

Funding information

FATHUM is funded by the UK 'Science for Humanitarian Emergencies and Resilience' (SHEAR) research programme

Grant number NE/P000525/1



AMURIA DISTRICT FLOOD RISK PROFILE REPORT

Harriet Aber¹, Irene Amuron², Prof. Shuiab Lwasa³, Dr Ailsa Holloway⁴, URCS team and Prof. Chris G. Orach¹

1. Makerere University School of Public Health, Department of Community Health and Behavioural Sciences; 2. Red Cross Red Crescent Climate Center; 3. Makerere University, School of Forestry, Environmental and Geographical Sciences, Department of Geography, Geo Informatics and Climatic Sciences; 4. Stellenbosch University



FINAL DRAFT

JUNE 2020

ACRONYMS AND ABBREVIATIONS

ACTED	Agency for Technical Cooperation and Development
DRM	Disaster Risk Management
DRR	Disaster Risk Reduction
ECMWF	European Centre for Medium-Range Weather Forecasts
FATHUM	Forecasts for Anticipatory Humanitarian Action
FbF	Forecast based Financing
GloFAS	Global Flood Awareness System
IFRC	International Federation of Red Cross and Red Crescent Societies
OCHA	United Nations Office for the Coordination of Humanitarian Affairs
RCCC	Red Cross Red Crescent Climate Centre
SG	Secretary General
UBOS	Uganda Bureau of Statistics
UNDP	United Nations Development Programme
UNMA	Uganda National Meteorological Authority
URCS	Uganda Red Cross Society
USAID	United States Agency for International Development
WATESO	Water welfare Agencies for Transformational Economics, Social and Sustainable Organization
WHO	World Health Organization
NECOC	National Emergency Coordination and Operations Centre

TABLE OF CONTENTS

1. EXECUTIVE SUMMARY	4
2. INTRODUCTION	5
3. OVERVIEW OF UGANDA’S SELECTED STUDY LOCATIONS	6
4. OVERVIEW OF METHODOLOGY	10
4.1.1 Research theme 1: Disaster risk profile and history.....	12
4.1.2 Research theme 2: Existing DRM capacity and institutional arrangements	12
4.1.3 Research theme 3: Existing early warning systems and FbF activities.....	12
4.2 Adaptation/application of the research methodology in the Uganda research site	12
4.2.1 Secondary data assessment, literature and policy review.....	13
4.2.2 Disaster risk profile and history.....	13
4.2.3 Data collection.....	13
5. FINDINGS.....	15
5.2 Recorded flood disasters in Amuria and Katakwi, 2007 - 2017	15
a) Flood History in Katakwi District.....	16
b) Flood History in Amuria District.....	18
5.3 Disaster risk drivers for Amuria and Katakwi	19
5.4 Disaster Risk Governance	24
<u>b. Early warning systems (EWS)</u>	<u>27</u>
d) Stakeholders involved in flood early warning in Uganda	30
e) Implementation of FbF/ FbA in Uganda- Case of Amuria district.....	30
6. CONCLUSIONS	32
a) Summary of findings	32
b) Recommendations for further research and policy makers	33

1. EXECUTIVE SUMMARY

In 2007 between July- November, unusually heavy rainfall led to flooding and water-logging across eastern and northern Uganda (Soroti, Amuria, Katakwi, Bukedea, Kumi, Lira and Sironko Districts), giving rise to a major humanitarian response across all sectors. About 20,000 households were severely affected and 58,000 people displaced. The floods also disrupted delivery of social and economic services such as education, healthcare, trade and agriculture. This resulted in increased risk of communicable diseases especially as the flood waters receded. Malaria and diarrhoeal disease incidence increased by over 30%. The Teso sub region particularly faces annual incidences of flooding that often alternate with dry spells in the subsequent year. Within the region, Amuria and Katakwi districts have been the hardest hit by flood episodes. In a bid to develop interventions to manage flood disruptions, the Uganda Red Cross Society (URCS), together with the German Red Cross launched a pilot Forecast based Financing (FbF) approach in two selected communities of Amuria District, Kapelebyong sub-County. The intervention sought to mitigate flood impacts by building community preparedness capacity before floods occur. This report gives insight into the flood history, drivers of flood risk, early warning and flood governance in Amuria district.

Research methodology

In this study, the research team sought to understand the context in which the FbF intervention was piloted in Uganda by

- Understanding the underlying drivers of flood risk and the disaster history of the study sites.
- Exploring the DRM capacity and institutional arrangements that exist in the study sites and
- Exploring existing early warning systems

This research was conducted by carrying out focus group discussions, reviewing existing academic studies, relevant reports, community-based risk assessments, Uganda Census reports, policies, and newspaper articles. It was undertaken by Makerere University School of Public Health in collaboration with the Uganda Red Cross Society and the RCRC Climate centre.

Summary of results

- Flood history; the study team explored the flood history of the study sites (2007-2017), and established that flooding or water logging is nearly an annual event that is often followed by dry spells in the study sites.
- The major direct drivers of flood risk included biophysical characteristics of the area such as the amount of rainfall received, the swampy landscape, clay soil etc. that support flooding
- Other underlying drivers of flood risk included the history of the study area that is embedded in a past of civil unrest such as the LRA war and the Karamojong cattle raids, environmental degradation
- The political drivers of flood risk included the land reform policy on wetland ownership, the continuous splitting of districts administrative units, and limited funding for DRM
- Governance issue; It was established that there exists an institutional arrangement for DRM within the district but it is often constrained by limited funding leading to non-functionality
- Early warning; A few early warning systems exist however Uganda still doesn't have a national flood early warning system.

2. INTRODUCTION

Forecast-based Financing (FbF) is a mechanism that uses climate and weather or other forecasts to trigger action before the impacts of the forecast event are felt (Wilkinson et al. 2018). This mechanism was developed in recognition that there is a window of opportunity between a forecast warning and a potential disaster. FbF, a framework developed by the Climate Centre and German Red Cross in 2015, uses forecasts of natural hazards to release funding for preparedness and relief when a forecast is issued and pre-defined trigger thresholds are reached (Coughlan de Perez et al. 2015; Stephens et al. 2015; Wilkinson et al. 2018). FbF allocates financial resources to selected communities, based on an early action protocol and in response to defined triggers and their thresholds.

Although there are many examples of FbF initiatives implemented and developed across the global South (Wilkinson et al. 2018), the FATHUM initiative focuses on FbF in three African countries. It specifically draws on the FbF experience in National Red Cross Society pilot sites in Mozambique and Uganda, with additional insight drawn from a flash-flood-prone rural site in South Africa, where responsibility for disaster response and humanitarian action resides in government and community structures. This multi-site research sought to probe the history of floods as well as changing patterns in local flood risk drivers (eg those embedded in environmental and broader socioeconomic conditions) that could influence future applications of FbF.

The rationale for the multi-site FbF study acknowledged that an incisive understanding of local risk context is integral to both resilience building and short-term humanitarian action. Beyond an appreciation of underpinning environmental and socio-economic conditions, the study also sought to probe current disaster risk management/reduction (DRM/DRR) and early warning capacities, policies, and mechanisms in each site - in addition to institutional arrangements for disaster response and humanitarian action. This aimed at identifying opportunities for technically integrating and aligning FbF with existing systems and structures, as well as leveraging political support where needed. For instance, by exploring local disaster preparedness and response frameworks, for example, FATHUM researchers sought to interrogate how FbF might fit within local and national disaster preparedness and response, in addition to longer-term resilience building.

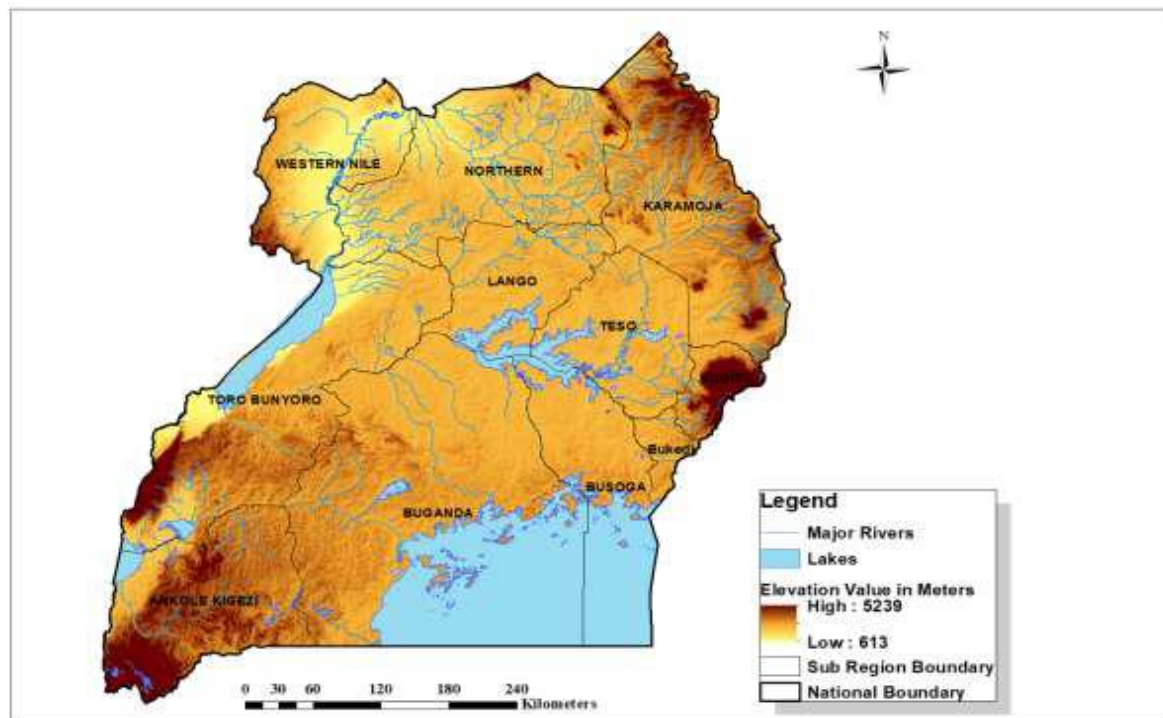
In the context of the Ugandan study, unusually heavy rainfall from July to November 2007 led to flooding and water-logging across eastern and northern Uganda (Soroti, Amuria, Katakwi, Bukedea, Kumi, Lira and Sironko Districts), giving rise to a major humanitarian response across all sectors. (OCHA, 2008). An estimated 20,000 households were severely affected and 58,000 people displaced. With about 80 percent of crops destroyed by floods, the risk of food insecurity rose quickly (IFRC, 2009). The floods also disrupted delivery of social and economic services such as education, health, trade and agriculture. This resulted in increased risk of communicable diseases especially as the flood waters receded. Malaria and diarrhoeal disease incidence increased by over 30% compared the usually expected incidence of about 8%. (WHO, 2007).

In a bid to develop interventions to manage flood disruptions, the URCS, together with the German Red Cross launched a pilot Forecast based Financing (FbF) approach in two selected communities of Amuria District, Kapelebyong sub-County. The intervention sought to mitigate flood impacts by building community preparedness capacity before floods occur.

This risk context report describes the Uganda case-study sites, of Okoboi and Amemia Parishes, situated within Amuria District of the Teso sub-Region, Eastern Uganda. It provides an overview of the study sites and methodology. Then, drawing primarily on secondary data, the report gives findings on the flood history for the study locations, as well as information on disaster risk drivers, risk governance and flood early warning processes, as these relate to the areas studied.

3. OVERVIEW OF UGANDA'S SELECTED STUDY LOCATIONS

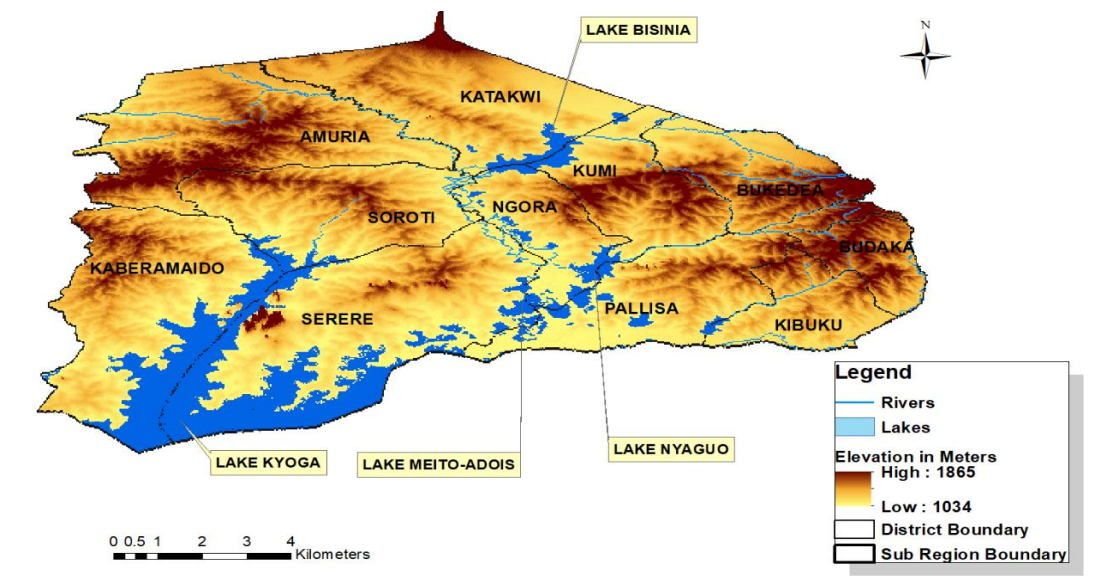
Figure 1. Map of Uganda



3.1 Introducing the Teso sub-region and study locations

Uganda is located in East Africa and lies across the equator, about 800 kilometres inland from the Indian Ocean. It lies between Latitude 10 29' South and 40 12' North of the Equator as well as Longitude 290 34' East and 350 0' East of Greenwich. The country is landlocked, bordered by Kenya in the East; South Sudan in the North; Democratic Republic of Congo in the West; Tanzania in the South; and Rwanda in South West. It has a total area of 241,551 square kilometres, of which the land area covers 200,523 square kilometres. It has a population of approximately 36m people with about 47.9 percent of the population aged less than 15years old (UBOS, 2014).

