves better able to deal with an uncertain future. Therefore, adaptation to climate change involves measures to reduce the negative consequences of climate change or exploiting new opportunities by making appropriate adjustments. To assess climate-related loss and damage, one needs to study the nature of coping and adaptation measures adopted and the constraints, limitations and effectiveness of these measures.

To assess loss and damage, one needs to study the constraints, limitations and effectiveness of coping and adaptation measures

1.2 Floods, impacts and responses in Kenya

The government of Kenya has recognized that climate change is a serious threat to its development and poverty reduction programs (GoK, 2012). During the last few decades, Kenya experienced severe flood and drought disasters in different parts of the country that caused major disturbances, destroying property and resulting in food insecurity and even loss of life. The government recognized that anthropogenic factors like forest degradation and poor land use practices that disrupt watershed areas, drainage basins and flood plains often exacerbate the impact of floods. For example, in some cases, floods have occurred in the river basins even with normal rains because of excess surface water runoff occasioned by deforestation and land degradation upstream (GoK, 2009a).

Anthropogenic factors such as deforestation and unsustainable land use practices can exacerbate floods and their impacts

The Lake Victoria Basin in western Kenya is one of the most flood-prone regions in the country (GoK, 2007). The basin covers an area of about 194,000Km² and is shared by the East African countries of Burundi, Kenya, Rwanda, Tanzania, and Uganda. On the Kenyan side the catchment has an area of 46,229 Km² and receives inflows from five major rivers: Nyando, Nzoia, Sio, Sondu and Yala, all of which rise from the Rift Valley and western highlands. Rivers Nzoia and Yala experience yearly floods in their lower reaches which affect the Budalangi plains (Otiende, 2009).

Globally, institutions play a critical role in determining how communities and households respond to climate change impacts. National and local institutions have shaped how rural residents respond to environmental challenges in the past (Agrawal et. al., 2008). These authors also recognized that local institutions are important in translating the impact of external interventions in facilitating adaptation to climate change. Since adaptation is essentially local, the role of local institutions in shaping and improving the capacities of the most vulnerable social groups is fundamental to the success of adaptation programs.

Local institutions play an important role in building adaptive capacities of vulnerable populations

National institutions are particularly important in providing policy frameworks within which local institutions operate as well as mobilizing capacity for interventions when extreme events occur. According to Warner and Zakelideen (2012) research shows that strong collaboration between national and local institutions can play a critical role in disaster preparedness.

In respect to institutions, flood management in Kenya falls under the Department of Irrigation, Drainage and Water Storage in the Ministry of Water and Irrigation (MWI). The district units of MWI report on the flood situation but have no specific sections that exclusively deal with flood management issues. The MWI owns most flood protection works like dykes, drainage channels and river conservancy works. However, the MWI lacks financial or organizational mechanism for routine repairs and maintenance of these structures. The procedure for monitoring floods is *ad hoc* because there are no field staff dedicated to track flood situations (GoK, 2009a). The MWI collaborates with the Meteorological Department mandated to carry out weather prediction and forecasting.

District offices of the Ministry of Water and Irrigation lack manpower and budget; flood monitoring is ad hoc

The new constitutional dispensation in Kenya introduced a two tier government, the national and county level governments. Under this new system, it is expected that national and local county government structures will operationalize climate change policies and interventions (GoK, 2013). However, a government report (GoK, 2009a) identified institutional weaknesses including the fact that the current management of floods in Kenya is not structured nor anchored in responsible agencies, current interventions are more reactive than preventive with the vulnerability of the community at risk that determines the extent of the flood disasters, lack of long-term mitigation and finally and inadequate funding for flood management.

Coping with and adaptation to climatic stressors should be rooted in indigenous knowledge systems. If this is the case, this can facilitate understanding and effective communication and increase the rate of dissemination and utilization of climate change mitigation and adaptation options. However, in the 1970's the Government responded to floods by constructing 32.8 km of earth embankments (dykes) at the lower reaches of River Nzoia without recognition of the indigenous knowledge of the local communities (accumulated over the years on water movement patterns) and this compromised the effectiveness

of the technical engineering approach to flood control (Wanyonyi, 2011).

Adaptation policies and interventions should be rooted in indigenous knowledge systems.

Indigenous traditional knowledge has elements of preparedness for dealing with natural disasters and over the years, various communities evolved their knowledge, skills, experiences and beliefs that aided them not only in predicting natural disasters but also in devising techniques and coping mechanisms to deal with the disasters (Pere and Ogallo, 2006). An assessment of the traditional approaches taken by the communities in Budalangi provides important insights into some of the strategies for preparedness. The people observed and carried out, a number of activities for flood disaster preparedness: each homestead had to have a dugout canoe for transport in case of heavy flooding; men dug trenches to control the water around homesteads and around farmland; people living on higher grounds would accommodate those from flood prone areas; ploughing/cultivation was not permitted along the river banks and lake shore when heavy flooding is predicted; and land preparation started in November-January when it is dry while crops like maize, millet, peas, beans and cowpeas were planted in February. These activities were based on observation of winds patterns and changes in fauna and flora (UNEP, 2008).

In the study area, several indigenous flood disaster preparedness measures were observed

Women in the study area are generally knowledgeable in disaster management strategies related to food storage, health, water and sanitation, and child care. Men tend to be more knowledgeable in measures related to animal husbandry, crop cultivation and shelter construction (Makhanu, *et. al.*, 2007). Elders, both male and female, traditionally took the responsibility of predicting disasters and guiding the people on the actions to take to prevent or mitigate the disasters. They predicted climatic conditions and natural disasters, monitored hazardous situations and advised their communities in disaster management after hazardous events occurred (UNEP, 2008).

The main objective of this study was to record people's experiences of loss and damage from flooding

1.3 Objectives and research questions

The main objective of this study was to record rural people's experiences of loss and damage arising from the impact of floods on their livelihoods and their coping and adaptation strategies in Budalangi District, Western Kenya.

The specific objectives of the study are: to assess impacts of floods on crop production, livestock keeping and fishing; to examine the coping and adaptation strategies used by

households and communities; to study to what extent these measures were successful in avoiding loss and damage; and to make policy recommendations for addressing future loss and damage.

1. To assess impacts of floods on crop production, livestock keeping and fishing;
2. To examine the coping and adaptation strategies used by households and communities;
3. To study to what extent these measures were successful in avoiding loss and damage; and
4. To make policy recommendations for addressing future loss and damage.

The central question of this study was "How does the impact of flooding on the main livelihood activities lead to loss and damage among households in Budalangi District in Western Kenya?" The main livelihood activities in the proposed research area are crop production, livestock keeping and fishing.

The central research question is answered through the following set of sub-questions:

1. What is the impact of flooding on the main livelihood activities?
2. How does the impact of floods on livelihood activities vary between households in Budalangi?
3. How do households deal with floods and flood impacts?
 - a. What are the short-term strategies for coping with floods?

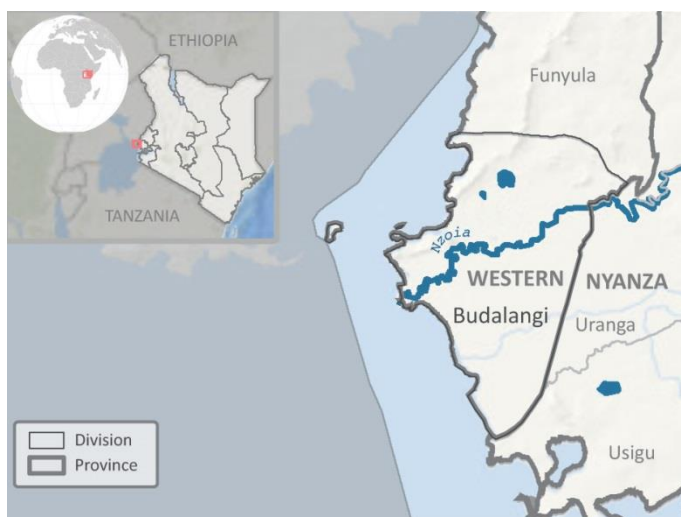
- b. What are the long-term strategies for adapting to more gradual changes in flood regimes?
 4. What kinds of losses and damages are incurred as a result of floods?
 - a. What are the losses and damages due to the inability of households to deal with the impact of floods?
 - b. What are the losses and damages (costs) associated with current ways of dealing with floods?
5. What kinds of losses and damages can be expected in the next two to three decades under local scenarios of climate change?
6. What can be done to reduce loss and damage from floods in Budalangi District?

2. The study area

The greater Nzoia River basin has a population of more than 3 million mainly Bantu and Nilotic speakers. The region is largely rural and about 90 percent of inhabitants earn their living from subsistence farming, livestock keeping and fishing, as well as informal sector activities (WRMA, 2006). The topography of Budalangi District is flat and consists of alluvial soils. Landsat data indicate open ground under small-scale arable farming of food crops such as maize, cassava and sweet potatoes (Onywere et al., 2011).

Farming communities in the area are frequently displaced by flooding with devastating effects on agricultural production. Crop losses of over 50 percent are experienced approximately once every three years. This has serious implications on food security in the area (Mogaka et al, 2006).

Figure 1: Location of the case study area



Flood impacts in Budalangi area manifested through the inundation of productive agricultural land often leading to total destruction of crops

and destruction of property and assets both of which result in widespread food insecurity in the areas directly affected and those that produce food consumed in other parts of the country. Flood waters have also been noted to lead to post harvest losses, i.e., destruction of stored food and displacement of farming communities in Budalangi, Kano Plains and the lower Tana River Basin (Pere and Ogallo, 2006; Budalangi District Report, 2008; Otiende, 2009; Dulo et al., 2010). In Budalangi District, the losses also include loss of human life, washing away of graves and burial sites, trauma associated with drowning of family members and flood-related diseases (Otiende, 2009). During the floods of 2003, floodwaters breached the southern dyke and displaced about 25,000 people. Some 10,000 people relocated to the District Officer's camp which necessitated emergency measures to control possible outbreaks of malaria, bilharzias, cholera and other water borne diseases (Onywere et al., 2011).

The costs of flooding due to human displacement can be immense, and are mostly borne by the poor and vulnerable. This is especially true given that it is usually the very poor who are forced to settle in the flood-prone plains to eke out a living from crop cultivation, livestock keeping and fisheries (Otiende, 2009). In Budalangi, increased pressure on land due to population growth has driven encroachment into wetlands and the floodplain areas thereby exposing local communities to flood risk (Albinus et al., 2008; Onywere et al., 2011).

Increased pressure on land has driven encroachment into wetlands, exposing local communities to flood risk

The disproportionate burden borne by women in regard to floods is attributed to their being among the most vulnerable groups in the communities. Women are hardly involved in decision-making processes and in aspects like flood risk reduction planning and implementation of activities (Otiende, 2009). This is worsened by the patriarchal system of the Manyala people (Onywere et al., 2011). Authority to make decisions on matters that affect the community like flood risk management is always vested upon elders, often older men in the community who tend to have near-supreme authority and perpetuate their dominance by being the first port of call even for external agencies initiating interventions in the community (Ngenwi et al., 2011).

This study was conducted in Bunyala District of Western Province of Kenya. The district covers an area of about 185 km², of which 112 km² is arable land (GoK, 2009b) and has a population of about 66,723 people comprising 31,718 males and 35,005 females, with an average household size of six people whose labour is crucial for agricultural production. The households have small farms of about 2.4 acres on which they live, grow crops and keep livestock (Kenya National Bureau of Statistics, 2010). The District has two distinct rainfall seasons, the April-May long rains and the

September-November short rains. The mean annual rainfall of between 750-1015mm is sufficient for rain-fed subsistence production of maize, sorghum, cowpeas, finger millet, pearl millet, sweet potatoes and cassava. Some people also rear livestock such as cattle, sheep, goats and poultry (GoK, 2009b; Budalangi District, 2011 Report).

