Pastoral pathways

Climate change adaptation lessons from Ethiopia

Siri Eriksen Andrei Marin

Department of International Environment and Development Studies, Noragric
Norwegian University of Life Sciences

UTVIKLINGSFONDET
THE DEVELOPMENT FUND • EL FONDO DE DESARROLLO

Published by the Development Fund
First published 2011
ISBN 978-82-91923-34-5 (Print)
ISBN 978-82-91923-35-2 (Digital)

For more information please contact the Development Fund
Utviklingsfondet
Grensen 9 B
N-0159 Oslo
Norway
+47 23 10 96 00
www.utviklingsfondet.no

Authors:
Siri H. Eriksen and Andrei Marin
Department of International Environment and Development Studies
Norwegian University of Life Sciences
P.O. Box 5003
NO-1432 Aas
Norway

Collaborating organizations:
Afar Pastoral Development Association, Afar Region, Ethiopia
Ogaden Welfare and Development Association, Somali Region, Ethiopia

Production:
Gitte Motzfeldt, Siv Helén Strømland
Graphic design/layout: Ian Dent – www.iandent.net
Photos: Utviklingsfondet, Andrei Marin, Maria Ölund, Sylvia Rani Rognvik

The Development Fund is a Norwegian independent non-governmental organization (NGO). We support environment and development projects through local partners in Asia, Africa and Latin America. We believe that the fight against poverty must be based on sustainable management of natural resources in local communities.

Trykk: GRØSET™

Contents

P4 Preface

P8 Executive summary

P12 1/ Climate change adaptation and sustainable development

P16 2/ The vulnerability context and multiple stressors among pastoralists

2.1 The Afar field sites

2.2 Vulnerability and pastoral management strategies in Afar

2.3 The context for pastoral vulnerability and adaptation in Ethiopia: Afar and Somali regions

P38 3/ Towards sustainable adaptation to climate change

P44 4/ Lessons from pastoral pathways

References

Acknowledgements

The authors would like to thank the local people in the Afar and Somali sites for participating in the study. We are grateful to the Afar Pastoral Development Association (APDA) and the Ogaden Welfare and Development Association (OWDA) for leading the local data collection and providing valuable input to the study. We would also like to thank Diress Tsegaye, Maria Ölund, Lars Otto Næss and Gitte Motzfeldt for invaluable comments on an earlier draft. Lastly, we would like to thank the Norwegian Agency for Development Cooperation (NORAD) for funding this report.

Preface

A key aim of the Development Fund activities is to increase the adaptive capacity of marginalized rural poor farmers and pastoralists in the South. Furthermore we want to respond to local, national, and global challenges that affect the livelihood of these farmers and pastoralist. Specifically, we recognize the need for integrated climate research and analytical knowledge to enhance the quality and sustainability of our project and policy work.

This report has two main objectives:

1. To increase the knowledge and understanding of key themes of the program and policy work of the Development Fund and its collaborating partner organizations in pastoral and agro-pastoral rural areas of Ethiopia, and to give guidance for future program planning in these areas.

2. To raise awareness among planners and policy makers and strengthen understanding of the critical situation the pastoralists are facing today, and to provide recommendations for sustainable pastoral adaptation pathways in the future.

Human induced climate change is increasingly affecting the rural poor, who often have the least capacity to respond to such change. Any alterations in climatic conditions exacerbate an already challenging livelihood situation. Given that both environmental and societal stressors experienced by the poor are driven in part by global processes, we now understand that the traditional ways of coping with climatic variability on their own will be insufficient in addressing climatic changes in the long term. Therefore, increased knowledge and an in-depth understanding of the stressors that influence people's livelihoods is necessary in order to address ongoing and future changes.

Despite many studies questioning this view, pastoral communities are often associated with degrading rangelands. A starting point for understanding vulnerability contexts and adaptation to climate change adaptation is a recognition that these communities are custodians of the local environment. The huge contribution these mobile systems can make economically, socially and especially environmentally needs to be considered by politicians and policy makers alike as development strategies and adaptation policies are formulated. The Afar, with their protective environmental management laws have, for example, been able to manage and utilize the scarce resources and maintain their livelihoods in one of the hottest places on Earth. Pastoralists have considerable knowledge and experience in dealing with climatic variability, which can be expected to increase with climate change.

Ethiopia's legacy of variable and unpredictable rainfall, causing frequent droughts and heavy floods, undermines local as well as national food and water security. This feature has implications for economic growth and poverty reduction efforts, especially for already vulnerable pastoral groups who are fully dependent on the natural environment they inhabit. The negotiations under the United Nations Convention to Climate Change (UNFCCC) are currently creating a global framework for national long term adaptation planning. At the same time, Ethiopia is in the process of developing regional adaptation plans. These plans will form the basis for the Ethiopian National Adaptation Plan. These multi stakeholder planning processes have the potential to identify and address the multiple stressors facing the Afar and Somali people, as outlined in this report. It is our hope that the knowledge generated through this report can provide useful tools for development and adaptation planners and policy makers and hence facilitate and strengthen their work.

Gitte Motzfeldt
Climate Change Advisor, the Development Fund

Knut Harald Ulland
Executive Director, the Development Fund

Afar women
fetching water

Executive summary

Climate change highlights the need for a new type of development. There is an urgent need to develop adaptation approaches that ensure social equity and environmental integrity. Specifically, there is a need to reframe policy towards responses that shift, rather than reproduce, the development paradigm causing the climate problems and vulnerability in the first place. There are few examples of how this can be done in practice, however.

This study exemplifies what sustainable adaptation – that is, adaptation to climate change that contributes to sustainable development pathways – means in a local context. Four normative principles have been developed that can guide policies and interventions towards achieving development pathways that strengthen both social equity and environmental integrity:

1. recognise the context of vulnerability, including multiple stressors
2. acknowledge differing values and interests affecting adaptation outcomes
3. integrate local knowledge into adaptation responses
4. consider potential feedbacks between local and global processes

This study examines the practical implications of these principles in an Ethiopian pastoralist context. Hence, pastoral pathways – past, present and future - can provide lessons for the type of societal transformations required to tackle the climate change problem.

The analysis is based mainly on interview data collected in two sites in Afar as well as insights from past studies in the region as documented in published literature. In order to understand their significance across contexts, some of the key issues identified for Afar are followed up with a smaller number of interviews in another pastoral area, the neighbouring Somali region. The vulnerability context, multiple stressors and local adaptation strategies are investigated in order to identify the social, environmental and development processes that shape adaptation options in both areas.

