

**Living With Risk: Flood disaster and local response
around Lake Tana area, North West Ethiopia**

03841

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Sociology and Social Anthropology and Christian
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Table of Contents

List of tables	3
List of Photos	3
Acronyms.....	4
Glossary of local terms	4
Acknowledgments	5
1. Introduction.....	6
1.1 <i>Background</i>	6
1.2 <i>Statement of the problem</i>	7
1.3 <i>Objectives of the study</i>	9
1.4 <i>The research questions</i>	9
2. Theoretical framework	10
2.1 <i>Actor oriented perspective</i>	10
2.2 <i>Disaster Management Framework</i>	13
3. Methodological considerations	16
3.1 <i>In-depth household interviews</i>	16
3.2 <i>Focus group discussions</i>	17
3.3 <i>Semi-structured interviews with key institutional stakeholders</i>	17
3.4 <i>Participant observation</i>	17
3.5 <i>The study sites</i>	17
4. Lake Tana Area	18
4.1 <i>Regional political and social settings</i>	18
4.2 <i>Topography of the Region</i>	20
4.3 <i>Rivers and lakes</i>	20
4.4 <i>Flooding around Lake Tana (Blue Nile Basin)</i>	21
4.5 <i>The 2006 flood in Amhara Region</i>	23
5. The findings	26
5.1 <i>Socio-demographic and residential characteristics</i>	26
5.2 <i>Major problems in the study sites</i>	28

5.3 Characteristics of the floods	29
5.4 The impacts of flooding.....	30
5.5 Flood preparedness and mitigation strategies.....	38
5.6 Emergency services provided by the Government and NGOs.....	41
5.7 Suggestion of participants to prevent flood.....	42
6. Discussion.....	43
6.1 Exposure to flood.....	43
6.2 Preparedness	44
6.3 Response to flood.....	45
6.4 Flood induced livelihood practices and the resettlement initiatives.....	46
7. Conclusion: Living with risk.....	48
References	51
Appendix.....	54

List of tables

Table 3.1	Selected kebeles for in-depth study	18
Table 4.1	Population of Amhara Region by type of residence, 2004	18
Table 4.2	Literacy rate by sex and residence, Amhara Region, 2000	19
Table 4.3	The Lake Tana River System	21
Table 4.4	Flood-prone Woredas, and Kebeles around Lake Tana	22
Table 5.1	Selected kebeles' population and distance	27
Table 5.2	Access to basic services by kebele	27
Table 5.3	Profile of household heads by kebele	27
Table 5.4	Ownership of land by kebele	28
Table 5.5	Mortality and injury by kebele	30
Table 5.6	House and domestic losses by kebele	32
Table 5.7	Flood affected, displaced residents and animals by kebele	33
Table 5.8	Loss of animals by kebele	35
Table 5.9	Loss of crop by kebele	36

List of Photos

Photo 5.1	Silted up compound of Robit School	31
Photo 5.2	Damaged hut in Shina Tision kebele	32
Photo 5.3	Mud plaster grain container damaged by floodwater	35
Photo 5.4	Inundated pastureland at Fogera	36
Photo 5.5	Fencing a compound with small rounded clay in Achera <i>kebele</i>	39
Photo 5.6	Earthen levee in Deber Zuria Adisge <i>kebele</i>	40

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1. Introduction

1.1 Background

The increasing nature of disasters throughout the World is a commonly identified indicator of non-sustainable development (United Nation, 1994; Burton et al., 1993). Environmental hazards in Developing Countries are essentially unresolved development problems. Climate induced natural disasters like drought and flood have become serious problems to Ethiopia.

Floods are considered the most destructive of all natural disasters because they are the most common cause of the greatest number of deaths, and result in the most damage (Mileti, 1999). Flooding of rivers and streams is the most frequent type recorded around the globe, most often stemming from long periods of rain or from rain combined with melting snow and ice. River floods inundate the largest areas of land and destroy more lives and property than any other form of flooding (Dynes 1970, Drabek 1986, Shaw 1989).

Flooding in Ethiopia has been since time immemorial. The country's amount of rainfall, the river basins and the topography contribute to flooding at large. Ethiopia's elevation ranges from 1500 to 3000 meters above sea level. Abdulkarim (2004: 13) notes that 'all of the Ethiopia's rivers originate in the highlands and flow outward in many directions through deep gorges'. The Disaster Prevention and Rehabilitation Commission has identified the following flood prone areas (DPRC 1997).

- Areas along the Wabe Shebele river from the village Imi to Mustahil
- Areas along the Baro river between the town of Gambella and border town of Jikao.
- Various areas along the Awash river (Teji area, Wenji, Amibara, Asaiyta)
- The area east of lake Tana where rivers Ribb and Gumara flow into lake Tana
- The lower reaches of Omo River.

Gambella region, for instance, is annually flooded by the overflow of Baro, Akobo and Gilo Rivers. The main causes of the annual flood occurrence are the flat topography of the terrain, which makes drainage difficult, and the huge inflows of water from upstream catchment areas of these rivers. According to a study it was forecasted that 'some 766,330 people in Ethiopia (of which 543,245 are river flood victims in which 147,000 (27 percent is for Gambella Region) are

likely to be affected by flood any time in the next five years (Gizachew, 1999:6)'. Eight out of the nine weredas in Gambella region (excluding Godare Wereda) are subject to seasonal overflowing of the Baro, Akobo Rivers and their tributaries, usually from July to September.

The Somali Region is also frequently impacted by flood. The recent flooding, for instance, took place in late April 2005 when heavy rains generated widespread flooding throughout Somali Region, which caused the Shabele River to burst its banks. As of May 2005, the flooding in Somali Region alone had caused over 100 confirmed deaths and widespread property damage affecting over 100,000 persons. The floods have also destroyed shelters housing 25,000 Somali refugees in Kenya (UN OCHA, 2005)

As there is no flood early warning and preparedness system in the country, thousands of people living in flood-prone areas are vulnerable to sever flooding. The common practice pertaining to flooding is to conduct damage assessment to provide relief aid to victims of flood after the occurrence of flood. The Disaster Preparedness and Prevention Commission usually carry this out in collaboration with some UN agencies.

1.2 Statement of the problem

In Ethiopia, rural households are exposed to many sources of risk including flooding, drought and livestock diseases (Dercon, 1999). The capacity of the government to anticipate and manage shocks through improved emergency preparedness and disaster mitigation is central to the famine prevention strategy. However, pertaining to flooding, the government's Disaster Prevention and Preparedness Commission is not strengthened to respond to crises in a rapid, integrated and coordinated manner. Kefyalew notes that 'in the context of the Ethiopian Water Resources Management Policy, flood management is viewed as an integral part of an Integrated Water Resources Management. However, it is not at an advanced stage, and flood management has not been treated separately on a sustainable manner in the country' (www.apfm.info/pdf/case_studies/syn_ethiopia.pdf).

The occurrence of flood disaster in Lake Tana area is communicated to higher authorities through the formal government structure meant for all development activities. The information including flooding is communicated from *kebele* (sub-district) to *woreda* (district) and then to Zone, which is in turn reported to the regional government. The Regional Disaster Preparedness and Prevention and Food Security Office, after assessing the severity of the flood disaster, will provide aid to flood affected communities depending on the availability of aid stock. If there is

no stock, it will report to the Federal Disaster Preparedness and Prevention Agency. The aid will take some days or weeks to arrive at the flood affected areas from Addis Ababa. If the flooding is not severe, victims are left to fend for themselves.

As there is no formal early warning and flood disaster preparedness system in Ethiopia, the local people use their own information sharing strategies. Villagers in Lake Tana area, for instance, practice flood early warning by watching out for cloud masses on the northern horizon. If they see dark cloud, heavy rain accompanied by flood is expected. The main indication of flooding is when the seasonal rivers start flowing and the level of Lake Tana, the Rib and Megech Rivers keep on rising. Thus, they communicate readily when flood comes, one easily alerting the other. At times of severe flooding, elders will blow horns to call all villagers to participate to mitigate the effects of the flood.

Villagers practice various flood mitigation strategies at household level, though they are not effective at times of sever flooding. The coping strategies usually are executed after the occurrence of flooding. Villagers, considering the level of water, do not often employ flood preventive strategies. When the flooding is severe, everyone in the village fetches for himself/herself. The poor, the weak and the women-headed families may get the attention of others only later on. Meanwhile due to the continuous attack of the flood, household properties including grain stored in mud-plastered containers are easily damaged (Woldeab, 2005).

In the context of Lake Tana area, flooding has both environmental benefits and risks. It is sometimes difficult to conclude for a small community whether flooding is benefiting or not because while a village at walking distance is benefiting, the adjacent village could be losing because of flooding (Woldeab, 2005).

Oliver-Smith (1996:308) notes that 'relocation or resettlement of disaster-stricken population is a common strategy pursued by planners in reconstruction efforts'. In Lake Tana area, similarly strategy was adopted, although it did not succeed. In 1995 and 1997, for instance, two villages were severely affected by flood. When the disaster occurred, officials of the Regional Government visited the area by helicopter. One week after the visit by the officials, local government officers came by motorboat and accompanied by policemen to force the flood-affected people to evacuate the area. Although the flooding problem had been intensifying, the local people were not willing to move out. Finally, the villagers were relocated in another area.

The re-located people generally stayed between 10 and 12 weeks in the makeshift tents. Some among the dislocated people returned to their villages within a day (Woldeab 2005). Commenting on relocation of disaster affected people, Blaikie *et al* (1994:211) classify relocation as the worst option as it gives the impression that nothing else can be done about hazards and hazard-zone inhabitants have to be provided. More significantly at least on the part of those being relocated, it provokes social disruption and upheaval when people are bundled into an alien environment'.

Although people live with risk in flood-prone areas, enough is not known about local flood mitigation strategies, involvement of government and community organisations in flood management; and flood-induced livelihood practices. The intended study will attempt to fill this lacuna.

1.3 Objectives of the study

- a) To examine flood mitigation strategies at households level.
- b) To understand how the community is organized in managing the adverse impacts of floods.
- c) To explore the flood induced livelihood practices.
- d) To examine the formal and informal rights of the communities/sub-groups with regard to accessing community, NGO and government provided services for flood mitigation and response.
- e) To understand why local people rejected the state initiated relocation as a flood coping strategy.

1.4 The research questions

In fulfilling these objectives, it aims to answer the following questions:

- a) What are the flood mitigation strategies employed by households?
- b) How is the community organized in managing flood?
- c) What are the flood-induced livelihood practices around Lake Tana area?
- d) What are the services provided by the government and NGOs to flood affected people?
- e) Why the flood-affected people rejected the relocation initiative taken by the regional government?

2. Theoretical framework

The intended study will employ an actor-oriented perspective and disaster management framework to understand the interlocking relationships and the strategic actions of actors in the flood-prone communities.

2.1 Actor oriented perspective

Agency and social actors

In understanding the life-worlds of social actors we must give weight to the meanings and motives attributed to events and relationships by the actors themselves. Furthermore, as Long (2001: 241) explains, 'social actors are all those social entities that can be said to have agency in that they possess the knowledgeability and capability to assess problematic situations and organise 'appropriate' responses. Social actors appear in a variety of forms: individual persons, informal groups or interpersonal networks, organisations, collective groupings, and what are sometimes called 'macro' actors (e.g., a particular national government, church or international organisation)'. In context of settlement intervention, the social actors include settlers, government and non-government bureaucrats involved in administration.