This District has a flat topography through which River Nzoia meanders, often spilling floodwaters over its banks on to large areas of the flood plain. There are many settlements near the dykes along the river, and in some locations there is encroachment into flood plains for agriculture, livestock keeping and fishing (GoK, 2009a; Onywere, *et. al.*, 2011).

The Budalangi District Agriculture Office gathered information about flood impacts on agriculture in the year 2008. According to their report, flood damage occurred when high volume of water resulted in River Nzoia overflowing and breached on both sides of the river at four different points on the morning of Monday 10th November, 2008. The floods displaced about 3500 households (about 21,000 people) whose homes and farms were submerged and crops swept away. The affected area was estimated at 4152 acres of farmland with a total loss of over Ksh. 45 Million (Budalangi District Agriculture Office, 2008).

3. Methodology

This section outlines the way in which the study was carried out in order to address the main objective and to answer the research questions.

3.1 Research design

The research questions for this study were answered using a mixed method approach. The aim was to record real-life experiences of loss and damage associated with the adverse effects of climate change. To achieve this aim, a combination of qualitative methods (focus group discussions and in-depth interviews) and more quantitative methods (questionnaire survey) was used.

The study used a descriptive research design for a snapshot view of the situation in Budalangi District. Both primary and secondary data sources were used. Primary data was obtained from a household survey, FGDs and key informant interviews. Secondary data was obtained through desktop review of available literature and information from relevant government departments such as the National Irrigation Board, Ministry of Agriculture, the Meteorological Department, Ministry of Livestock and Fisheries and Busia Community Development Organization.

The process of data collection entailed recruitment and training of six research assistants and one administrative assistant. The training was important to enhance recording and reliability of information. The fieldwork for data collection started on 20th August, 2012 with a training of the

enumerators and piloting of the research instruments. Actual data collection began on 23/08/2012 for a period of four weeks. During this period, focus group discussions and in-depth interviews were also conducted.

3.2 Sampling

The respondents for the study were identified from households spread across 17 sub-locations of Bunyala District: Mundere, Budalangi, Bulemia, Mudembi, Rwambwa, Sisinga, Bukoma, Bukani, Magombe East, Magombe Central, Magombe West, Lugare, Rugunga, Mabinju, Rukala, Ebulwani and Obaro. Stratification was used to select the sub-locations. The sample for each sub-location was proportionately allocated based on the number of households within the jurisdiction of each sub-location. Then households were randomly selected beginning at the most central part of each sub-location as guided by village elders. The first household was picked from this point and subsequently every fifth household was systematically selected in a clockwise direction until the required number of households was achieved per sub-location.

3.3 Research Instruments

Data was collected through an approach that combined a household questionnaire survey, three focus group discussions with a total of 34 women, men and youth (see appendix 2), six key informant interviews with representatives of public and private organizations (see appendix 3), and four in-depth interviews with some respondents

who participated in the household survey (see appendix 4)..

3.3.1 Quantitative data

The household questionnaire survey generated mostly quantitative data although it also contained open questions that provided qualitative information. The questionnaire had four sections. The first section dealt with general, socio-economic and demographic characteristics. This was followed by two sections on coping with extreme weather events and adaptation to gradual climatic changes to assess the impact of climate stressors on the households, and their strategies to cope with and adapt to the impacts of extreme weather-related events. The last section of the questionnaire used open questions to examine local perceptions of vulnerability and the ideas of respondents about policy options to reduce loss and damage. The questionnaire interviews took approximately 35 to 45 minutes each.

3.3.2 Qualitative research tools

Qualitative information was obtained through focus group discussions, key informant interviews and in-depth interviews. This information was used to complement the household survey (questionnaire).

A focus group discussion (FGD) is a form of interview that involves addressing questions to a group of individuals who have been selected for this specific purpose. In this study, three FGDs were conducted to obtain the experiences of men, women and youth with impact, coping and

adaptation to floods. In total, there were 10 women, 10 men and 14 youth participants. The participants were ordinary members of the community. Interaction among them stimulated ideas and perceptions about floods, including perception of change in the frequency and severity of flooding over time, drivers of flooding, impacts, responses, constraints (factors impeding effective coping and adaptation) and policy (what governments and organizations could/should do).

Key informant interviews were used to collect information from people with specific knowledge and experience of floods. The aim was to obtain information that would not easily be obtained from focus group discussions and the questionnaire. Six key informant interviews were conducted. The interviewees were a District Agriculture Officer, a District Livestock Officer and a District Fisheries Officer, a journalist from the local community radio BULALA FM, an official from the National Irrigation Board and a traditional weather expert.

3.4 Research limitations

This study had several limitations. First of all, it is a local assessment of loss and damage. Other districts in Kenya may face similar problems with flooding, but these were not included in this study. Also, other parts of Kenya face severe drought problems which could not be covered in this local case study.

This research looks at loss and damage from flooding. So the focus is on consequences of flooding, and not on the causes. While attribution

of flood damage to anthropogenic climate change is an important topic and challenge in climate research, it is beyond in the scope of this research. Being part of a series of nine pioneer case studies (see Warner et al., 2013 for an overview), this case study aimed to explore ways of assessing loss and damage from climate-related events (in this case, floods), where loss and damage was defined as the adverse effects of such events that occur despite adaptation efforts.

Most questionnaire respondents only spoke Kinyala (the local language) or Swahili (national language) while the original questionnaire was in English. To avoid distortions during translation, a pilot survey was carried out and the results used to provide the enumerators with appropriate and standardized translations in Swahili and Kinyala for important concepts and technical words.

The timing of daily livelihood activities of respondents was a bit of a challenge as many respondents were occupied with activities like farm work and market visits, particularly in the morning hours. Enumerators sometimes had to wait for them until about 11.00 am so as not to interfere with household activity schedules. This resulted in delays in completing the questionnaire survey.

Poor transport infrastructure was another challenge. Some parts of Budalangi District have impassable roads, while two sub-locations, Ebulwani and Obaro, could only be reached by boat depending on the daily weather reports which determined safety of using boats to those

destinations. Several trips had to be scheduled to conduct the set numbers of questionnaire interviews.

In the focus group discussion, a topic list was used to structure the discussion. This was helpful, but it also limited the diversity of narratives about people's perceptions and experiences with floods. More generally, on perception data, it is recognized that these do not always tally with official data such as information from the agriculture and meteorological departments.

The questionnaire was designed to be administered among household heads. As it was expected that in the vast majority of households in the study area, these would be men, and we wanted to avoid a male bias in our findings, enumerators were instructed to interview the wives of the household if that was possible. In the end a bit more than half (54%) of the questionnaire survey respondents were males compared to 46% females.

4. Demographics, livelihood and vulnerability

The respondents to the questionnaire were both men and women. There were slightly more male respondents (214, 54%) compared to females (186, 46%). The average age of the household heads was 46 (the lowest age was 22 years while the highest was 90 years). Monogamous and polygamous unions are the most prevalent forms of marriage among the respondents despite the fact that all claimed to profess the Christian faith. This indicates that both Christian and traditional marriage practices exist side by side. A majority of the respondents had low levels of education. Over a quarter of respondents (28%) had received no formal education or just a literacy course, and 45% had only gone to primary school. Only 81 (20%) had attended a secondary school and 23 (6%) had tertiary education (see Table 1).

One focus of the study was to examine the livelihood activities and the vulnerability to flood impacts in the study area. This information is presented in terms of livelihood sources, poverty and vulnerability, food security, and gender.

4.1 Main sources of Livelihood

The survey findings indicate crop cultivation, livestock keeping, non-farm activities and fishing were the main economic activities in the study area (see Table 2). Most households had several of these sources of food and income.

Table 1: Characteristics of respondents

Characteristic	respondents	%
Sex		
Male	214	53.3
Female	186	46.7
Marital status		
Single	6	1.5
Monogamous	246	61.7
Polygamous	68	17.0
Consensual union	8	2.0
Widowed	62	15.5
Separated/divorced	9	2.3
Education		
None	54	13.5
Literacy course	57	14.3
Primary	180	45
Secondary	81	20.3
Tertiary	23	5.8
Technical/vocational	5	1.3
Religion		
Christian	400	100

Table 2: Livelihood sources

Activity	Households	Percentage
Crops	391	97.8
Livestock	329	82.5
Fishing	156	39.2
Economic trees	270	67.7
Farm labour	133	33.3
Non-farm activities*	281	70.3

* includes teachers, clerks, nurses, office work and police, masonry, carpentry, bicycle repair, etc.

Note: Multiple responses as respondents could engage in more than one livelihood activity.

Table 3: Land holdings in acres

Land size in acres	Households	Percentage
0	36	9.3
0.01- 0.99	53	13.7
1.00 – 1.99	124	32.0
2.00 – 2.99	75	19.3
3.00 – 3.99	48	12.4
4.00 – 4.99	28	7.2
5.00 – 9.99	20	5.2
10.00 or more	4	1.0
Total	388	100.0
Missing values	12	

Crop production

Land holdings are generally small – typically between 1 and 2 acres – as the study area is very densely populated (see Table 3). Among respondents who do not own land or who own only part of the land they cultivate, most gained access to land by borrowing (50), renting (51), or using community land (27). Two households accessed land through share cropping. Most farm work is done by hand. Only 45 respondents used a plough to prepare their land. All except one household had to hire these farm implements. Some 109 (28%) farm households hired fellow villagers to work on their farms while 281 (72%) farm households did not use hired labour.

Photo 1: Plots with maize and sorghum crops. Photo by Denis Opondo

Photo 1 shows plots with mature sorghum and maize crops in the flood plain on the Northern Bank of River Nzoia. Maize, sorghum and beans were the main crops grown in the study area.

Maize was grown by 359 (91.8%) of respondents, sorghum by 306 (78.3%) and beans by 268 (71.1%). Other crops were sweet potatoes, grown by 57 farmers (14.6%), kale (a leafy vegetable) by

35 (9.0%), cassava by 31 (7.9%), tomatoes by 20 (5.1%) and groundnuts by 19 (9.4%).

Agriculture in the study area is mostly subsistence-oriented. When asked about the main purpose of crop cultivation, the vast majority (94.4%) said that it is primarily for household consumption while for only 5.6% crop sales were the main purpose. When asked how much of their harvest in the past 12 months they had sold, most respondents said that they had sold 'nothing', 'hardly anything' or less than 'half' [see Table 4]

Table 1: Sale of Crops

Crop sales	Households	Percentage
Nothing	160	40.9
Hardly anything	105	26.9
< than half	87	22.3
Approximate half	11	2.8
> than half	21	5.4
Everything	7	1.8
Total	391	100.0

Crop production in Budalangi District is mainly based on rain-fed agriculture. Therefore, rainfall patterns largely determine the variety of crops and quantities of harvest. In addition, household incomes determined the use of fertilizer, manure, certified seeds and use of traction. The respondents were asked whether their crop production had increased, decreased or stayed more or less the same over the past 10 years. This information is reported in Table 5. More than 75% of the respondents said that their production had decreased. Many respondents attributed the decline in crop yields to increasingly frequent flood damage, low rainfall and poor timing of

planting seasons. Others blamed poor quality of seeds, and the fact that they could no longer afford fertilizers.

Table 2: Perceptions on crop yield trends

Crop trends	Households	Percentage
Decrease a lot	162	41.4
Decrease a little	141	36.1
Remained the same	13	3.3
Increase a little	64	16.4
Increase a lot	11	2.8
Total	391	100.0

Livestock keeping

Livestock keeping is an important source of food and income in the study area. The most important types of livestock are cattle (owned by 55%), sheep and goats (42%), poultry (61%) and pigs (21%). The main purpose of livestock keeping was 'for own consumption' (60.9% of the households) or 'for sale' (127, 39.1%). Very few households use livestock for traction. Livestock products used for household consumption is primarily chicken meat, eggs and milk from cattle. The purpose of sale of livestock was to get money to pay school fees for children, buy food and other household expenses. Livestock also serves other functions such as cultural obligations like sacrifices and payment of dowry.