Figure 2: shows the Teso Sub-region, Eastern Region, Uganda



The **Teso sub-region** (previously known as **Teso District**) is a sub-region in Eastern Region, Uganda that consists of Soroti, Kumi, Ngora, Bukedea, Serere, Kaberamaido, Katakwi and Amuria districts (fig.2). Teso is bordered in the north and east by the semi-arid region of Karamoja, to the west by Lango and to the south by Bukedi. According to the 2014 National Population and Housing Census, 1.8 million people are living in Teso, 80% of whom belong to the Ateso ethnic group.

The Teso sub region is an undulating plateau, with large outcrops of rock, divided by shallow lakes and swamps. The region has bimodal rainfall regime, supporting two cropping seasons. The first and major cropping season normally starts in March and runs until mid to late June/July when the dry season sets in. The second and minor rains are often received between August and early December when second season harvests begin (UBOS, 2014).

The Teso sub region has had a history of civil unrest such as cattle rustling that existed since the 1940s. In the beginning, the cattle rustlers used spears and later locally made guns called “Amatida”. This low capacity limited cattle rustling activities to the borderline areas of Karamoja and the then Soroti District. Cattle rustling reached its peak between 1986 and 1990 when the Karamojong warriors overran the whole of Teso region. This was at the time when there was rebellion in Teso against the government and delivery of social services including security broke down. The affected people moved into government facilities like sub county headquarters, dispensaries, schools which later became camps where government provided security through the local militia and soldiers. The attacks from the Karamojong resulted in over 74 Karamojong induced camps hosting about 176,911 people in Katakwi district (NRC, 2005).

The Teso rebellion in 1985 also resulted in large scale displacement when people were forced into a “protected” camp by the government in 1990. The IDP situation in the Teso region was further aggravated by an incursion of LRA rebels in 2003 and 2004 which forced 300-400,000 people to leave their homes and seek refuge in camps mostly in Katakwi, Kabermaido and Soroti districts. Mass killings, looting and burning of houses and land, and abductions of children became common. Tens of thousands of people from villages in Soroti and Katakwi district poured into Soroti town in search of safety. Kabermaido residents mostly fled to nearby village camps or trading centres, surviving without any assistance and facing severe shortages of food and water. By late 2003 the majority of the LRA left Teso region and moved into Lira district. A few months later, some of those who had sought

refuge in Soroti town started to return home to rebuild their homes. This displacement greatly distorted the existing settlement structures of the communities leaving certain areas of the district over populated or deserted. The most impactful immediate driver to land dispossession in Teso is the mass displacement that was caused by the violent conflicts (Kandel, 2015).

Note: During our research work, we were notified that Kapelebyong was to be given district status and as of 2019, Kapelebyong is no longer a county in Amuria district but an independent district.

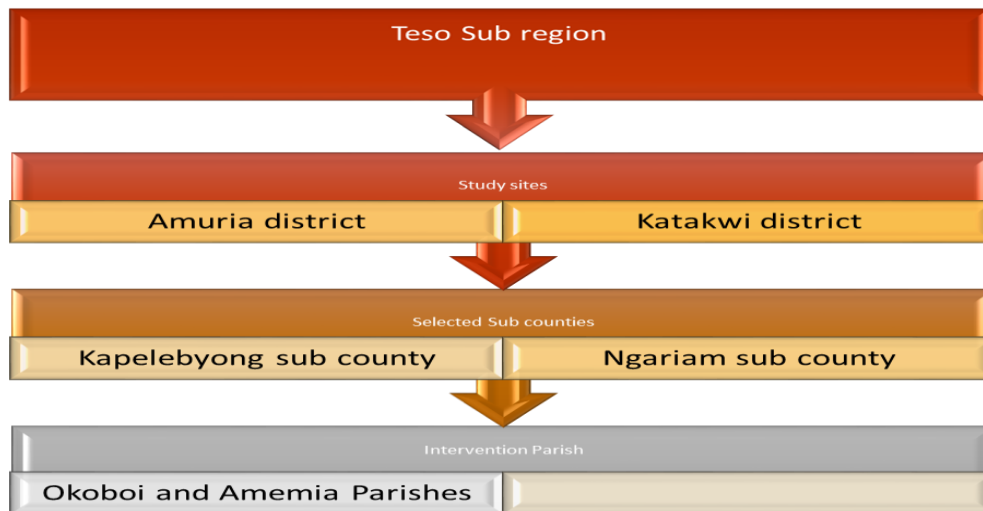


Fig 3: shows the Study sites: Amuria and Katakwi

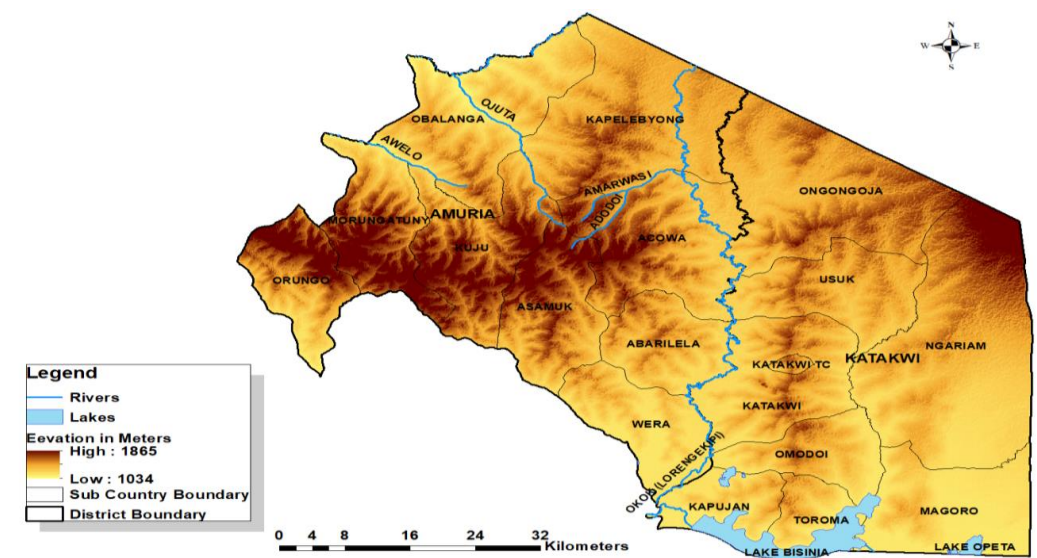
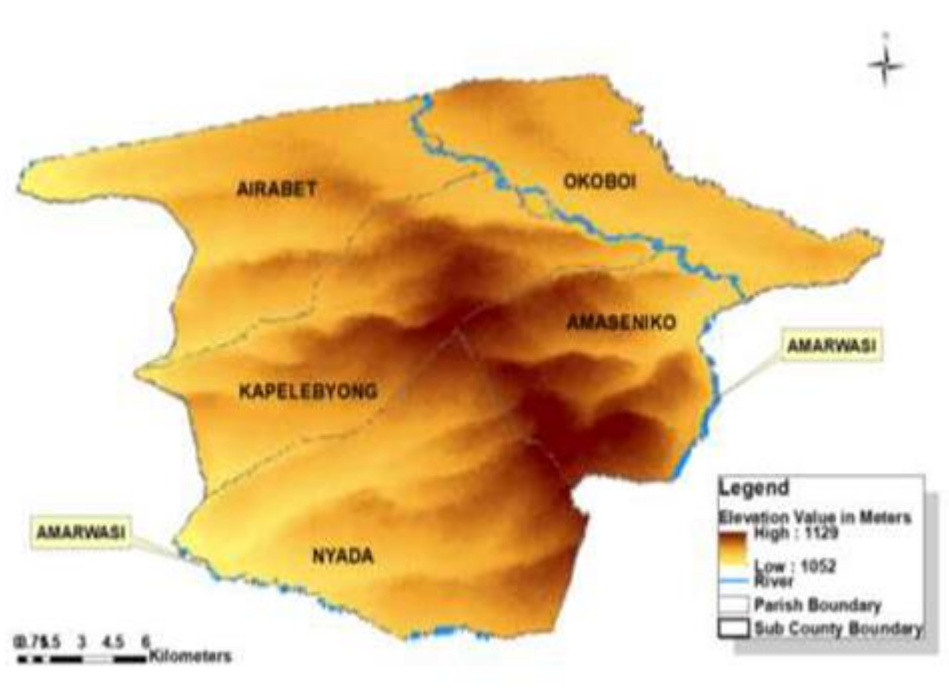


Fig 4: Okoboi Parish- The intervention area



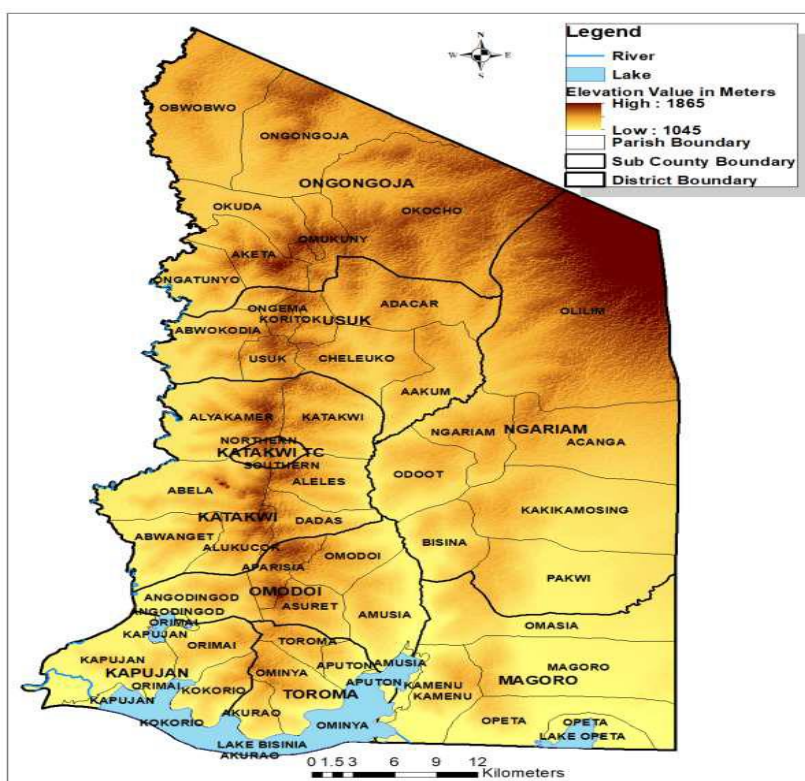
a. Introducing Amuria District

Amuria District is located in North-eastern Uganda and it is bordered by Katakwi District in the East, Soroti District in the South, Kaberamaido District in the South West, Napak District in the North East, Otuke District in the North and Alebtong District in the West. Amuria comprises two counties of Kapelebyong and Amuria with a total area of 2,695.6 square kilometres.

The district has a population of approximately 270,928 with more than half being below 17 years (59.8%) and female (51.1%). The district has about 48,234 households with majority (74.1%) of the households being male-headed. About 37.6% of persons aged above 18 years are illiterate. The majority (84.4%) of children aged 6-12 years attend primary school but only 27.8 % attend secondary school(UBOS, 2014a).

In **Kapelebyong sub-county**, the pilot location for FbF, about 13.1% of children aged 6-12years old don't attend school and about 38.9% households are located more than 5km away from the nearest health facility. About 34.7% of all households have no sanitary facility and 16.2% have less than one meal a day. Only 1% of all households have no access to safe drinking water(UBOS, 2014a).

b. Introducing Katakwi district - Control site



Katakwi District is a district in the Eastern region of Uganda bordered by Napak district to the north, Nakaapiripirit district to the east, Kumi district to the South, Ngora and Soroti districts to the South west and Amuria district to the west. The district is divided into two counties namely; Usuk and Toroma, with nine sub counties. The district's 'chief town', Katakwi, is located approximately 55 kilometres (34 mi), by road, north of Soroti, the largest town in the sub-region. The district has a population of approximately 166,231 with just over half being female (50.9%). It has about 30,744 households of which 70% are male headed households. More than half of the population in Katakwi is of children aged under 17 years with school attendance levels dropping with increasing education level (UBOS, 2014b).