Human agents are knowledgeable and capable of taking actions meaningful to their life. Agency commonly refers to the ability of actors to operate independently of the determining constraints of social structure. The concept of 'agency refers to the knowledgeability, capability and social embeddedness associated with acts of doing (and reflecting) that impact upon or shape one's own and others' actions and interpretations. Agency is usually recognized *ex post facto* through its acknowledged or presumed effects. Persons or networks of persons have agency. In addition, they may attribute agency to various objects and ideas, which, in turn, can shape actors' perceptions of what is possible. Agency is composed, therefore, of a complex mix of social, cultural and material elements' Long (2001: 240-241). Agency suggests not merely the ability to act, but to act in ways that demand the recognition and/or response of others.

Arena

In the implementation of settlement, interaction takes place between the intervening actors, the government and non-governmental agencies involved in the settlement development on the one hand, and the settlers (often called 'beneficiaries') on the other. In view of this, I am interested to investigate why actors rejected the settlement intervention by adopting 'pragmatic moves'

(Schutz and Luckmann, 1974). Such an approach would enable me to take into account social actors' reasons and the social context of action.

In the study sites, local people have rejected resettlement initiated by the regional government. Development intervention is an arena in which infusion of resources takes place in order to 'improve' or 'prevent' difficult situations (e.g. drought, famine, flooding, disease, alcoholism, soil erosion). As Long (2001:242) describes, 'arenas are spaces in which contests over issues, claims, resources, values, meanings and representations take place; that is, they are sites of struggle within and across domains'. In Ethiopia, for instance, a state sponsored resettlement program was carried out following the 1984/85 drought and famine that claimed thousands of lives. In the implementation of the settlement program, coercion, cooperation, resistance and rejection were all manifest.

Long and Ploeg (1989:230) argue that 'Intervention (...) implies the confrontation or interpenetration of different life-worlds and socio-political experiences, which may be significant for generating new forms of social practice and ideology'. An actor-oriented approach is useful then in understanding and analysing the process of change initiated by the government such as resettlement intervention and settlers' response. Farmers are not passive recipients of an intervention. Planners with linear thinking may assume that planned projects could get full acceptance on the part of 'beneficiaries'. But, as Long and Ploeg (1994:69) note local people '... try to create space for their own interests so that they might benefit from, or, if need be, neutralize, intervention by outside groups or agencies'.

Long (1992:9) argues:

Applied to the field of development research, an actor-oriented approach requires a full analysis of the ways in which different social actors manage and interpret new elements in their life-worlds, and understanding of the organising strategic and interpretive elements involved, and deconstruction of conventional notions of planned intervention. Rather than viewing intervention as the implementation of a plan for action, it should be visualized as an ongoing transformation process in which different actor interests and struggles are located. Integral to this type of approach are two other crucial aspects: an understanding of the processes by which knowledge is negotiated and jointly created through various types of social encounter, and understanding of the power dynamics involved.

Thus the interaction among social actors is dynamic and entails the shaping and reshaping of planned intervention. On the part of the 'target population' adoption, transformation or rejection

of the intervention can take place. Such results are an outcome of power and negotiation among the social actors. The concept of 'social interface' is important to explore planned intervention and settlers' life-worlds. Long (2001: 177) defines '... social interfaces as critical points of intersection between different social fields, domains or lifeworlds, where social discontinuities based upon differences in values, social interests and power are found'.

Livelihood and practices

The concept of livelihood has been defined in different ways. The dictionary meaning is 'the way by which one earns enough to pay for what is necessary' (Longman Contemporary English). Rennie and Singh (1996) explain that a livelihood comprises the capabilities, assets (stores, resources, claims and access) and activities required for a means of living. These definitions mainly focus on the material resources and labour that are the basic components for the maintenance of livelihoods. Others view livelihoods as something more than the means of earning incomes. De Haan (2000:343) notes that 'livelihood is not necessarily the same as having a job and does not necessarily even have anything to do with working. Moreover, although obtaining a monetary income is an important part of livelihood, it is not the only aspect that matters'. Furthermore, Ellis (1998) states that 'a livelihood encompasses income, both cash and in kind, as well as the social institutions (kin, family compound, village and so on), gender relations, and property rights required to support and sustain a given standard of living'. Long goes on to stress that one should not focus only on material and labour resources but also on adaptive and coping strategies that individuals and groups employ to sustain livelihoods. Hence, he argues that 'livelihoods are made up of practices by which individuals and groups strive to make a living, meet their consumption necessities, cope with adversities and uncertainties, engage with new opportunities, protect existing or pursue new lifestyles and cultural identifications, and fulfil their social obligations' (Long, 2001:241).

According to Giddens (1976:75) the concept of practice involves 'regularised activities that take the form of habits, traditions or customs', and as Arce (1994:156) underlines, this entails 'analysing the ways in which people operate in their everyday life'. Hence, the usefulness of concept of practice as applied to the response of flood-prone communities is clear.

In the livelihood domain, interlocking relationships among the different social actors including farmers, local government administrators, development agents, are central. The concept of

'domain' best expresses the nature of these interlocking relationships. As Long (2001: 241-242) notes:

2.2. Disaster Management Framework

Disaster

Floods are usually considered as one of the most destructive natural hazards. Kreps (1984: 312) slightly revising the definition of Fitz writes: 'Disasters are events, observable in time and space, in which societies or their larger subunits (e.g., communities, regions) incur physical damages and losses and/or disruption of their routine functioning. Both the causes and consequences of these events are related to the social structures and processes of societies or their subunits'.

Vulnerability

Vulnerability is the second causal factor of flood disasters. Vulnerability is a term that has been defined in a variety of ways. Vulnerability is conceived as both a biophysical hazard as well as a social response within a specific geographic domain (Brooks, 2003). Following Blaikie et al., Kelly and Adger (2000: 328) define vulnerability as "the ability or inability of individuals or social groupings to respond to, in the sense of cope with, recover from or adapt to, any external stress placed on their livelihoods and well-being." Their approach focuses on existing "wounds" (or prior damage), which might limit capacity to respond to stresses and are independent of future threats.

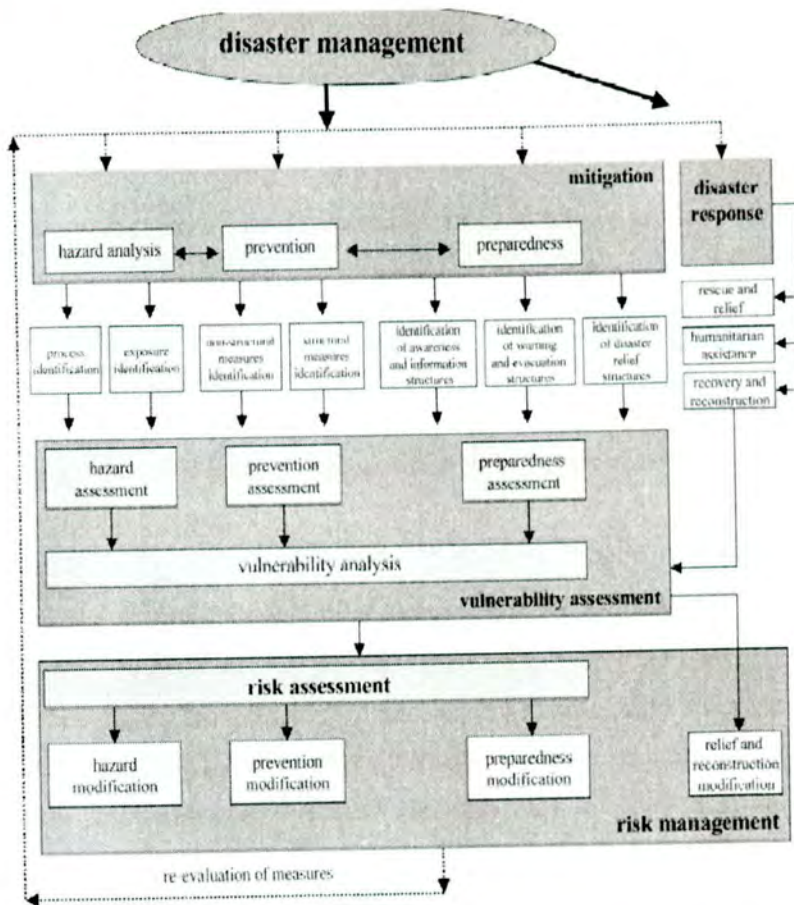
Risk is a result of proximity or exposure to triggering agents, which increases the probability of disaster and the potential for human or material losses (Buckle et al., 2000; Reynolds, 1993).

Mitigation means to reduce the severity of the human and material damage caused (WHO/EHA document).

Prevention is to ensure that human action or natural phenomena do not result in disaster or emergency. (WHO/EHA document)

The disaster management framework recognises the six elements of disaster management, namely natural hazard, exposure, preparedness, prevention, response and vulnerability.

Figure: Disaster management process



Source: Weichselgartner, 2001.

Weichselgartner (2001:90-91) suggests six interrelated steps of analysis in disaster management cycle.

- a) **Natural hazard analysis** focuses on identification, inventory and assessment of all natural events in a given area that can potentially damage human life and property. Relevant physical processes are studied, on the basis of which a natural hazard map is created. For mapping of flood hazard, indicators such as peak flow, depth of flooding, duration of flooding, sediment concentration, pollution load of flood water, and wave and wind action are used.

- b) **Exposure analysis** aims at identification, inventory, and assessment of infrastructure, property, individuals etc. in a given area and both direct and indirect consequences in case of hazard occurrence. To realize this, social structure and infrastructure variables are analysed, which forms the basis for an exposure map. Important factors that concern exposure are susceptibility of building contents to damage, robustness of building fabric, key installations and public supply services, transportations and public supply services, transportation systems, population distribution and density, and land-use activity.
- c) **Preparedness analysis** considers identification inventory, and assessment of all precautionary activities and measures in a given area to be prepared best for natural disasters. This concerns the analysis of awareness, warning, evacuation and disaster relief variables and should lead to a preparedness map. In this map precautionary preparedness activities are portrayed.
- d) **Prevention analysis** aims at identification, inventory, and assessment of all activities and measures in a given area to prevent hazards and their effects and provide permanent protection from their impact. For the creation of prevention map, structural and non-structural measures are analysed and portrayed. Factors such as water control measures, land-use and infrastructure control measures, and financial relief and loss reduction measures are considered. Indicators which characterize prevention are: dikes, dams, levee banks, reservoirs, retarding basin, channel and catchments medication in the river basin; drainage and flood protection; terracing and flood-proofing works; zoning and planning control; acquisition and relocation; flood insurance schemes established; public prevention information and education.
- e) **Response analysis** focuses on identification, inventory, and assessment of all response activities and measures in a given area to reduce social and economic damage and losses. Measures for the creation of a response map are analysis of search, rescue, humanitarian assistance, recovery, and reconstruction structures. This map is emergency-oriented and shows existing disaster response structures. Important factors are rescue, relief, and humanitarian assistance facilities and measures.
- f) **Vulnerability analysis** aims at the assessment of the existing condition of a given area and its ability to cope and withstand to specific natural hazard events and their impacts.