Fishing

Fishing is another important economic activity in Budalangi. It is undertaken by men in Lake Victoria but sometimes women and children participate in fishing along the banks of River Nzoia and in receding flood waters. Women are mostly responsible for trading the fish products.

The main commercial fishes caught in the area are Nile perch, Tilapia and *Rastrinesbola argentea* popularly called *Omena*. Other types include mudfish and catfish. Almost four out of every ten households surveyed (39.2%) engaged in fishing. For those who engage in fishing, the main purpose was selling the fish (77.6%). The rest fished primarily for home consumption. Fishing activities are carried out throughout the year except during ban periods imposed by the Fisheries Department. Most people who fish live near Lake Victoria or River Nzoia. Besides fishing, most of them also have farms for crop production and also keep some livestock.

Economic trees

About two of every three households (67.7%) in the study area mentioned the exploitation of 'economic trees' as a source of food and income. For the purposes of this study economic trees were described as fruit trees and trees planted for timber and firewood. The common fruit trees included avocado, guava, banana, mangoes, and oranges. Trees for timber include various indigenous trees species, eucalyptus and *tecoma stans*. Most households had less than ten economic trees, and only 6.3% had more than fifty such trees. Tree products were primarily used for home consumption (68.3%), while for 31.7% the main purpose was to sell the products.

Non-farm income activities

Apart from crop cultivation, livestock keeping and fishing, many people engage in non-farm activities. The study findings show that 271 (70%) of the households engaged in non-farm income

activities, while 119 (30%) did not. Livelihood diversification into non-farm activities is an important way for people to become less vulnerable to climatic stressors. This is not always the main reason for engaging in such activities, however. The next chapter will discuss in more detail to what extent people engage in non-farm activities as an adaptation to climatic stressors.

Petty trade was the most common source of non-farm income among the surveyed households. It is a popular activity among women especially. They engage in the retailing of food items (e.g. vegetables, fruit, flour, sugar) or non-food items (e.g. soap, kerosine) and sale of second-hand clothes (*mitumba*). Few households had members who received salaries as white collar or blue collar workers, which can be attributed to the low educational levels in the study area, and the predominantly informal local economy (see Table 6).

Table 3: Non-farm income activities

Activity	Households	Percentage
Petty trade	208	52.0
Other non-farm self-employment*	55	13.8
White collar work**	30	7.5
Blue collar work***	28	7.0

* includes weaving and basketry, fishing net repair, brick making, timber/firewood harvesting and sale, charcoal and sand harvesting, bicycle and motor bike transport, boat transport, hair dressing, house work, public transport touting

** includes accountants, clerks, armed forces, nurses, secretaries and teachers.

*** includes drivers, masonry, carpentry

Remittances

Household heads were asked about the contribution of remittances from outside the area to family welfare. Almost half the surveyed households (47.5%) received remittances, mostly from other parts of Kenya (primarily Nairobi, Mombasa and Kisumu). Ten received remittances from abroad, mostly Uganda. The respondents reported that remittances were most often received from sons (27.4%), followed by daughters (18.4%) brothers (17.4%), sisters (9.5%), and parents (3.7%). The average amount received over the last 12 months was US\$ 240, with a median of US\$ 140.

4.2 Food security

The food security situation was assessed based on meals per day by children and adults, volume of food crops sold, volume of food consumed that was bought and periods of food shortage. Household heads were asked about the number of meals eaten by children and adults. The responses to this question showed that in most households members had at least two meals per day. The number of meals per day may not be constant throughout the year and was influenced by the rainfall seasons and flood events. In the hunger season households may diminish their meals per day. While just after the harvest, households may increase the number of meals. This information is presented in figure 2.

The food security situation was verified when household heads were asked about the number of months in the last year that they had eaten less. The vast majority of respondents (368, 92.0%)

reported that they had faced food shortage at least one month in the past year, while only 32 (8%) indicated that they had had enough food throughout the year. A summary of the months in which food shortage was experienced is presented in Table 7.

Figure 2: Number of meals taken by households on a regular day

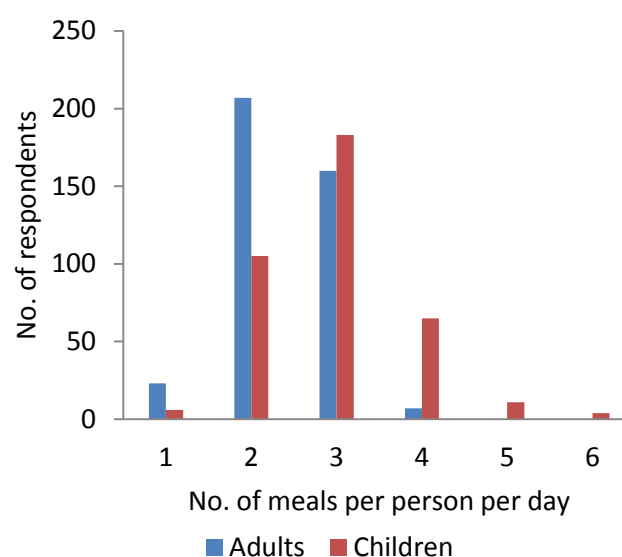


Table 7: Months of food shortage in the past year

Month	Responses	Percentage
January	169	42.3
February	200	50.0
March	242	60.5
April	279	69.8
May	278	69.5
June	126	31.5
July	21	5.3
August	11	2.8
September	8	2.0
October	10	2.5
November	21	5.3
December	17	4.3

On average, households experienced food shortage during 3.5 months (median: 5). The respondents who stated that they had eaten less during the previous year indicated that food deficiency was experienced especially between January and June. This corresponds with dry spell after the short rains (September/November) and the long rains (April/May) which is the peak of the planting season. Less food shortage was reported between July and December which coincide with the post-harvest period after the long rains.

The level of self-sufficiency was assessed by asking respondents about the proportion of the food they consumed that was bought. Only 18% of the respondents indicated that they bought less than half of the food they consumed. The rest had to buy at least half of their food to meet their needs, which is an indication of low levels of self-sufficiency. Most of the food bought constituted processed products such as rice, sugar, bread and tea; and fresh produce such as vegetables, meat and milk. This information is as shown in Table 8.

Table 8: Amount of food bought

Food	Households	Percentage
More than half	214	53.6
Approximately half	105	26.3
Less than half	69	17.3
Everything	9	2.3
Hardly anything	1	0.3
Nothing	1	0.3

4.3 Gender and vulnerability

In regard to vulnerability and gender, respondents were asked whether flood impacts affected men and women differently. Most responses to this question reflect gender division of labour in terms of the typical work men and women. Men are affected as they have to support their families, rebuild houses, replace lost or damaged property, feed livestock, and work on dykes. Women are equally affected but in terms of feeding their families, caring for children and domestic chores, emotional stress, limited time for trade activities, and lack of privacy in camps. This information is presented in Table 9.

Table 9: Differential flood impacts on men and women

Effects of floods on Women	Responses	Effects of floods on Men	Responses
More farm work	111 (28%)	Struggle to support family	122 (30%)
Domestic chores	89 (22%)	Rebuild house	80 (20%)
Care for children	51 (13%)	Replace property lost/damaged	43 (11%)
Vulnerable due to pregnancy	26 (6%)	Fishing difficult	40 (10%)
Emotional stress	20 (5%)	No grazing land/pasture	21 (5%)
Less physical strength	19 (5%)	Less time for income generating activities	18 (5%)
Unable to swim	18 (5%)	Work on dykes	8 (2%)
Lack of privacy/insecurity in camps	18 (5%)		
No time for small-scale trade	9 (2%)		

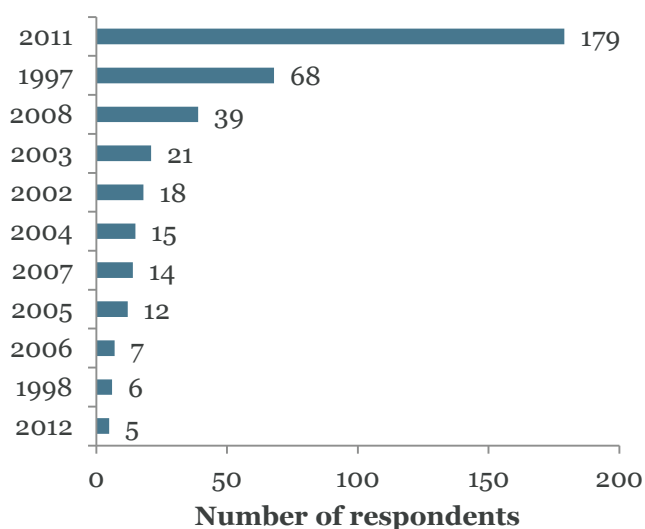
5. Loss and damage from floods

This chapter looks at how households coped with and adapted to flooding, and the limitations and costs of the measures taken. The term coping is used to refer to short term measures that were used to deal with the immediate impacts of flooding while adaptation refers to longer term strategies used in response to (changes in) flood risks.

5.1 Floods

Respondents were asked to choose a particular flood – for example the most recent or the most severe one – that affected their household. The follow-up questions on impact and coping focused on that particular flood. Important flood years were 1997, 2002, 2003, 2008 and particularly 2011. Most respondents reported the flood of November, 2011 as the most recent and devastating flood in the study area (see Figure 3).

Figure 3: Respondents perception of severe flood years



Besides inquiring about impacts of and responses to specific floods, respondents were also asked about changes in flood frequency and intensity in the study area over a 20 year period. This was first done through an open-ended question, with no pre-determined answer categories. The qualitative information from the answers to the open questions was analysed and coded for changes in flood frequency and intensity. The majority reported increases in flood frequency and intensity. The results are shown in Table 10. While increases in flood frequency and intensity were most often perceived, about a quarter to a third of the respondents felt that flood frequency and intensity respectively had reduced or stayed the same over the past 20 years. In other cases, the answer to the open question was not clear enough about *changes* in frequency and intensity to assign it to one of these categories. A total number of 226 households reported that either flood frequency or flood intensity had increased (not in table).

Table 10: Perception of changes in flood frequency and intensity

Change	Frequency	%	Intensity	%
Increased	187	47.3	138	34.9
Reduced	63	15.9	104	26.3
No change	36	9.1	18	4.6
Answer unclear	109	27.6	135	34.2
Total	395	100	395	100
Missing	5		5	

Table 11: Perceptions of change in floods (20 years)

	Perceptions of flood changes	Percentage
Yes a lot	305	78.8
Yes but a little	74	19.1
No	8	2.1
Total	387	100
Missing	13	

After the open questions, a closed question asked respondents to qualify the extent of changes in flooding. Almost all respondents (97.9%) reported big or moderate changes in flood regimes (Table 11). This is much more than in response to the open question, but it should be noted that the latter includes other changes than increases in flood frequency and intensity, such as changes in the location or timing of flooding. The general perception of increased flood frequency and intensity was confirmed in an in-depth interview with a traditional weather expert who stated:

"Rains in the hills lead to floods in the area (Cherangani Hills and Mt Elgon) even if it does not rain in Budalangi. We usually expect floods at the beginning of August/September. In the past floods were fewer but have increased. The 1962/1963 floods were the most intense that we remember, but floods of similar magnitude occurred in December, 2011 after about 50 years. Today floods occur in June, August, September, October, December... it has become unpredictable."¹

¹ In-depth interview with Benson Maina Okoth, 25th August, 2012

5.2 Flood Impacts

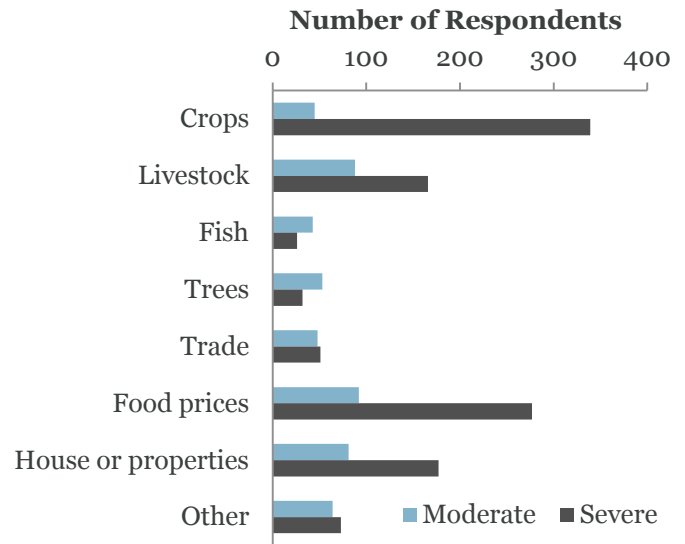
The negative impacts of floods on households in Budalangi include loss of human life, damage to farms, loss of crops, destruction of property (e.g. buildings and pit latrines) and disruption of social and economic activities. When asked about impacts of flooding on household, only a very small number of respondents (2%) claimed to have been unaffected by floods. The other respondents (98%) reported that floods had had impacts on their households. Focus group participants indicated that the households most affected were those settled in the flood plain where they grow crops and raised livestock. They also maintained that the least affected households were those settled on higher/raised land. All in-depth interview respondents and participants of focus group discussions agreed that the loss of human life was the most severe impact of floods. During the 2011 floods, for example, this happened when a boat capsized on River Nzoia at Siginga and ten people died (reported in FGD with men).