In **Ngariam sub-county**, about 29.95% of households consume less than 2 meals per day and about 26.1% have no sanitary facility. Less than 1% of households have no access to safe water and more than half of households are located 5kms away from the nearest health facility. Only 11.1% of children aged 16-12 years old are not attending school. (UBOS, 2014b)

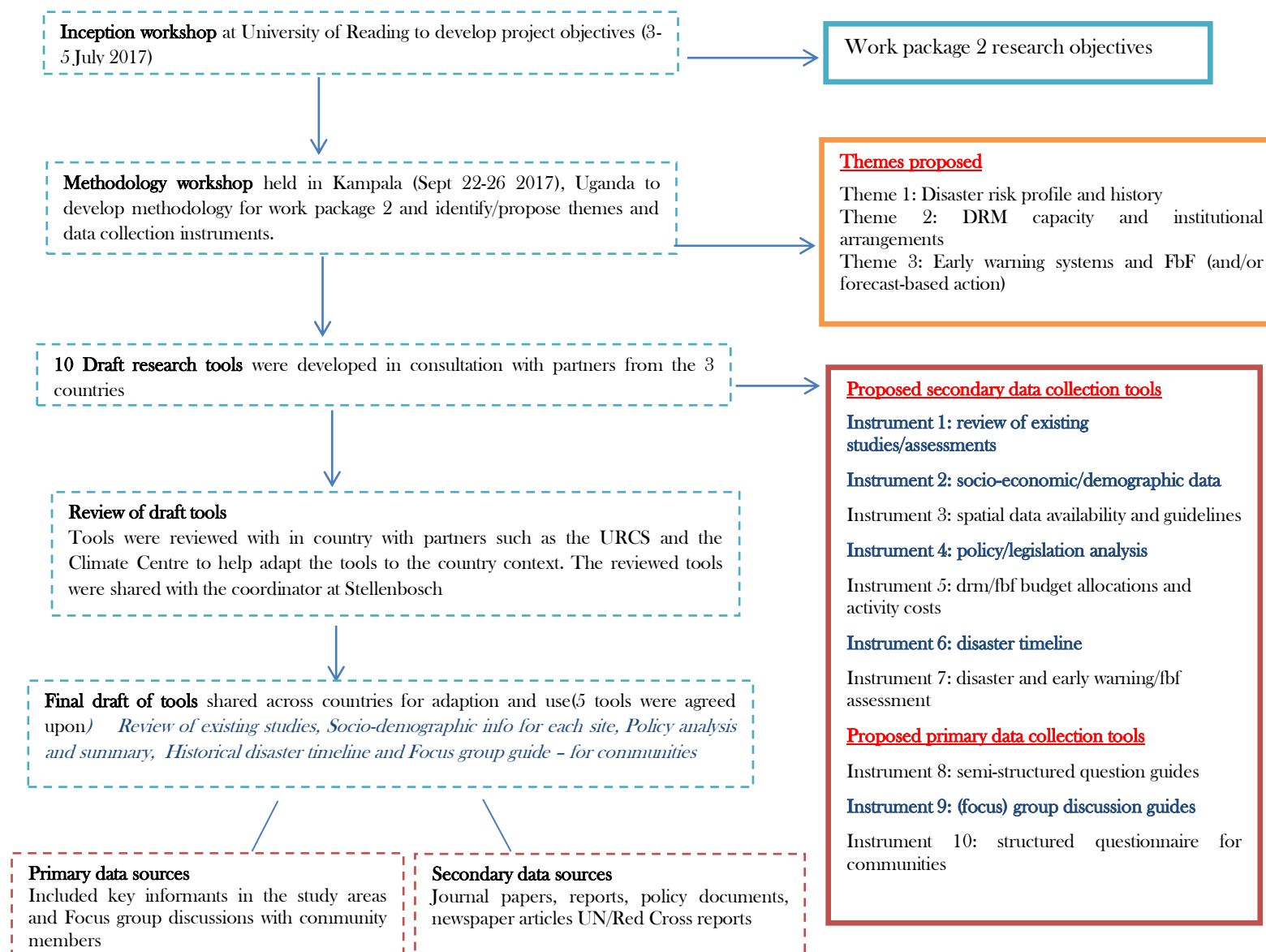
4. OVERVIEW OF METHODOLOGY

4.1 A Collaborative Process

In order to align the research methods in the three countries a collaborative methodology was developed jointly with team-members from Uganda and Mozambique, in consultation with other FATHUM researchers. This process (shown in Fig. 5) spanned 12-16 months, and included consultation with team members in the Reading, Kampala and Stellenbosch. The process evolved so that the comparative research in three sites could provide valuable insights on the effectiveness of FbF in different settings, including understanding of the enabling and constraining factors for its

implementation. This schematic diagram (Fig. 5) illustrates the processes followed in the development of the research methodology.

Fig 5: Flow chart of work package 2 methodology



To enable a comparative analysis of findings across all country case study sites, the research team developed standardised data-gathering tools for collecting a range of primary and secondary data. The methodology comprised both secondary research and field work phases of investigation, enabling the appropriate approach to address the research questions. In developing the relevant methods and tools necessary for capturing data in each case study site, three broad themes (Figure 6) structured the conceptualisation of the research priorities and questions.

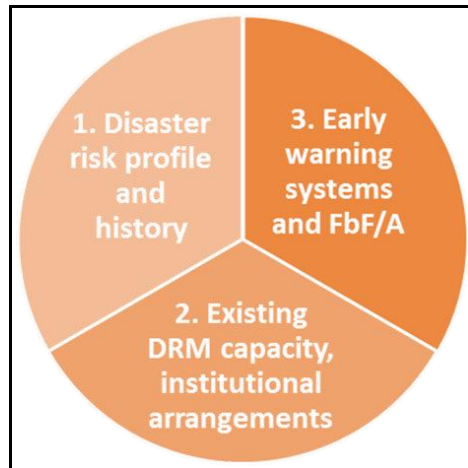


Figure 6: FATHUM case-study research themes identified

4.1.1 Research theme 1: Disaster risk profile and history

This theme focused on understanding the underlying drivers of flood risk, how these have changed over time, and the impact they might have on FbF. This necessitated a study of the biophysical, economic, political, social, and cultural factors that might increase flood risk. It was also necessary to document past hydro-meteorological disasters, unpacking the underlying drivers for each event, what their impacts were, if any FbF was taken and how. This information was critical for creating a baseline for understanding the disaster context within which decisions and activities related to FbF are being developed and implemented. It may also assist FbF stakeholders in developing better threshold triggers, determining the need for FbF activities and their application to other hazards.

4.1.2 Research theme 2: Existing DRM capacity and institutional arrangements

It was deemed critical to understand the existing local and national capacities. This required the identification of the stakeholders governing disaster risk and response, their responsibilities and capacities, and the relevant governing institutional frameworks. It was also critical to determine what actions had been taken before, during, and after past flood events by various stakeholders. The collected information provided a framework for exploring how FbF fits within existing mechanisms and processes, whether there is the capacity for integrating FbF into these, and the potential governance challenges for scaling up FbF in each site.

4.1.3 Research theme 3: Existing early warning systems and FbF activities

This focused on exploring existing early warning systems and FbF activities and capacities to understand how FbF could potentially add value. It necessitated investigating people's perceptions of FbF activities and the potential for integrating FbF into existing early warning systems. The aim was to map the process of communicating early warnings, identify the stakeholders creating, disseminating, and receiving the warnings, and documenting the timings of these warnings. In addition, the challenges of and perceptions regarding formal and informal early warnings, FbF, and disaster relief and response activities were also investigated.

4.2 Adaptation/application of the research methodology in the Uganda research site

The two research phases and disaster history as an example are described in more detail below in relation to the Teso case study in Uganda.

4.2.1 Secondary data assessment, literature and policy review

This included a review of existing academic studies, relevant reports, community-based risk assessments, Uganda Census reports, policies, and newspaper articles. The desktop review provided insights into historic disaster events, underlying risk drivers, vulnerability indicators, socio-economic and other demographic information, as well as key policies that might either address or exacerbate disaster risk in the study sites.

4.2.2 Disaster risk profile and history

This research focus incorporated two dimensions; the change in overarching development conditions linked to recognised flood risk drivers, as well as realised flood events.

The secondary data review probed patterns in changing flood risk drivers, including population change, as well as shifts in livelihood activities. Drawing on Blaikie et al's Pressure and Release Model (Blaikie et al, 1994; Wisner et al, 2004), the study examined potential root causes and dynamic pressure (eg land degradation, deforestation, population change, risk governance) over a ten-year period (from 2007-2017).

The focus on risk drivers was complemented by a critical examination of **realised flood occurrence** within the Teso sub-region during the same period. This involved compiling an historic review of flood events in newspapers and other publications relating to flooding within Teso sub region with a focus on mortality, number affected, and displacement, economic losses, knock on effects and Response. The inclusion criteria included any reporting of the flood and drought/famine disaster in Teso sub-region in the period from 2007 to 2017. It also drew on any publication that reported deaths or injuries; people who were affected and displaced; declaration of a state of emergency; or a call for international assistance. Multiple data sources were sought to ensure a complete listing of events, to allow for both human and geophysical factors to be included, and to facilitate cross checking of information between sources. During the review, two primary data sources dominated, local newspapers; URCS database, UNHCR database the DAILY Monitor and New Vision newspapers.

It was not possible to disaggregate loss and damage data to district scale, because most records reported cumulative numbers for flood impacts over regions such as Teso sub region. Moreover, due to missing data for variables (such as numbers affected by floods and economic impacts of floods), it was necessary to obtain this information through qualitative interviews with community residents.

4.2.3 Data collection

The main 'on the ground' data collection was undertaken for a period of three weeks in September 2018.

We conducted a qualitative study that used Focus Group Discussions (FGDs) and Key Informant Interviews (KIIs). FGDs and KIIs were best suited to explore underlying causes of flood risk, flood history, livelihoods and coping strategies for floods.

A total of about 80 participants were involved in the 10 FGDs. The FGDs were drawn from the community members, mainly opinion leaders, political leaders, cultural leaders and other categories of individuals who had a good knowledge of the flood history of the area. All participants were aged

18 years and above. Participants from each focus group had both males and females. Despite gender not being a direct influence for behaviour as regards disasters, we still conducted separate group discussion for every gender due to the socio cultural set up of the community. FGDs participants were from rural areas worst affected by floods. We also conducted 12 KIIs with District Technical Officials, representatives from the Uganda Red Cross Society (URCS) and district Political/ Opinion/Religious leaders from Katakwi and Amuria.

Data collection process

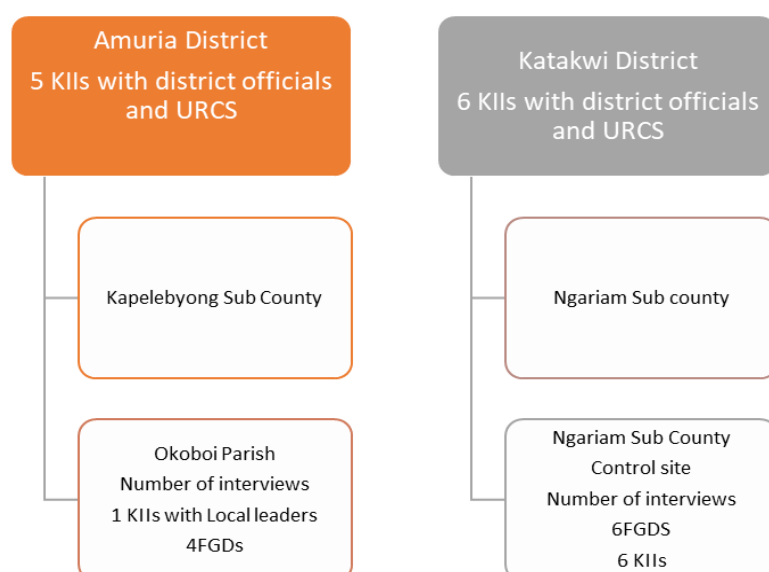
The focus of the study was assessing the underlying drivers of flood risk, livelihoods, coping capacity of communities, early warning systems and the available local capacities to handle flood hazards. The target districts were selected based on the presence of the FbF intervention and the similarity in their flood risk. Kapelebyong sub- County was selected in Amuria as the intervention area where FbF was triggered while in Katakwi district, the sub county selected was Ngariam subcounty because it was an area where the URCS intervened and also because the two areas had similar flood risk and similar population demographics characteristics. We conducted 6 FGDs in Ngariam sub county and 4 FGDs in Kapalebyong Sub County.

We recruited four experienced research assistants who also had a good working knowledge of English, and the local language (Ateso) and trained them on the study protocol and procedures. The KI and FGD guides were pretested among the research team in order to get feedback on questions that were not clear. This was done prior to data collection. All research assistants also participated in the data collection process.

