

# From Surviving to Thriving: Evaluating Communities' Capacities for Flood Disaster Risk Reduction in Eastern Uganda

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**Abstract:** Eastern Uganda in East Africa is one of the most flood-prone regions of Uganda. The area for this study is situated in a lake basin ecosystem which is surrounded by highland locations and fed by three rivers. Despite being highly prone to flooding, the basin is home to over half a million small scale farmers who derive their livelihoods from this ecosystem. Land fertility in the basin area is one of the push-factors for the continued habitation of the watershed. Consequently, past attempts by the Government to relocate communities from this area have been resisted. There is however a paucity of knowledge on how communities reduce flood disaster risk and mitigate flood disaster effects in this fragile ecosystem. This study evaluated the effectiveness of the communities' capacities, not just to survive but to thrive in the flood-prone watersheds through sustainably balancing land use, environmental conservation and disaster risk reduction. The study indicates that whereas the communities have proactively put in place some measures, these efforts are too localized and too rudimentary to significantly reduce their risk to flood disasters. Strengthening the communities' endogenous action for flood disaster risk reduction is therefore an imperative. A combination of endogenous community action and exogenous support would particularly enable the communities at risk of flood disasters not just to survive but to thrive in the flood-prone watersheds through balancing production and environmental conservation.

**Keywords:** Capacities, Disaster, Floods, Risk Reduction, Endogenous Action, Exogenous support.

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## 1. INTRODUCTION

The aim of this paper is to evaluate the effectiveness of the communities' capacities<sup>1</sup> for flood disaster risk reduction in the flood-prone watersheds of Eastern Uganda. A historical design was used to assess the communities' level of awareness of flood-related disaster risks, the effectiveness of the communities' own measures for flood disaster risk reduction and the communities' ability to make use of exogenous opportunities to strengthen their own endogenous action. In total 445 individuals took part in the study: 269 in the questionnaire survey, 102 in focus group discussions, 34 in key informant interviews and 10 in phenomenology interviews. The study was motivated by the fact that climatic trends show that extreme rainfall is increasingly being experienced in Uganda, including in the Eastern region of the country<sup>[1], [2]</sup>. These trends have in turn led to increased frequency and intensity of climate-accentuated phenomena such as floods<sup>[2]</sup>.

Despite these trends, cultivation of the flood-prone ecosystem has continued unabated<sup>[3]</sup>, yet there is a paucity in knowledge on how the communities are sustainably reducing their risk to flood disasters in this fragile ecosystem. The

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<sup>1</sup> Capacities denotes communities' awareness of flood disaster risk, the communities' endogenous action to reduce those risks and the communities' ability to seek external opportunities (exogenous support) for sustainable landscape flood disaster risk reduction.

Government of Uganda (GoU) for example acknowledges that there has generally been limited research on Disaster Risk Reduction in Uganda. The GoU has consequently challenged the Academia to get more involved in generating the requisite knowledge to enable the country attain a high level of disaster preparedness and disaster risk reduction <sup>[1]</sup>.

While households in Uganda are reported to have developed some strategies to cope with and adapt to extreme weather phenomena <sup>[4]</sup>, little evidence exists of *wide-scale* application of these options for sustainable DRR. Some strategies for strengthening farmers' resilience have been suggested in frameworks such as the Uganda National Communication on Climate Change (UNCCC) and the Uganda National Adaptation Programme of Action, NAPA <sup>[5]</sup>, but their implementation requires high technological and capital investments which are beyond the reach of the vulnerable communities.

Participatory, community-led approaches have recently emerged as viable and sustainable options for risk reduction <sup>[6]</sup>. Putting communities at the centre of risk reduction arises from the realisation that disasters are most pronounced at the grassroots and that the affected people are not only the first responders to disasters in the *short-term* but can use their experience to reduce disaster effects through adaptation in the *long-term* <sup>[6]</sup>. Other schools of thought however contend that vulnerable communities must first be given the exogenous support to help them get out of the state of vulnerability as they build their own capacities for risk reduction <sup>[7]</sup>. While some participatory approaches subscribe to this school of thought, the challenge that remains is to obtain documented evidence of external support that is truly premised on the initiatives of the vulnerable communities.

From the perspective of environmental management, the study provides insights into the dilemma of enforcing environmental policies, as well as the efforts to balance conservation and production in fragile ecosystems. This is a pertinent issue given that it is practically impossible, for example, to relocate whole populations from the ecosystem. By documenting the vulnerable communities' efforts to survive and thrive in flood-prone habitats, the study provides insights into the fundamental question of how the vulnerability of communities at risk of flood disasters can be reduced while balancing agricultural production and environmental conservation.