Figure 4 shows the impact of floods on different aspects of the household economy, as reported by respondents. The figure shows that floods 'severely' affected livelihood activities, particularly crop production, as reported by 339 respondents (85%), food prices (69%), housing/property (44%), and livestock (42%). Other impacts, which were less common – typically affecting around 10% of the population – were in the area of trade, fishing and commercial trees. With respect to crop production, one respondent stated:

"All crops in the farms such as maize, sorghum, potatoes, beans and vegetables within and outside the dykes were washed away. There was nothing to harvest after the floods. Lack of food affected many poor households, particularly widows, orphans and the elderly. Flood waters killed cattle, sheep, goats and poultry. Grazing areas were submerged and livestock could not feed and so there was reduced milk supply."²

"transportation of fish catch from Musoma and Mabinju beaches was hampered by bad roads."⁴

Figure 4: Flood impacts on livelihood activities, food prices and assets



Participants in the FGD with youth said this about the negative impact of flooding on livestock keeping:

"Livestock – including cattle, goats, sheep and poultry – drowned or were swept away. In addition, flooding destroyed grazing areas and led to increased incidence of livestock diseases. As a result some households sold their livestock at low prices to avoid losses and to obtain money to purchase food and other basic necessities."³

Impacts by income group

Information in Figure 4 also shows that fishing, economic trees and trade activities were not severely affected by the floods. However, participants in the focus group discussion said that fishing activities came to a standstill as fishing grounds and fish breeding areas were destroyed. This resulted in a low fish catch while

The questionnaire included questions about all common income sources of the survey households, such as income from crops, livestock, fishing, trees, farm labour, non-farm income and remittances. Adding up these income sources, almost half the respondents (47%) earned less than US\$ 500 per year, while 36% earned between US\$500 and US\$1500 per year. Only 16% earned more than US\$ 1500 per year. Table 12 shows the extent to which respondents in these three different income categories were affected by flooding.

² In-depth interview with Roseline Mbalaga (Mabinju), 1st August, 2012.

³ FGD with youth at Salvation Spirit Church of Israel East Africa Mowar, 2nd August, 2012.

⁴ FGD with men at Salvation Spirit Church of Israel East Africa Mowar, 1st August, 2012.

Table 12: Annual income categories and reported flood impacts:

<i>Income (USD)</i>	<i>Not affected</i>	<i>Moderate impact</i>	<i>Severe impact</i>	<i>Total</i>
0–500	2 (1%)	40 (21%)	145 (78%)	187
500–1500	0 (0.0%)	42 (29%)	102 (71%)	144
>1500	4 (6%)	18 (28%)	43 (66%)	65
Total	6 (2%)	100 (25%)	290 (73%)	396

The proportion of respondents reporting that they were 'severely' affected by floods was high (73%). While the proportion of non-affected households was higher among non-poor households, and the poorest were most often 'severely affected' (see Table 12), the differences were smaller than expected. Even wealthy respondents mostly reported 'severe impacts'. One relatively well-to-do village elder even though that wealthier households are more severely affected because they lose more in the event of flooding:

"Last year, our village was flooded for more than three weeks. I personally lost 61 bags of rice from my farm. My crops were just washed away and I could not harvest anything. A bag of rice was worth about 3,700 shillings at the time of the flood so I lost 225,700 shillings (US\$2,640). Compared to others in my village, I am not a poor man. But the floods also affect wealthier people. We lose more. The poor can run away and save their lives. People like me suffer to save our property."⁵

⁵ In-depth interview with Benson Maina Okoth, 25th August, 2012.

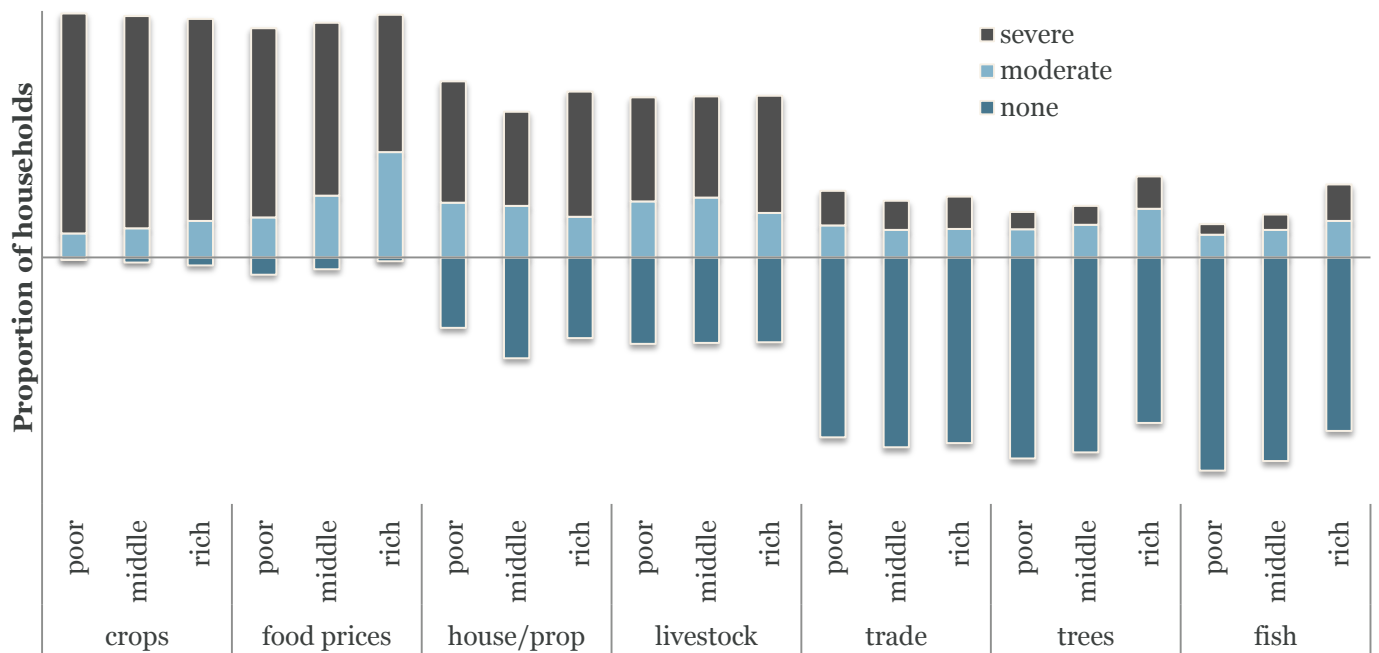
By contrast, an agricultural officer we interviewed felt that poor households are more severely affected. He said:

"Poor peasant households lack money to buy land elsewhere. The only land they own is ancestral land in the flood zone. The elite from the community can buy land and build a house in safer areas. Also, they have money to renovate their houses in case of destruction from floods."⁶

Figure 5 takes a more in-depth look at the differences between income groups per impact type. The poorest households (with less than US\$ 500 cash income per year) were more likely to report 'severe impacts' on crop production and food prices. By contrast, the least poor households (earning more than US\$ 1500 per year) most often reported severe flood impacts on livestock, trees and fishing activities. One explanation for this is that poorer households were less likely to own livestock and trees, or engage in fishing.

⁶ Interview with the Budalangi District Agriculture Officer, 27th July, 2012.

Figure 5: Flood impacts by income group



5.3 Adaptation

In this case study a distinction is made between coping strategies and adaptation. Coping strategies were defined as short-term responses to the impacts of sudden events. Adaptation was defined as longer-term responses to more gradual changes (Warner and van der Geest, 2013). Adaptation measures are adopted “in response to actual and expected impacts of climate change in the context of interacting non-climatic changes” (Moser and Ekstrom, 2010, p. 22026) and such measures “aim to meet more than climate change goals alone” (ibid). A distinction can be made between planned adaptation (by government and organizations) and autonomous adaptation by individuals, households and communities. In reality, planned and autonomous adaptation interact in many ways.

Adaptation measures include the prevention, tolerance and sharing of losses, changes in land use or activities, change of location, and restoration (GoK, 2010). People’s portfolios of coping and adaptation options play a critical role in determining whether and when they will move in response to climate stressors (Afifi et al., 2012). In Kenya, institutional adaptation initiatives target community-based strategies such as building or enhancing systems for conveying climate information to rural populations, promoting irrigated agriculture along river basins and water harvesting, addressing land degradation and diversifying rural economies (GoK, 2010). Thus, adaptation to flood impacts may imply more or less permanent solutions to situations that affect people’s livelihoods.

Survey respondents were asked whether they had taken any measures to adapt to changes in the frequency and intensity of floods, first in an open question and then in closed questions inquiring about specific adaptation measures (related to agricultural change, livelihood diversification and human mobility). The findings reveal that 85.6% confirmed taking adaptation measures, and provided information about the measures taken. Often, several adaptation strategies were used at the same time. These adaptation strategies are discussed below. Only 14.4% indicated they had not taken any such measures. These were mostly people who had reported no clear trend in flood regimes in the open question discussed above, or people who indicated that they lacked knowledge, skills or resources for particular adaptation measures.

Modification of crop production

One of the adaptation measures to protect against flood impacts involved changes in crop production practices. Forty percent of the survey households reported that they had made such changes in crop production practices in response to changes in flooding. About a quarter (92; 23%) shifted to other crops; 54 households adapted crop production techniques (e.g. use of early maturing seeds; different seedbed type, changes in sowing dates; and 5 households changed irrigation practices.⁷ In addition, 20 households reported 'other' agricultural adaptations, which

mostly involved moving their farms to higher grounds.

Many households that modified crop production planted early maturing crops such as egg plants, beans, sweet potatoes and cowpeas and maize. These crops have a relatively short growing season and farmers can benefit from wet soils due to receding flood waters. Others started cultivating vegetables such as tomatoes and cabbages.

Changes in production techniques did not just involve crop cultivation. Fishing is an important livelihood source for many people in the study area. In order to deal with flood impacts on fishing activities, participants in the FGD with men stated that:

"Some household heads migrated to Uganda or to islands in Lake Victoria to continue fishing when the situation was not good at home because of the floods. Some families bought motor boats for fishing deep inside the lake. Other households migrate to farm in areas that experience no flooding".⁸

Engagement in non-farm income activities

Diversification of income sources was another strategy reported for adaptation. The objective is to make one's livelihood less dependent on increasingly scarce natural resources and the vagaries of the weather. Almost four out of every

⁷ Most farming in the study area was rainfed. Only 53 households practices irrigation on their farms.