Measures are analysis of hazard characteristics; socio-economic, exposure, preparedness, prevention, and response variables. In this phase vulnerability map is created. This map can be described as a natural hazard map, which shows the degree of ability to cop with and respond to specific natural hazard events. Vulnerability is determined through the overlay of the former maps. "Average class value" obtained is based on the assumption that all factors are equally important. Since this map is based on the previous maps, indicators are the same as those used for the hazard, socio-economic, exposure, preparedness, prevention, and response maps.

3. Methodological Considerations

Capturing the complexities of human responses to flooding and assessing vulnerability requires a flexible and wide-range of methodology. An ethnographic approach was adopted to understand social life and discovering how people construct meaning in natural settings. An attempt was made to learn what is meaningful or relevant to the people being studied, and how individuals experience daily life. The methodology was designed to employ a variety of methods to capture different aspects of complex relationships. It comprises four distinct but complementary strands:

- a) In-depth household interview
- b) Focus group discussions with residents in flooded areas
- c) Semi-structured interviews with institutional stakeholders
- d) Participant observation.

3.1 In-depth household interviews

In order to generate information relating to *flood mitigation strategies* (objective 1), *adverse impact of floods* (objective 2) and *flood induced livelihood practices* (objective 3) in-depth household interviews were conducted with 48 randomly selected household heads in four *kebeles*. The candidates for in-depth interview were men and women household heads with rich experience in flood mitigation. Such interviews were effective to draw out specific problems faced by these individuals and to identify coping strategies that are in use, as well as those that are potentially possible.

3.2 Focus group discussions

Focus groups provide a means to elucidate detailed and nuanced information on how community is organised in managing the adverse impacts of floods and residents' attitude towards relocation as a flood coping strategy.

Focus group participants were recruited from the residents. Eight focus group discussions (four men and four women) in the four villages were conducted. The men participants were 38 and women 23. The age of participants ranges from 22 to 57. Each focus group discussion, held sitting under a tree for shade, lasted around 90 minutes with 5-10 of interviewees.

3.3 Semi-structured interviews with key institutional stakeholders

The purpose of the interviews with key institutional stakeholders was to examine the formal and informal rights of the communities with regard to accessing community, NGOs and government provided services for flood mitigation and response. Further, to understand why local people rejected the state initiated relocation as a flood coping strategy. Semi-structured interviews were held with Amhara Regional Food Security Program Co-coordination and Disaster Prevention Office, Woreda Administrations, Woreda Agriculture and Rural Development Department Heads, Kebele Administration Chairmen and Agricultural Extension Agents.

To examine the monitoring, warning and emergency response aspects of flood preparedness we interviewed officials in the Amhara Food Security and Disaster Preparedness and Prevention Office (FSDPPO), Woreda Administration, Woreda Department of Agriculture and Rural Development and Kebele Administration. We also examined the measures that local authorities and FSDPPO feel work best for promoting flood awareness without flood events.

3.4 Participant observation

The researcher with the research assistant lived in the communities during the period of the fieldwork. The aim of this technique is to draw a different perspective on more sensitive issues that are not effectively understood or addressed through more formal techniques of interviews and focus group discussions.

3.5 The study sites

The study sites selected are among the highly flood affected kebeles around Lake Tana area. In Debir Zuria Adisge kebele, flooding is caused by Megech River, which is categorized as severe. All the residents of the kebele have been vulnerable to flood disaster since 1998. The flooding

takes place during rainy season, which starts in July and extends to mid-September. At this time, crops are damaged and houses are flooded.

Table 3.1 Selected kebeles for in-depth study

Zone	Woreda	Kebele
South Gonder	Fogera	Wagatera
		Kidist Hana
North Gondar	Libo Kemkem	Shina Tsion
	Dembia	Debir Zuriya Adisge

Flooding occurs in Wagatera, Kidist Hana and Shina Tsion when the perennial and seasonal rivers (e.g. Gumara, Rib) overflow or burst their banks. Kidist Hana is one of the most severely affected *kebeles* in Fogera *woreda*.

4. Lake Tana Area

4.1 Regional Political and Social Settings

Lake Tana is located in the Amhara Region. The Region, with an area of 3600 square kilometres is located in the north-western and north-central part of Ethiopia. The Region shares common borders with the Tigray Region in the north, Afar in the east, Oromiya in the south, Benishangul-Gumuz in the southwest, and the Republic of Sudan in the west.

The Region consists of 11 administrative zones, one special zone, 113 *woredas*, and 3224 *kebeles*. The size of the population based on estimate of 2004 was 18.15 million. The capital city of the Amhara Region is Bahir Dar.

Table 4.1 Population of Amhara Region by type of residence, 2004

Residence	Total Population		
	Male	Female	Total
Rural	8186295	7970586	16156880
Urban	913832	1083074	1996906
Total	9100127	9053659	18153786

Source: BoFED, 2005

The large majority of the population is Amhara. Besides the Amhara, the Oromo, Awi, Wag, Argoba and Kimant form the ethnic composition.

Table 4.2 Literacy rate by sex and residence, Amhara Region, 2000

Amhara Region	Rural	Urban	Total
Male	26	80.7	30.9
Female	9.7	57.2	15.6
Both	17.9	66.9	23.1
National			
Male	--	--	39.7
Female	--	--	19.4
Both			29.2

Source: BoFED, 2004

About 89 percent of the people of the Region live in rural areas and are engaged in agricultural activities. The Region is one of the major *teff* (staple crop) producing areas in the country. Barley, wheat, oil seeds, sorghum, maize, oats, beans and peas are major crops produced in large quantities. Cash crops such as cotton, sesame, sunflower, and sugarcane grow in the vast and virgin tract of the Region's lowlands. The water resources from Lake Tana and all the rivers found in the Region provide immense potential for irrigation development.

Among the total population of Amhara Region, 10.7 percent were migrants based on an official survey of 1994. The level of internal migration by sex showed that 9.3 and 12.1 percent of the males and of the females, respectively, were migrants. The percentage of migrants in the urban areas amounted to 43.1 percent, while in rural areas it was 7.5 percent (CSA, 1998).

The estimated livestock population of the Region is 10.5 million cattle, 5.3 million sheep and 3.8 million goats, and 13.4 million poultry (BoFED, 2004). The huge livestock potential of this Region gives ample opportunity for meat and milk production, food processing as well as leather and wool production.

Among the ten leading top diseases in the Region, all forms of malaria constitute 48.25 percent, parasite 9.10 percent, diarrhoea and vomit 5.4 and varieties of tuberculosis 5.35 percent. There are 15 hospitals, 78 health centres, 517 clinics and 385 health posts in the Region. Health facility population ratio is below the national average. Primary healthcare service coverage in the Region

is 47 percent. However, the rural population forced to travel more than a distance of 5 km to reach to the nearest health institution is 62 percent (BoFED, 2004).

The total road network of the Region is about 5733.1 km. Seasonal roads are about 2865.5 km. The Region's road density is 35 km per 1000 km². In the Region telephone usage average is about 304.8 per 100,000 persons (BoFED, 2004).

4.2 Topography of the Region

The Amhara Region is topographically divided into two main parts, namely the highlands and lowlands. The highlands are above 1500 meters above sea level and comprise the largest part of the northern and eastern parts of the Region. Chains of mountains and plateaus also characterize the highlands. Ras Dejen (4620 m), the highest peak in the country, Guna (4236 m), Choke (4184m) and Abune-Yousef (4190m) are among the highest mountain peaks that are located in the highland parts of the Region. The lowland part covers mainly the western and eastern parts with an altitude between 500-1500 meters above sea level (masl).

The Region has four climatic zones, namely 'Wurch', 'Dega', 'Woina Dega' and 'Kolla'. Areas between 3000-4543 masl fall within 'Wurch' climatic zone, which constitutes 2.53 percent. Areas within the range of 2,300-3000 masl are in the "Dega" climatic zone, and areas between the 1,500-2,300 masl fit in the "Woina Dega" climatic zone; and areas lower than 1,500 masl belong to the "Kolla" or hot climatic zone. The 'Wurch', Dega, Woina Dega and Kolla parts of the Region constitute 2.53, 24.15, 46.71 and 26.71 percent of the total area of the Region, respectively (Bol, 1996 (EC)). The mean annual temperature for most parts of the Region lies between 15°C-21°C. The highest rainfall occurs during the summer season, which starts in mid-June and ends in early September.

4.3 Rivers and Lakes

The Abbay, Tekezze and Awash rivers basins form three major drainage basins in the Region. The Blue Nile (Abbay) River is the largest, covering approximately 172,254 km². The total length of the river up to where it links with the White Nile in Khartoum is 1,450 km, of which 800 km is within Ethiopian boundary. The drainage basin of the Tekezze River is about 88,800 km². In addition, the Angereb, Millie, Kessem and Jema are among the other major national rivers, which originate in the Region.

Tana, the largest lake in Ethiopia is located around the geographical centre of the Region. The lake covers an area of 3100 km². Besides, some other smaller crater lakes such as Zengena, Ardebo and Jardo are also found in the Region.

The rivers and lakes of the Region have immense potential for hydroelectric power generation, irrigation, fishing and navigation. Rib and Gumara Rivers which have a drainage area of about 1790 km² located on the Northern East side of Lake Tana commonly impinge on the *woredas* of Libo Kemkem, Fogera, Dembia and Derra. These localities that border on or share a vast plain where drainage is extremely poor are frequently affected by over-bank spills of the Gumara and Rib rivers that exposes them to serious flooding (DPPC, 1997).

4.4 Flooding around Lake Tana (Blue Nile Basin)

Lake Tana, the largest lake in Ethiopia is located around the geographical centre of the Amhara Region. The lake covers an area of 3100 km². Besides, some other smaller crater lakes such as Zengena, Ardebo and Jardo are also found in the Region.

Table 4.3 The Lake Tana River System

General location	Sub-basin	Area, km ²
North	Lake Tana	3060
	Megech	747
East	Ribb	24464
	Gumara	1893
South-west	Gilgel Abay	5005
	Others	2151
	Sum	15320

Source: Abdulkarim, 2004: 18

Flooding is a recurrent threats occurring almost every year in Lake Tana area caused by the overflowing of the Rib, Megech, Gumaro and Gumara rivers and the spill over of Lake Tana. The flooding is severe during rainy season, which starts in July and extends to mid-September. At this time, crops are damaged and houses are flooded.

Table 4.4 Flood-prone Woredas, and Kebeles around Lake Tana

Zone	Woreda	Kebele		
South	Fogera	Shana		
Gonder		Kuhar Mincheal		
		Abena Kokit		
		Wagatera		
		Kidist Hana		
		Nabega		
		Shaga		
		Dera	Jigena	
		Libo Kemkem	Shina Tsion	
		North Gondar		Bambik
				Gendassa
Tega Amba				
Kaba				
Tebaga				
Bura				
Agidana Kiring				
Dembia	Tana Woyin			
Achera				
Robit				
West Gojam	Bahir Dar	Lijome		
Bahir Dar	Zuria			
	Achefer	Estumit		
	Bahir Dar city	Sefen Selam		
		Fasilo		
		Shimbit		
		Tana		

Source: Woldeab 2005:17



Source: UNOCHA

Rib and Gumara Rivers which have a drainage area of about 1790 km² located on the Northern East side of Lake Tana commonly impinge on the *woredas* of Libo Kemkem, Fogera, Dembia and Derra. These localities that border on or share a vast plain where drainage is extremely poor are frequently affected by over-bank spills of the Gumero and Rib rivers that expose them to serious flooding (DPPC, 1997).