## 2. THEORETICAL PERSPECTIVES ON DISASTERS

There have been four fundamental theories that attempt to explain the origin of disasters <sup>[8], [9]</sup>. These theories in a way influence the decisions that vulnerable populations make to reduce their vulnerability to disasters. The first two theories conceive of disasters as either *acts of God/Fate* or *acts of nature*, while the other two theories view disasters either as *joint effects of nature and society*, or as *a social construction*.

Proponents of *Disasters as an Act of God* theory attribute disasters to spiritual and uncontrollable forces that are beyond the realm of human comprehension <sup>[8], [9]</sup>. Consequently, whenever a disaster occurs, it is either attributed to divine retribution for human misdeeds and failings or to sheer acts of fate. By being part of God's plan, or simply occurrences of sheer fate, disasters are not to be understood or questioned by humans but just to be accepted and got on with. The advance of scientific inquiry has however led to a re-examination of the *Disasters as Acts of God* theory with some critics generally dismissing it as "an excuse (by those who wanted) to avoid responsibility" <sup>[8]</sup>.

The shift from theological to logical understanding of the causes of disasters led to the emergence of *Disasters as the Acts of Nature* theory <sup>[8], [9]</sup>. Within this theory, the word "Disaster" is etymologically traced to the Greek pejorative prefix *dis-* plus *-aster*, which refers to *a bad star* and was linked to the astrological theme in which the ancients used it to refer to *destruction* and *deconstruction* of a star <sup>[9]</sup>. A disaster therefore came to be known as a tragedy of *natural* or anthropogenic hazard which negatively affected the environment and society. In a nutshell, the *Act of Nature* theory attributes natural hazards and disasters to extreme conditions and processes of the geophysical world <sup>[9]</sup>. The theory for example, establishes a simple cause-effect relationship between the overflow of rivers and the resultant flooding. Premised on the scientific method, the theory views a *natural* disaster as "an outside attack upon social systems that 'broke down' in the face of such an assault from outside" <sup>[10]</sup>. Just like the first theory however, *Disasters as Acts of nature* theory portrays people as helpless victims of disasters.

This gap in the theory has led to increasing debate on whether at all there is anything like a natural disaster <sup>[11], [12] [13]</sup>. In deed critics of this theory argue that what is often referred to as natural disasters are *natural hazards* which only become disasters when they meet vulnerable human conditions <sup>[12]</sup>.

Arising from the criticism of *Disasters as Acts of Nature* theory, the *joint effects of nature and society* theory introduces the human system into the vulnerability context by arguing that humans play a major role in the causation of disasters and therefore in disaster risk reduction<sup>[8]</sup>. The theory attributes disasters to the interaction of two systems- a physical event system and a human use system. According to this theory, it takes both a hazardous physical event and a vulnerable human system to produce a disaster. By implication, if human beings are not in the nature system, or are adequately prepared to resist the impact of hazards, then a disaster does not occur. On the other hand, failure by the human system to anticipate terrestrial and climatic changes in the environment, is a potential recipe for disasters.

Related to the theory of disasters as “joint effects between nature and society” is the theory of Disasters as *a Social Construction*<sup>[8]</sup>. According to this theory, social constructs can have both negative and positive effects on society. The earthquake and tsunami that struck Eastern Japan, in March 2011 illustrates this point<sup>[8]</sup>. The earthquake caused a secondary disaster through triggering the melt-down of the Fukushima nuclear reactor and the resultant radiation. The earthquake changed the social fabric of Japan and increased the population’s mistrust of their government’s ability to anticipate and address future disasters. On the positive side, the policy makers, within a year of the occurrence of this disaster, shut down all the nuclear power plants throughout Japan. In this regard the disaster enacted a *positive* social construction in Japan<sup>[8]</sup>.

From the review of the four fundamental theories of disasters, it is evident that from the perspective of affected persons, perception influences the action (or a lack of it) on disaster reduction. While earlier views attributed disasters to acts of God/fate and nature that were often perceived to be beyond human control, more recent views introduce the social perspective into the vulnerability discourse by attributing disasters to the interaction between hazards and the human systems. This implies that humans can act to reduce their risks to disasters, thereby “taking the naturalness out of disasters”<sup>[13]</sup>. In this regard, vulnerable populations are not *victims* but rather *survivors* of disasters who are able to thrive in hostile environments through proactive disaster risk reduction.