⁸ FGD with men at Salvation Spirit Church of Israel East Africa Mowar 1st August, 2012

ten households (38.1%) reported expanding existing non-farm activities, engaging in new activities or involving more household members in these activities. It is acknowledged that the increased uptake of non-farm activities is not necessarily in response to climate-related changes. The questionnaire asked specifically whether these kinds of livelihood diversifications were actually in response to changes in flood risks. While over seventy percent of the surveyed households had some non-farm income generating activity (see Chapter 4), almost forty percent indicated that the uptake of these activities was at least partly in response to changes in flood risks.

Table 13: Livelihood diversification

Diversified income sources in response to flood changes	Responses	%
No	236	61.9
Yes	145	38.1
Total (missing: 19)	381	100
Intensified existing non-farm activities	82	
Engaged in new non-farm activities	55	
More members involved in non-farm activities	14	
Other	8	

Migration

Another adaptation strategy employed is migration. From the study findings temporary migration or relocation was more of a short-term coping measure to deal with immediate impacts of flooding (see below) than a longer-term adaptation strategy to reduce impacts of flooding.

It mostly involved temporary relocation, often to nearby camps. Longer-term migration of household members to other parts of the country in response to changes in flooding was low among the surveyed households. It should be noted, however, that more permanent migration of entire households could not be captured adequately by the survey instrument because households that migrated more permanently from the study area – whether in response to increased flood risk or not – were no longer around to be interviewed. However, in the qualitative research activities, more permanent migration of entire households was mentioned several times. Typically, such households moved to areas not affected by floods.

“My neighbour decided to move away after the December 2011 flood. He bought land in a neighbouring village, Mulwano and abandoned his home in our village. Some people also hire land in Migingo that is not affected by floods. It is in the River Yala swamp and farming is made possible by the draining of part of the swamp by the Dominion Food Company.”⁹

According to focus group participants, migration to areas with less flood risk was more common among better-off households who are able to buy land elsewhere.

Another indication that migration does play an important role in making people’s livelihoods less

⁹ In-depth interview with Benson Maina Okoth, 25th August, 2012.

vulnerable to local stresses, such as flood impacts, is the fact that almost half the surveyed households received remittances from migrant relatives, mostly sons and daughters (see chapter 4).

5.4 Coping strategies

In order to deal with the immediate impacts of floods, it was found that almost all respondents (97%) adopted at least one coping strategy. More often, several coping strategies were utilized. The coping strategies adopted primarily focused on survival in terms of shelter and getting access to food when houses were damaged or when crops were washed away. The findings show that the most common coping strategies adopted by households included seeking support from organisations, temporary relocation, reduction of expenditure on household necessities, engagement in extra income-generating activities, sale of property, reliance on social networks, and modification of food consumption. This information is presented in Table 14.

Table 14: Coping strategies adopted by households

Coping strategy	Responses	%
Modified food consumption	331	82.8
Help from organizations	305	76.3
Reduced expenses	279	69.8
Migration	233	58.3
Earn extra income	143	35.8
Help from people	130	32.5
Sale of property	77	19.3

Other coping measures that people adopted in the aftermath of floods included seeking pay-out

of money they invested in saving groups, borrowing money, moving properties, moving children to unaffected relatives and planting tomatoes on moist land for consumption and sale.

Below, additional information is provided about each type of coping strategy adopted by people in the study area to deal with flood impacts.

Modified food consumption

In Budalangi District most households depend on small-scale agriculture. When floods destroy crops in farms and food in stores, this leads to acute food shortages. Therefore, many households were forced to eat less or skip meals as available food is rationed. Information on food modification and consumption patterns is presented in Table 15.

Table 15: Modification of food consumption

Measure	Households	%
Less meals per day	247	61.8
Cheaper food	225	56.3
Smaller portions	124	31.0
Adults eat less	52	13.0
Less people eat at home	4	1.0

Table 15 shows that households mostly modified food consumption patterns by having fewer meals per day, eating cheaper foods, having smaller portions, and by reducing food intake of adults to be able to feed young children adequately. Since food is a basic necessity, the reduction of portions served and the number of meals per day highlights the desperation of households amid food scarcity. It is doubtful whether modification of food consumption should actually be

considered a *coping* strategy or an indication that other coping strategies have *failed*.

Support from Organisations

The flood events precipitated emergency rescue operations by both public and private agencies. These were top-down interventions to save lives in crisis situations. In the aftermath of floods, many residents received help from the government and other organisations. Non-governmental organisations (NGOs) provided assistance to 272 respondents (68.0%), while 126 respondents (31.5%) received help from government agencies and 31 (7.8%) from religious organisations; 90 respondents (22.5%) did not get help from any organisation. The government agencies and departments that provided assistance to residents included the Ministry of Water and Irrigation, Ministry of Health, Ministry of Agriculture, Ministry of Internal Security and Provincial Administration, Ministry of Defence and Ministry of Special Programmes. The NGOs engaged in emergency activities in Bunyala are Kenya Red Cross, Action Aid, USAID and Busia Community Development Organization (BUCODEV). In addition, international organisations such as UNICEF and World Food Programme (WFP) were mentioned in this category. Organizations related to the Catholic Church were identified as the main religious organisation that provided emergency assistance to flood victims.

Households were helped to evacuate to camps set up by the government and NGOs. Assistance also included provision of relief items such as

clean water, food, medicine and shelter. Although more than 75% of the respondents received aid in one way or another, many complained that the relief provided by NGOs, government and religious agencies was inadequate. The inadequacy of emergency support provided to those displaced by floods is best echoed by the sentiments of Oonge Ochao, a resident of Sigingira Village. During an in-depth interview session, he stated that:

"I moved my family to the camp at Runyofu Primary School and stayed there for two months. I did not have money for food and depended on relief from the government and some NGOs. They provided tents and some relief food but this was not sufficient at all. As you can see, I have two sons and three daughters, one of whom is disabled. Imagine living with all of them in a tent! It was very stressful. I did not have any other options to deal with the floods because I did not have money and fully depended on relief aid. My dependence on others means I lack respect in the community. I am tired of relief aid from the government and NGOs. Being a recipient of aid all the time is not good. If I had the resources, I would move to a place where I can farm without flood disturbance. The government should consider giving us land in a place where we can live and be productive. Otherwise permanent dykes should be constructed to control the flow of water in the river."¹⁰

¹⁰ In-depth interview with Oonge Ochao (Mwangalalo village) Sigingira sub-location, 25th August, 2012.

Similarly, a village elder also observed that:

“Dependence on aid and relief is not the way. For how long will we be given relief food? What the people need is a permanent solution so that they can continue to live and feed their families.”¹¹

Reduction of expenses

Some respondents reported reducing household expenditure to cope with floods. This coping strategy entailed spending less money on important household requirements such as children’s education, healthcare, investment in productive activities, maintenance of homes and non-essential consumption. When asked about the use of this coping strategy, about 279 households (69.8%) said they had reduced their expenditure on household necessities. The aim was to conserve resources for as long as possible to survive after floods. For most survey households, reducing expenditure was not easy because of already low incomes and expenditure.

Migration and temporary relocation

Another coping strategy adopted during floods was migration and temporary relocation. Most household who moved went to camps, set up by governmental and NGOs or relocated to relatives or friends in non-affected areas. Camps were set up in schools, churches and health facilities to accommodate households and community members whose homes and farms were

¹¹ In-depth interview with Benson Maina Okoth, 25th August, 2012.

inundated by floodwaters. The study found that in 233 households (58.3%) at least one member had relocated temporarily or migrated in response to flooding. Within the group of households that moved to cope with flooding, 59.0% moved for periods of less than six months, while 41.0% moved for periods of more than six months. Most households (96.5%) migrated to rural destinations and within the region (97.4%) while very few (3.5%) moved to urban areas and out outside the region (2.6%).

Engagement in extra income-generating activities

A bit more than a third (35.8%) of the households engaged in extra income-generating activities to buy food and pay for other household requirements when their usual sources of food and income – particularly crops – were damaged or lost due to flooding. The main income-generating activities were non-farm activities including small-scale trade, basketry, carpentry, masonry, sale of local alcoholic brews, manual labour, bicycle repair, motor cycle and bicycle transport, brick making, water vending, sand harvesting and tailoring. Some households intensified existing non-food activities (23.0%) and others took up new income-generating activities (14.5%).¹²

¹² The sum of these two percentages is more than the total percentage of households using this coping strategy (35.8%). This is because in seven households, members adopted new income generating activities and intensified existing ones.

Help from other people

In rural societies like Budalangi, residents depend on mutual assistance in times of need. This is an important coping strategy, and 32.5% of the households received help from relatives (29.0%), friends (8.3%) or neighbours (3.3%). Help from neighbours probably was least common because neighbours had to deal with similar flood impacts at the time support was needed. Most of the help received from other people was in the form of food, cash, materials and time, for example in helping to repair houses.

Sale of property

The sale of household property was another strategy used by household heads to deal with the effects of floods. The main purpose of selling assets was to buy food for survival. This strategy was used by 19.3% of the households. Table 16 shows the proportion of households who sold different kinds of property.

Table 16: Sale of household property

Property sold	Respondents	Percentage
Livestock	53	13.3
Land	20	5.0
Trees	6	1.5
Bicycles	4	1.0
Stored crops	3	0.8
TV	2	0.5
Mobile phone	1	0.3

As shown in Table 16 livestock and land were the most commonly sold assets as reported by 53 (13.3%) and 20 (5.0%) respondents respectively. Other assets people sold to deal with flood impacts were trees, bicycles, stored crops, TVs and

mobile phones. Participants in the focus group discussion with young people mentioned that livestock is often sold in the aftermath of floods to obtain money to stock up on foodstuffs, to purchase materials for reconstruction of houses, to buy drugs to treat the remaining livestock suffering from waterborne diseases, and sometimes to buy or lease farmland elsewhere.

5.5 Loss and damage

This previous two sections described the measures that households adopted to prevent flood impacts and to cope with impact that could not be prevented. The findings show that most adaptation measures were not effective enough to avoid adverse flood effects and that many coping strategies had negative effects. In the case of poor and vulnerable households, severe floods have the capacity to affect livelihoods to such extent that it takes households a long time to recover, if at all. For many such households, it is difficult to get by, let alone improve their living standards due to poverty, low education levels and lack of diversification of income sources. Their coping strategies are often erosive, which means that these may provide short-term relief, but have long-term negative effects on the household economy (van der Geest and Dietz, 2004).

When people in the study area are confronted with increasing flood risks, they first of all try to adapt to reduce future impacts of flooding, for example by changing agricultural practices, by reducing dependency on agriculture (livelihood diversification) or by moving their houses or farms

to higher land. However, these adaptation options are often out of reach for poor households and only partly successful. The most recent floods, in December 2011, had severe impacts in the study area despite the adaptation measures taken. To deal with these impacts, and resultant food and livelihood stresses, many households were forced to adopt coping measures that exhausted assets – tangible and intangible – that people had built up over time. This makes them more vulnerable in the face of future floods and other misfortunes that can fall on them. The erosive or potentially erosive character of the most commonly adopted coping strategies is summarized in Table 17.