A crucial issue is the extent to which the local dynamics – that is, the interaction between local livelihood responses and the multiple changes that they face (including climate variability and change, conflict and development policies) – contribute to more or less sustainable development pathways. Climate related events, compounded by factors such as disease or conflict, play a prominent role in local history in both areas. A comparison of the Afar and Somali study areas reveals that some of the main processes driving vulnerability are similar in both sites, even if some of the local manifestations and responses differ. In both areas, respondents perceive the climate to have changed over time, with higher temperatures, reduced rainfall, more unreliable and localized rainfall, and resulting drought events as a key livelihood concern. These changes take place alongside a deterioration of the grasslands over the past decades and a resulting shift from cattle to smallstock as well as a dramatic reduction of herds. Such developments threaten the viability of pastoralism, with many people being forced to turn to other, often marginal livelihoods, such as the production of charcoal in Afar and the collection and sale of grasses and other rangeland products as well as migration to cities in the Somali study area. Many also turn to trade as a response in both areas. Remaining pastoralists seek to migrate further with their animals in search of pasture and water.

These responses to multiple stressors are often precarious and also threaten the viability of pastoralism in the long term, however, reinforcing vulnerability and inequity. Some activities such as the cutting of live trees contribute to declining rangeland resources; in addition, pastoral mobility is severely constrained. This is particularly evident in Afar, where the expansion of agricultural schemes and insecurity related to conflicts with neighbouring Somali Issa groups mean that key drought grazing areas increasingly become unavailable. In both study areas, the loss of grazing areas is exacerbated by a process of individuals enclosing land for farming (in Afar and Somali) and for harvesting of grass and forest products (Somali). This development is a strategy by individuals to diversify incomes in the face of declining pastoral incomes; however, the loss of access to grazing further diminishes the adaptive capacity of pastoralist systems. The increased need for crisis mobility and harvesting of rangeland resources for sale also put customary systems of resource management as well as systems of mutual support under pressure, further threatening the adaptive capacity of the community as a whole.

In order to achieve more socially and environmentally sustainable pathways, a number of issues must be tackled. The four normative principles of sustainable adaptation have very specific local significance in the context of Ethiopian pastoralism. First, the vulnerability context, although closely connected to climatic events such as drought, flood and perceived climatic changes, is driven by multiple environmental and social processes. These include sedentarisation and pressure to 'modernise' toward farming that relies on expansion of irrigation agriculture. While some of the smaller scale conflicts can be negotiated locally, the intensifying conflicts between the Afar and Somali are related to the political system of ethnic federalism, where political influence is tied to the occupation and control of land by clans and ethnic groups. Hence, unless political systems and development patterns are addressed at a structural level, policies are unlikely to get to the root causes of vulnerability.

Second, there are differentiated interests and strategies within the pastoral communities, between population groups and between pastoralists and the government. For example, government policies aimed to strengthen cultivation diverge from local herders' aspirations to restock and sustain pastoralist livelihoods. At the same time, the enclosure of land by influential individuals is causing tension with pastoralists who lose access to key resources needed to survive droughts. Current domination of some interests and groups over others in power relations, policies and decision-making processes can in effect lead to increased vulnerability and maladaptation.

Third, local knowledge and customs have been critical in managing environmental variability, though they come under pressure when droughts are severe. It is unclear whether formal laws and administrative systems are offering support to these customary laws at the moment and whether this can be done in ways that do not hijack or delegitimise customary institutions or cause favouritism and inequities. A critical question is whether these traditional institutions and informal relations are restored if climatic conditions improve and the current crisis is ameliorated. Traditional knowledge can also be reinforced with formal research to raise indigenous trees, shrubs and grass well adapted to the local dry climate.

Fourth, findings of the current study of the Afar and Somali challenge the way that global–local linkages have been conceptualised so far. While pastoralists contribute little to global environmental or social problems, they are at the receiving end of many global

strategies to respond to climate change, and potentially unfavourably so. For example, irrigated sugar cane production (which may contribute to biofuel production) limits a key Afar drought-coping mechanism, the accessing of drought grazing near the Awash, at the same time as it leads to increased risk of severe floods. Nevertheless, the pastoralists interviewed have a keen moral and global conscience regarding their own environmental management practices and the potential impacts on the wider community.

Critically, the vulnerability context and people's responses vary between places and change over time. Therefore, sustainable adaptation does not pertain to identifying a particular 'sustainable' practice or action, but to develop a set of actions that contribute to socially and environmentally sustainable development pathways. A key lesson from the identification of potential measures required to achieve sustainable adaptation in the context of Ethiopian pastoralism is that implementing measures at a single level only, whether the national policy level or community response level, is insufficient. Instead, an understanding of vulnerability and social and environmental sustainability must permeate actions at all scales from the local to the international in order to shift development pathways and effectively adapt to climate change.

The case of Ethiopian pastoralism distinguishes some specific lessons regarding the dynamics that sustainable adaptation approaches must address. First, some of the processes perceived to exert the most severe stress on local livelihoods, undermining ability to face droughts and climatic changes, are actually unintended consequences of development interventions. Second, there is a disconnect between local pastoralist values and aspirations and national policy ambitions to modernize through farming. Third, the resulting responses to climate change and other long-term changes to some extent actually reinforce vulnerability, in particular the enclosure and de facto privatisation of key communal drought resources.

As demonstrated by this study, a shift is required in development and political structures if socially and environmentally sustainable pathways are to be found. Viewing development through the lens of climate change vulnerability and adaptation may contribute to identifying which transformation in current development pathways that is required. In particular, pastoral pathways in terms of the dynamic vulnerability context and adaptations described here provide valuable lessons regarding the actions and development approaches through which the concept of sustainable adaptation can potentially be realized in practice.

Camels drinking
water at a riverbed

1/ Climate change adaptation and sustainable development

Adaptation to climate change is not simple or straightforward. With new funding mechanisms and increase in formal climate change adaptation policy processes, there is an urgent need to identify adaptation approaches that lead to desired outcomes, such as actions and interventions that effectively contribute to the quality of life and reduced vulnerability of diverse population groups. This study exemplifies what sustainable adaptation means in a local context, that is, adaptation to climate change that contributes to sustainable development pathways. The case of pastoralists in Ethiopia is used to illustrate how vulnerability to climate change can be meaningfully understood and how adaptation strategies may be better designed and fostered if included in the encompassing context of development strategies. Ethiopia has a climate change national adaptation programme of action (NAPA) in place and is also paying increasing attention to pastoral development (Tadege 2007). The country hence provides an excellent illustration of the challenges and opportunities involved in realising the potential for sustainable development in terms of achieving social equity and environmental integrity in the long term. The analysis is based mainly on interview data collected in two sites in Afar as well as insights from past studies in the region as documented in published literature. In order to understand the significance of the local context for vulnerability among pastoralists, some of the key issues identified for Afar are followed up with a smaller number of interviews two sites in another pastoral area, the neighbouring Somali region. By examining the causes of vulnerability, responses to climatic and societal changes and the implications for sustainable adaptation, the study aims to contribute to identifying ways of reducing the vulnerability of pastoralist groups in Ethiopia.