During interviews we asked open ended questions followed by targeted questions on predetermined categories. Both guides focused on the hazard profile of the area, flood risk and history, copying strategies, local capacities and early warning systems. The FGDs and KIIs were audio recorded after verbal consent was obtained.

The FGDs and KIIs were all transcribed verbatim and those in the local languages translated without altering the meaning. A conventional content analysis approach was analysis was done in two stages, first, the manifest content analysis and then the latent content analysis.

Fig 7: shows the data collection process



5. FINDINGS

5.1 Overview

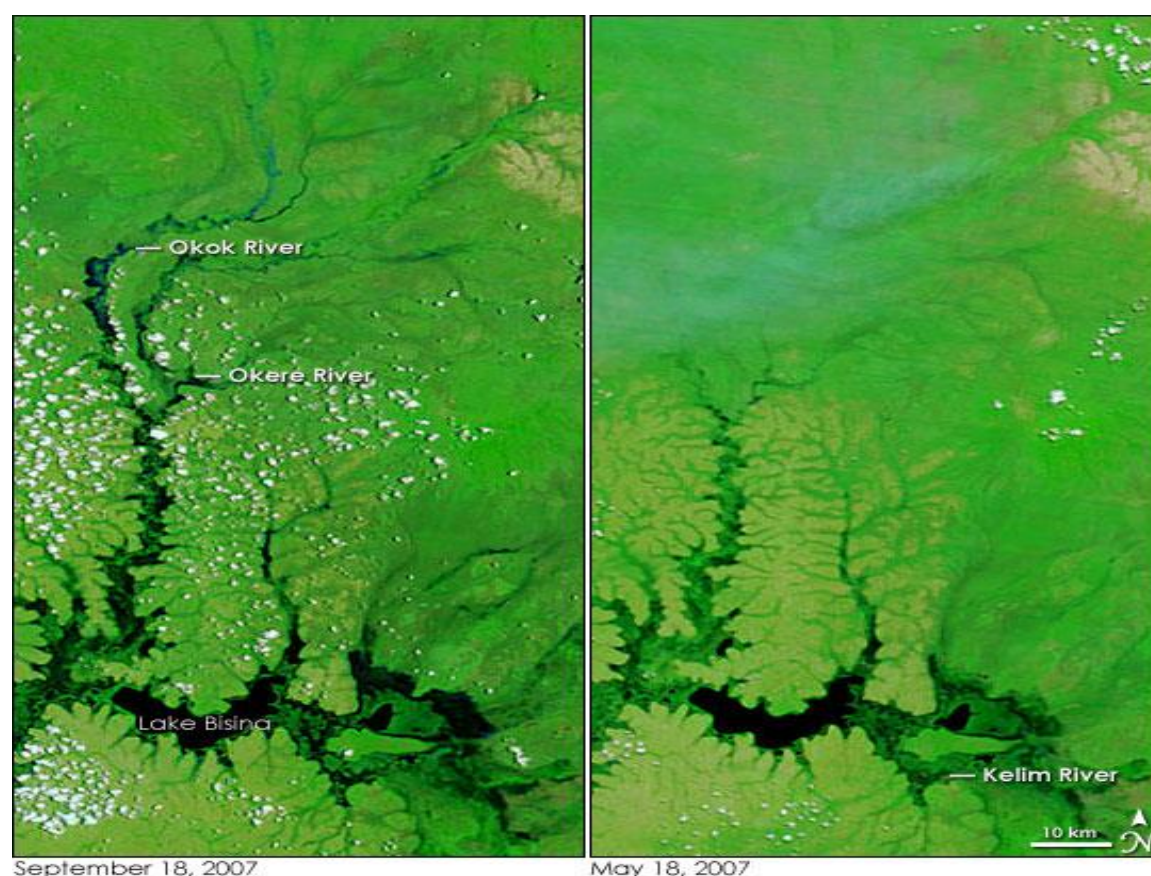
The desktop study revealed that floods alternated by drought have been the key hazards afflicting the two districts with floods contributing both material and human life loss. In this section we shall explore the estimated disaster losses attributed to floods, the flood history of the study sites between 2007 and 2017. This time period was selected for comparability between the 3 study sites.

5.2 Recorded flood disasters in Amuria and Katakwi, 2007 - 2017

5.2.1 Overview of identified flood disasters

In this eastern part of Uganda, floods widen the rivers flowing into Lake Bisina (satellite images of 2007) leading to water pooling in the U-shaped bends of the Kelim River east of the lake, and the Okok and Okere Rivers to the north (satellite Images of 2007). The rivers then burst and flood into the neighbouring districts of Katakwi, Kumi, Amuria and Soroti

Fig 7:(satellite Images of 2007) (NASA, 2008).



(NASA, 2008)

Since early 2007 and earlier, the districts of Amuria and Katakwi in Eastern Uganda have experienced inundation due to high rainfall totals. From July 2007, media has been awash with incidents of flood deaths, property loss and infrastructure breakdown as shown in figures 1 to 5. Floods in the two districts have regularly recurred in 2007, 2010, 2011, 2013, 2015, 2017, and 2018 as reported by media and as captured in the focus group discussions. The following tables trace the history of floods in Katakwi and Amuria districts as recorded by focus group discussions and the districts' technical

teams. The tables also highlight extent in terms of areas affected, the impacts of the floods and the vulnerable groups involved.

a) Flood History in Katakwi District

Table 1: Flood History in Katakwi District

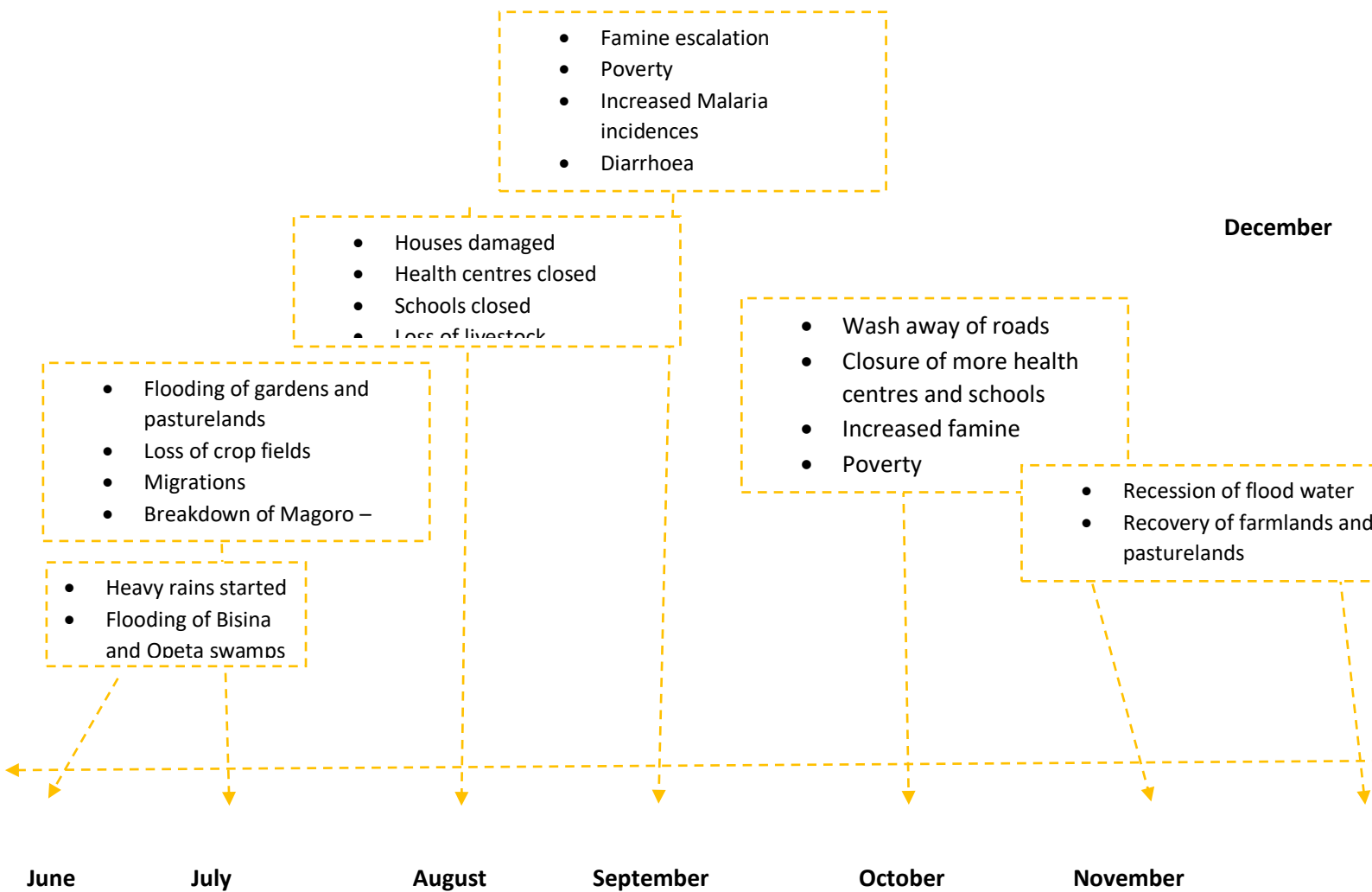
Flood Year	Flood Month/s	Flood Extent [Affected Parishes/Villages]	Flood Impact	Vulnerable People/Property
2007	June – December	Kamenu, Masia, Angisa, Opeto, Magoro	Loss of lives (10 people), Loss of property Livestock loss, Closure of schools and health centers	Children, Women Disabled, All food crops
2011	July – October	Kamenu, Aleles, Kaikamosing, Kolir	Loss of lives (3 people dead), Migrations (40 families) Increased incidences of snake bites	Elderly, Children, Women, All food crops
2013	August – September	Kamenu , Aleles	Loss of groundnut and cassava gardens	Cassava and Groundnuts
2018	April – July	Kamenu, Omasia, Angisa, Opeto, Omagoro	Loss of lives (2 children and 1 adult), Loss of property (110 houses damaged), Migrations Increased snake bites incidences	All food crops, Children

In Katakwi district, devastating floods were first recorded in 2007 in which more than half the district flooded for seven months with variation in intensity. This flood resulted into loss of lives, livestock and property and rendered most especially the elderly and women, the disabled and children vulnerable. Because the floods caused the inundation of gardens and pasturelands, all in season crops were especially exposed and vulnerable. This flood was followed by equally shattering floods in 2011, 2013, and most recently in 2018. Historical records indicate that floods reappear every after a break of one year or utmost two years. For instance, a flood year like 2011 would be followed by a typical year (2012) which would be succeeded by a flood year again (2013). Although there is a possible flood pattern, the period observed is not long enough to confirm its cyclicity. Focus group members found it impossible to recall flood events before the 2007 floods.

On average, floods tend to dominate the months of June to November of flood years. In some years (i.e. 2018) floods start as early as April and run to July while in others, floods claim the better part of the year until December. From the case studies below, it is evident that floods tend to peak in July and August, after which the impacts span the following months depending on the depth of water.

Key impacts of the floods in the district ranged from loss of lives, livestock and property to washed-out roads and destroyed bridges. In several areas, increased cases of malaria, snake bites and liver fluke infestation were also reported.