According to the Abbay Integrated Master Plan Study, the total area affected by flooding (excluding the flooding area for Gilgel Abbay) is approximated as 15,000 ha with an average flooding depth of 0.5m to 0.90m. The maximum flooding depth reaches 2 m (Abdulkarim, 2004:20).

4.5 The 2006 flood in Amhara Region

The 2006 flooding was reported to be the worst in terms disaster. Flooding has taken place in Dire Dawa, SNNPR, Amhara, Oromiya Gambella, Tigray, Somali and Afar Regions. The flood situation resulted in considerable human death, displacement and suffering as well as loss of

property and crop damage. Since late July 2006, unusually heavy rains resulted in flash floods and overflow of rivers and dams took the country by surprise, affecting 199,000 people in eight regions of Ethiopia. The 2006 Flash Appeal of Flooding sought a close to US\$ 27.1 million (JGHP, 2006).

In Amhara region, the 2006 flooding was reported to have affected Libo Kemekem and Fogera woredas of South Gonder, Dembia woreda, Bahirdar Zuria and Bahir Dar town and flash floods in Dewcheffa and Ansokiya woredas of Oromia and North Shewa zones respectively. The rivers that caused major flooding are Abay, Gumara, Megech, Derma, Amede Beshir and Mehalwonz.

In the Fogera and Dembia plains, several kebeles were covered with water until the first half of October. The depth of the flooding varies from village to village. Informants reported that the depth of the 2006 flooding ranged from half a meter to two meters. Flooding mostly affects the people living close to Rib and Gumara Rivers and Lake Tana.

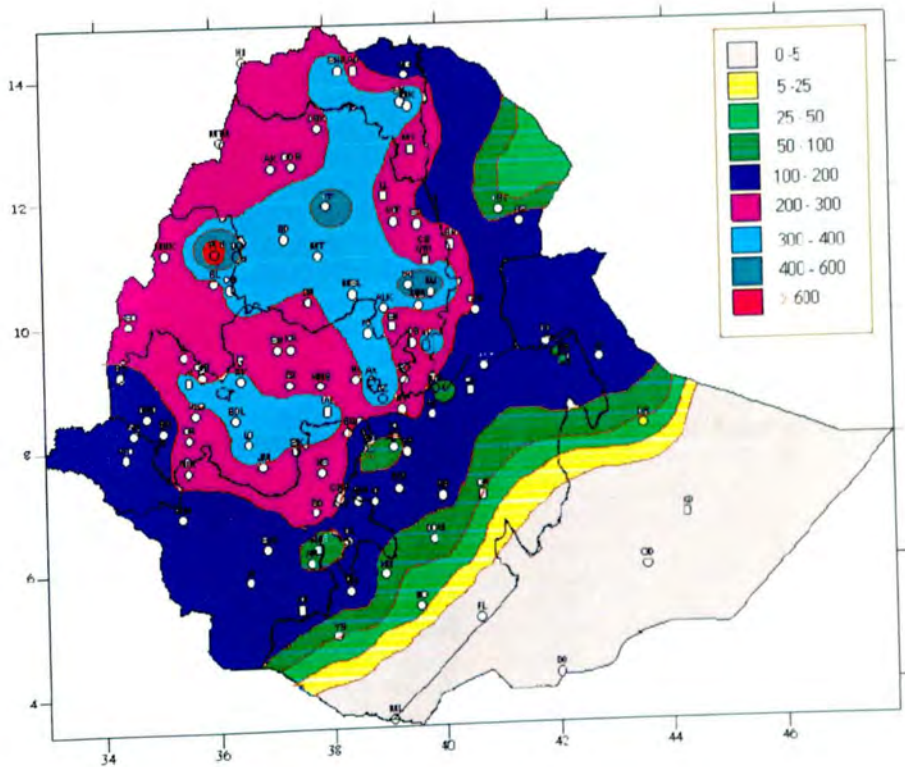


Fig. 3 Rainfall distribution in mm for the month of August 2006

Much of Amhara, parts of central and western Oromia, southern and western Tigray, exhibited 300-400 mm of rainfall in August 2006.

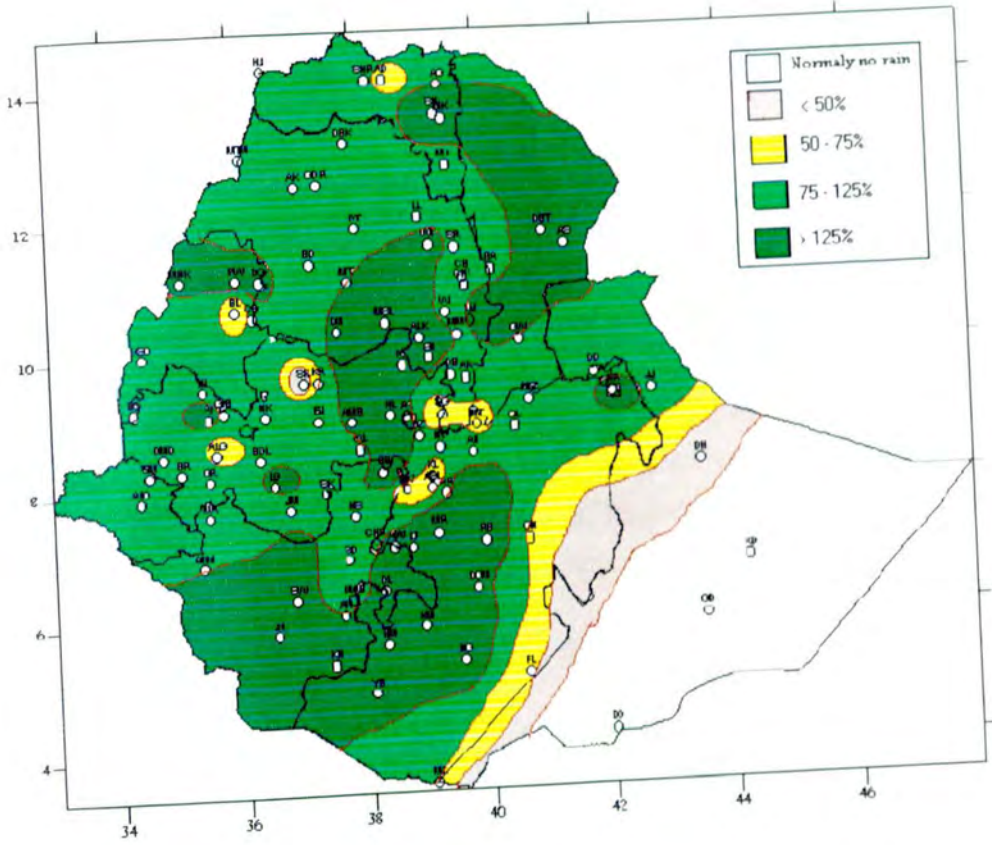


Fig. 4 Percent of Normal Rainfall distribution for the month of August 2006

Explanatory notes for the Legend:

- < 50 - Much below normal
- 50-75% - Below normal
- 75-125% - Normal
- > 125% - Above normal

Source: National Meteorological Agency, 2006

As indicated in the map, with the exception of pocket areas of northern Tigray, eastern Benschangul-Gumuz, western and central Oromia, parts of northern Somali, the rest parts of the country received normal to above normal rainfall.

Impact of flooding

Among the 106 woredas of the Region, 22 woredas with 68 kebeles were affected. A total of 24611 households (with 130008 family members) were affected. Among the affected 39897 people were relocated and stayed in shelters provided by the government, in some institutions such as schools and relatives. However, 28628 people were in shelters in Libo Kemkem, Forgera, Dera and Dembia wordedas.

The floods have also devastated life and property. It destroyed the standing crops, homes and belongings; and disrupting transportation. Flooding reached unprecedented levels particularly Around Lake Tana area and Fogera plain during August 2006. It has damaged standing crops on over 20 thousand hectares of land. In addition, about 6788 quintals of grain stored at home was damaged. 927 beehives were also damaged. Animals including cattle 251, sheep and goat 519, mule and donkeys 40 and 10373 hens have died. Four people have died. Since pastureland inundated, animals had difficulty to graze. Further, schools were damaged amounting to 1.4 million Birr. 54 Feeder roads in Libo Kemkem, Fogera and Dera were affected. In Libo Kemkem and Fogera wordas 40 waster supply schemes were also affected.

Disruption of farming activities has taken place. Farmers were not able to weed out farmlands. Grains such as chickpea, lentil, *guaya*, *abesh* were not sowed on time because of inundation. Farming along Lake Tana was not possible since the lake water on the field did not subside.

5. The findings

This chapter puts the human face on being flooded and living with the risk of being flooded in the four kebeles selected for in-depth study. They are Shina Tision, Wagatera, Kidist Hana and Debir Zuriya Adisge. The quotations from informants amplify the impact of flooding in their lifeworld.

5.1 Socio-demographic and residential characteristics

Wagatera and Kidist Hana kebeles are located in Fogera Woreda, South Gondar Zone. In Wagatera, except the residents of one village (Kirstos Samera), others have settled on Fogera plain. Gumara River borders Kidist Hana kebele. The Kebele is centre to all Fogera kebeles. Shina Tsion is under Libo Kemkem Woreda. The people of Shina Tsion have settled along the Rib River on the Fogera plain. The asphalt road that goes to Gondar divides the kebele in to two. Except one village the others are located on the west side of the asphalt road. Deber Zuriya

Adisge kebele is under Dembia Woreda. Large majority of the residents live in the plain of Dembia. Both kebeles are under the administration of North Gondar Zone

Table 5.1 Selected kebeles' population and distance

Name of Kebele	Population		Distance from the Woreda town (in km)
	Male	Female	
Shina Tsion	9000	7480	12
Wagatera	6360	5640	20
Kidist Hana	4320	3680	19
Debir Zuriya Adisge	8185	6971	18

Table 5.2 Access to basic services by kebele

Name of Kebele	Health post	Primary school	Potable water	Road	Agriculture development office	Farmers' training centre	Telephone
Shina Tsion	1*	1	No	D.W [*]	1	1	Wireless
Wagatera	1	2	No	D.W	1	1	Wireless
Kidist Hana	1	5	No	D.W	1	1	Wireless
Debir Zuriya Adisge	2	4	No	D.W	1	1	Wireless

*Under construction

*Dry weather road

Table 5.3 Profile of household heads by kebele

Kebele	No. Households	Sex		Marital status		Educational status	
		Male	Female	Married	Single	Literate	Illiterate
Shina Tsion	12	9	3	8	4	9	3
Wagatera	12	9	3	12	-	4	8
Kidist Hana	12	9	3	12	-	6	6
Debir Zuriya Adisge	12	8	4	12	-	10	2

5.4 Ownership of land by kebele

Name of Kebele	No. households	Total land owned in <i>timud</i>	Average land holding
Shina Tsion	12	68.04	5.67
Wagatera	12	69.48	5.79
Kidist Hana	12	65.00	5.40
Debir Zuriya	12	44.00	3.66
Adisge			

All most all interviewed residents belong to Amhara ethnic group and are followers of Orthodox Christianity. In Deber Zuria Adisge, less than one percent of the residents belong to Woito ethnic group, following Islam religion. The informant's age ranges between 30 and 80. They own 2-12 *timud* land and the average landholding is 5.3 *timud*. The main occupation of the large majority of the informants is farming. However, few of them supplement their income by engaging in petty trading and selling local drinks (*araki* and *tella*). Informants living closer to Rib and Gumara Rivers practice irrigated agriculture. In Shina Tsion kebele farmers who live close to Rib River use about 40 water pumps for irrigated agriculture.