1.1 Vulnerability to climate change: A challenge now!

There is overwhelming scientific evidence indicating that climate change is no longer a distant prediction but a reality whose imminent impacts on ecosystems and people are often underestimated. Africa is generally regarded as being highly vulnerable to climate change, because many of its people and economies depend to a large extent on agricultural production, which is sensitive to climate change (Boko et al., 2007). The horn of Africa and Ethiopia in particular is often cited as an extreme case where the impacts of present and future climate changes could lead to disasters similar to the famines of the 1980s (Conway and Schipper, 2010). An identification of vulnerable areas based only on levels of climate sensitivity nevertheless fails to take into account that disasters occur only when they hit already vulnerable people and that major negative impacts cannot be attributed to climate change or environmental change alone, but to a combination of environmental, social, economic and political factors.Vulnerability can be seen as present before the exposure to climate change takes place and exposure is only one element of a complex context of biophysical, socio-economic, institutional and technological forces and structures that shape the vulnerability context (O'Brien et al., 2007). This approach to studying vulnerability is fundamentally different from many studies that perceive that people, livelihoods, or ecosystems become vulnerable only after they have been exposed to climate change and where vulnerability is the negative outcome of exposure minus the responses undertaken to counteract the impacts of climate change.

1.2 The urgency of understanding the vulnerability context

The present study focuses on how the long-term vulnerability *context* of pastoralist groups can be changed, in terms of reducing social inequity in access to adaptation options, enhancing long-term environmental sustainability of options, and addressing the social, environmental and development processes that shape these options. In addition to climate risk to livelihoods, the study hence focuses on local capacity to respond to change as well as the fundamental causes of vulnerability.

Local capacity to respond to change, including how pastoralists have adapted to environmental variability for generations and the conditions and arrangements that allow them to continue to do so, such as land tenure rights, is an important aspect of adaptation to climate change. The exact nature of climate change in terms of the specific altered climatic conditions in different regions of Ethiopia cannot easily be predicted, in particular with regard to rainfall patterns. However, average temperatures are likely to increase by several degrees over the next century, along with greater climatic uncertainty and variations (Boko et al., 2007). Since people's own coping strategies are the main way that people have survived so far, it is important that deliberate policy measures to strengthen adaptation build on and support such strategies. However, supporting local coping strategies alone is not sufficient to adapt to climate change. The underlying causes of vulnerability must also be addressed. Processes such as land tenure change, economic marginalisation, loss of resource rights or changing investment patterns are often generated at the regional and international level and outside the scope of household or village-based strategies. Such structural factors need to be addressed at regional, national and potentially international levels and are critical in determining whether local livelihood and coping strategies become meagre 'strategies for survival' or 'strategies for success' securing a decent life in the long term (Ziervogel et al., 2006).

1.3 Climate change highlights the need for a new type of development

Pastoral experiences, in addition to generating understanding of what adaptation may mean in their particular context, can also help to elaborate the notion of sustainable adaptation; that is finding ways of adapting to climate change that contribute to socially and environmentally sustainable development. There is increasing attention being paid to the need for global transformation towards more sustainable pathways (Eriksen et al., 2011). This is highlighted by the issue of climate change, which is fundamentally caused by development problems such as economic growth, consumption patterns, and economic and political relations based on inequity and high energy use. Conventional social and economic development pathways have also often ignored the climatic and natural conditions as well as people's previous adaptations to their natural environment and ecosystems, undermining resilience. As a conse-

quence, adjustment to current practices, technologies and institutions within the current development regime is not enough; there is a need for a different approach to adaptation and development in the face of climate change that can address the shortcomings of current development pathways. There is a need to reframe policy towards responses that shift, rather than reproduce the development causing the climate problems and vulnerability in the first place.

Such a different approach involves shifting adaptation and development paradigms. Structural development problems need to be addressed in order to effectively adapt. The climate problem, and its implications in terms of the vulnerability context on the ground, highlights the need to rethink development. Sustainable adaptation represents one potential way of rethinking development in the face of climate change. It has emerged from climate change vulnerability studies focusing on how multiple stressors – that is, the interaction between climatic and a wide range of socio-environmental processes – create the local vulnerability context. Levels of vulnerability and processes through which people become vulnerable differ greatly both between and within groups and over time (Ziervogel et al., 2006; Leichenko and O'Brien, 2008; Eriksen et al., 2011). People's responses to change and the outcome from such responses differ accordingly. The concept of sustainable adaptation has hence grown out of an awareness that the general notion of climate adaptation can have unintended negative effects both on peoples and on the environment and that there is a need to think critically about what types of adaptation are desirable – and which groups or interests are promoted at the expense of others through particular adaptation actions. Specifically, there is a need to focus on finding solutions that promote social equity and environmental integrity.

1.4 How to study sustainable adaptation in a pastoral context

In this report, we explore the implications of the vulnerability context of Ethiopian pastoralists for how sustainable adaptation pathways could potentially be achieved in practice. A crucial issue is the extent to which the local dynamics – that is, the interaction between local livelihood responses and the multiple changes that they face (including climate variability and change, conflict and development policies) – contribute to more or less sustainable development pathways. This approach raises a number of questions: What social, political, economic, cultural, technological and biophysical conditions create vulnerability, and what processes and relations drive this context? What are the ongoing social and environmental changes that pastoralists have to manage, and how do these changes affect their vulnerability context and ability to manage change in future? How do current policies and development interventions interact with the socio-environmental changes and vulnerability context? What are the strategies and traditional knowledge that pastoral groups currently use to achieve their aspirations and a meaningful life in the face of multiple stressors, including climate variability and change?

Importantly, what are the differing values and interests affecting adaptation outcomes, and how are these different interests negotiated within a community, between communities, and between pastoralists, the state and other actors? How may these processes affect the vulnerability of different social groups and individuals unequally, favouring some and disadvantaging others? Whose knowledge, problem perception and solutions are recognised in decision-making and formal policies? How are local knowledge and practices integrated with 'scientific' knowledge and adaptation interventions?

Finally, we need to understand what global–local linkages are embodied in local responses; do local responses contribute to or undermine sustainability in other areas or globally, for example through increased emissions, or are local strategies to manage climate variability influenced by climate measures elsewhere? Fundamentally, what are the current societal transformations and can they be altered to contribute to more socially equitable and environmentally sustainable pathways? Are there examples of existing policies and interventions that strengthen local adaptation, especially among the most vulnerable, in a way that does not undermine the welfare of other groups or environmental integrity? Can such measures be further developed and included in regional or national climate change policies?

These questions expand on and operationalise the four normative principles characterising policies and interventions that may contribute to achieving development pathways strengthening both social equity and environmental integrity, identified by Eriksen et al. (2011):

1. Recognise the context for vulnerability, including multiple stressors.
2. Acknowledge differing values and interests affecting adaptation outcomes.
3. Integrate local knowledge into adaptation responses.
4. Consider potential feedbacks between local and global processes.