### 3. METHODOLOGY

A historical design was used to evaluate trends in evolution of communities’ capacities for flood disaster risk reduction in the flood-prone watersheds of Eastern Uganda over a six-year period (2010 to 2015). The year 2010 marked the formulation of Uganda’s National Policy for Disaster Preparedness and Management (NPDPM) with the goal of establishing institutions and mechanisms to reduce the vulnerability of people, livestock, plants and wildlife to disasters in Uganda<sup>[14]</sup>. The NPDPM observes that the primary responsibility for disaster risk management rests with the citizens, with Government playing a supportive role. The six-year period from 2010 to 2015 was therefore deemed adequate to assess the communities’ DRR efforts from the time DRR gained national consciousness in Uganda. Moreover, 2015 was the target year for the realization of the outcome of Hyogo Framework for Action namely, *the substantial reduction of disaster losses, in lives and in the social, economic and environmental assets of communities and countries*<sup>[15]</sup>. The study was therefore designed to align with these critical national and international commitments and timelines.

Data collection methods entailed questionnaire surveys, review of related literature, Focus Group Discussions (FGDs) and key informant interviews. Data were collected from 363 individuals (217 through questionnaire survey, 102 through FGDs, 34 through In-depth interviews and 10 through phenomenology interviews).

### 4. RESULTS

The study indicates that the communities in the flood-prone watersheds of Eastern Uganda have put in place some measures for flood disaster risk reduction. As in Table 1, the main practices that the communities use to reduce their risk of flood disasters are use of community early warning systems (77 percent), drainage channels (70 percent), and timing of the crop calendar (70 percent). Others are tree planting/Agroforestry (68 percent) social safety nets (60 percent), formulation of relevant by-laws (59 percent) and crop rotation (54 percent). Less widespread practices include existence of food reserves, practical use of early warning messages, community participation in DRR, proper land use planning and availability of flood resistant infrastructure.

TABLE 1: Communities' Endogenous Action for Flood DRR in Eastern Uganda

Communities' Endogenous Action for Flood DRR	Percent (n=236)*
Community early warning systems	77
Tree planting/Agroforestry	68
Crop rotation/fallow	54
Improved drainage (drainage channels, raised compounds etc)	70
DRR by-laws	59
Land use planning, including avoiding dangerous sites	36
Functional Disaster Risk Management Committees	54
Early warning messages put into practice	45
Community participation in DRR	44
Social Safety nets (community support to affected individuals)	60
Food reserves	48
Timely/staggered planting	70
Flood resistant infrastructure	32

\*Note: 236 out of 269 questionnaires were returned (88 percent response rate).

Source: questionnaire survey data, PhD Research.

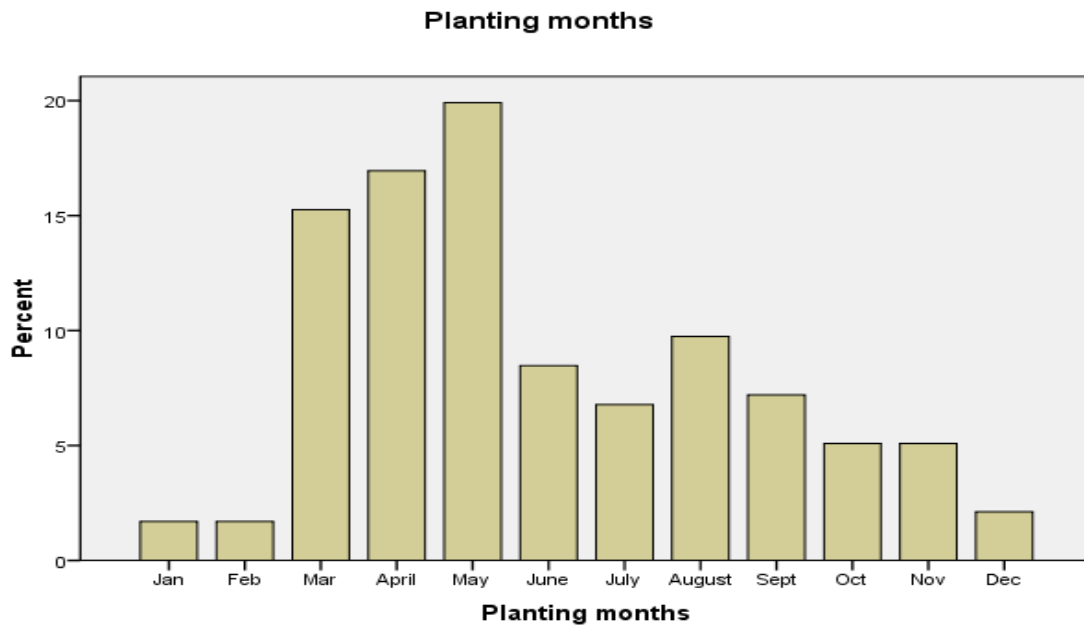
Of all the identified practices, staggered planting (throughout the year) was the most observable at the farm level. Table 2 and Figure 1 for example show that whereas the main planting periods still followed the "traditional" rain seasons, there was an emerging trend in which planting took place throughout the year, including in the typically dry period between December and February, a practice the farmers refer to as "gambling with the rains".