Fig 8: Katakwi Flood Case study [2007 Floods Timeline



b) Flood History in Amuria District

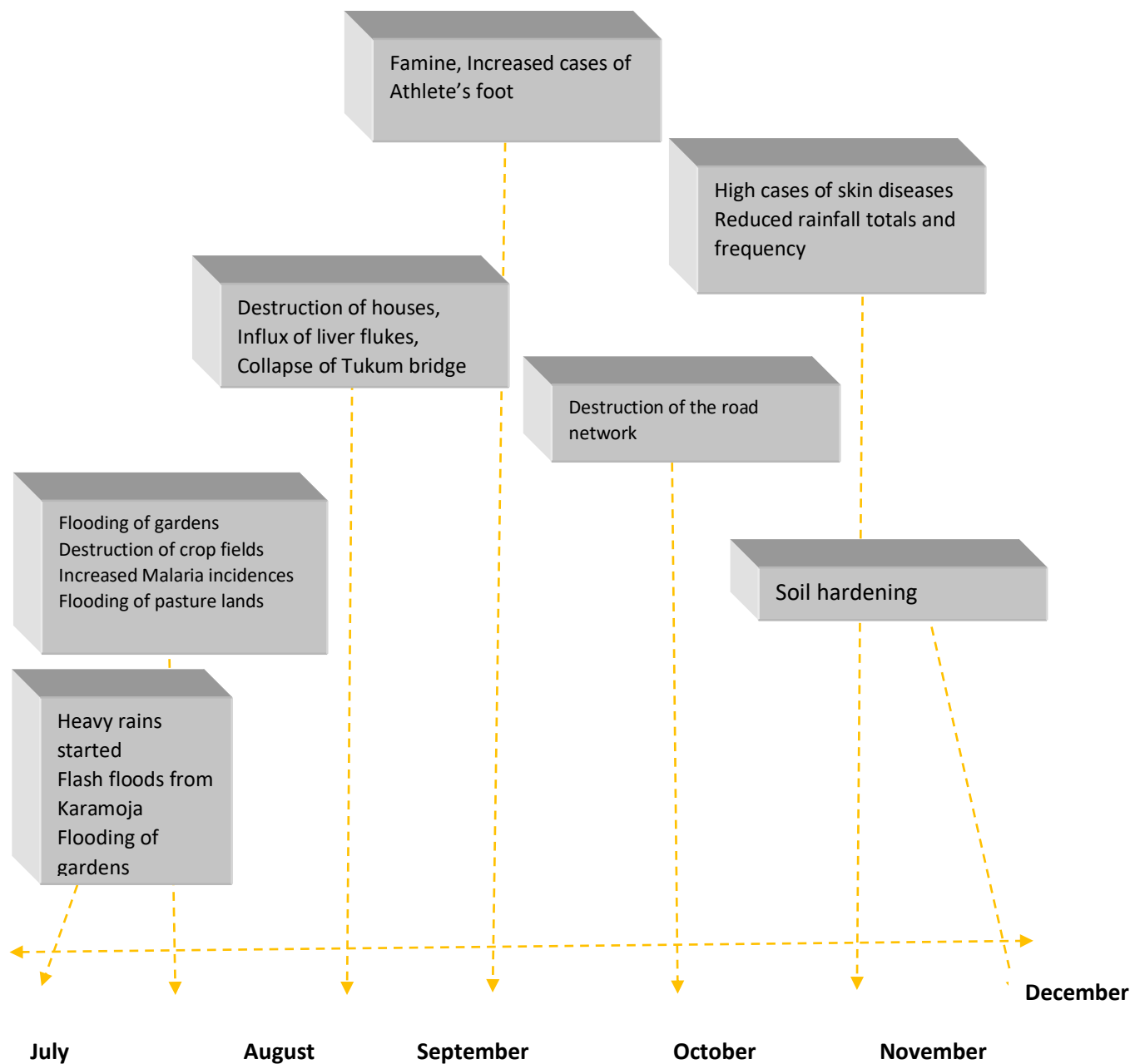
Table 2: Flood History in Amuria District

Flood Year	Flood Month/s	Flood Extent [Affected Parishes/Villages]	Flood Impact	Vulnerable People/Property
2007	June – September	Apedu Oliabai, Omatai, Ocapai, Amemia, Akum, Mobasa	Destruction of houses, Loss of livestock, Breakdown of bridges, Reported cases of Pneumonia in the elderly, Reported cases of Athlete's foot, Water pollution, Escalation of river flukes Destruction of roads	Children between ages of 4 to 12 y The Elderly
2008	August – November	Apedu Oliabai, Omatai, Ocapai, Amemia, Akum, Mobasa	Destruction of houses, Loss of livestock, Breakdown of bridges, Reported cases of Pneumonia in the elderly, Reported cases of Athlete's foot, Water pollution, Escalation of river flukes Destruction of roads	Children between ages of 4 to 12 y The Elderly
2013	May – November	Apedu Oliabai, Omatai, Ocapai, Amemia, Akum, Mobasa	Destruction of houses, Loss of livestock, Breakdown of bridges, Reported cases of Pneumonia in the elderly, Reported cases of Athlete's foot, Water pollution, Escalation of river flukes Destruction of roads	Children between ages of 4 to 12 y The Elderly
2015	August to December	Apedu Oliabai, Omatai, Ocapai, Amemia, Akum, Mobasa	Destruction of houses, Loss of livestock, Breakdown of bridges, Reported cases of Pneumonia in the elderly, Reported cases of Athlete's foot, Water pollution, Escalation of river flukes Destruction of roads	Children between ages of 4 to 12 y The Elderly
2017	August to November	Apedu Oliabai, Omatai, Ocapai, Amemia, Akum, Mobasa	Destruction of houses, Loss of livestock, Breakdown of bridges, Reported cases of Pneumonia in the elderly, Reported cases of Athlete's foot, Water pollution, Escalation of river flukes Destruction of roads	Children between ages of 4 to 12 y The Elderly

As with Katakwi, the 2007 floods that ravaged the entire Eastern region were the first recorded floods in Amuria district. Flood events before 2007 were not reported as the participants had poor memory of such events. In this district, floods were recorded in 2007, 2013, 2015 and 2017. The flood pattern observed in Katakwi was also noted in Amuria district. Major floods occur every after a typical non-flood year. The typical years as noted from group discussions may experience low to moderate flood events.

In the District, floods peaked in the months of September and October with most floods starting in August and running until November and December. Major flood impacts included; loss of lives, property and livestock. Water borne diseases were also reported on the rise.

Fig 9: Amuria district [2007 Floods Timeline]



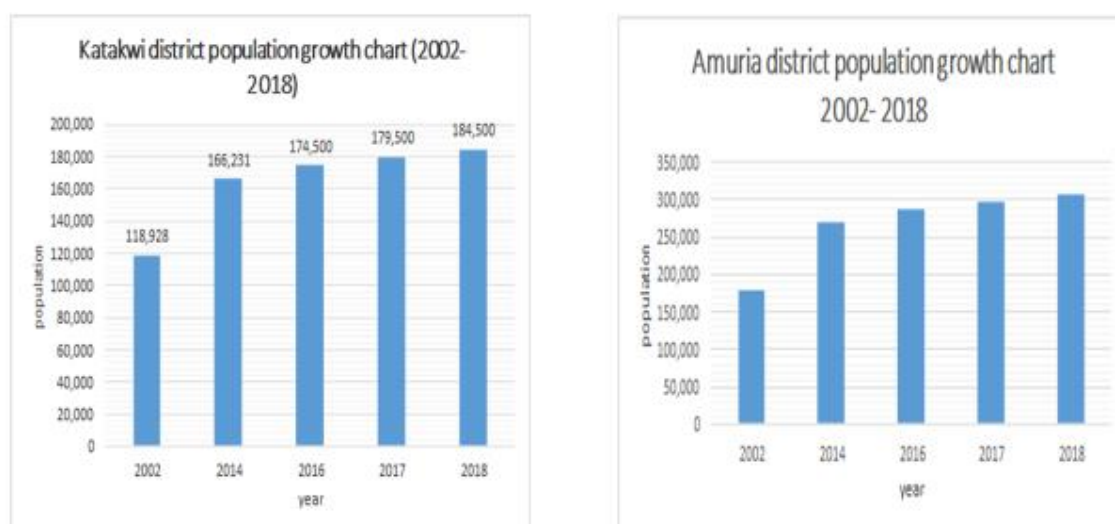
5.3 Disaster risk drivers for Amuria and Katakwi

Introduction

The drivers of flood risk in the study sites are multifaceted and range from environmental conditions (incl. deforestation), population change, economic conditions, and infrastructure change such as road network, telecoms, socio-cultural factors and governance. For instance the population of both districts has gradually increased over the years with the population shooting from 180,000- 307,000 and 118,000- 184,000 in Amuria and Katakwi respectively within a time period of 2002-2018 (UBOS, 2019) as illustrated in the figure 10 below. This Population pressure has forced people to settle in areas that used to be river channels (Mayega et al., 2015). The primary effects of flooding are loss of

life and livelihoods; displacement the 2007 floods left over 143,000 people displaced and led to massive destruction of crops and crop failure; destruction of bridges, roads and buildings; blocked urban drains and flooded latrines; and contamination of water sources ((NUDC), 2012)

Fig 10: shows population growth in Katakwi and Amuria from 2002-2018



Source: Uganda Bureau of Statistics, Statistical abstract 2019 (UBOS, 2019)

5.3.1 Biophysical/environmental drivers of risk

Amuria district has soils that are predominantly shallow grey brown sandy loams over laterite and greyish brown sands and sandy loams whose parent material is lake deposits derived from basement complex granite, gneisses and other materials. These can support agricultural production of fast maturing cereals, leguminous and tuber crops(UNDP, 2014a). However a significant proportion of the district is covered by wetlands/swamps that often have calcareous black and grey clays whose parent material is River Alluvium. Other soil types that cover small patches of the district include grey clays with occasional sand (found in Morungatuny and parts of Obalanga sub-counties), brown sandy loams over mottled grey clay and black calcareous clays and clay loams (these are found in the northern parts of Kapelebyong sub-county).

The district is characterized by a bimodal type of rainfall with peak periods in the months of March-June and September-November. However, the district experiences pronounced erratic weather conditions quite frequently, manifesting as excessive rainfall within a short period leading to water-logging, or lack of rainfall over a long period of time (not less than three months), resulting in drought. Thunderstorms accompanied by heavy winds usually occur at the onset of every rainfall season, often resulting in destruction of buildings, trees, vegetation, crops and sometimes life. Occasional hailstorms during rainfall peaks can result in the destruction of crops and even livestock (UNDP, 2014)

The control study area has a peculiar geomorphology that is generally a plateau with gently undulating slopes in certain areas with an altitude of approximately between 1,036m – 1,127m above sea level. The district has a climate characterized by two seasons: a wet season during March – October and a dry season during November – February. The mean annual rainfall varies from

1000mm – 1500mm(UNDP, 2014b). The rainy season has a principal peak due around March - June and a minor peak around August – October. December and January are usually the driest months however; recent rainfall has been unreliable and unpredictable. The district sometimes registers extremes of both very heavy rainfall and drought. In some cases, hailstones accompany the heavy rainfall. Water-logging due to heavy down-pours is sometimes experienced in many areas, especially in Ngariam and Magoro sub-counties(UNDP, 2014b).

Katakwi District records a mean annual maximum temperature of 31.3°C and a mean minimum of 18°C with a relative humidity ranging from 66% to 83% at 0600 GMT in the morning, and 35% - 57% at 1200 GMT, thereby reducing chances of rainfall(UNDP, 2014b).

The soils are mainly of ferralitic type constituting of sandy sediments and sandy loam with a vegetation that is largely savannah grasslands dotted with shrubs and trees, dominated by Acacia, Combretum, Piliostigma, Butyrospermum paradoxum and Hyperenia species. Geological surveys have revealed that Precambrian age basement complex rock of granites; migmatites, gneiss, schist and quartzite underlie most areas of the district. (UNDP, 2014).

The two districts neighbor the Lake Bisina so whenever it rains heavily, flood waters burst open the Lake leading to water pools in the U-shaped bends of the Kelim River east of the lake, and the Okok and Okere Rivers to the north. The rivers then burst and flood into the neighbouring districts of Katakwi, Kumi, Amuria and Soroti.



Poor road network in Amuria district

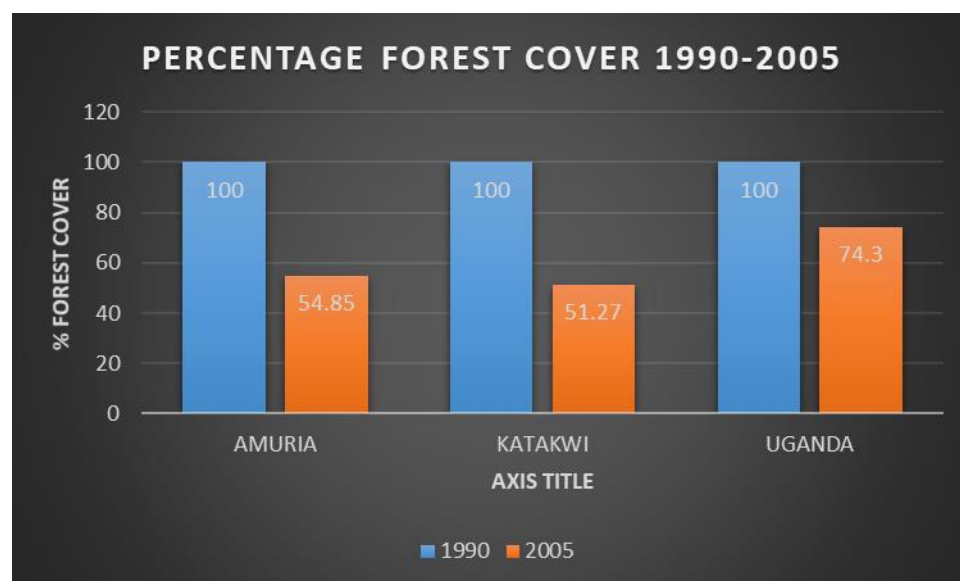
5.3.2 Environmental degradation in Amuria and Katakwi districts

The forest cover in the two districts has greatly declined over time by nearly half as illustrated in the figure below (NFA, 2005). This loss is attributed to depleting gazetted forest reserves and trees on privately owned land that are felled at alarming rates without replacement. Commercial forestry mainly exploits the following species for charcoal, firewood and timber (UNDP, 2014a).

The scale of commercial tree cutting in Amuria is so devastating that an immediate intervention is required to regulate the practice. The heaviest damage has resulted from charcoal production, but firewood and timber exploitation are also significant. The licensing of persons involved in tree cutting has not been undertaken despite the large number involved and the large quantity of trees felled per week(UNDP, 2014a).