The next section describes the vulnerability context, multiple stressors and local adaptation strategies in the Afar and Somali regions. The following section explores the meaning of the four key features of sustainable adaptation in an Ethiopian pastoral context; that is, the implications of findings from the Afar and Somali regions for how we understand sustainable adaptation. The conclusions comment on the lessons for how we understand sustainable adaptation, and the potentials (and barriers) for current societal development and future policies to support more sustainable pathways in Ethiopia. The study aims to contribute to such policy outcomes in two ways: first, by developing suggestions for how adaptation to climate change can be strengthened among vulnerable pastoralist groups, that can be tested in ongoing development programmes; and second, to provide valuable input to the dryland development Programs of the Development Fund Ethiopia, that have special outreach to pastoralist in the Afar and Somali regions, and the Horn of Africa more generally. Through this analysis, we hope to illustrate how policy efforts to promote adaptation to climate change can benefit from an understanding of local people's set of opportunities and constraints as shaped by the larger socio-economic and political context generated by encompassing development strategies.

Afar herders increasingly switch from cattle to small stock such as goats

2/ The vulnerability context and multiple stressors among pastoralists

In this section, we first examine the vulnerability context among the Afar, focusing in detail on two *woredas* (districts). We then distinguish some key features of multiple stressors and adaptation among pastoralists drawing on a comparison of the Afar and Somali regions.

The Afar, as well as the Somali, live intimately with climatic variability and change, traditionally adapting to the very hot and dry conditions through pastoral livelihoods and detailed knowledge of their local environment, such as local ecological and meteorological signs. At the same time, their daily lives are shaped by multiple societal transformations such as the political and economic changes taking place in Ethiopia, including the drive to modernise rural areas. After the Federal Democratic Republic of Ethiopia (FDRE) regime took over from the military Derg regime in 1991, the government divided the country into nine ethnically based administrative regions (Hagmann, 2005). The Afar region is located in north-eastern Ethiopia sharing international border with Eritrea and Djibouti, which also have significant Afar populations. The region is the fourth largest in Ethiopia (100,860 km²), with an estimated population of 1.4 million people. It is divided into 5 zones and 30 districts (*woredas*). Most of the people in the region are rural (87%) and more than 80% of them rely on livestock production as their main livelihood (Davies, 2006; FDRE, 2008). The Afar region is predominantly arid; the average rainfall for the period 1990–2000 was 188 mm/year at Dubti (Davies, 2006). In addition, the region is one of the hottest inhabited places on Earth, with temperatures sometimes exceeding 50°C (Davies and Bennett, 2009). The pastoral livelihood relies on a mobile, flexible utilisation of seasonal pastures by using different species of animals (camels, cattle, goats, sheep and donkeys). The livestock and their products (meat, milk, butter) are used for subsistence and trade.

The Afar region borders the Somali region in the east. Similar to the Afar, international boundaries dissect Somali populations, with related Somali groups residing in the neighbouring Djibouti, Kenya and Somalia. The Afar and Somali regions are by far the two poorest regions in the country: about 70% of the population fall into the poorest 20% of the population in the country. The adult literacy rates are also the lowest in the country: 27% (men) and 16% (women) in Afar and 22% (men) and 10% (women) in Somali (Macro International Inc, 2008). The Somali region is the second largest in Ethiopia at approximately 280,000 km² and a population of 4.4 million. Both Afar and Somali are sparsely populated with about 15 people per square kilometre. Like Afar, the Somali region population is mainly rural (86%) with livelihoods based mainly on livestock production (FDRE, 2008). Somali populations have also been actively involved in trade. The area is dry but also exposed to flooding; in 2005, for example, there was major flooding when the Shebelle River burst its banks leading to deaths and widespread damage. There are 9 zones and 53 *woredas*; however, the number of *woredas* has been changing (increasing) over time and the boundary with other regions has been disputed. Ethnic federalism, involving political representation based on domination of a territory, means that more and more clans claim their own districts (Hagmann, 2005). The Somali region is often perceived as volatile, partly because of localised conflicts between clans and partly because of Somalia-led attempts to create a Greater Somalia involving military attacks on Ethiopia. There was also a proliferation of rivalling clan-based political parties when multi-party democracy based on ethnic identity was introduced in 1991 (Hagmann, 2005).

2.1 The Afar field sites

Background about the sites

Two districts were selected for data collection in Afar: Mille and Uwwa. These two display some similar features in terms of pastoral livelihoods and frequent exposure to drought. At the same time they exemplify some differing features typical of the Afar region; Mille is close to a river and farming schemes while Uwwa is out on the drier plains. Interviews in Mille were carried out in a relatively more settled village with permanent housing which can be partly explained by the presence of a banana plantation that was operating during the Derg regime (1974–1987). This plantation was closed after the end of the Derg socialist era and inhabitants, who are mainly pastoralists, now migrate more with their animals than they used to. The nearby Dubti and Ayssaita woredas are also home to a large sugar cane plantation (60,000 hectares) sustained by irrigation provided by the recent damming (in 2009) at Tendaho of the Awash river. This is one of the main rivers in Ethiopia and an important source of water in an otherwise very arid region. Mille district is upstream from the dam, named after the main tributary of the Awash that flows from the Ethiopian highlands in the west. The Mille site is on the banks of the river near where it joins the Awash. It is described by the Afar as '*kallo*' or 'wet', riverside area. The Uwwa site, meanwhile, is part of the vast semi-dry grazing lands in the west of the region termed '*duka'a*'. *Duka'a* has no permanent river but the pasture is generally better than in *alta*, the third topographic division in the Afar region. The *kallo* areas support both agro-pastoralists and pastoralists whereas the *duka'a* is the area to which herds mass-migrate for pasture when the rain falls, supporting the pastoralist lifestyle. The *alta* supports only pastoralists requiring more movement than *duka'a* to balance the ecology.

In Uwwa, interviews were carried out in four villages. The population is much more dispersed and mobile than in Mille, relying even more on pastoralism. The area was selected because of its high exposure to drought over the past years. These differences are reflected in the population features: Mille woreda has a population of 79,000 of which 85% are rural, while Uwwa woreda has a population of 47,000 that is almost exclusively rural (98%).