5.2 Major problems in the study sites

In the focus group discussions, participants were asked to rank order the major problems in their villages. They indicated the major problems in order of their gravity as follows.

1. Flooding of houses and crop fields
2. Hailstorm damages crops
3. Malaria
4. Diarrhoea
5. Cutworms
6. No access to safe water
7. Shortage of land
8. Shortage of animal feed
9. Market place is far away
10. Shortage of pasture in their village
11. Lack of pastureland where they could keep cattle in uplands at times of flooding.

As indicated above, the most pressing problem is flooding of residential quarters and crop fields. When flooding takes place the hand dug water gets contaminated and affects the lives of local people. The outbreak of diseases such as malaria, Diarrhoea and cutworms usually follows flooding. Participants indicated that they have no access to safe water under normal conditions. In Shina Tsion kebele, Salddiba village, 26 people died during the 2006 flooding because of diarrhoea

The problem of Shortage of pasture is compounded when there is flooding. Animals do not get pasture. Participants noted that the estimated depth of floodwater is between one and two meters at times of sever flooding.

5.3 Characteristics of the floods

The kebeles around Lake Tana area get rain from June to August. The normal rainfall in Bahir Dar area for the month of July was 422.5 mm. However, the July 2006 recorded rainfall has reached 562.9 mm (joint Government and Humanitarian Partners, 2006).

Residents remember the flooding that took place in 1987, 1993, 2005 and 2006 in the rural kebeles around Lake Tana affecting the community at various levels. Flooding occurs when the perennial and seasonal rivers overflow or burst their banks. Among the perennial rivers Abay (Blue Nile) Megech, Rib and Gumara cause severe damage to the local communities. Following heavy rainfall, the brim over from Lake Tana affects the kebeles closer to it. Kortit, Ablay, Jara, Tikur Bahir are affected by beaming over of Lake Tana. The depth is between one and one and half meter. There were villages such as Jara, Tikur Bahir, Abalay and Kurtit inundated until 25 October 2006. The participants of the focus group discussions mentioned Jara, Amibala, Shumbaye, Abuy, Robit, Arabia, Abebeye, Dinge and Kurtit (partially) as among the highly vulnerable villages.

In recent years, Rib and Gumara Rivers are changing their courses affecting new villages. Until 1997, Rib River did not change its course Rib River usually brings silts to the plain of Fogera. When the river water reaches the plain, the water spreads over the fields because the riverbank is filled with silts. In most cases, floodwaters contain mud, silt or gravel. An informant, aged 60, said,

‘Until 1997 Rib River used to flow directly to Lake Tana. In 1997 Rib River started flowing to north through Sidyen village to Tena Amba Kebele joining Liben River. In 2000 the river started to flow south crossing Aba Kokit and Shaga Kebeles to Shesher (marshy area) located in Shaga, Shina Teklehaimanot, Nabega and Kidist Hana kebeles. In 2005, Rib River was flowing to north and south directions. The first direction is to Shsher and the second through Sidyen to Tibaga Kebele. In 2006, Rib River started to flow through Agewech village to Shina village joining Saben River. Rib River changes its course because the river bank is filled with silts.

In 2006, Sale Deb villagers (Shina Tsion kebele) faced flood disaster on unprecedented scale. Residents considered the construction of three bridges on Bahir Dar – Gondar asphalt road that channelled the water to their villages, which used to over flow on the asphalt, as one of the major reasons for flooding. The depth of the floodwater of 2006 was between one and two meters.

5.4 The impacts of flooding

The 2006 flood has affected large majority of the residents of the Kebeles around Lake Tana. The impact of flood varies from family to family and village to village. Death was not reported because of flooding. However, 26 people have died because of dieahorrea following the flood. Residents of the area often drink water from hand-dug wells. These wells have collapsed due to the flooding. Thus, residents were drinking contaminated water since they had no option.

Table 5.5 Mortality and injury by kebele

Name of Kebele	Mortality	Injury /illness
Shina Tsion	25	--
Wagatera	--	--
Kidist Hana	--	4
Debir Zuriya Adisge	1	--

Informants of Wagatera noted the difficulty to move from place particularly to market places, churches and other villages at times of flooding. During rainy season farmers of Wagatera had to swim or use small boat (tankua) to cross the river to go to the nearby Hmusit market place.

The human sufferings included children were spending day and night on raised beds. The aged and the handicapped people constitute the most vulnerable group in the community, who find moving in heavy mud rather very difficult. The impact of flooding on the residents of Debir Zuriya Adisge is more sever compared to Fogera plain residents since former do not have rich experience in flood management. Informants of Debir Zuriya Adisge reported that the incidence of flooding in their area started over the last 10 years when Megech Rivers changed its course. All the residents of the kebele have been vulnerable to flood disaster since 1998. As a result of the flood phenomenon being new to the kebele the local knowledge of flood disaster mitigation or coping strategy is very limited. Villagers most affected include the very poor, petty traders in Robit village, and the landless. The inundation of Robit village drenches stored grains and goods of the petty traders. Further, the petty traders find difficult to sell their products on open markets. The landless are often engaged in sharecropping to earn their livelihood. At times of flooding they are not able to cultivate waterlogged farms. The flood also affects institutions such as clinics and schools.



Photo 5.1 Silted up compound of Robit School

Table 5.6 House and domestic losses by kebele

Kebele	No of houses flooded	Grain damaged in quintal	No. of houses damaged	Maximum estimated depth of flood
Shina TSION	12	98	--	2 m
Wagatera	4	4.3	--	2.5m
Kidist Hana	12	163.5	4 (roof)	2 m
Debir Zuriya	8	24	1 complete	1.5 m
Adisge				



Photo 5.2 Damaged hut in Shina TSION kebele

Among the Shina TSION informants, three did not go to the shelter since their houses were located near the Bhair Dar – Gondar road and they felt that if the worst comes they could easily evacuate from their locality.

The case of Wagatera, only two residents went to the shelter. According to the official of the kebele, about 700 household heads (28 percent) went to the shelter although all of them were told

to go. Most of the evacuees were from Barge and Algor villages, which are closer to Lake Tana. Residents of Telefa and Wushet did not go because of the widespread fear that there will be

- a) food shortage in the shelter;
- b) looting;
- c) outbreak of diseases such as diarrhoea; and
- d) lack of pasture land for cattle around the shelter

Table 5.7 Flood affected, displaced residents and animals by kebele

Kebele	Flood affected household heads	Household heads sheltered		Household heads moved with animals	
		F	%	F	%
		Shina Tsion	12	9	75
Wagatera	12	2	16.6	1	8.3
Kidist Hana	12	9	75	6	50
Debir Zuriya Adisge	12	3	25	-	-

Further, Fogera residents have a secret fear that the government will give their land to investors willing to engage in large scale farming in the area. Some residents were unwilling to go to the shelter expecting hardship. In Kidist Hana kebele, an elder woman aged 70, a disabled person and a woman with a sick child did not go to the shelter assuming that if they go to the shelter they might face a problem.

In Shina Tsion, 83.3 percent of the interviewed farmers took their cattle to the highlands and the Bahir Dar –Gondar asphalt road. One of the informants who owns 20 cattle, 17 sheep and two donkeys paid 600 Birr to a person who kept the animals for two months until the end of flooding. Half of the informants from Kidist Hank Kebele kept their animals on Bahir Dar – Gondar Asphalt road. Some informants didn't take their cattle to far places for the fear of cattle theft.

The displaced people in Deber Zuri Adisge had shelter in Robit junior secondary school. Among the interviewed, 41 percent did not go to the shelter because of they were economically well off since they all own flourmills. The three people (two women and one Woito man) who live on the north east of Megech River were the only ones who went to the shelter among the

interviewed. The Woito man was alone in the shelter since the Woitos are ostracised in the community.

Among the interviewed, an informant living at about 50 meters from Gumara River gave the following flood account.

Alem Tihun Adebaby, 38, is a resident of Dengiz village, Kidis Hana. He is married with 7 children. He has 9 *timud* land of which 7 is irrigable. He cultivates *teff*, lentil, chickpea and onion on the irrigable land. His house is located at about two kms from Shirshir (swampy area). Every year he encounters flooding. The 2006 flooding was severe in which on August 8 in the evening around 9 pm the roof of his house was blown down in a storm. His house was flooded. The depth of the flood was about one meter.

His wife was not at home at the time of flooding. He was highly frightened because of the incidence. Hugging a three years old child, he shouted for help but no one came. When the situation became unbearable, he decided to shelter himself and the children in a small hut. He moved all the children, the oxen and other animals to the small hut. Even his brother-in-law who lives in the hamlet couldn't come to his house since he had serious problem of flooding at his home. Alem Tihun and his children spent the night in the small hut.

In the following morning, he sent a message to his brothers and they all came. He also sent his son to his wife, and as she heard she came crying. Those who heard his voice told him that they didn't help him since they were afraid of the flying corrugated iron sheets. In the morning, many villagers came to his house. The following morning Alem Tihun had to feed his children but he had no flour and firewood since the flood has taken it. A woman who knew his problem brought him firewood and dry dung. He prepared breakfast for the children with the flour he obtained from his neighbours. In addition, his sister and a relative brought *enjera*. He was highly worried and disturbed because of the incidence.

The villagers searched the corrugated iron sheets taken by the wind. They found the iron sheets and wood at about 300 meters away. His brothers and villagers reconstructed the house on the third day. Alem Tihun bought three new corrugated iron sheets in addition to the old ones. He obtained the wood on loan to return it in summer. His family

members dried up the left over drenched grain with water. The villagers also made raised beds. Alem Tihun lost 6 quintals of lentil, 20 quintals of *teff*, 25 quintals of *guaya*, one-quintal oats, 4-quintal chickpeas, 2 quintals of flour, 6 quintals of onion and one quintal sunflower. Further, he has lost 6 beehives and 14 hens. Household items were also destroyed.



Photo 5.3 mud plaster grain container damaged by floodwater

5.8 Loss of animals by kebele

Name of Kebele	Cattle	Sheep	Hens	Beehives
Shina Tsion	8	10	38	7
Wagatera	--	--	5	7
Kidist Hana	3	2	108	25
Debir Zuriya	--	--	101	--
Adisge				

5.9 Loss of crop by kebele

Name of Kebele	Land size owned in timad	Irrigable land in	Damaged Standing Crops in timad
Shina TSION	72	-	65
Wagatera	69.5	52.1	50.5
Kidist Hana	65	39	63
Debir Zuriya Adisge	44	11	47

Shina TSION informants reported that 98 quintals of grain stored in mud-plastered containers was totally damaged. The standing crops damaged by flood included rice, teff, *dagussa*, maize and sunflower.

During the 2006 flood, all pastureland was covered with water. Informants indicated that animals were not able to pasture on inundated lands. When animals stayed on such places they were exposed to diseases.



Photo 5.4 Inundated pastureland at Fogera

An informant from Shina TSION kebele, aged 56, provided the following account of 2006 flood disaster and the loss of land.