Environmental degradation risk in Katakwi is high, although the town council which reports medium risk. Unsustainable exploitation of ecosystem services through the district has significantly degraded the environment. Causes and manifestations of environmental degradation include contamination of water sources, deforestation due to uncontrolled cutting of trees for charcoal, uncontrolled bush burning, wetland encroachment for rice cultivation, poor sanitation and hygiene in households, inadequate waste disposal and management, deteriorating soil fertility due to poor agricultural practices, destructive quarrying methods, soil erosion, stream siltation and water body pollution (UNDP, 2014b).

Fig 11: Forest cover in Katakwi and Amuria from 1990-2005



5.3.3 Economic drivers of risk

The main livelihood activities of these districts are subsistence agriculture and livestock rearing. In the last 10 years there's been a high stress burden on the land available for pasture with inhabitants opting to encroach on the forest land cover and the wetlands to obtain land for growing crops. In addition during the drought season, communities are forced to encroach on the wetlands due to the water stress for both their households and livestock. Charcoal production is a critical livelihood activity being practiced by numerous people in the district. This has resulted in tree cutting as a source of income which has negatively impacted on the natural ecosystems.

The Teso economy has historically revolved around peasant agriculture, pastoralism, fishing and hunting. This remains the case today, in addition to an upward trend in commercial agriculture and speculative land purchases (Kandel, 2015) however, from the late 1980s to the mid-2000s, three violent conflicts, namely the Karamojong raids, LRA war and the war between the National Resistance Army (NRA) and the Uganda People's Army (UPA) further decimated the Teso economy. It has been estimated that virtually all livestock was lost during the peak years of the violence from the late 1980s to the early 1990s (Mkutu, 2006) thereby greatly altering the livelihoods of the Teso people. See table below to observe the decline in proportion of households rearing livestock

5.3.4 Social and cultural drivers of risk

There have been continuous changes in the administrative and geographical boundaries of the districts with new districts being carved out of old ones. This has increased the vulnerability of the newly developed districts that often have poor road networks, non-existent infrastructure such as hospitals and electricity. Both districts of Katakwi and Amuria were originally part of Soroti district and though time has passed and the areas received district status, their infrastructural development has stalled compared to the parent district they were cut from.

In the past, elders in the Teso region ensured that land, especially land held under customary tenure, did not leave the clan through sales. As a result, widows were not evicted from their land by other relatives. Similarly, the sale of land by citizens who held leases or rights in customary land was therefore legally limited to only improvements on land. However, the Land Act of 1998 does not recognise the important role played by elders in the protection of land from leaving the clan, and protection of women. Consequently, Section 40 of the 1998 Land Act that was meant to protect women, is ineffective because the names of the women and children are not reflected on the land titles or certificates and land transactions. This includes the sale of land that complies with the Land Act of 1998 presided over by the Local council chairmen, and not elders. Hence, women are often left unprotected and vulnerable (NRC, 2005).

A study by (Mayega et al., 2015) reported that population pressure has forced people to settle in areas that used to be river channels. In addition, the use of poor-quality construction materials to make roads and houses makes them prone to destruction. Houses are built using local indigenous materials such as grass, mud and wattle. Similarly, the roads constructed in lowland areas are not raised, and when it rains heavily, flooding makes them impassable and easily destroyed. Most roads do not have water channels or culverts to direct water, so when heavy rains come, the roads are flooded.

5.3.5 Political/governance drivers of risk

The government has in place existing structures at the district level responsible for DRM, however these sub committees are often ill equipped with funds for their day to day running hence they are non-functional and lack the capacity to intervene in the event of a disaster and often look to the assistance for Humanitarian agencies.

Prior to the destruction of the Teso agro-pastoralist economy in the late eighties, wetlands were managed as grazing land for the benefit of any clan members owning cattle – which was the majority of households. The situation was complicated by the 1998 land law, which makes all wetlands state property (on environmental grounds. With no enforcement plan in place, a management and ownership vacuum has been created hence rather than maintaining the wetlands as an environmentally protected ‘no-go’ area, a free-for-all has been created, where a ‘common property’ (with rules and management at community level) has been turned into an ‘open access’ (no rules) resource. The situation is extremely sensitive politically, because some of the encroachment onto wetlands has been from outside Teso and has raised fears that the issue can be manipulated on ethnic grounds, either using the claim that ‘all Ugandans have the right to settle anywhere in Uganda’ or that “Teso lands are being stolen, because the Government is stopping Teso using their own land, in order to give them to ‘foreigners’ (i.e. non-Teso)” (Adoko and Levine, 2007). This lack of wetland ownership has made abuse inevitable as encroachers have claimed the wetlands through environmental degradation by destroying the existing fauna and flora.

5.4 Disaster Risk Governance

c) Institutional frameworks guiding disaster risk decision-making

Institutional arrangements

The implementation of the National Disaster Preparedness and Management Policy is a multi-sectoral and multidisciplinary process. The process involves all government ministries in collaboration with humanitarian and development partners, the private sector, local governments and the community. The Ministry responsible for Disaster Preparedness and Refugees in the Office of the Prime Minister is the lead agency in coordinating all stakeholders on disaster preparedness and management in the country. Disaster preparedness and management is a shared responsibility between the state and all citizens. The policy document for DDR in Uganda stipulates the following institutional flow for DRM. See figure 12 below

Funding

The Public finance management act provides for a contingency fund to be utilized in the event of a disaster. This fund is to be administered with the discretion of the minister and is a part of the annual budget and Parliament may, in addition to the amount appropriate such other money as it may deem necessary. The Contingencies Fund is to be used to provide funding for supplementary expenditure and to respond to natural disaster. Eighty five percent of the money of the Contingencies Fund is to be used to finance supplementary expenditure and fifteen percent is allocated to finance responses to natural disasters. Where required, more than fifteen percent of the money may be used to finance disasters. (The Public Finance Management Act, 2015).The limitation of this fund is that it only applies in response to a natural disaster and not in preparedness activities.

District DRM structures

An evaluation by communities indicated that there were no organisational structures for disaster preparedness or emergency response, early warning systems nor community and household contingency plans. Individually, each household takes care of itself in an emergency and that there is no centralized disaster management system. When there have been any emergencies, such as during the current flooding in parts of Serere and a few others, households individually took care of their needs. Where the situation covered a relatively large geographic area, the communities reported that even local administration, such as at the sub-county, lacked the means to effect any plans due to inadequate planning and resources. The lower cadre administrative structures rely on the district authorities who in turn look to the central government for any response, with often minimal positive response, if not after a long time(Mutengu, 2011)

International standards on disaster response and preparedness require that when disaster occurs, it is responded to within the first 48 hours (i.e. 2 days) of the occurrence of disaster, in the case of the 2007 floods in Teso, It took the Office of the Prime Minister(OPM) an average of 1,176 hours (i.e. 49 days) to respond to some disasters(OAG, 2010)

The delays were attributed to OPM's inability to maintain adequate stock of emergency food relief items in the stores. For example at the time floods hit Teso region on 24th August 2007, there were only 112,000 kgs of maize flour which could feed 250,000 people (i.e. 72%) out of 348,000 affected people in the whole region for only one day.(OAG, 2010)

At the local government (district and sub-county) levels, disaster management structures such as District Disaster Management Committees (DDMCs) and Sub-County Disaster Management Committees (SCDMCs) have been established and plans to establish disaster management committees at parish level are underway (GOU, 2010). The committees are responsible for disaster management planning and coordination and the two study districts had fully developed district disaster management plans which included budgets. However, these were for planning purposes and were not funded as it was noted that the government doesn't have adequate funds (DRT, 2017).

Structures are functional at the height of a disaster but as calm is restored, the committees and structures become less functional. The committees are also reported to be existent and functional only in disaster prone districts in the country, mostly northern and north eastern districts, which have experienced prolonged and frequent disaster occurrences. DDMCs and SCDMCs are comprised of sector heads who may prioritise sector-specific issues over general disaster response issues, thus affecting the performance of these committees.

Local capacity during disaster

Communities reported that overall casual work such as digging trenches, clearing roads stood out as the most significant domestic response during the flood times, although in the early stages of the flood, evacuation to safer ground, sharing of food and shelter between host and displaced communities were more important. In 2007, it took about 3 months before external support started reaching the affected areas because the floods had completely cut off the districts from other parts of the country. Most relief agencies started intervening after the routes had been cleared and rehabilitated although movement was limited. During this period prior to the arrival of international assistance, communities survived on food which they had harvested before the floods while other community members who could swim would risk going to the fields to gather food. Those with some food shared it with their neighbours and relatives (DRT, 2017).

Humanitarian agencies

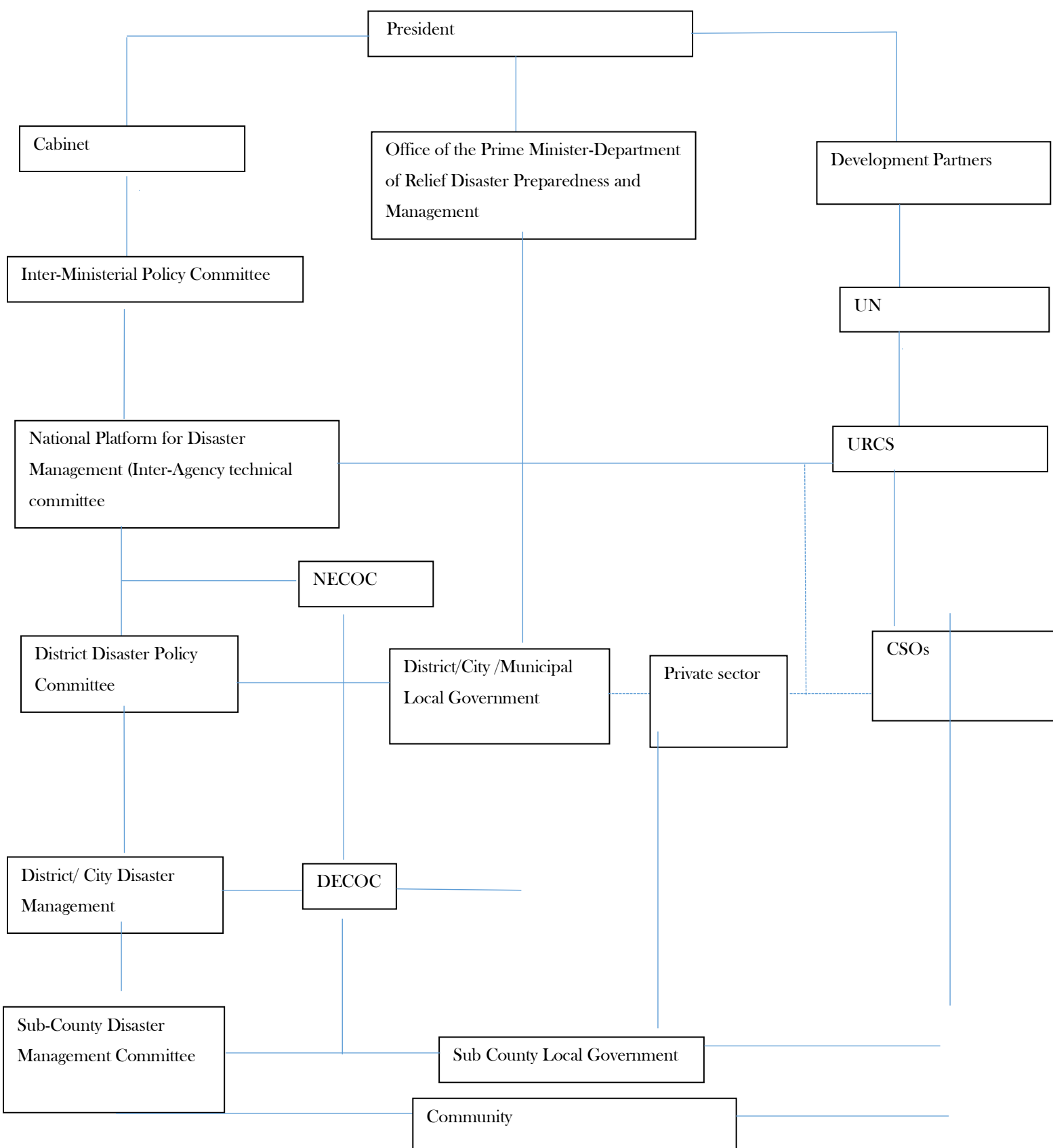
The humanitarian actors involved in the 2007 Teso floods response included the Government, Action Aid, WFP, WHO, UNHCR, UNICEF, THW, Red Cross Movement, ADRA, TASO and many other NGOs and Church affiliated organizations (WFP, 2007)

Communities view domestic response as more immediate than international assistance because responses by the affected community, such as aiding others to evacuate and hosting displaced persons, occur the moment a disaster happens whereas international assistance takes time to arrive. International assistance intervenes only after central government publicly declares a disaster or emergency situation and makes public appeals for assistance. Even agencies that are already operating in affected areas often wait for the official appeal before they scale up their interventions.