The two sites also exemplify some other key features shaping the social context in Afar. The Mille site is exposed to conflict with pastoralist Issa Somali, an issue increasingly affecting grazing, security and livelihoods in large parts of south-eastern Afar and forming part of the recent political development in Ethiopia (Ali, 2008; Hagmann and Mulugeta, 2008). In Uwwa, interactions and to some extent conflict is taking place with the agro-pastoralist Amhara. The Afar have had strong market and social interactions with neighbouring highlander groups, an interaction that may be changing with pastoral livelihoods coming under pressure both in the highlands and in Afar (Simonsen, 1996; Tesfay and Tafere, 2004; Tafere, 2006). Both sites have received food aid; however, they display very different levels of development interventions. While a dam and the plantation are large-scale development interventions prominent in Mille, there has been very little intervention or even NGO presence in the Uwwa site. The Mille district site is

** In order to ensure anonymity of the respondents, the particular villages where interviews were conducted are not named here.*

also geographically closer to the government administration and more accessible by road. By contrast, the road to the Uwwa site is a community-constructed road. Mille illustrates some of the dramatic changes to vulnerability context caused by development schemes – indeed an unintended consequence of the dam has been dramatic flooding threatening livestock, grazing, farmland and possessions. In addition, Mille illustrates a development that is typical for Afar; that is, the enclosure of land for farming in the Awash valley and subsequent reduction in access to dry season grazing lands for pastoralists (Kassa, 2001; Tesfay and Tafere, 2004).

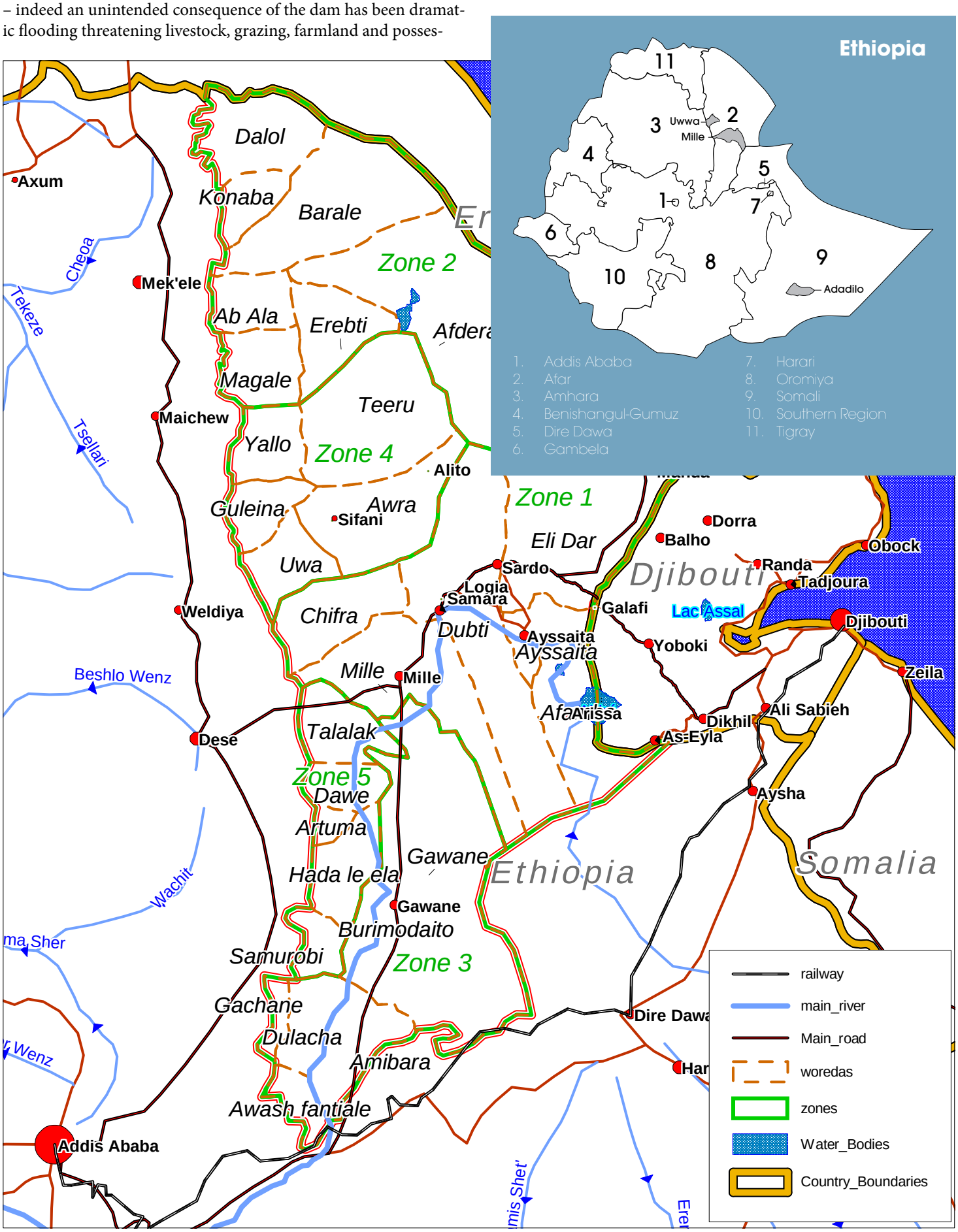

Figure 1/ Map of Afar Region

How we conducted the study

In each area, we conducted four group discussions covering four themes: A) climatic and other important events; B) long-term changes; C) development and institutions; and D) interactions).. Each of the four group discussions was conducted with a targeted group: male elders for A, women for B, administrators for C, and youth for D. This provided depth regarding the perception of each group regarding a particular team. Given the overlap between the themes, differing perceptions between groups could also be elucidated though ideally such differences could have been better elaborated had more group discussions covering the perception of all groups for all themes been possible. We complemented the overview acquired from group discussions with 20 key informant interviews in each site. The interviews were designed to gather in-depth information, each covering one of themes A to D. Respondents were purposefully selected with the help of local key informants (a health coordinator in Mille and a head of mosque in the Uwwa site) to display a balanced range of key socio-economic characteristics (men/women, young/old, rich/poor). An effort was made to ensure inclusion of vulnerable households in the sample. In Uwwa, a gender balance could not easily be achieved because women respondents were unavailable: owing to the severe drought in April 2010, several women were fully occupied collecting water and some had migrated. Interviews were carried out in the Afar language by a team consisting of an APDA (Afar Pastoralist Development Association) employee as well as a local Afar member.

2.2 Vulnerability and pastoral management strategies in Afar

The key role of climate in local knowledge

Climatic conditions and dramatic events form an integral part of the local history and context for making daily decisions. Seasonal variability in Afar is described as several named seasons (Table 1).

Table 1/ Local seasons in the Afar sites

Local name	Months	Description
Gilal	November to January	Cool weather
Daba/daddah	December	Showers/winter rains
Suggum	March to April	Short rain period
Hagai	May to June	Hot, dry period
Karma	July to September	Main rain period
Dababa	October to November	Showers – unusual between the main seasons

People in both the Mille and Uwwa sites hold detailed knowledge pertaining to climatic and other unusual events, codified in collective memory of the past and related to catastrophes, with suggestive local names. For example, when asked to recount climatic events in recent Afar history, both the elders and key informants mentioned the same events, and gave symbolic local names to some of them (Table 2). While many of the events are present in both sites, the local historical accounts also indicate that the severity and character of events can be highly localised.