I am married with six children and two others family members. I have a primary school education. I cultivate seven *timud* lands. Three of the *timud* land is irrigable. I earn additional income form the sale of cattle and honey. My house is located at about 30 meters from Rib River. I have never encountered flooding like the 2006. It was a sever flood. It was in the mid night of July 8 that we heard the sound of the river. I lighted and started calling my brother who lives at a distance of 120 meters from my house. Since Rib changed its course it has already started flowing through our village, separating my brother and me. We were separated for almost three months.

My house was flooded out. It destroyed five quintals of rice, two quintals of oats and two quintals of *teff*. The flood level was between two and two and half meters. The flood made canal of 3 to 6 meters. My two *timud* land turned to water canal.. The flood has damaged rice planted on three *timud* and *dagussa* on a half-*timud* land. All these damage took place since Rib over flowed the levee with one and half meter height and 12 meters length, which I constructed with the cooperation of my relatives. About 20 to 30 ha of the farm and grazing land have turned to canal by Rib River.

On August 23, the chairman of the Kebele with a group of government workers sent a message to us to evacuate the *kebele*. We took our family members by swimming and walking on foot. We were sheltered in tent at a place called Yifag, which was prepared by the government. I sent my cattle to my relatives who live in up lands. We were coming to look after the household property, which we were not able to take out from Yifag village on turn. When the waterlogged land dried up they went back to their original places.

Women participants of the FGDs noted how the occurrence of flooding brings about heavy burden on them. At times of flooding, food items and cooking places in a house are damaged. In the first place, it is usually women's responsibility to take out the floodwater from the house to make the floor dry. Women should prepare a cooking place made up of piece of clay and ash on the raised bed. Until the floor is dry, cooking takes place on the raised bed with a height of 1.5 to 2.5 meters. Women find it tiresome to go up and down the ladder of the raised bed. Providing food to children and other family members creates a lot of pressure on women.

5.5 Flood preparedness and mitigation strategies

There is no formal flood early warning system in the *kebedes*. The main indication of flooding is when the seasonal rivers start flowing and the level of the Rib and Gumara Rivers keep on rising. Wagatera residents, for instance, expect flooding when one or two of the following are observed. First, if they see darker cloud at the uplands. Second, when a very cold wind blows from the direction of Gumara River followed by rain. Third, during winter, if the weather is very warm and flies bite cattle. An elder in Shina Tsion, said 'we know the occurrence of flood when there is heavy rain in *Dega* (highlands)'.

Information sharing with regard to flooding takes place in the *kebedes* since the social bond is strong and in many ways they have either marriage or blood relationships. Elders notify the community members when the flooding takes place. They tell villagers to come out save lives and property. The time of flooding varies from village to village. Those who are closer to the rivers or Lake Tana are affected first.

There is no organised flood response mechanism at Kebele or Woreda level. The prevention activities are largely carried out at household level. Even after the occurrence of flooding except immediate relatives and neighbours, there is no responsible group to look after elders, disabled and other vulnerable people in the kebele. However, informants reported that local government representatives gave them education on how to prevent and mitigate flood disaster. There is no property insurance in the area.

Informants noted how the 2006 sever flooding was handled by the residents and the government. When the flooding increased, every body rushed to save his/her life and property. After many houses were flooded and property damaged, the kebele officials ordered the residents to evacuate with out giving the due consideration to the following important issues.

- a) Transportation to the place where shelter constructed
- b) Assignment of people to look after the property left behind in flood affected locality
- c) How animals are kept
- d) How elders and disabled should be transported to shelters

Residents of Fogera plain have traditional way of flood disaster mitigation measures. Starting from childhood, residents learn how to swim in Gumara River and Lake Tana. It is a common

practice to see children practicing swimming daily. Residents also use rafts to transport grain and other household items when they cross Gumara River.

Residents have the experience of constructing levees along the Rib and Gumara Rivers and their homesteads. An informant, 58, has constructed a levee of 50-meter length with a height of half to one meter. He has also redirected floodwater by constructing a small dike.



Photo 5.5 Fencing a compound with small rounded clay in Achera *kebele*

Many residents constructed their houses on higher grounds with a height of 0.5 to 1.5 meters. In Wagatera, 66 percent of the informants have protected their houses since they constructed their houses on a plot of land with a height of up to one and half meters. The informants got a lesson from the 1993 flooding. Conversely, an informant, 50, reported that the 2006 flood had destroyed household items and food since his house was constructed on a flat site. In Kidis Hana, 75 percent of the interviewed reported that their houses were flooded because the floors were not raised. In Wagatera, residents construct houses with a height of 5 to 8 meters, which allows raising the floor as needed.

In addition, they use raised beds for sleeping and to put on grain. The local people have started storing grains in sacks to put them on high beds easily during flooding. Women also cook food on high beds. In Shina Tision, among the interviewed residents, 75 percent of them cook on raised beds at times of flooding. While 25 percent of the respondents were cooking on raised ground. In the past they used to store grain in mud-plastered containers, which were easily

drenched. Women have the tradition of carrying household items and grain on their heads, which helped them to protect their belongings against flooding. Moreover, the local people construct small canals to guide the floodwater to the main canals.



Photo 5.6 Earthen levee in Deber Zuria Adisge *kebele*

Until 1975, most of the Fogera plain residents do not stay at home during winter because of flooding. At times of flooding the area is not suitable for the people and animals. Thus, they used to migrate to highlands such as Dera and Amora Gedel with their animals as of July and return when the floodwater began to subside. The seasonal migration was an important survival strategy in Fogera. The migration discontinued when peasant associations established, and distributed land to peasants at the time of Derg (the former regime). Further, movement was restricted due to lack of pastureland for seasonal migrants' cattle. Further, when residents are flooded out, they go to their relatives who live in the uplands to get temporary shelter until the water level goes down. Flood victims who lost crop in 2006 had been to Metema as daily laborers. Later, they came back when the wet season ends.

5.6 Emergency services provided by the Government and NGOs

After the occurrence of flooding in the Region, Disaster Preparedness and Prevention Committee composed of representative of the Regional Government Office, Office of Food Security and Disaster Prevention and Preparedness, Bureau of Agriculture and Rural Development, Health Bureau, Education Bureau, Organisation for Rehabilitation and Development in Amhara and Bureau of Water Resources Development were engaged in flood emergency coordination. . The following tasks forces were established.

- a) Food and non-food sheltering
- b) Water and sanitation
- c) Health and nutrition
- d) Agriculture and livestock
- e) Education and HIV/AIDS

Various NGOs and international organisations including World Food Program, UNICEF, Red Cross, Save the Children, World Vision, and Office of Women's Affairs were members of the different task forces established for emergency.

The emergency shelter

The first major activity carried out by the task force was to save human lives by deploying 9 motorboats and vehicles for transporting thousands of residents taken to shelters. The government constructed emergency shelters for the displaced flood victims. The flood-affected people were provided with emergency support such food, blankets, water, medical treatment from July 12 to September 22, 2006. One of the shelters was constructed at 7 kms away from Woreta town at a place called Work Meda. Over 14 thousand people were sheltered. The Regional Food Security and Disaster Preparedness and Prevention Office coordinated the emergency support. Various NGOs were involved including UNICEF, WFP, MSF Greek, Save the Children, World Vision, Red Cross, Care Ethiopia and Rotary International.

Participants of the FGDs reported how the victims of 2006 flooding evacuated and lived in the shelter provided by the government. Many of the evacuees went on foot, except those who were provided with boats by the government. Relocated people were highly crowded in the tents. There was an outbreak of diarrhoea. Although the food provided to dislocated people was not enough in the shelters, participants noted that victims wouldn't have survived without it.

All the residents of the flooded villages did not evacuate. In the Wagater kebele, few residents had gone to the shelter provided by the government. About 600 households of Telefa and Wushet villages did not go to the shelter. Participants mentioned the following reasons for staying in their villages.

- Lack of pasture land to keep their cattle if they move to the shelter
- Grippled by fear of rustling
- Heard of the insufficiency of food at the shelter
- Fearing of the outbreak of disease in the shelter

Participants reported about the seed they were given from Care Ethiopia. The first complaint was that farmers did not get seed for all the crops damaged in the field due to flooding. The second complaints pertain to the quality of the seed. Participants noted that Care Ethiopia did not consider the cultivated land, i.e., whether it is irrigated or rainfed land. Those who cultivate rainfed land said that the seed was unsuitable for their land. Thus they sold the seed. One participant said 'the chickpea seed purchased from merchants at over 300 Birr, we sold it at 200 Birr per quintal'. Further, they reported that they spent up to three days to get a small amount of seed. The participants noted that three years ago they were given chickpea seed by agriculture department. The seed was purchased on credit did not grow. They suggested that in the future when the government gives seed, care must be taken. The seed must be tested whether it can grow or not in the area. Conversely, the Deber Zuria Adisge farmers did not complain about the seed they were given. The participants of the focus group discussion reported that the seed that was purchased and distributed to displaced people was suitable because it was purchased from farmers in their area. However, some reported that they did not get seed although flood has damaged their stand crops. The kebele officials reported that the seed is given on the assessment of the damage on standing crop made by agricultural experts. Those who complain, said the official, are the ones who sharecrop their land. In principle, such farmers did not get seed.

5.7 Suggestion of participants to prevent flood

In the FGDs and individual interviews, participants noted how the area they live in is convenient for irrigated and rainfed agricultural production since they can produce twice in a year grains such as rice, paper, sunflower, *teff*, wheat and others. Thus, they said vehemently 'we do not want to be relocated to other places. The government should help us here to reduce the impact of flooding'. They suggested the following measures to prevent flooding in their villages.

- a) The Rib and Gumara Rivers should flow directly to Lake Tana by constructing permanent structure. In the past, the government with the cooperation of local people has attempted to construct levee, which was eroded with big floodwater.
- b) At times of flooding, people have difficulties to go to marketplace or evacuate their villages since there is no road. Thus an all weather road should be constructed.
- c) During flooding, residents drink floodwater. This has resulted in the outbreak of diseases such as diarrhoea and intestinal diseases. Potable water is needed

6. Discussion

This chapter draws together the findings from the in-depth household interviews, the focus group discussions and interviews with key institutional stakeholders. In this chapter we discuss earlier findings on exposure to flood, flood preparedness and response to flood and flood-induced livelihood practices and resettlement initiatives.

6.1 Exposure to flood

The residential quarters are located on Fogera and Dembia plains. Rivers such as Rib, Gumara and Megech cross the plains flowing to the Lake Tana basin. Almost all the houses are mud plastered made of wooden products. Residents are not advised how and from which material they should construct their houses. The quality of housing is an important determinant of the communities' vulnerability to flood. The construction materials used also contribute to the vulnerability. The mud plaster walls are easily damaged due to flooding. Houses without raised floors are also easily flooded out. Poverty, health, access to resources determines the vulnerability of individuals and communities. In general, poor people are the most affected and take some time to rehabilitate.

As expected, there exists a significant relationship between the distance people live from Rib, Gumara, Megech Rivers and Lake Tana as an indicator of risk exposure. The area has been experiencing flood since the historical past. No report is available on floods. All the kebles are not equally exposed to flooding. Villages closer to Rib, Gumara or Megech Rivers and Lake Tana are highly vulnerable to flooding. All the villages in Shina Tision kebele are vulnerable to flood. However, the degree of vulnerability varies from village to village depending on the proximity to Rib River and bridges constructed to pass water from one side of the Bahir Dar - Gondar asphalt road to the other. In 2006, Sale Deb villagers faced flood disaster on unprecedented scale.