Table 17: Erosive coping strategies

Coping strategy	Costs / adverse effects
Sale of property	<ul style="list-style-type: none"> • Reduced household asset base; • Sale of land results in less land for farming hence lower food security and less income from crop sales; • Sale of livestock reduces possibility of animal traction power for farming, income and food (e.g. milk or eggs);
Extra income-generating activity	<ul style="list-style-type: none"> • Less time available for primary occupation (usually farming); • Hand-to-mouth existence, hence less chance of capital accumulation; • Sometimes children are withdrawn from school to engage in non-farm activities, to deal with flood impacts. This comprises their future educational achievements and job opportunities;
Modified food consumption	<ul style="list-style-type: none"> • Less food intake or inferior foods means less energy for farming and other productive activities; • Poor nutrition can have serious health implications, e.g. it can affect brain development especially in very young children. Among children of school-going age, it can affect educational attainment;
Reduced expenditure on household requirements	<ul style="list-style-type: none"> • Reduced spending on education and withdrawing children from school affects their future job opportunities; • Less money for healthcare, leading to poor health and reduced productivity; • Less money for house maintenance: poor shelter, hence unsanitary conditions;
Migration and temporary relocation	<ul style="list-style-type: none"> • Inadequate facilities in camps, no privacy; • Schools and health posts used as refuge, hence not able to provide their normal services; • Risks associated with temporarily abandoning homesteads (e.g. theft and dilapidation); • The need to depend on relatives or friends for shelter and food can erode social capital as there are usually limits to their ability or willingness to provide hospitality;

As shown in Table 17, many coping strategies employed by households in Budalangi District are erosive or potentially erosive to future livelihood security. Similarly, Mango, *et al.*, (2007) argue that floods in Kenya destroy household assets. The sale of property reduces the asset base of households and makes them more vulnerable to the shocks of recurrent floods. In particular, the sale of land is detrimental for long-term livelihood sustainability as households who sell all or part of their land have less land at their disposal for crop production, livestock keeping and other economic activities. This is important since most respondents own small pieces of land (about 2.4 acres on average). As a result household which sell off portions of their land are more likely to face food insecurity even in years when no floods or droughts occur. For such households there is usually no way back, as they are unlikely to accumulate money to buy back the land they sold. The other important property sold was livestock. The sale of livestock not only reduced the asset base of households but also the opportunity to use animal traction power for farming and to earn income from cultivating other people's farms.

Second, engagement in extra income-generating activities to raise additional income can be counterproductive, as it often means households have less time available for their main activities: farming, livestock and fishing, and the non-farm activities they typically engage in (mostly petty trade) are very low-yielding. Moreover, often children are withdrawn from school to help in these activities. As children, both sons and

daughters, are an important source of labour in rural areas, they may be forced to abandon school, resulting in early drop-out rates and low or irregular school attendance. This reduces the opportunities for those children and households to improve their future life chances.

Third, the strategy of reducing expenditure on household requirements has negative effects on present and future household circumstances. Less expenditure on food often means having a poor diet. When people reduce their food intake or consume less nutritious food, they do not have enough strength to work properly on their farms or in other occupations. This increases the likelihood that their ordeal will continue. In addition, less well-fed children cannot perform well in school. Poor children who experience malnutrition have low educational attainment as malnutrition affects their brain development Webster (1984:122). Reduced expenditure on health and house maintenance increases the likelihood of ill-health, poor shelter and unsanitary and unproductive living conditions. Equally deleterious to household welfare and socio-economic status is reduced expenditure on productive investments such as education and economic activities. This limits the capacity to diversify or generate more resources and assets that could provide insurance against unexpected future tragedies such as those resulting from floods.

Fourth, migration and temporary relocation to camps or to relatives or friends living on higher ground was a coping strategy adopted for the

safety and security of family members, household goods and livestock in flood-emergency situations. However, this had negative effects because homesteads were abandoned and fell into disrepair. The camps to which households were evacuated were set up in schools, health facilities and churches, and often lacked basic sanitary facilities and privacy. In the congested environment of the camps, many children and adolescents reportedly developed behavioural problems, including drug and alcohol abuse and petty crime.

Furthermore, moving away from one's house and land was often costly in terms of the time and money required to reconstruct houses after return. For households who moved away to stay with relatives or friends, assistance was based on goodwill and the availability of resources, which can get exhausted and lead to strained relations over time. Social networks can erode when too much is asked from relatives and friends, and this means that people's capacity to cope reduces in the future when another flood situation occurs (see also Haile et al. (2013) for an example from Ethiopia).

The problem of erosive coping strategies highlights the vulnerability of households in Budalangi District to flood impacts. The erosiveness of coping measures they have to adopt perpetuates their poverty. With limited buffers and coping capacity, poor households recover more slowly from the adverse impacts of floods (Mango et al. 2007). Households with diverse resources or the ability to access other livelihood options are in better a position to manage climate-related loss and damage. Households without such opportunities for viable livelihood diversification incur increasing costs as they struggle to survive. The lack of alternatives was underscored in an in-depth interview, with a youth respondent who observed that:

"The main problem with the effects of floods in Budalangi is lack of money and knowledge of what to do particularly because these floods occur so often, almost every two years. Therefore, some families have abandoned their homes and migrated to other places."¹³

¹³ In-depth interview with Denis Masiga, Rugunga sub-location, 2nd August, 2012.

6. Conclusion and policy reflections

The respondents in this study represent households that face increasingly frequent and severe flood impacts. This climate-related stressor comes on top of a wide range of structural vulnerabilities, such as high poverty levels, rapid population growth, increased pressure on natural resources, limited livelihood opportunities, and low educational levels. The high incidence of poverty and low education level undermine households' ability to diversify livelihood sources in ways that could enhance their resilience to climate events.

Participants in the household questionnaire survey, FGDs and key informant interviews reported significant changes in the frequency and severity of flood events and their impacts, particularly on crop cultivation, livestock, food prices and houses and properties.

Due to high population density, most households own small parcels of land for crop subsistence farming (crops and livestock). Food security is a major issue in the study area. Over nine out of every ten respondents (92%) reported they had they experience food shortage and had to eat less during certain months in the past year. Major food shortages occur between January and June. In addition a sizeable proportion of the food consumed in households was bought, as own production fell short of consumption needs.

Flood impacts on households include loss of human life; human and livestock diseases; destruction of property and dwellings; loss of harvest in stores and destruction of crops in farms; livestock death; reduction in opportunities for fishing activities and small-scale business activities; displacement; destruction of infrastructure, including roads, bridges and irrigation structures, and general disruption of social and economic activities.

Many of the measures that households were forced to adopt to deal with flood impacts were erosive, meaning that they helped to survive in the short term, but undermined livelihood sustainability in the longer term by exhausting.

Loss and damage results when coping and adaptation measures are not enough to avoid adverse effects of floods or when the adopted measures have costs or adverse effects themselves, as in the case of erosive coping.

Interventions by public and private organizations in the form of emergency assistance to victims of floods was found to be inadequate and poorly organized, which leads to undesirable side-effects. In the absence of long term interventions in flood protection measures and inadequate disaster relief by the government, households have developed their own coping and adaptation strategies. While these adaptation measures are sometimes successful in preventing impacts of

minor floods or at the margins of flood-prone areas, they proved to be insufficient to prevent impacts from more severe flood events.

Photo 2: Children on the northern dyke of River Nzoia. Photo by Denis Opondo



Reflections for policy

The aim of this study was to assess loss and damage from flooding among rural households in Budalangi District. Impacts of flooding were investigated from the perspective of the people in the study area who experienced the floods and their impacts. The findings of this study have several policy implications for politicians and planners, particularly because policy makers and rural dwellers have different and often conflicting perceptions and concerns. Dialogue and inclusion of all stakeholders in development initiatives can mitigate this gap.

Interventions by the government and NGOs are required to support households in preventing flood impacts that jeopardize lives and livelihoods and that throw people back on their development

paths. An important requisite for interventions to succeed is that the communities are consulted properly and given a voice in decision-making. This is especially true for interventions such as resettlement away from the most flood-prone areas and investments in flood protection infrastructure. Some possible policy interventions are listed here. They are based on suggestions from questionnaire respondents (section 4 of the questionnaire), focus group participants and expert interviews. As a disclaimer, it should be noted that policies to address loss and damage were not the main focus of this research, and the author recognizes that some of the interventions and policy reorientations suggested here, might be more complex to achieve than study participants imagine.

- It would be good to explore the possibilities of interventions that can help exploit the *opportunities* presented by floods for agricultural transformation to increase food production and incomes of rural households. A suggestion was to harvest flood waters upstream and then organize farmers downstream to make better use of the flood plains through irrigation.
- Floods are to a certain degree predictable. Risks and harmful effects associated with floods can be minimized with proper forecasting and early warning. The District Disaster Management Committee has an important role to play here and should collaborate with other public and private agencies such as BUCODEV and BULALA Community radio. Although early warning systems generally use modern technologies, they may also benefit from traditional early warning signs that are known to some 'local experts'. More research is needed to assess this indigenous knowledge and its applicability.
- Disaster management officers can benefit much more than they done hitherto from local communication structures to facilitate preparedness, organization of evacuation and emergency assistance in case of floods.
- Loss and damage due to floods will likely increase as human population increases and as more people get into harm's way. On the other hand, more man power means better opportunities to construct anti-flood structures. There is a need to anticipate flood events by taking proactive steps to prevent flood disasters and minimize effects. Proper land use planning and sustainable construction of flood walls or dykes can make a big difference.
- Indeed, many of the questionnaire respondents, participants in focus group discussions and in-depth interviewees proposed similar interventions that they think could permanently solve the problem of floods: They said that what is needed is better dykes and a dam to regulate flood waters for use in irrigated agricultural production.
- If dams were constructed in River Nzoia for flood control and water storage, the flood waters could be utilized for agriculture and other activities, such as electricity generation and industrial activity. Dams could regulate water flows downstream of the river and safeguard the livelihoods of the residents of Budalangi District.
- Many of the public agencies tasked with rural development, agriculture and the environment have not achieved the desired development goals. This calls for institutional change in the Ministry of Water and Irrigation, Ministry of Lands, and Ministry of Environment and Natural resources. The management of multipurpose dams can be handled by the Water Resources management Authority (WARMA) with participation from affected communities as key stakeholders.
- Laws can help to protect people who fail to see or recognize flood hazards. Laws and regulations should be enacted and enforced to ensure public safety by controlling the types of buildings that can be constructed in

particular locations. For example, homes should not be allowed in flood plains, close to rivers or dykes. Dangerous situations, such as depicted on Photo 2, a homestead next to the northern dyke along River Nzoia in Bunyala, should be avoided. This can be achieved if the Kenyan government formulates a well-informed policy of flood plain zoning that is sensitive to the needs of the residents of the area.

Pressure on land due to population increase is one of the critical factors driving settlement in the flood plain area and in the process, households and communities are increasingly exposed to flood hazards. While the suggestion for policy and interventions will not all be feasible in the short-term, it is clear that with current land-use practices, poor planning and ever increasing population, flood hazards will continue to turn into disasters.

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Suggested Reading

Ten journal articles based on the loss and damage case studies have been published in a special issue of the International Journal of Global Warming (Open Access):

Bauer, K. (2013). Are preventive and coping measures enough to avoid loss and damage from flooding in Udayapur District, Nepal? *Int. J Global Warming*, Vol. 5, No. 4, pp. 433-451.

Brida, A.B., Owiyo, T. and Sokona, Y. (2013). Loss and damage from the double blow of flood and drought in Mozambique. *Int. J Global Warming*, Vol. 5, No. 4, pp. 514-531.

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Kusters, K. and Wangdi, N. (2013). The costs of adaptation: changes in water availability and farmers' responses in Punakha district, Bhutan. *Int. J Global Warming*, Vol. 5, No. 4, pp. 387-399.

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Yaffa, S. (2013). Coping measures not enough to avoid loss and damage from drought in the North Bank Region of The Gambia. *Int. J Global Warming*, Vol. 5, No. 4, pp. 467-482.