International humanitarian actors have been described as "hopping from one emergency area to another" with less commitment and coordination to sustain interventions in early post emergency situations. It was reported that most international agencies have presently shifted from Acholi and Teso sub regions including Katakwi and Pader to Karamoja region (currently perceived to have more humanitarian needs) despite recurring disasters in the previous districts. Decisions around flexible systems, structures, procedures, budgets and plans and above all, type of assistance are easier and regularly done with domestic response more than the international (DRT, 2017).

Key actors and organisations

Fig 12: Institutional framework for DRM in Uganda- Adopted from the National disaster policy document for Uganda 2015



b. Early warning systems (EWS)

To explore the existing early warning systems and actors involved in these activities, we reviewed published policy documents, progress assessment reports and related documents to establish how the Ugandan government manages its disaster risks with regards to policy framework guidelines and focusing on early warning and communication systems of floods. The inclusion criteria included: policy documents. Publications on early warnings in Uganda and Committee reports.

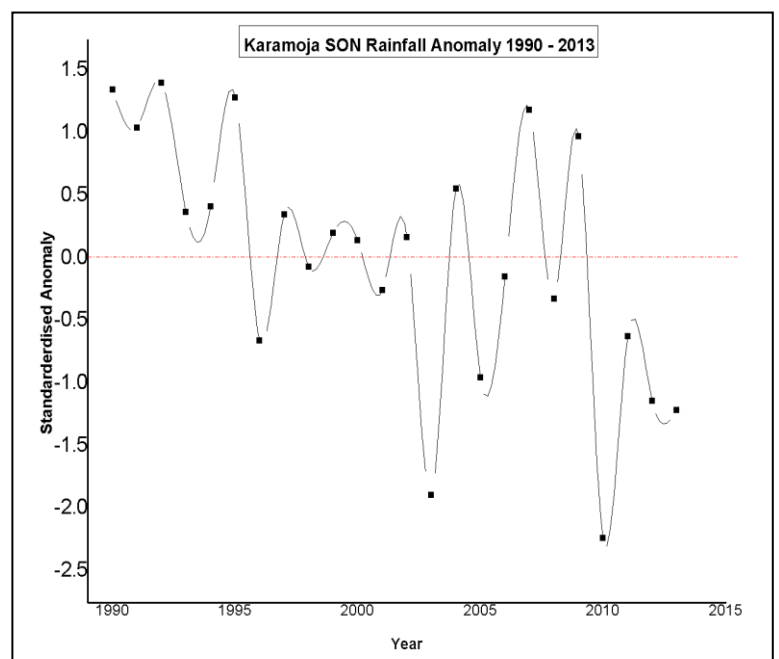
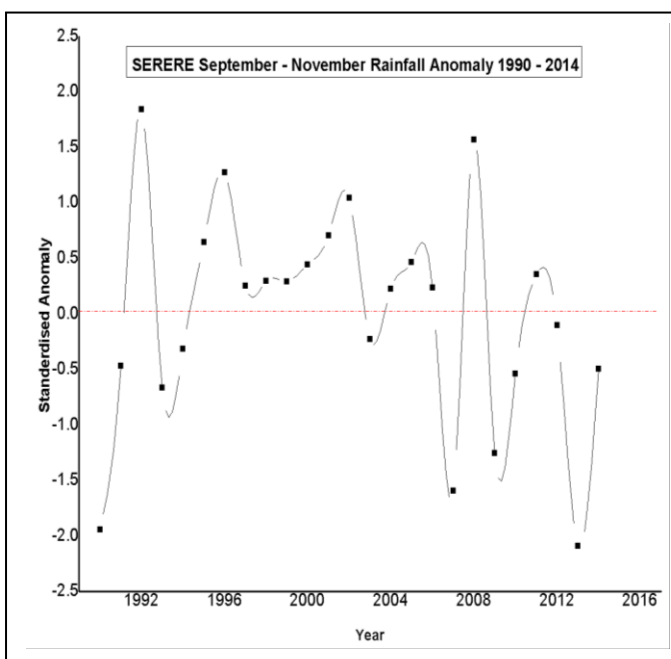
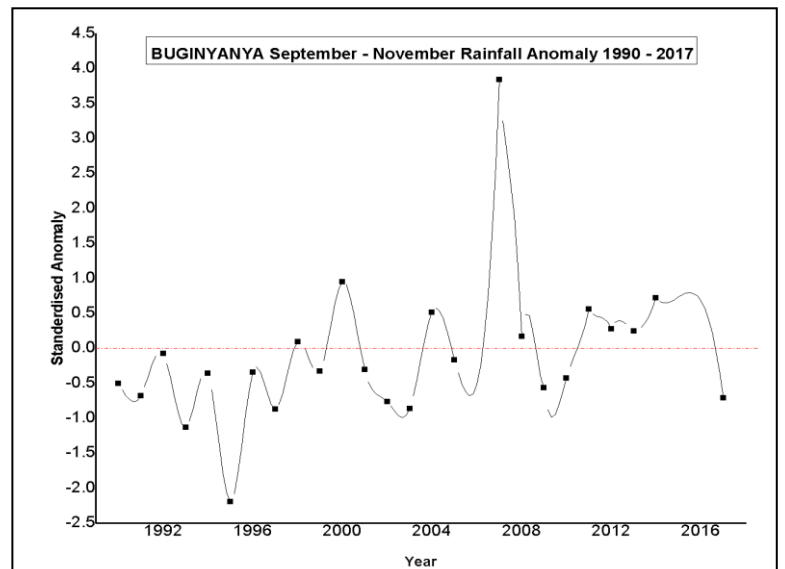
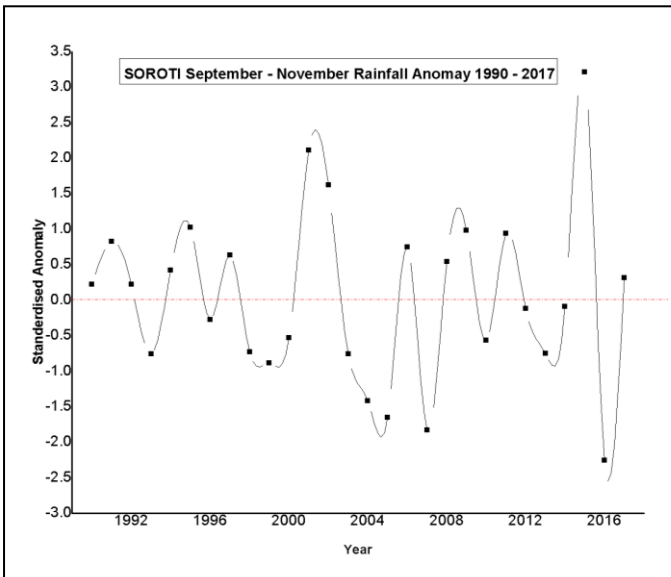
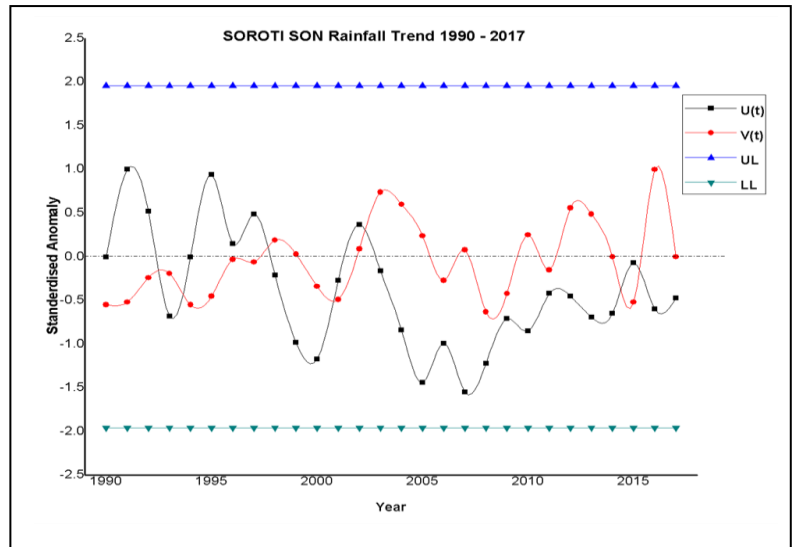
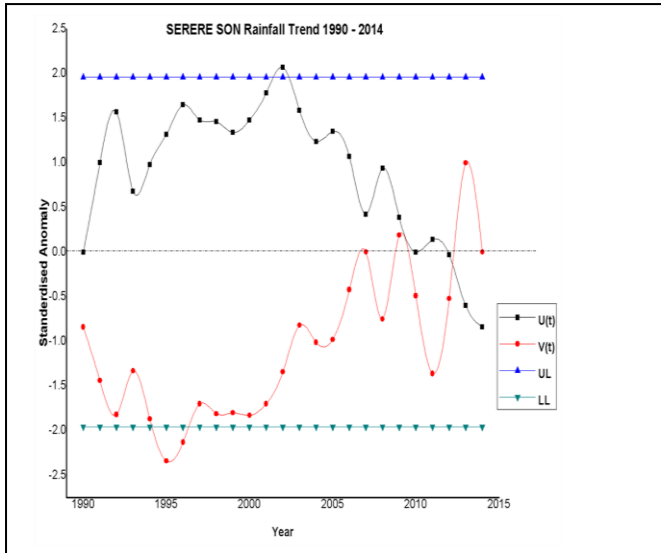
In Uganda the Uganda National Meteorological Authority is responsible for the monitoring and early warning reporting of weather related disasters at short and medium range basis as well as predicting extremes such as droughts, floods and landslides. It is an autonomous government institution mandated to analyze scientific research findings on climate change. The authority has 12 synoptic stations, 12 hydromet stations, 10 agromet stations and 300 rainfall stations. The national meteorological Centre issues weather forecasts that include daily 24 hour forecasts and tailored forecasts for public weather stations, warnings of hazardous weather and warnings about the impacts of severe weathers such as floods. In addition they also issue other short range forecasts such as 3-day, 5-day and ten day weather forecasts as well as weather outlooks and advisories routinely

The hydrometeorology division deals with monitoring water levels at river discharge for major rivers in Uganda and issues advisories and warnings as appropriate.

To assess the impact of high rainfall received in influencing flood episodes in Teso sub region, we retrieved rainfall data from September, October and November (rainfall months) from 1990-2016 to test the hypothesis that rainfall received in Teso sub region- represented by Soroti and Serere weather stations rather than rainfall from the neighboring highland districts represented by Buginyanya sub station and Karamoja substation are responsible for the flood occurrence over the years.

We also collected data from Bulambuli, Buginyanya sub-station to represent seasonal rainfall received from 1992 - 2016 the Elgon districts and Karamoja sub- station to represent seasonal rainfall received from 1990-2015 in the Karamoja sub-region. we analyzed the data using the Mann- Kendall Trend tests at a 95% confidence interval. This analysis showed that flooding within the Teso sub-region is caused by not only the high amounts of rainfall received in the region rather but also by high amounts of rainfall received upstream in the areas of Karamoja and Bugishu sub regions. See graphs below for details

Fig 13: Analysis of Rainfall Trends in Teso Sub-region and Surrounding Districts, 1990-2016



Uganda does not have a National Early warning system (NEWS) as a result, there has been a

proliferation of a few EWS each monitoring different hazards and issuing their own warnings targeted at various audiences. Some of these EWS are standalone and are not linked to any other. (UNDP, 2015). Most recently, NECOC is currently implementing a strategy to implement a national early warning system that will coordinate all the warnings generated by the various EWSs in the country

See table 3 for details on existing early warning systems in the country.