Residents gave two reasons for this. First, the volume of rain was very high compared to other years. Second, the bridges constructed on Bahir Dar – Gondar asphalt road to reduce the water that over flow on the asphalt channel the water to the villages of Shina Tision which had not been before. As Fox (2006:4) noted ‘all engineering (structural) measures applied to a river result in the loss of some part of the natural environment, and all engineering solutions aimed at decreasing the risk of flooding for one part of a river basin increase the risk of flooding for other’

In terms of vulnerability, the second category of villages that are affected by flood are those close to Rib River or villages crossed by Rib when it changed its original course. For instance, Yagawech village is affected by flood because of the change of river course. The third category of vulnerable villages is Berngua and Walka villages. These villages are far away from Rib river. They are also closer to uplands. They can be affected by flood when high level of flooding occurs in the area, for instance, the 2006 flood.

The farming practice is one factor of vulnerability in the area. The location of farms is on the plains of Fogera, which can easily inundated at times of heavy rain. The road network is poor in the rural kebeles of the three woreds which made difficult to provide emergency services. For instance, in Libo Kemkem the length of rural road is 204 kms, which connects 33 kebeles with over 100 thousand people. The length of all weather road is only 56 Kms.

6.2 Preparedness

Although people could observe that floods are becoming worse, they prepare at a level commensurate with the worst disaster they experienced, and not at a level that might exceed their experience. In the 2006 flood, people’s preparation for and local institution perception about the flood were all based on their past experience. Some families do not begin to make any reparations until the floods are virtually upon them. Elderly, young couples with small children and women-headed households in particular may not have enough labour to undertake thorough preparations.

The above-mentioned strategies although they are effective in some cases, generally high floods wash away the canals and levees. The community members suggest the construction of lasting canals that can route the floodwater. The permanent canals may have two advantages. First, the floodwater will be drained without damaging the community. Second, the canals can help farmers to irrigate farmlands during dry season

The Lake Tana Basin has good number of river level monitoring (gauging) and meteorological observation stations. The National Metrological Agency forecasted that the Amhara region will receive rainfall of 20 percent above normal, 65 percent normal and 15 percent below normal. It was predicted that during the kiremt season of 2006 that there will be hailstorm and unexpected flood in advance in the western part of the Amhara region, but there was no indication of the magnitude of the flood.

As the magnitude of the flood was not predicted, people and local institutions were not prepared against the 2006 flood. Hence, the whole effort was a response to emergency, which proved to be inadequate. Another main shortcoming was with flood warning interpretation in the villages. Local people, with their own grassroots experience of disasters, do not always respond to warnings. Also, there is a lack of understanding by local institutions on the interpretation and communication of flood warnings to potential victims. There is a need to develop a community-based flood warning system with appropriate capacity building at the local community-based institutions, and provincial and national meteorological forecast information providers.

6.3 Response to flood

Nowhere do people desert their homes unless they are compelled to do so. If floods force them out of their houses, their first choice is to look for a temporary shelter within the village as close to their homes as possible. If that is not possible, perhaps because flood water has entered into every nook and cranny of the village or because they are unable to get to a higher ground on some one else's land they try to find shelter in some nearby village. It is only when even that option is not available that people brave the uncertainties of the outside world in search of food and shelter for the time being. Floods are temporary seasonal phenomenon. Most of the people who leave their homes wait for the floodwater to recede and then return to their houses to begin anew their economic activities. Only the very few who do not own any land or working capital at all and are faced with the grim prospect of unemployment and starvation in their usual place of residence actually desert their homes or villages in order to try their luck elsewhere generally leaving for the urban areas. If the floodwater rises further and forces them from homes, people take shelter on the high roads. Some move out the village and take shelter in temporary relief camps, set up by the government during that period.

When floodwater rises, people first try to collect all their belongings and move to the higher and safer of their homes. If the water reaches there too, they take shelter on platforms or other raised

fittings if there are any within the household, and stay there until the water level falls. When that fails or, if the household does not have any furniture on which people can perch, they try to build raised wood platforms, known as 'kot' within their homes where all the members of the household huddle together, waiting for the flood water to recede.

There was comprehensive action from the Government at all levels, as well as from local organizations, in response to the crisis. Immediate action was taken for rescue operations and food distribution by the task forces. Kebele leaders and task force members were in boats during the whole flood, organizing rescue operations.

Livelihoods in the Fogera plains and Dembia lowland areas centre on rainfed and irrigated cultivation and livestock raising. Those interviewed at the study sites continue to plant two crops but report losing part or the entire second crop at times of severe flooding.

Even farmers who have made relatively successful investment in agriculture and livestock raising acknowledge that they do not "get ahead" by agriculture alone. Having capital to invest has been one of the keys for households to improve their livelihoods in the last decade. Those who have been able to diversify sources of household income have had an advantage. For example, the ability to make to increase livestock herds and to commercialise handicraft production have been important factors in improving household well being and in absorbing shocks caused by natural hazards. However, the poorest households in Lake Tana area lack the resources to improve their economic well-being, and are particularly vulnerable to economic shocks.

An increasingly common strategy in the study sites is for young people to migrate, either temporarily or long-term, in search of work. They go to Metema and other urban centres.

6.4 Flood induced livelihood practices and the resettlement initiatives

The farmers cultivate different types of crops according to the seasons. For instance, they plant rice on deluged farmlands. After the end of the wet season they cultivate crops such as beans and lentils. In addition, farmers produce tomato and vegetables using irrigation during dry season.

Almost all informants are not willing to be relocated due to flooding. The residents don't appreciate resettlement for number of reasons. Firstly, the Fogera plain is convenient to live in. Except malaria, the incidence of other diseases is very low. They said 'this is the place where our

ancestors' umbilical cord is buried. We do not want leave'. One informant said 'a fish can't survive if it is out water. We are like that. We can't leave in other places'. Secondly, the plain is suitable for cultivation. Many of the farmers get good harvest every year. The presence of alluvial soil and water has encouraged farmers to cultivate with out applying chemical fertilizer, unlike thousands of farmers in the Region Many farmers who have access to irrigation water cultivate two times in a year. In the rainy season they cultivate rice. The yield of rice per hectare ranges from 30 to 45 quintals. Relatively, rice also withstands flooding compared to other crops such as teff and wheat. After the rainy season, farmers cultivate chickpea, lentil, *gurya*, otas, barley and other crops are planted. In the dry season, farmers practice irrigated agriculture by planting tomato, onion, maize, oats and potato. Farmers reported that the income from the sale of onion is very attractive.

Although residents close to Rib River are vulnerable to flooding, these farmers are also beneficiaries of irrigated agriculture. Among the informants, 77 percent of them own irrigable land ranging from 0.5 to 8 *timad*. About 40 farmers own water pump live close to Rib. Residents noted that the irrigators earn better income than the farmers who depend on rainfed agriculture. The expansion of irrigated agriculture along Rib River has contributed to the reduction of the grazing land.

The recent development in Shina Tsion is the sheep raising. During dry season, the plain is suitable for sheep raising. However, during wet season, farmers sell sheep since flood inundates the pasture. After the wet season (September and October) , farmers buy sheep to fatten up for sale.

In 1998, the local government resettled displaced people from Debir Zuria Adisge. However, the flood victims abandoned the resettlement and went back to their original villages after they stayed for three months in their resettlement sites.

In the focus group discussions, participants noted that there is no need to resettle the Achera people because they are controlling the flood problem. In Debir Zuria Adisge, the reaction to the resettlement program is mixed. Those who are better off (e.g. owners of shops and flourmills) do not appreciate resettlement because they could somehow protect themselves against the flood. Furthermore, those who cultivate the alluvial soil also do not appreciate resettlement since they would lose the fertile farming plots. Conversely, the landless youth and the very poor people appreciate resettlement on two grounds. Firstly, if they resettle they will get a plot of land for

cultivation and construction of their own houses. Secondly, the very poor people expect that they will get more land to cultivate.

7. Conclusion: Living with risk

The study in Lake Tana area focused on four rural *kebeles* namely Wagatera, Debir Zuriya Adisge, Kidist Hana and Shina Tsion. The number of affected people reported and the damages on property were estimates by *kebele* leaders and participants of FGDs.

Flooding occurs in the above-mentioned *kebeles* when the perennial and seasonal rivers overflow or burst their banks. Among the perennial rivers Abbay, Megech and Rib cause severe damage to local communities. The drainage of majority of the rivers of the region is to Blue Nile and Lake Tana. Villagers believe that the spill over from Lake Tana (locally known as *keriz*) to the fields of their villages as the major source of flooding.

The vulnerable groups include women, handicapped, the very poor, old people, children and landless youth. During severe flooding, especially women-headed households, the handicapped and the old may not get community support immediately since everyone in the village focuses on his/her own household. Petty traders in small rural towns (e.g. Robit) are among the vulnerable groups. In many of the *kebeles*, flooding was mentioned as the most pressing problem. Followed by malaria, diarrhoea, animal and crop diseases and lack of access to safe water.

Flood inundates large part of the rural villages by displacing and making people homeless. The damages are the following:

- Inundates residential areas, farm and pasture lands and houses are drenched and temporarily put out of use;
- Displaces residents and creates burden to villagers in the area that provide temporary shelters to relatives and acquaintances and of temporary shelters to flood victims
- Damages household belongings including grains stored;
- Kills livestock;
- Makes impossible to cultivate deluged farmlands during summer and results in lose of agricultural income;
- Creates conducive conditions for the breeding of vectors for malaria and other water-borne diseases;

- Damages feeder roads and other vital infrastructure;
- Disrupts economic activities.

Flooding has also benefits to a certain group of people in the study areas. The land that used to be unsuitable for farming or grazing (*Amaga* land in Debir Zuriya Adisge *kebele*) has become fertile due to deposits of alluvial soil. Cultivation of crops on the alluvial soil has enabled farmers to harvest good yield per hectare without using fertilizer and improved seeds. A recent development is the cultivation of rice in the floodwater-covered fields of Fogera woreda. The pastureland is also suitable for cattle raising during dry season.

Flood affected people have developed various coping mechanisms to mitigate/prevent flooding. Villagers make high beds for sleeping and putting on household items during flooding. In some villages local people started to store grains in sacks in order to move them easily at times of flooding. They also make small boats for transporting family members and goods from place to place. Digging canals, construction of levees made of wood, leaves and soil along the bank of rivers and houses, raising the floor level of a house help communities to halt inundation. During flooding, lowland villagers send their cattle to the uplands for grazing.

Since flooding has started recently in some *kebeles*, villagers lack experience of flood disaster mitigation strategy. Landless youth (*Achera kebele*) migrate to other places in search of jobs since they cannot cultivate inundated farmland on sharecropping basis. Cultivation of crops according to seasons is also employed as coping strategy.

Many of the community-based coping strategies are effective. However, poor people cannot afford to make high beds. Furthermore, the bed cannot accommodate belongings including grains at times of severe flooding. The levees constructed with soil and woods are easily demolished by flash floods.

Villagers suggest that construction of large canals to divert water as a viable means to mitigate flood. The introduction of irrigated agriculture, for instance, on Megech River in Debir Zuriya Adisge *kebele*, is also suggested to minimize the flooding effect and use the water for production purposes.