TABLE 2: Changes in the cropping calendar for Eastern Uganda in Response to Climate Change

Planting Month	Percent (n=236)*
Jan	1.7
Feb	1.7
Mar	15.3
April	16.9
May	19.9
June	8.5
July	6.8
August	9.7
Sept	7.2
Oct	5.1
Nov	5.1
Dec	2.1
Total	100

\*Note: 236 out of 269 questionnaires were returned (88 percent response rate).

Source: Questionnaire survey data, PhD Research.



**Fig 1: A cropping calendar in response to climate variability in Eastern Uganda**

(Source: Questionnaire Survey Data, PhD Research).

Consensus on availability and use of disaster risk reduction practices was high in the focus groups as well, with at least eight out of 10 participants indicating agreement that these practices were in use in the ecosystem (Table 3).

**TABLE 3: Results of Micro-interlocutor analysis to measure the consensus among FGD participants on communities' action for flood DRR**

Focus Group Number	FGD Participant											
	1	2	3	4	5	6	7	8	9	10	11	12
T1	A	A	A	D	A	A	D	D	SE	A	A	-
T2	D	A	SE	A	A	NR	A	A	A	D	-	-
T3	A	A	A	A	D	A	A	A	A	A	D	A
T4	A	A	D	A	A	A	A	A	A	A	A	-
T5	A	D	SD	D	A	A	A	SE	A	-	-	-
T6	SE	A	A	SD	D	A	SE	A	-	-	-	-
B7	A	A	A	A	A	SE	D	D	-	-	-	-
B8	A	A	NR	SE	A	A	A	D	A	A	D	SE
B9	SE	A	A	A	SE	NR	A	A	A	D	A	-
B10	A	SE	A	A	A	A	A	A	A	A	-	-

Source: FGD Data.

Analysis:

A = indicated agreement (i.e., verbal or nonverbal): 70

D = indicated dissent (i.e., verbal or nonverbal): 15

SE = provided significant statement or example suggesting agreement: 13

SD = provided significant statement or example suggesting dissent: 1

NR = did not indicate agreement or dissent (i.e., nonresponse): 3

T1-T6= Tororo FGs (61 participants)

B7-B10= Butaleja FGs (41 participants)

Total FGD Participants: 102.

The findings of the questionnaire survey and FGDs were corroborated by the key informants who reported that farmers in the flood-prone watersheds were increasingly adapting to the changing climatic patterns by cultivating crops during “non-rain” months. In addition, the communities were introducing non-traditional crops such as vegetables and sugarcane into the farming system in response to climate change and to spread out risks of crop failure which could arise from relying on traditional crops. In this sense, climate variability is viewed as both a challenge and an opportunity for risk reduction. As one key informant observed:

Due to changing weather patterns crops such as sugarcane and yams are increasingly being grown in upland locations and not just limited to the swamps as it used to be. On the other hand, root crops such as cassava and sweet potatoes which used to be grown exclusively in uplands are now also being grown in the swamps, so long as the planting is carefully timed to avoid peak rainfall periods.

Communities were further participating in self-help and collective action such as de-silting of the rivers, tree-planting, and digging of drainage channels. The use of drainage channels to protect crops and homesteads from floods was particularly widespread due to its relative affordability. The key informants however noted that the practise is still *ad hoc*, and the drainage channels are poorly maintained and often get overrun by floods.

Relatedly, the key informants noted that sharing of early warning information was increasing within the communities, especially through platforms such as places of worship, funerals and other community forums. The practise of community members gathering around a radio to listen to announcements, news and topical discussions was similarly reported to be widespread. At the same time traditional mechanisms for early-warning were available, although their use has drastically declined over the years. One key informant for example cited a case of “rain-makers” who were gifted in predicting rain events but were no longer in existence because the practice was being considered as “mystic archaic and irrational”.

In the view of the key informants, some regulations such as by-laws on food reserves, deforestation and wetland protection were in existence. Implementation of these by-laws was however observed to be weak, although community leaders endeavoured to raise awareness on their benefits. One key informant observed that while community leaders should ideally be working with community structures such as Disaster Management Committees (DMCs) to raise awareness on DRR, these structures have remained inactive because they are not adequately facilitated to execute their mandate.