Table 2/ Named events in recent local history

Mille site	Uwwa site
1996 *Qubili* ('clouds and no rain')	
1998 *Arkakis** ('not knowing what to do')	
	2002 *Gosonu* (camel disease, killed many camels)
	2003 *Qubili* ('cloud and no rain') drought and livestock disease
	2004 *Arkakis** ('scattered') drought forced all people to migrate, scatter around
2006 *Kurbeyta* Xaa (place name – conflict with neighbouring group, in which 33 Afar died)	2006 *Dumus* ('expectation') no rain for a whole year, waiting long for the rains
2007 *Laa sele* ('cattle are finished'). Drought, conflict and disease. *Baggexo* ('diarrhoea') 83 people died	2007 *Caben sele* ('the remainder is lost')**
2008/ 2010 *Gaala sele* ('camels are finished'). In 2010, camels drank flood water and died	2008 *Goad maale* ('cut by the axe')
2009 Flood from the dam	2009 *Caben sele* ('the remainder is lost')**
2010 *Yeden lee* ('the tying of the water'). Flood from the dam	2010 Drought and migration

** Arkakis refers to being scattered beyond the ability to know where to go, and hence has slightly different but related meanings in the two sites*
*** The new drought killed the remainder of the animals from the previous drought (in 2006 in one of the villages, in 2008 in two other villages)*

Unusual events: The product of interaction between multiple stressors, responses and local outcomes

The local naming of events reveals several conspicuous features: first, people compare unusual weather occurrences with a model of what is normal; that is, names identify conditions and outcomes that are more extreme than those experienced in normal seasonal or year-to-year variability. For example, in 1996 in Mille, there were clouds but no rain; this was unusual. The severe and widespread drought of 1998 also left people wondering where to go, with the dilemma that if animals were being moved they might die on the way to distant pastures. The year 2010 was termed the 'tying of the water' in Mille in reference to the widespread and persistent floods that forced people and livestock to stay in the flood waters, waiting for their retreat. Similarly, in Uwwa, main events in the recent local history were identified to be connected to climate, such as the years 2003 (clouds but no rain) and 2006 (no rain for a whole year). Most respondents referred to specific negative weather events that they identified as unusual in intensity and frequency.

However, people often register specific weather events in combination with their impacts (on people and livestock). Events are thought of in terms of the interaction between stressors, responses and outcomes: the vulnerability context. Isolating climate stressors from other stressors contributing to the event, and treating responses and impacts separately, as is sometimes practised in climate change impacts and vulnerability analyses, is not meaningful to them. Hence, a second feature, the close linkages between climate and other stressors, local responses and outcomes in how events are recollected, was very clear in the naming of events in both sites. For example, major events that male elders and other key informants identified in both Mille and Uwwa were conflicts and disease epidemics. The importance of such events was evident in the fact that they named particular years in relation to such events: In Mille, the 2006 event was given the name of a place where a significant violent conflict between Afar and Issa Somali pastoralists took place, leading to a high number of casualties on both sides. Other years (e.g. 2007 in Mille) were identified with reference to diseases such as acute watery diarrhoea affecting people and diseases caused by floods or droughts affecting livestock, especially camels. Similarly, the 2002 event in Uwwa was named after a camel disease. Such events have significant negative impacts: camels are not only an important source of food and wealth; they are also the most important means of transport out of areas affected by drought.

The names also indicated the impacts of the events and provide an insight into what people themselves perceive as unusual environmental effects and social coping strategies. For example, Uwwa informants identified 2004 as '*Arkasis*', meaning 'scattered', and referred to the fact that, because of the drought, people from one of the villages took their animals to neighbouring villages, many animals dying on the way from starvation or disease. Similarly, the year 2008 was identified as '*Goad maale*' or 'cut by the axe' in reference to the fact that there was no grass because of the extended drought and people resorted to cutting tree branches to feed their animals; everybody was carrying an axe to cut such branches. Unfortunately, the strategy was unable to prevent some animals from starving to death that year.

Events such as conflict and disease outbreak interact closely with changes in the climate and in access to resources. Diseases outbreaks can be caused by droughts and floods directly (for example camels who drank flood waters got sick and died) or indirectly (such as drought in surrounding areas forcing other people and livestock to move into Mille, bringing diseases with them and infecting local livestock). In Mille, the effects of droughts have been further compounded by the increased exposure of humans and their herds to crocodile and hyena attack as a result of competition for resources and low river water. During drought, Mille pastoralists are also forced to graze in areas considered unsafe because of Issa attacks (the eastern side of the Awash river), with the risk of violent conflict. In Uwwa, influx of other pastoralists during drought, or the need of Uwwa pastoralists to move to other areas in search of pastures, can bring conflicts but also cooperation and potential incomes.

Afar dryland vegetation

Disease and conflict also exacerbate the negative impacts of drought and floods. According to group discussions and key informant interviews, people appear to have to face the combination of these stressors more often now than before, with potentially devastating effects on people and their livelihoods. Therefore, in order to understand the relevance for adaptation to climate change, local vulnerability and local responses apparent in connection with local events need to be investigated in the context of longer-term environmental, social and economic change.

Longer-term changes: A deteriorating vulnerability context?

Climate models do not yet provide the resolution in time or space to allow us to identify the extent to which recent changes in climatic conditions are due to anthropogenic climate change or natural climatic variations over time. While climate models can provide scenarios of average temperature and precipitation conditions for larger areas, local livelihoods are adapted to very specific temperature and rainfall patterns (Meze-Hausken, 2004).

Many of the observations and knowledge of weather presented by Mille and Uwwa residents are connected to the rains: their timing, quantities and spatial distribution. Rain and its characteristics appear in people's narratives to control every aspect of their livelihood: from pasture production, animal health, human malnutrition to adaptive strategies.

People in Mille agree that in recent years, rains have come late or not at all. Some say that rains come at the wrong time, or that one or several of the three rainy seasons (winter rains, *daddah*; short rains, *suggum*; main rains, *karma*) are affected, with winter rains and short rainy seasons sometimes 'disappearing' altogether. This can have a significant negative impact on pastoralists' livelihoods: when the first rains (after the dry season) disappear, the lean period when livestock are deprived of sufficient fodder is prolonged, making such bottleneck periods increasingly challenging. Hence,

the timing, length and reliability of seasons are perceived to have changed. One middle-aged male informant of medium wealth explains:

"The summer ['hagai', hot period] is much longer and the winter ['gilal' and 'daddah', cool weather with some rains] shorter. The rain does not come on time and especially there is no rain for a long time."

This observation is reiterated by a 40-year old very poor woman:

"The temperature is now much hotter in the summer; we did not have proper rain for the past four years and seasons do not come at the time they are expected."

Rains are also said to have become patchy, making the location of pasture resources unpredictable and increasing the need to move between patches that had received rain and therefore have enough pasture. As explained by a 45-year-old man of medium wealth:

"The temperature is getting hotter. We were getting rain at least three times in one year [but now] the nature of the rain is different. There is rain in one corner and not in another corner."