Resettlement as coping strategy was one of the issues discussed with community members and leaders in the study sites. Past experiences show that forced resettlement is not a viable solution

to the problem of flooding. In fact the regional government has attempted in Debir Zuriya Adisge kebele to relocate flood-affected people, which did not materialize. Relocated people abandoned settlements in few weeks. Villagers do not appreciate resettlement. There are fears that the government will take fertile land if flood affected people resettle elsewhere. Moreover, villagers have a feeling that life would be difficult if they move out of their villages.

Community members practice indigenous flood early warning and information sharing procedure. For instance, watching the cloud mass on a horizon helps villagers to forecast rainfall and flooding.

The role of stakeholders in support of flood early warning system and disaster preparedness is very minimal. The regional government does not have flood early warning system. The occurrence of flood is communicated to the higher government bodies through the formal government structure meant for all development activities. After the flood occurred, government provides relief aid to flood victims depending on the severity of flood. In some cases improved seeds is given on credit to flood victims. If the flooding is not severe, victims are left to fend for themselves. No fund is allotted for flood disaster.

In summary, the study shows that:

- the flood mitigation strategies employed by the residents are temporary which can not withstand high volume of flooding as exhibited in the case of the 2006 flooding.
- There is no formal community organisation that is involved in early warning or prevention of flooding in the kebeles. Residents deal with the problem of flooding when it occurs.
- The major flood induced livelihood practice is rice cultivation. Followed by job seeking migration.
- There is no early warning system. The Government and NGOs' will provide depending on the severity of flooding the provision of food and other services on ad hoc basis.
- Relocation of residents due to flooding is entirely rejected by the residents.

In conclusion, people live with risk in Lake Tana area as Fox (Fox: 2006:3) indicates 'because of the natural richness and livelihood opportunities presented by the land-river environment. This convenience comes at a cost, and that cost is the risk of losing one's property, livestock, and livelihood— even one's life'.

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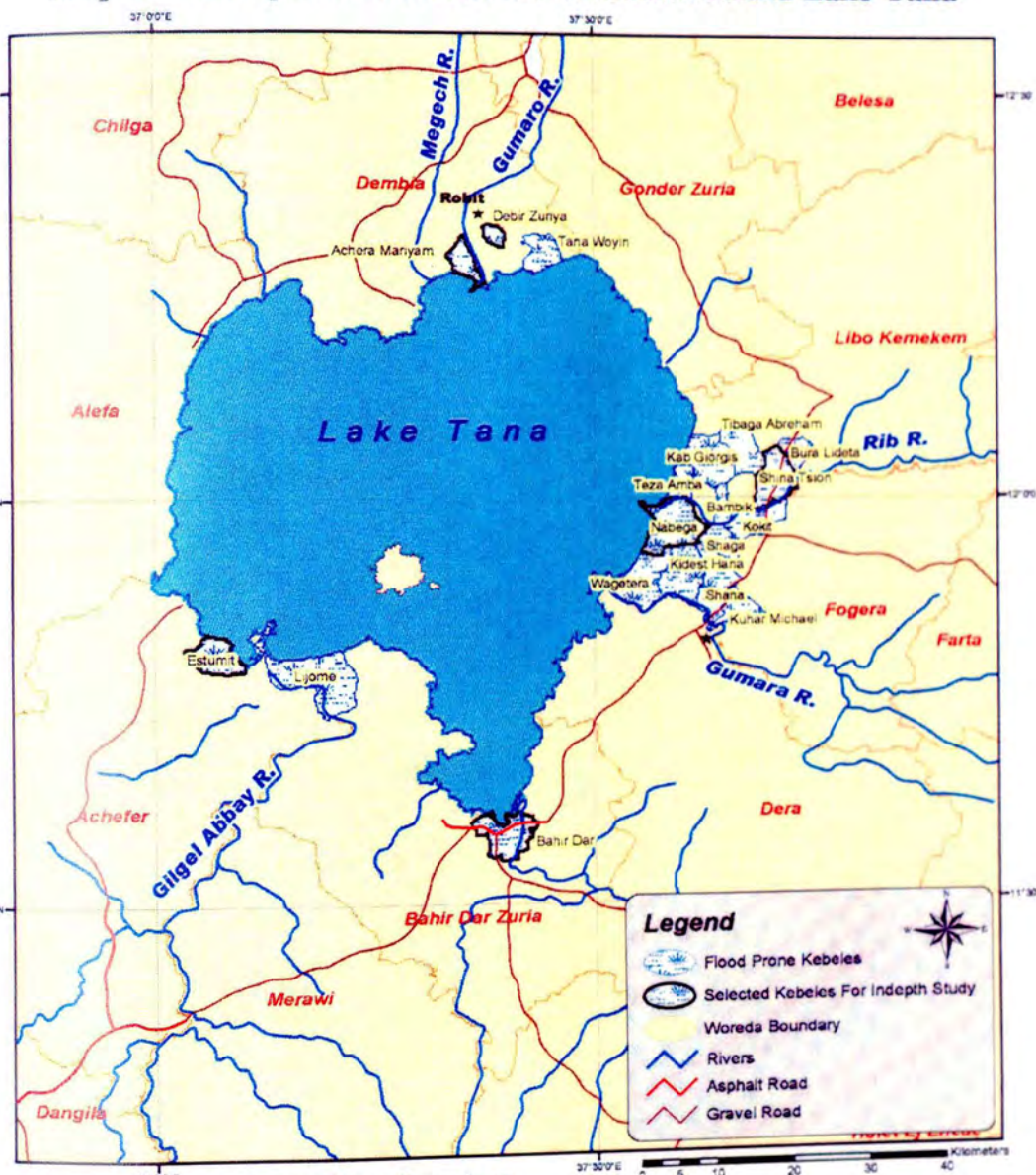
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- በአብክመ:- በደቡብ ጎንደር አስ/ዞን በሊቦ ከምክም ወረዳ በተከሰተው የጎርፍ ማጥለቅለቅ የተጎዱ ቀበሌዎችን ከአደጋ ለመከላከልና በዘላቂነት ለማቋቋም የወጣ ዕቅድ /የተከሰሰ/ ነሐሴ 1998 ዓ.ም
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Map of Flood-prone Woredas and Kebeles Around Lake Tana



Data Source: Central Statistics Authority and Ethiopian Mapping Agency
 Map Produced by ENTRO, Dec 2005.

Appendix 2

Estimate lengths of major rivers and drainage by zone

Zone/River	Drainage	Estimate length in km
West Gojjam		
Blue Nile	Blue Nile	200
Gilgel	Lake Tana	150
Abbay	Blue Nile	105
Bir	"	95
Fetam	"	125
Beles	"	65
Debohila	"	N.A
Zima	"	60
Jema	"	80
Ayehu	"	N.A
Gilgel Beles		
East Gojjam		
Blue Nile	Blue Nile	400
Abbaya	"	70
Suha	"	90
Muga	"	75
Chemoga	"	45
Temcha	"	115
Cheye	"	45
Teme	"	55
North Gonder		
Dinder	Blue Nile	220
Rehad	Blue Nile	170
Genda	Atbara	95
Wuha	Atbara	185
Guang	Atbara	210
Angereb	Lake Tana	N.A
Megech	Tekezze	105
Mena	Atbara	N.A

Tekezze

South Gonder

Rib	Lake Tana	80
Gumara	Lake Tana	70
Blue Nile	Blue Nile	N.A
Liben	Tekezze	45
Tekezze	Atbara	N.A
Mewen	Tekezze	40
Goleye	Tekezze	55
Beshilo	Blue Nile	N.A
Chefa	Blue Nile	60

South Wollo

Blue Nile	Blue Nile	N.A
Weleka	?	"
Yeshum	Blue Nile	"
Durame	?	"
Beshilo	Blue Nile	"
Borkena	Awash	"
Chelenka	Awash	"
Mesble	Blue Nile	"
Mechal	Blue Nile	"
Selgie	Blue Nile	"

North Wollo

	N.A	N.A
Gimmora	"	"
Alewuha	"	"
Getu	"	"
Golina	"	"
Tekezze		

North Shewa

Benesa	N.A	80
Chancha	"	75
Mofer	"	43
Wuha	"	135
Wonchite	"	110

Zima	“	75
Kessem	“	N.A
Shayie	“	N.A
Gadowa		

Source: BoFED, 2005

N.A Not available

Approximate sizes of major lakes in Amhara Region

Zone	Name of lake	Area (Sq.Km.)	Height (m)	Depth (m)	Width (m)	Length (Km)
West Gojjam, and						
South and North	Tana	2412.3*	1785	9	60	75
Gonder	Zengena	0.5	2500	-	0.85	0.75
Awi	Godana	1.4	2300	-	1.4	1.3
West Gojjam	Tilba	0.5	2200	-	0.9	0.75
West Gojjam	Haike	35.0	2030	23	5	7
South Wollo	Ardebo	18.0	2000	-	3	7
South Wollo	Jardo	75.0	800-	-	10	10
South Wollo			1000			

Source: BoFED, 2005

- Data not available

* The figure appears to be wrong.

Short description of Lake Tana

General Information	
Description	Lake Tana is the largest lake in Ethiopia and is the source of the Blue Nile, which flows to Khartoum, Sudan and beyond. There are 37 islands in the lake, on which are located some 20 monasteries dating from the 16th and 17th centuries.
Latitude	12° 10' 0" (12.1667)
Longitude	37° 20' 0" (37.3333)
River Basin	Nile
Physical characteristics	
Description	<p>Although it is relatively small in comparison with the three "great lakes" of East Africa— Lake Victoria is approximately 20 times larger –Lake Tana is very important to Ethiopia as permanent source of both water and hydroelectricity in the drought-prone Region. The lake is situated in the northern highlands at an altitude of approximately 1800 meters. Four perennial rivers and numerous seasonal streams that depend heavily on the local climate, feed the lake. Rainfall averages 1315mm/year, but evaporation is higher about 1800 mm/year. With a mean depth of 8 meters only, the alternating dry and rainy seasons result in an average difference of 1.5 to 2 meters between the lowest (May-June) and highest (October-November) lake levels.</p> <p>Lake Tana was formed by a volcanic blockage that reversed the previously north-flowing Blue Nile and created one of Africa's greatest waterfalls known as Tis Abbay or Tis Isat. The falls isolated the lake, in which 18 species of barbus fish evolved, the only extended cyprinid species flock in Africa and the only intact flock in the world. The only other known flock, in Lake Lanao, in the Philippines, has been decimated by introduced species</p>
Volume	28.00 ³
Surface Area	3,600.00 km ²
Depth	Mean depth: 9.0 m Maximum depth: 14.0 m
Origin	Volcanic

Trophic Region	Mesotrophic
Catchment	Catchment size: 16,500.00 km ² Catchment/surface area ratio: 5:1

Socio-Political

Economic Value	<p>The Lake Tana Basin significantly contributes to the livelihoods of tens of millions of people in the lower Nile River basin. The fish resource potential of Lake Tana itself is over 10,000 metric tons per year. The lake is also a natural reservoir for the eighty-megawatt runoff power station at Tis Abbay.</p> <p>The largest city on the lakeshore, Bahir Dar, has a population of over 200,000, and at least 15,000 people are said to live on the islands in the lake. Bahir Dar is the capital of the Amhara Region and is home to Bahir Dar University (BDU), which evolved into a university through the amalgamation of a teacher-education college and a polytechnic institute.</p>
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Source: <http://www.worldlakes.org/lakedetails.asp?lakeid=8568>