Appendix 1: Loss and Damage Case Study Questionnaire

Note: The original questionnaire layout has been modified to save space

1. Questionnaire number: _____
2. Date of interview: __ / __ / __
3. Name of village or town: _____
4. Name of interviewer: _____
5. Date of data entry: __ / __ / __
6. Name of data entry officer: _____

Section 1: Respondent, household, livelihood and vulnerability

1.1 Respondent and household information

7. Name: _____
8. Birth year [YYYY] [write age (YY) if easier]: _____
9. Sex: 1=Male | 2=Female
10. Relation to household head: 1=Household head | 2=Spouse | 3=Other, specify _____
11. Marital status: 1=Single | 2=Monogamous marriage | 3=Polygamous marriage | 4='Consensual union' | 5=Widowed | 6=Separated/divorced | 7=Other, specify _____
12. Number of children: Sons ____ Daughters ____
13. Place of birth: 1=This village or town | 2=Elsewhere in the region | 3=Elsewhere in the country, specify region _____ | 4=Abroad, specify country _____
14. Education level: 1=None | 2=Literacy | 3=Primary | 4=Secondary | 5=Tertiary | 6=Technical/vocational | 7=Other, specify _____
15. Ethnicity/mother tongue: _____
16. Religion: 1=Christian | 2=Muslim | 3=Buddhist | 4=Hindu | 5=Other, specify _____
17. Occupation (multiple options): 1=Farming | 2=Livestock raising | 3=Fishing | 4=Trading | 5=Salary work ('white collar'), specify _____ | 6=Other non-farm income, specify _____ | 7=Farm labour | 8=Other labour, specify _____ | 9=Housework | 10=Student | 11=Unemployed | 12=Other, specify _____
18. Household composition: Adult men (aged 18-65) ____ | Adult women (aged 18-65) ____ | Boys (<18) ____ | Girls (<18) ____ | Elderly men (>65) ____ | Elderly women (>65) ____

19. How many members of your household are involved in activities that provide food or income? __

1.2 Land and farm

20. Do you (or does your household) 'own' land? 1=Yes | 2=No

a. If yes, for what do you use your land (multiple options)? 1=House | 2=Crop cultivation | 3=Livestock raising | 4=Renting out | 5=Fallowing | 6=Nothing | 7=Other, specify _____

b. If yes, please estimate the total land size? Number ____ Unit _____

21. Do you (or does your household) farm? 1=Yes | 2=No (if no, go to next section)

22. What is the size of the land that you cultivate this year? Number ____ Unit _____

23. Do you own the land you farm? 1=Yes, all | 2=No, none | 3=Partly

a. If 2 or 3, how do you get access to this land (multiple options)? 1=Renting | 2=Sharecropping | 3=Borrow | 4=Community land | 5=Other, specify _____

24. Is some of the land you farm irrigated? 1=Yes | 2=No

a. If yes, how much? Number ____ Unit _____

25. Which crops did you cultivate last year? [in order of importance] (1) _____ (2) _____ (3) _____ (4) _____ (5) _____ (6) _____

26. Do you use animal traction or a tractor to cultivate your land? 1=Yes | 2=No

a. If yes, do you own, hire or borrow these implements (multiple options)? 1=Own | 2=Hire | 3=Borrow | 4=Other, specify _____

27. Do you employ people to work on your land? 1=Yes | 2=No

a. If yes, please estimate the total number of 'person days' per year _____

28. What is the main purpose of your crop production (choose one)? 1=Household consumption | 2=Sale | 3=Other, specify _____

29. How much of your crop production do you usually sell? 1=Everything | 2=More than half | 3=Approximately half | 4=Less than half | 5=Hardly anything | 6=Nothing

30. How much income did your household derive from crop sales in the last 12 months? _____

31. In the last 10 years, did your crop production... 1=Decrease a lot | 2=Decrease a little | 3=Remain the same | 4=Increase a little | 5=Increase a lot
- a. If decreased or increased, please indicate the cause(s):

1.3 Livestock, fishing and economic trees

32. Do you or other household members own livestock? Please indicate the number of (1) Cows ___ | (2) Donkeys ___ | (3) Goats and sheep ___ | (4) Pigs ___ | (5) Fowls ___ (5) Others, specify ___
- a. If yes, what is the main purpose of your livestock (choose one)? 1=Household consumption | 2=Sale | 3=Traction | 4=Other, specify _____
- b. Please estimate the income you derived from livestock raising in the last 12 months? _____
33. Do you or any other household members engage in fishing or fish raising? 1=Yes | 2=No
- a. If yes, please specify: 1=Fishing | 2=Fish raising | 3=Both
- b. What is the main purpose of your fishing / fish raising (choose one)? 1=Household consumption | 2=Sale | 3=Other, specify _____
- c. Please estimate the income your household derived from fishing / fish raising in the last 12 months? _____
34. Does your household own economic trees (fruit, timber, etc)? 1=Yes | 2=No
- a. If yes, what is the main purpose of your economic trees (choose one)? 1=Household consumption | 2=Sale | 3=Other, specify _____
- b. Please indicate the number of economic trees: (1) <10 | (2) 10-50 | (3) 50-100 | (4) >100
- c. Please estimate the income your household got from economic trees in the last 12 months _____

1.4 Other income generating activities

35. Do you or any household members derive income from non-farm activities? 1=Yes | 2=No
- a. If yes, how many household members engage in such activities? _____

- b. In which activities do they engage (multiple options)? 1=Petty trading | 2=Larger business | 3='White collar' salary work, specify _____ | 4='Blue collar' salary work, specify _____ | 5=Crafts, specify _____ 6=Processing natural resources, specify _____ 7=Other non-farm income, specify _____
- c. Please estimate the total income derived from non-farm activities in last 12 months? _____
36. Does your household receive remittances from migrant relatives or friends? 1=Yes | 2=No
- a. If yes, from whom [relation to HH-H] (multiple options)? 1=Daughter | 2=Son | 3=Brother | 4=Sister | 5=Parents | 6=Other, specify _____
- b. Where do they live (multiple options)? 1=Within the region | 2=Other region, specify _____ | 3=Abroad, specify _____
- c. Please estimate the total amount of money you received in the last 12 months _____
- d. And the value of other things (food, goods) you received in the last 12 months _____
37. Do you or household members sometimes labour on other people's farms? 1=Yes | 2=No
- a. If yes, how many household members? _____
- b. Please estimate: the total number of 'person days' in the last 12 months _____
- c. Please estimate the total annual income derived in the last 12 months _____
38. Do you have any other sources of income besides the ones you mentioned? 1=Yes | 2=No
- a. If yes, please specify source _____
- b. Please specify the total annual income derived in the last 12 months _____
39. Please estimate the amount of money your household usually has to its disposal:
Amount _____ Currency _____ per (underline time unit): week / month / year
40. Compared to other households in your village/town, would you say that your monthly income is (1) Less than most others | (2) Average | (3) More than most others

1.5 Housing and other assets

41. Do you 'own' the house you live in? 1=Yes | 2=No
42. Do you own any other houses? 1=Yes, specify how many _____ 2=No
43. Please indicate the building materials of the house you live in:
- a. Roof (multiple options): 1=Roofing tiles | 2=Iron sheets | 3=Concrete | 4=Natural materials, e.g. thatch or earth | 5=Other, specify_____
- b. Walls (multiple options): 1=Cement blocks/concrete| 2=Baked bricks | 3=Sun-dried bricks | 4=Wood | 5= Iron sheets | 6=Other natural materials, specify_____ 7=Other, specify ____
- c. Floor (multiple options): 1=Cement | 2=Earth | 3=Wood | 4=Other, specify _____
44. How many bedrooms does the house you live in have? _____
45. Compared to the other houses in your village/town, would you say that the house you live in is (1) Of better quality | (2) Average or | (3) Worse quality?
46. Does your house have electricity? 1=Yes | 2=No
47. What is the source of your drinking water (multiple options)? 1=Surface water | 2=Well | 3=Borehole/Pump | 4=Pipe | 5=Other, specify ____
48. Does your house have a private latrine or WC? 1=Yes | 2=No
49. Please indicate whether your household owns the following assets [and how many]:
 (a) TV __ (b) (Mobile) phone __ (c) Bicycle __ (d) Motorbike __ (e) Car __ (f) Fridge __
 (g) Computer __

1.6 Food security

50. How many meals a day do adults in your household eat on a 'regular day'? _____
51. How many meals a day do children in your household eat on a 'regular day'? _____
52. In the past year, have there been months that you had to eat less? 1=Yes | 2=No
- a. If yes, in which months did this happen (multiple options)? 1=Jan | 2=Feb | 3=Mar | 4=Apr | 5=May | 6=Jun | 7= Jul | 8=Aug | 9=Sep | 10=Oct | 11=Nov | 12=Dec
- b. What was/were the cause(s) of this food shortage?
53. In the past ten years, has your household experienced any food shortages? 1=Yes | 2=No
- a. If yes, in how many out of ten years?

b. What was/were usually the cause(s) of such shortages?

54. How much of the food your household consumes is bought (i.e. not produced by household itself)? 1=Everything | 2=More than half | 3=Approximately half | 4=Less than half | 5=Hardly anything | 6=Nothing

2. Impact of and coping with weather-related extreme events

55. In the past twenty years, how many years have you lived in this [district, area or province]? ____

2.1 Open Questions

56. Choose a **flood** that affected your household (the most severe one or the most recent one). Please mention the year [_ _ _ _] and reconstruct what happened:

57. How did this **flood** affect your crop production, livestock production, fishing activities?

58. Did this **flooding** - extreme event have any other negative effects on your household? Please explain:

59. Did your household do anything to deal with the impact of this **flood** on your crop production, livestock production and fishing activities? 1=Yes | 2=No (if no, skip next two questions)

60. If yes, what did you do?

61. If yes, do you feel that despite these measures your household still experienced negative effects from this **flood** (multiple options)? 1=No | 2=Yes, measures are not enough | 3=Yes, measures have costs/negative effects | 4=Yes, other reason

a. Please explain:

62. If no, why not (multiple options)? 1=Didn't know what to do | 2=Lack of financial resources (to do what?) | 3=Lack of skills/knowledge (to do what?) | 4=Lack of other resources (to do what?) | 5=It's not a priority/not very important to us | 6=Not my task/responsibility | 7=Other, specify

a. Please explain:

63. If no, what negative effects (loss, damage, costs) did your household experience from this **flood** because no measures were taken?

2.2 Closed questions: extreme events (impact and coping)

64. Has your household (ever) been affected by a **flood**?

1=No | 2=Yes, but not severely | 3=Yes, severely

65. If yes, how did it affect your household (multiple options)?

a. Negative effect on crops: 1=No | 2=Moderate | 3=Severe | 4=Not applicable (NA)

If 2 or 3, explain/estimate costs: _____

b. Negative effect on livestock: 1=None | 2=Moderate | 3=Severe | 4=NA

If 2 or 3, explain/estimate costs: _____

c. Negative effect on fishing: 1=None | 2=Moderate | 3=Severe | 4=NA

If 2 or 3, explain/estimate costs: _____

d. Negative effect on economic trees: 1=None | 2=Moderate | 3=Severe | 4=NA

If 2 or 3, explain/estimate costs: _____

e. Negative effect on trade/business: 1=None | 2=Moderate | 3=Severe | 4=NA

If 2 or 3, explain/estimate costs: _____

f. Effect on food prices: 1=None | 2=Moderate | 3=Severe | 4=NA

If 2 or 3, explain/estimate costs: _____

g. Damage to house/properties: 1=None | 2=Moderate | 3=Severe | 4=NA

If 2 or 3, explain/estimate costs: _____

h. Other negative effects, specify _____ 1=None | 2=Moderate | 3=Severe | 4=NA

If 2 or 3, explain/estimate costs: _____

Questions about what people did to cope with (impacts of) extreme events:

66. Did you ask for food or money from other people to deal with this **flood** (multiple options)? 1=No | 2=Yes, from a relative | 3=Neighbour | 4=Friend | 5=Other, specify _____

67. Did you receive support from an organization to deal with this **flood** (multiple options)? 1=No | 2=Yes, government agency, specify _____ | 3=NGO, specify _____ | 4=Religious organization, specify _____ | 5=Other, specify _____