The most important climatic trend in Uwwa district was unequivocally identified as more frequent and severe droughts. In turn, droughts are identified as emerging in connection to the absence of rains and increased temperatures during recent years:

"*I have noticed that the environment is getting drier. Drought used to be [once] each eight years, now it is one after the other*" (40-year-old man of medium wealth).

Respondents in Uwwa also identified changes to the season's onset

Dry pastures

and length, in particular a tendency that one or several consecutive rainy seasons start late, and higher temperatures as key changes to the climate regime:

"Temperatures are very high, summer begins before winter ends. Rain is much more infrequent" (20-year-old woman, very vulnerable).

Interestingly, residents of Uwwa confirm the observations from Mille that rains, when they do arrive, have become more localised. A very poor 23-years-old man observes:

"The rain is very localised. In one area it rains and not in another area."

Particularly severe floods are specific to the Mille site. Unlike the smaller seasonal floods which normally replenish vegetation in the Awash river, recent flooding caused by a combination of rain elsewhere and closing of the dam have led to a new type of flood that completely inundates farmland, rangelands and settlements for extended periods of time, such as in 2010.

Recollecting past weather as more favourable than the present may be part of human nature; nevertheless, the detail and level of agreement in local accounts of change is conspicuous. This may indicate that longer-term changes, such as increasing unpredictability of key seasons and meteorological parameters, are indeed occurring. It may also indicate reduced capacity to face climatic variability and uncertainty in general. Hence smaller meteorological events may have more dramatic effects on local livelihoods than previously, as a combination of socio-environmental changes creates a more severe vulnerability context. Indeed, it appears that several developments have eroded precisely the capacity that may become more important with climate change and increased climatic uncertainty: that is, mobility, knowledge and institutions designed to live with climatic variations and maximise dynamic ecological resources.

Flood destroying browsing resources and infrastructure

Box 1/ Flood experience of a poor widow in Mille

In the August floods (2010), Kadiga lost 45 goats – they were drowned as they slept the night the floods came. The remaining 15 goats from her herd needed to be grazed away from the village as there was no remaining pasture at the time of the interviews. Therefore she gave them to her 14-year-old daughter who joined a group of herders and moved away with the animals toward 'Adda'ar. The widow remained in the village with her four other children and sold firewood, something she began in order to make a living after losing so many goats. Her dream was to re-establish herself as a goat-herder – perhaps in a different place – but meanwhile to support her need by selling firewood.

Drivers of vulnerability

This process of decreasing capacity and increasing vulnerability is multifaceted and takes place through various pathways. Both Mille and Uwwa interviews confirm an Afar-wide trend of decreasing livestock herds and shifts from livestock to smallstock over the past decades (Kassa, 2001). The declining herds were often associated with closely interlinked processes of changes in climatic and rangeland conditions. More severe weather events were perceived to directly contribute to animal losses.

In particular, higher temperatures and less rain lead to intense droughts. Pasture production and water availability decline, in turn leading to high livestock mortality and human malnutrition and higher incidence of disease among humans and livestock alike (both get weaker and are more prone to diseases). Mille informants also claim that hot weather cause camels to miscarry, though this may be the result of combined hot weather and insufficient browsing resources. As indicated in the interviews and local naming of events, consecutive droughts have led to huge losses of animals and many families have been unable to restock. One particular Mille herder (considered of average wealth today) gave a quantitative representation of how severe the reduction in number of livestock had been:

"*Before [the environmental changes] I was having 50 camels, 200 goats and 30 cattle. I am now left with 2 camels and 20 goats*".

An important environmental effect of droughts that all informants in Uwwa were very concerned with was the death of many trees in the area. Local residents recognised that forests have also been depleted by the increasing production of charcoal and wood for construction, but they also propose that drought plays an important role. Several informants in Mille describe a similar trend (Box 2).

Box 2/ Changes in tree resources, Mille

"*The previous trees that helped us in the drought have gone: for example Madeera, this was a drought fruit… The trees that helped the animals in drought time have been eradicated [by the] drought*" (clan elder, medium wealth).

"*There were many different trees in our area but now most of the trees have perished… There is no life without trees – animals need the trees and we need the animals*" (23- year–old man, very poor).

"*[Over the past two or three decades] the number of indigenous trees and grasses are diminishing, especially Adangalita and Adayto, which are very good for the camels and the grasses Sardoy le, Mali'l and Bukut. Due to the Mille River diversion it swamped the village and those useful trees are replaced by Sarganto…and Prosopis julante. Prosopis does not let any other trees or grass grow. Sarganto is only useful for building houses*" (middle-aged herder).

In Mille, the combination of floods and droughts were seen to degrade rangelands. The number of trees has significantly reduced in recent years as a result. The recent dramatic floods have also caused degradation of agricultural land, reducing the alternative sources of food for most people. According to Mille residents, increasingly hot summers are also leading to less regeneration of trees which in turn means that they can no longer be used for fodder. The combined effects of drought and cutting of trees seem also to have led to ecosystem changes where valuable tree species are being replaced by invasive species that are not valuable as fodder, indeed some of them (*Prosopis juliflora*) represent one of the most important environmental problems in East Africa and the Afar region in particular (Shiferaw et al., 2004).

Trees are used as alternative sources of fodder for browsing livestock (camels, goats and sheep) in times of drought. Some indigenous tree species, such as *Dobera glabra*, are important sources of food and fodder during drought that are now threatened in many areas (Tsegaye et al., 2007). Trees also reduce land degradation and maintain a better microclimate for livestock (shade and moisture). According to local residents, drought and deforestation seem to be locked in a feedback loop where decreasing forest is leading to increased droughts, further diminishing forest resources. Several studies in Afar confirm a trend of declining grasslands, loss of trees and invasion of bushy vegetation during the past decades. This trend reduces the grazing quality of the rangelands severely and makes them more suitable to browsers, with people shifting to small stock such as sheep and goats rather than cattle (Simonsen, 1996; Tsegaye et al., 2010b).

The causes of these changes may be diverse, including climatic variability and change, altered grazing patterns due to the loss of key rangelands, and the invasion of alien species. In interviews, unfavourable events and changes were also explained as being caused by local people's sins against the religious precepts (all Afar are Muslims). Nevertheless, the detailed accounts of such 'sins' point more to a need for social cohesion rather than an abstract religious doctrine: the sins most commonly mentioned were gossip, clan discrimination, adultery, stealing of livestock and camels, dishonesty and lack of loyalty, while the increased chewing of *khat*, a leaf with amphetamine-like effects, is also seen as a threat. It appears therefore that most residents perceive difficult weather (and especially droughts) as a divine act of retribution for their sins against moral customs.