Table 3: Summary table of findings on early warning systems

Core indicator	Finding	Reference
National Flood early warning system(NECoC is working on one currently)	NECOC is currently implementing a strategy to implement a national early warning system that will coordinate all the warnings generated by the various EWSs in the country	(Lumbroso and Wallingford, 2018)
Dissemination and communication	The warning messages are disseminated in English but only reach a relatively small percentage of the total number of people at risk from floods in Uganda therefore there is a need to further diversify the languages of communicating forecast information to reach a wider population	(Lumbroso, 2016)
Types of EWS		
Forecast-based financing scheme for floods in North-East Uganda	This represents the Fbf action in Teso sub region that utilizes the Global Flood Awareness System (GLOFAS) which uses probabilistic forecasts of relevant variables (e.g. rainfall, temperature) from the European Centre for Medium Range Weather Forecasting (ECMWF) together with a simple hydrological and hydraulic model to produce probabilistic forecasts up to 40 days in advance.	(Lumbroso, 2016, Erin Coughlan de Perez et al., 2016)
Famine Early Warning Systems Network (FEWS NET)	FEWS NET is a project of the United States Agency for International Development (USAID) which monitors and reports on food security conditions and issues early warning to decision makers for response to emerging humanitarian crises. FEWS NET monitors hazards like drought, floods, price shock, livestock epidemics that may have an impact on food security.	(Atyang, 2014)
Drought Early Warning Systems (DEWS)	The DEWS is implemented in Karamoja sub-region largely by the district local governments with support from ACTED. It was set up purposely to provide communities, districts leadership and development partners with timely warning of increased risk of drought and therefore initiate implementation of drought preparedness measures. The DEWS is located in the seven districts of Karamoja run by technical staff from each district. The system isn't regarded as reliable by members of the community from a recent evaluation by URCS due to continued low levels of accuracy of early warning messages disseminated. There is a need to strengthen the accuracy of forecast information given.	(Atyang, 2014)
Flood Early Warning System in Butaleja District	The system is placed on River Manafwa between Himutu and Mazimasa sub-counties in Butaleja district. It has two warning levels; alert and alarm. The first sounding of a siren indicates that communities should prepare, while a second one indicate that they should evacuate. The warning reaches to the community within a 5 km radius. A recent evaluation by the URCS, established that this system is not fully functional mainly due to high maintenance costs and vandalism of system parts.	(Atyang, 2014)
Conflict Early Warning System (CEWARN)	It is implemented by the Conflict Early Warning and Early Response Unit (CEWERU) located in the Community Service Centre in Ministry of Internal Affairs on Jinja Road. Its basic mission is to assess situations that could potentially lead to conflicts or violence and prevent their escalation. It covers	(Atyang, 2014)

	the Ugandan side of the Karamoja cluster. In 2012 this was expanded to include Lamwo, Adjumani, Yumbe and Koboko because of conflict in S. Sudan; Bulambuli and Abim due to the spill-over effects of the conflicts in Karamoja. CEWARN monitors conflict in pastoral areas and related conflict such as cattle rustling	
Challenges affecting early warning for floods in Uganda	<ul style="list-style-type: none"> • Inadequate financing of disaster risk reduction. • The low priority accorded to DRR in national budgeting • There are several local/small scale? EWS in Uganda depending on mainly donors for funding which is not sustainable in the long-term. Establishing the NEWS under OPM would build a sustainable system. 	<p>(UPFDRR, 2013)</p> <p>(Atyang, 2014)</p>

d) Stakeholders involved in flood early warning in Uganda

According to the Uganda national Policy for disaster, the following organizations are responsible for awareness creation and management of all flood related events.

Ministry of Water and Environment (Lead Institution), Ministry of Agriculture, Animal Industry and Fisheries, Ministry of Lands and Housing and Urban Development, Ministry of Local Government, Office of the Prime Minister, Local Governments, Community and Private Sector, UN Agencies and NGOs, Ministry of Health, Ministry of Education, Ministry of Works and Transport, District Local Government, Research Institutions like NARO, Uganda Communications Commission (UCC), International Telecommunication Union (ITU), Uganda Red Cross Society, National Emergency Coordination and Operations Centre (NECOC), and the District Disaster Management Technical Committee (DDMTC)

Challenges facing early warning in Uganda

UNMA does not appear to be perceived by the Government to be important. Although there are currently a number of ongoing initiatives to strengthen the hydro-meteorological network in Uganda, the role of UNMA in forecasting and warning of weather-related hazards needs to be given more prominence. Currently the early warning capacity of UNMA is low (Lumbroso and Wallingford, 2018) In Uganda warning messages are often too general and are not geographically or livelihood zone specific.

There is also limited evidence of mechanisms in place to inform the community when the threat has ended and an absence of evidence on how people access and interpret early warning messages and lessons learnt, incorporated into message formats and dissemination processes.

The capacity of stakeholders to interpret and disseminate early warning information to engender contingency plans in advance of a threat is limited. In Uganda some 75% of surveyed stakeholders stated that existing EWSs “never “or only “occasionally “emphasise preventative actions (Lumbroso and Wallingford, 2018).

e) Implementation of FbF/ FbA in Uganda- Case of Amuria district

On November 9th 2015, the threshold set for the Forecast based financing in Amuria district was exceeded for the very first time leading to the activation of Standard Operating Procedures or forecast based actions. Upon receipt of the forecast, Uganda Red Cross Society conducted a quick

beneficiary verification procured and transported relief non- food items to 370 households in the villages of Okoboi, Omatai, Apedu and Akulonyo.

Each of the beneficiaries received a 20 litre jerrycan to store drinking water, 30 water purifying tablets, hoe to dig drainage channels/trenches that would keep water away from their houses. In addition, the households received 2 bars of soap, and two food storage bags to safely keep their harvest.

In April 2016 another trigger was activated for Amuria district, Kapelebyong Sub County. The second trigger was quite interesting in that URCS coordinated with other district partners including local government official who participated in assessments and mobilizing communities. The other key partner was WATESO an NGO whose doctors sensitized and demonstrated usage of water purifying tabs to the communities. Before the second distribution, the project team including RCCC jointly agreed to conduct an assessment to find out about households that still had previously distributed items and establish additional quantities to be distributed. Eventually the team distributed items to (approximately 400) households. Although UNMA and GloFAS forecast both predicted increased probabilities of flooding in the target areas during this period, the forecasts did not materialize. Consequently, the team acted in vain.

Challenges in the implementation of FbF in Amuria district, Uganda

FbF is a relatively new concept that is often confused for the routine DRM preparedness activities that the URCS is already doing in these communities. In addition the communities perceived the geographical area for the FbF intervention as being very small since only two parishes were assisted compared to the vast number of parishes neighbouring the intervention areas that either had similar flood risk or even greater. Since FbF hinges on the accuracy and precision of the forecast, communities raised concerns about the accuracy of the forecast since there were communities that were left out yet the reality of their flood risk on the ground was greater and the impact of the floods after the intervention proved greater also. The community members that received assistance from the FbF intervention noted that the items in the kit were limited and asked that for further interventions, more items such as tarpaulins be included and some the use of cash rather than non-food items. Some of the local leaders alluded to the mismanagement of the FbF kits since some households either sold off the jerry cans distributed or shared them with their neighbours. This undermines the intention of the intervention since all items distributed were given as a bare minimum for a single household. Lastly there was no criteria for selecting the most vulnerable populations as support was given to all people in the FbF intervention villages and members of the communities noted with concern that there were more vulnerable households that could have been left out.

6. CONCLUSIONS

a) Summary of findings

It is very vital to understand the complexities of a context in which an intervention such as FbF is being piloted because any gaps can undermine the success of such interventions. For instance, in our African risk context of Teso, we established that beyond the surface issues that drive risk (such as the fact that a significant proportion of the districts is covered in swamps and wetlands), there are other issues such as the environmental conditions (incl. deforestation), population change, economic conditions, and infrastructure change such as road network, telecoms, socio-cultural factors and governance that influence risk. Below is a summary of the findings.

Flood history

In this study, we established that the hazards that frequently affect our study sites are floods and droughts that follow in subsequent years. We evaluated the occurrence of floods between 2007 to 2017 and found that floods and waterlogging are almost an annual event that results in loss of crops in the gardens, destruction of houses, loss of livestock, breakdown of bridges disease outbreaks, water pollution, escalation of river flukes and destruction of roads

Drivers of flood risk

The major drivers of flood risk is the biophysical nature of the study sites coupled with environmental degradation and poor environmental conservation practices. In addition are other underlying issues such as the poorly developed infrastructure such as housing and road networks in the districts. Also the poor governance of the wetland resource and the long history of civil unrest from the LRA war and the Karamojong cattle raids that the districts have faced further highlight the vulnerability of the inhabitants. Other immediate issues include the huge loss of forest cover and the growing population that has led to encroaching of wetlands. There have also been cases of people in the study sites being involved in charcoal burning, an economic activity that has greatly reduced the tree cover in the districts.

DRM governance

The major actors in response to floods are majorly government, local community, Local NGOs and the URCS. In the cases where a state of emergency is declared, numerous actors such as the UN agencies and other bilateral agencies have been involved. Although there is an existing institutional framework for DRM in Uganda, however its functionality at the district level is often hampered by limited funds.

Early warning

Although there is no functional national early warning system for floods in Uganda, there are a few early warning systems that exist.

The absence of ready contingency funding for flood preparedness shows that there is need to evaluate where FbF will fall in the overall government priority. The major limitation of our research is the quality of secondary data available on the hazards and their impacts, there is need to strengthen the data capturing capacity for hazards in Uganda to strengthen and guide evidence based programming. In addition the magnitude of the intervention is not broad enough to be able to generalize the results on impact of FbF to communities as well as the unique context in which it was implemented.

b) Recommendations for further research and policy makers

- Since Amuria district suffers from multi hazards, it would be vital to create a multi-hazard Early Warning System with a single authority issuing warnings.
- Also due to the high illiteracy level at the district, early warning messages should be co-produced with the local people in their own language to facilitate ownership and ease of understanding
- UNMA currently give out seasonal forecasts however, these forecasts are not impact sensitive therefore there is need to strengthen UNMA through capacity building to carry out impact based forecasting
- Government should take an active role in curbing wetland encroachment by taking ownership of these public properties to prevent environmental degradation
- To better understand the impact of FbF as a preparedness tool for DRM, we need to carry out a cost benefit analysis for FbF. We also need to evaluate the use of FbF for either other hazards or multi hazard conditions. We need to equally understand the role of government in FbF action.

REFERENCES

(NUDC), N. U. D. C. 2012. Uganda Humanitarian Profile

Kampala Uganda.

ADOKO, J. & LEVINE, S. 2007. Land transactions in land under customary tenure in Teso: Customary land law and vulnerability of land rights in Eastern Uganda. *Land and Equity Movement in Uganda*.

ATYANG, A. 2014. Study on Early Warning Systems in Uganda.

DRT, D. R. A. T. 2017. Uganda Domestic Humanitarian Response.

ERIN COUGHLAN DE PEREZ, BART VAN DEN HURK, MAARTEN K, VAN AALST, IRENE AMURON, DEUS BAMANYA, TRISTAN HAUSER, BRENDEN JONGMA, ANA LOPEZ, SIMON MASON, JANOT MENDLER DE SUAREZ, FLORIAN PAPPENBERGER, ALEXANDRA RUETH, ELISABETH STEPHENS, PABLO SUAREZ1, JURJEN WAGEMAKER & ZSOTER, E. 2016. Action-based flood forecasting for triggering humanitarian action.

GOU, G. O. U. 2010. THE NATIONAL POLICY FOR DISASTER PREPAREDNESS AND MANAGEMENT. *In: DIRECTORATE OF RELIEF, D. P. A. R. O. O. T. P. M. (ed.)*.

KANDEL, M. 2015. Politics from below? Small-, mid-and large-scale land dispossession in Teso, Uganda, and the relevance of scale. *Journal of Peasant Studies*, 42, 635-652.

LUMBROSO, D. 2016. *Building the concept and plan for the Uganda National Early Warning System (NEWS). Final report*.

LUMBROSO, D. & WALLINGFORD, H. R. 2018. How can policy makers in sub-Saharan Africa make early warning systems more effective? The case of Uganda. *International Journal of Disaster Risk Reduction*.

MAYEGA, R. W., TUMUHAMYE, N., ATUYAMBE, L., OKELLO, D., BUA, G., SSENTONGO, J. & BAZEYO, W. 2015. Qualitative Assessment of Resilience to the Effects of Climate Variability in the Three Communities in Uganda.

MKUTU, K. A. 2006. Small arms and light weapons among pastoral groups in the Kenya–Uganda border area. *African Affairs*, 106, 47-70.

MUTENGU, A. K. J. 2011. Evaluation of Community Resilience in Teso, Uganda

NASA 2008. Natural hazards: Floods in Uganda. Earth Observatory, National Aeronautics and Space Administration (NASA), Washington. Also available on:
<http://earthobservatory.nasa.gov/NaturalHazards/view.php?id=19110>

NFA 2005. Biomass Technical Report Uganda. National Forestry Authority.

NRC 2005. PROFILE OF INTERNAL DISPLACEMENT : UGANDA Compilation of the information available in the Global IDP Database of the Norwegian Refugee Council Norwegian Refugee Council

OAG 2010. VALUE FOR MONEY DRAFT AUDIT REPORT ON PROCUREMENT AND DISTRIBUTION OF RELIEF FOOD ITEMS IN THE OFFICE OF THE PRIME MINISTER-DEPARTMENT OF DISASTER PREPAREDNESS AND REFUGEES IN UGANDA.: OFFICE OF THE AUDITOR GENERAL UGANDA.

UBOS 2014a. National Population and Housing Census 2014 Area Specific Profiles Amuria District. Uganda Bureau of Statistics.

UBOS 2014b. National Population and Housing Census 2014 Area Specific Profiles Katakwi District. Uganda Bureau of Statistics.

UBOS 2019. Uganda Bureau of Statistics, Statistical abstract 2019.

UNDP 2014a. TESO Amuria District June 2014 Profile Hazard, Risk and Vulnerability. UNDP.

UNDP 2014b. TESO Katakwi District June 2014 Profile Hazard, Risk and Vulnerability. UNDP.

UPFDRR 2013. UGANDA PARLIAMENTARY FORUM ON DISASTER.

WFP 2007. Uganda Logistics cluster: Teso Region Emergency Flood Response – Bulletin #1

16/10/2007