The phenomenology interviews revealed that despite the negative experiences from the floods, the affected individuals neither left the flood-prone watersheds nor gave up with the farming enterprise. This resolve was evident in the words of one participant who said: *“I am not giving up. I will plant again and again. If I lose today it does not mean that I will lose tomorrow as well. Life must go on”*. Moreover, other participants saw floods as an opportunity to cash into alternative livelihoods. One participant for example intimated that the large volumes of river sand deposited in the ecosystem by the floods provided an alternative income generating opportunity from the construction sector. Another participant observed that floods brought with them fertile soil deposits which were invaluable for agriculture. In some instances, floods were considered an opportunity to learn and therefore to prepare better for future flood events. In the words of one phenomenology participant: *“I have another two acres of tomatoes and I think I have beaten the flood this time round”*. These experiences partly explain why farmers do not abandon their land but remain in the farming enterprise despite the perceived risks and actual negative experiences from the floods.

Trends in respondents’ perceptions on the communities’ capacities for flood DRR over the six-year period 2010 to 2015 are presented in Table 4. Whereas approximately 9 percent of the respondents perceived that community capacities for flood disaster risk reduction had increased since 2010, up to 91 percent perceived that these capacities had either remained the same (38.6 percent) or even reduced (18.6 percent), while 33.9 percent did not know whether they had changed.

**TABLE 4: Trends in communities' capacities for Flood disaster risk reduction from 2010 to 2015**

Perceived trend in evolution of community capacities		% (n=236)
Valid	Reduced	18.6
	remained same	38.6
	don't know	33.9
	some increase	5.5
	much increase	3.4
	Total	100.0

**Note:** 236 out of 269 questionnaires were returned (88 percent response rate).

Source: Questionnaire survey data, PhD Research.

A Spearman's rank-order correlation run to determine the relationship between the communities' capacities for flood disaster risk reduction and the perceived effects of flood disasters (Table 5) indicated a weak and negative relationship which was not statistically significant ( $r_s = -.046, p = .483$ ). These results suggest that despite the communities putting in place measures for flood disaster risk reduction, this endogenous action was not effectively leading to a reduction in the flood disaster risks that the communities face in the ecosystem. By implication, while these practices are helping the vulnerable communities to survive in the watershed, they are not effective enough to enable the communities to sustainably thrive in the ecosystem.

**TABLE 5: Relationship between communities' capacities for flood DRR and level of flood disasters 2010 to 2015**

			disaster trend 2010_15	internal capacities 2010_15
Spearman's rho	disaster trend 2010_15	Correlation Coefficient	1.000	-.046
		Sig. (2-tailed)	.	.483
		N	236	236
	capacities 2010_15	Correlation Coefficient	-.046	1.000
		Sig. (2-tailed)	.483	.
		N	236	236

Source: Questionnaire survey data, PhD Research.

## 5. CONCLUSION

Vulnerable communities in the flood-prone watersheds of Eastern Uganda have put in place measures for flood disaster risk reduction. By being at the centre of reducing their vulnerabilities to disasters, the communities hold a perception of disasters that transcends divine or natural conceptualisation. This awareness drives the communities to action. The localised nature of the endogenous practices and the lack of uniformity in the way they are implemented however, makes them ineffective for sustainable disaster risk reduction. In other words, while the communities have demonstrated ability to survive in the flood-prone ecosystem, this capacity is not sufficient to enable them to thrive through balancing agricultural production, environmental conservation and disaster risk reduction. Exogenous support to the communities' efforts is therefore an imperative. The exogenous support should focus on scaling up the communities' scattered and localised flood disaster risk reduction initiatives. For realisation of multiplier effects at the landscape level, the exogenous support should target community groups as opposed to individuals. As part of their capacity building, communities should be equipped with skills to enable them to identify their flood risks and to assess their strengths to manage those risks. Internal capacity assessments would enable the communities to appreciate their strengths even in situations of vulnerability and to harness their potential for more effective and sustainable disaster risk reduction outcomes.

While thriving in fragile ecosystems is desirable, in severe or catastrophic disaster occurrences, relocation of vulnerable communities to save lives becomes paramount. Populations are generally reluctant to relocate outside the community, but often voluntarily evacuate to safer locations within the ecosystem. These temporary community-initiated protection mechanisms ought to be supported. In this regard, the external stakeholders need to discuss with the people at risk their preferred “safe havens” to avoid costly relocation programmes that would meet resistance from the communities. At the same time however, environmental management laws such as observance of minimum distance to river banks and non-occupation or cultivation of gazetted wetlands ought to be enforced. This will not only reduce communities’ exposure to flood disaster risks, but also ensure sustainable protection of the fragile ecosystem.

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