68. Did you or household members try to earn extra income to deal with this **flood** (multiple options)? 1=No | 2=Yes, intensified existing activities, specify_____ | 3=Engaged in new activities, specify_____
69. Did you or your household members migrate (more) to deal with this **flood**? 1=No | 2=Yes, household head migrated | 3=Yes, other household member(s) migrated | 4=Yes, whole household migrated
- a. If yes, for what periods? 1=Short-term (<6 months) | 2=Longer-term (>6 months)
- b. If yes, where to? 1=Within region | 2=Other region, specify _____ | 3=Abroad, specify ____
- c. Was migration destination rural or urban? 1=Rural | 2=Urban
70. Did you sell properties to deal with this **flood**? 1=No | 2=Yes, land | 3=Livestock | 4=House | 5=Productive assets, specify _____ 6=Means of transport, specify ____ | 7=Luxury items, specify _____ 8| Other, specify _____
71. Did you try to spend less money to deal with this **flood**? 1=No | 2=Yes, spent less on food items | 2=On school fees | 3=On healthcare | 4=On productive investments, specify_____ | 5=On house maintenance | 6=Other, specify_____
72. Did you modify food consumption to deal with this **flood**? 1=No | 2=Yes, bought less expensive foods | 3=Limit portion sizes | 4=Reduce number of meals per day | 5=Adults ate less so children could eat | 6=Less people eating at home | 7=Other, specify_____
73. Did you do anything else to deal with [extreme event]? 1=No | 2=Yes, specify _____
74. If measures were taken, were these things you did to deal with this **flood** enough to avoid negative effects on the living standard and well-being of your household?
1=No, still severe negative effects | 2=No, still moderate negative effects | 3=Yes, it allows us to carry on | 4=Yes, it has even improved our situation
- a. Please explain:

3. Impact of and adaptation to slow onset climatic changes

3.1 Open questions

75. What changes have you experienced in flood frequency and intensity in your village/town over the last twenty years?

76. How do these changes in **flooding** affect your crop production, livestock production and fishing activities?
77. Do these changes in **flooding** have any other negative effects on your household?
Please explain:
78. Has your household done anything to deal with (the impact of) these changes in **flooding** on your crop production, livestock production and fishing activities? 1=Yes | 2=No (if no, skip next two questions)
79. If yes, what did you do?
80. If yes, do you feel that despite these measures your household still experiences negative effects from changes in **flooding** (multiple options)? 1=No | 2=Yes, measures not enough | 3=Yes, measures have costs/negative effects | 4=Yes, other reason, specify _____
a. Please explain:
81. If no, why not (multiple options)? 1=Don't know what to do | 2=Lack of financial resources (to do what?) | 3=Lack of skills/knowledge (to do what?) | 4=Lack of other resources (to do what?) | 5=It's not a priority/not very important to us | 6=Not my task/responsibility | 7=Other, specify
a. Please explain
82. If no, what negative effects (loss, damage, costs) does your household experience from changes in **flooding** because no measures were taken?

3.2 Closed questions: slow onset climatic changes (impact + adaptation)

83. Have you experienced any changes in **flooding** over the past twenty years? 1=Yes, a lot | 2=Yes, but only a little | 3=About the same | 4=No, less than before | 5=Not existed at all
84. If 1 or 2, does this adversely affect (the economic situation of) your household? 1=Yes, a lot | 2=Yes, but only a little | 3=No, it doesn't affect us at all
85. If yes, how does it affect your household?
a. Negative effect on crops: 1=None | 2=Moderate | 3=Severe | 4=Not applicable (NA)
If 2 or 3, explain: _____

b. Negative effect on livestock: 1=None | 2=Moderate | 3=Severe | 4=NA

If 2 or 3, explain: _____

c. Negative effect on fishing: 1=None | 2=Moderate | 3=Severe | 4=NA

If 2 or 3, explain: _____

d. Negative effect on tree crops: 1=None | 2=Moderate | 3=Severe | 4=NA

If 2 or 3, explain: _____

e. Negative effect on trade/business: 1=None | 2=Moderate | 3=Severe | 4=NA

If 2 or 3, explain: _____

f. Effect on food prices: 1=None | 2=Moderate | 3=Severe | 4=NA

If 2 or 3, explain: _____

g. Damage to house/properties: 1=None | 2=Moderate | 3=Severe | 4=NA

If 2 or 3, explain: _____

h. Other negative effects, specify _____ 1=None | 2=Moderate | 3=Severe | 4=NA

If 2 or 3, explain: _____

Questions about what households do/did to adapt to (impacts of) climatic changes:

86. Did you modify agricultural production/fishing to deal with changes in **flooding (multiple options)**? 1=No | 2=Yes, shift to other crops/livestock/fish, specify _____ | 3=Shift from rain-fed to irrigated agriculture | 4=Modify production techniques/inputs, specify _____ 5=Other, specify _____

87. Did you engage (more) in non-farm activities to deal with changes in **flooding (multiple options)**? 1=No | 2=Yes, switch to new economic activities, specify _____ | 3=More household members engaged in economic activities | 4=Expand existing non-farm activities | 5=Other, specify _____

88. Did you or household members migrate to deal with changes in **flooding (multiple options)**? 1=No | 2=Yes, I migrated | 3=Yes, other household member(s) migrated | 4=Yes, whole household migrated

a. If yes, for what periods? 1=Short-term (<6 months) | 2=Longer-term (>6 months)

b. If yes, where to? 1=Within region | 2=Other region, specify _____ | 3=Abroad, specify _____

c. Was migration destination rural or urban? 1=Rural | 2=Urban

89. Did you do anything else to deal with changes in **flooding**? 1=No | 2=Yes, specify

90. (Only ask if measures were taken): Are these things you did to deal with changes in **flooding** enough to avoid negative effects on the living standard and well-being of your household? 1=No, still severe negative effects | 2=No, still moderate negative effects | 3=Yes, it allows us to carry on | 4=Yes, it has even improved our situation
a. Please explain:

4. Vulnerability, gender and policy

91. Do you feel that your household is more or less likely to suffer from the impacts of **flooding** than other households in your community? 1=More | 2=Average | 3=Less

a. Why?

92. Do you think that the impacts of these climate threats (**flooding**) affect men and women differently? Please explain.

93. Do you think men and women play different roles in dealing with these climate threats (**flooding**)? Please explain.

94. What do you think the government or other organizations could do to reduce the impacts of this climate threat (**flooding**)?

Appendix 2: Key informant interviews

List of key informant interviews

1. Interview with Michael Wekesa, Budalangi District Agriculture Officer in his office at Budalangi District headquarters on 27th July, 2012. Michael Wekesa is the person in charge of all agriculture activities including extension, seed provision, food situation analysis, and training.
2. Interview with Pius Omoke, technician at the Fisheries Department offices in Port Victoria in Budalangi on 26th July, 2012.
3. Interview with Thomas Mango a community activist at the Busia Community Development Organization (BUCODEV) at the CBO offices in Budalangi on 20th July, 2012.
4. Interview with Samwel Namulohi, officer in-charge of Bulala FM (community Radio) at the radio offices in Budalangi on 9th August, 2012.
5. Interview with Richard Muthama, provincial government officer in charge of Budalangi district, at the District headquarters on 9th August 2012.
6. Interview with Gabriel Radoli, District Livestock officer in charge of Budalangi District, at the District headquarters on 19th August 2012.

Appendix 3: Focus group discussions

- All three focus group discussions (FGD) had participants from different sub-locations in the study area but for convenience we only used one venue.
- The FGD with youth had both male and female participants.

1. FGD with women at Salvation Spirit Church of Israel East Africa Mowar in Siginga sub-location, Budalangi District on 1st August, 2012. Among the participants was one village elder; the others were house wives, small-scale farmers and traders.

Participant name	Sub-location
Scholastica Ajiambo	Bukani
Mary N. Wepukhulu	Siginga
Christine A. Hiloni	Siginga
Consolata A. Oduor	Bulemia
Beatrice A. Omenda	Rugunga
Jacinta O. Ouma	Budalangi
Rose A. bwire	Bukoma
Seraphine A. Okori	Magombe
Margaret W. Eroni	Mudembi
Christine N. Onyango	Rukala

2. FGD with men at Salvation Spirit Church of Israel East Africa Mowar in Siginga sub-location, Budalangi District on 1st August, 2012. The group had traditional elders, retired civil servants and ordinary village men.

Participant name	Sub-location
Johnstone Wanyama	Siginga
Paul W. Ndwoya	Siginga
John Bosco Obonge	Bukani
Francis W. Okuku	Mudembi
Cyril Nyogesa Nafula	Bulemia
Allex Khalobwa Anyango	Budalangi
Peter Khayombe Maloba	Mabinju
Clement Wanga Okuku	Rugunga
Thomas Songa	Rwambwa
Thomas Mango	Magombe Central

3. FGD with youth at Salvation Spirit Church of Israel East Africa Mowar in Siginga sub-location, Budalangi District on 2nd August, 2012. All participants were aged between 20 and 35 years, non-was in formal employment, some engaged in fishing, small-scale farming, trade, and informal sector jobs- as operators of motor cycle taxis (famous as *boda boda*).

Participant name	Sub-location
George Okelo (male)	Siginga
Maira Mukhungulu (male)	Budalango
Bonface Nalumwa (male)	Bulemia
Denis Masiga (male)	Rugunga
Beatrice Negesa (female)	Bulemia
Lilian Andenda (female)	Lugare
Emmanuel Mbalaga (male)	Mabinju
Eunice Musumba (female)	Bukoma
Margaret Barasa (female)	Bukani
Jacob Mutonga (male)	Rukala
Zuena Apondi (female)	Mabinju
Elias Nyongesa (male)	Mudembi
Celestine Odango (female)	Bukani
Leonida Mackinon (female)	Magombe

Appendix 4: In-depth interviews

List of in-depth interviews

1. Interview with Benson Maina Okoth (male) at his home in Magombe East Sub-location on 25th August, 2012. Benson is a village elder and traditional weather expert.
2. Interview with Roseline Mbalaga (female) at her home in Mabinju on 1st August, 2012. Roseline is a widow who had to resettle from her original home after a flood destroyed her house.
3. Interview with Oonge Ochao at his home in Mwangalalo village, Siginga sub-location on 25th August, 2012. Oonge is an old man who is a squatter on another person's land, where he rears goats and cultivates crops.
4. Interview with Denis Masiga (young man) from Rugunga sub-location on 2nd August, 2012. Denis' family was severely affected by floods.

The Loss and Damage in Vulnerable Countries Initiative

Accepting the reality of unmitigated climate change, the UNFCCC negotiations have raised the profile of the issue of loss & damage to adverse climate impacts. At COP-16, Parties created a Work Programme on Loss and Damage under the Subsidiary Body on Implementation (SBI). The goal of this work programme is to increase awareness among delegates, assess the exposure of countries to loss and damage, explore a range of activities that may be appropriate to address loss and damage in vulnerable countries, and identify in which ways the UNFCCC process might help countries avoid and reduce loss and damage associated with climate change.

The “Loss and Damage in Vulnerable Countries Initiative” supports the Government of Bangladesh and the Least Developed Countries to call for action of the international community.

The Initiative is supplied by a consortium of organisations including: Germanwatch, Munich Climate Insurance Initiative, United Nations University Institute for Environment and Human Security (UNU-EHS), and the International Centre for Climate Change and Development (ICCCAD).

More info: www.loss-and-damage.net

United Nations University Institute for Environment and Human Security

The UN University (UNU), established by the U.N. General Assembly in 1973, is an international community of scholars engaged in research, advanced training and the dissemination of knowledge related to pressing global problems. The University operates a worldwide network of research and post-graduate training centres, with headquarters in Tokyo. UNU created the Institute for Environment and Human Security (UNU-EHS) to address and manage risks and vulnerabilities that are the consequence of complex - both acute and latent - environmental hazards including climate change - which may affect sustainable development. It aims to improve the in-depth understanding of the cause effect relationships to find possible ways to reduce risks and vulnerabilities. The Institute aims to establish cutting edge research on climate change and foster an internationally renowned cohort of up-and-coming academics. Based on the research-to-policy mandate of the UNU, UNU-EHS supports policy processes such as the UNISDR (disaster risk reduction), UNFCCC (climate change) and others, as well as national governments across the world with authoritative research and information.

More info: www.ehs.unu.edu

Kindly supported by the Climate and Development and Knowledge Network (CDKN)

This document is an output from a project funded by the UK Department for International Development (DFID) for the benefit of developing countries. However, the views expressed and information contained in it are not necessarily those of or endorsed by DFID or the members of the Climate and Development Knowledge Network, which can accept no responsibility or liability for such views, completeness or accuracy of the information or for any reliance placed on them.