Different sources of information (traditional forecasts, government early warning, and moral norms of conduct) influence local pastoralists' adaptation strategies, particularly their mobile use of resources. A religious world-view explaining environmental change is also informed by various other forms of knowledge and inputs that are used opportunistically to make sense of the situations and guide actions. Local pastoralists seem to make extensive use of traditional forms of weather forecasts (even though these are forbidden by religious doctrine). By using the position of particular stars and the moon at specific points in time and divination by special stones, local people are able to predict to some extent the occurrence or non-occurrence of rains, or the arrival of droughts. Knowledge of indicator plant species is also used to predict drought (Kebebew et al., 2001). In Afar, teams of scouts are regularly sent out to other areas to observe the state of the rangelands, effects of rainfall and the suitability for grazing. In addition to traditional knowledge, many of the people interviewed also used formal scientific information regarding the climate, if not to explain then at least to predict events, such as the government warning about the likely occurrence of a flood in the region in mid-2010. The reason most of the families chose not act upon this information and chose to remain in the area is not clear. One explanation could be that the warning for flood was too general in terms of geography, local people mentioning that they did not know if the flood would occur specifically in their own village or other places in the region mentioned by the state-issued flood warning.

Changing pastoral adaptive capacity

Although the most important adaptation to drought and reduced quality of rangelands was to increase mobility, interviews indicated that such mobility was also becoming more difficult and less viable. When asked to identify the main socio-economic changes that affect their livelihoods, people in Mille invariably mentioned the need to increase their mobility, to move in search of pastureland and water. People both in Mille and Uwwa were being forced to migrate further and more often, with several negative consequences. When moving to a different area, water resources may be scarce or difficult to locate, herds may be attacked by wild animals when migrating, or people and livestock may be affected by diseases that are present in the receiving areas. Informants also mentioned that the danger of disease and resource depletion was also present when droughts were not affecting their district, since people from neighbouring areas may be forced to migrate to Uwwa and thus they may bring human or livestock diseases and reduce their water and pasture resources. Yet, the drought was recognised as

Afar cattle adapted to extreme heat

an emergency situation that legitimised others to come to Uwwa. This behaviour of welcoming those in need is bound by traditional culture. Indeed, people conceded that there was no alternative to migrating.

While mobility has always been an important element in adapting to climatic variability, the new type of crisis mobility was seen to have negative social consequences. As a result of increased migration, the social life was perceived to be changing in both sites and the society in danger of becoming more atomised. Whereas things were done collectively in the past, in recent times everybody was forced to take individual decisions related to migration and thus the community was fragmenting. In Uwwa, local people referred to the necessary 'drought migration' as having a significant negative impact on social life and relations:

"Social changes affect us because before we were doing everything together… Now everybody is trying to survive for himself" (20-year-old woman, very vulnerable).

"Because of drought we are not interacting as we used to and our social structure is not so strong [anymore]" (clan elder, 60 years old, medium wealth).

One aspect of this weakened interaction and atomised social structure is that the traditional institutions of wealth-sharing (*zakka*) - whereby richer herders give gifts of livestock to poor ones - as well as clan member assistance are diminishing, both in Mille and Uwwa. Fewer people (or virtually no one) are disproportionately rich, most people being severely affected by the series of bad years. Fewer herders can afford to give away animals without significantly increasing their own vulnerability. The drought induced cattle losses combined with a shift to browsers rather than grazers due to deteriorating grasslands means that *Zakka* is no longer is being paid in cattle but in sheep and goats. There was a sense among respondents that the system of wealth-sharing is important and should continue but that at present the social fabric was being eroded. Social cohesion and institutions of mutual support are often critical for the poor in surviving climate events and adapting to environmental change; at the same time, these systems are coming under pressure. A key question for adaptive capacity is the extent to which local institutions for mutual support and decision-making can adapt to the changing forms of mobility and reduced number of cattle to maintain social cohesion.

Afar herder with his goats

Box 3/ *Zakka*

Zakka is one of the Five Pillars of Islam and is practised among the Afar in the following way: At the end of the fasting month of Ramadan each year those over a certain wealth-level must give 10% of their earnings to the poor. Wealth rating is determined by the clan leaders and the religious leaders. The cut-off rate has decreased from 40 to 25 animals per household because Afar households generally own fewer animals than before. According to key informants, cattle losses may have been between 30 and 50 percent over the past decade.

Drivers of vulnerability

Even if many of the proximate causes of drought, degradation and declining herds were perceived as local, such as the cutting of trees, moral sin and in-migration, people were keenly aware of the fundamental externally driven processes threatening the viability of pastoralism in Afar. The Afar have consistently lost key rangeland resources, in particular drought grazing areas, to development schemes, settlements and to neighbouring groups (in particular the Issa, a Somali clan that raid large areas in the Afar Region) over the past decades (Kassa, 2001; Ali, 2008). Mille provides a particularly stark illustration of these processes.

When asked what he or she thought were the main issues that the government should address for the area, a Mille informant responded unequivocally: "*The flood and the conflict with the Issa*" (35-year-old woman, very poor). A major development project, the damming of the Awash river in the Awash valley, has had huge impacts on their pastoral livelihoods. The Tendaho dam flows back over the land into Mille district for 35 km. The dam was first put into use in 2009 mainly for the purpose of providing irrigation services for large areas cultivated with sugar cane and maize. However, pastoralist respondents all recount how waters flood back up the river washing away houses, inundating grazing lands, sweeping away livestock and leaving families split up and stranded for days. The Mille respondent explains:

> *"We see it as negative because the dam was constructed not for us and then also the water returns to us and floods us affecting our livelihoods."*

While any benefits of the dam are not at present apparent to people interviewed, the negative effects have been immediate and dramatic.

Hence the combination of loss of livestock and possessions, land degradation and loss of rangelands associated with the flooding is a severe stressor on livelihoods. At the same time, though Mille and Uwwa have received government food aid and some NGO attention (Médecins Sans Frontières and APDA), the sites both illustrate that much of the support that would make it easier to tackle the combined onslaught of drought and disease, such as veterinary facilities, water harvesting structures, assistance to restock after drought, or mobile health and education units, is sorely missing. In Afar, development schemes along the Awash river have contributed to the persistent loss of drought grazing areas under successive governments over the past decades (Kassa, 2001), making droughts harder to survive. The situation is particularly stark in large parts of Afar, including Mille, because remaining important grazing areas are at the same time increasingly becoming unsafe as a result of conflicts with Issa, neighbouring the Afar in the east. The conflict takes the form of mutual raiding with deaths and loss of livestock: *"Last month [March] we were in conflict with the Issa: one from each side was killed and the Issa looted 50 cattle and Afar took 30 cattle"*. (43-year-old woman, poor)

The character of the conflict is described as having changed, however, shifting the balance of power and making it less manageable for the Afar. As two respondents explain: "*Before it was pastoralist against pastoralist but now the Issa are well equipped and organised by backing – it is now a politics to take the land*" (45-year-old woman, very vulnerable). "*Before it looked like the Issa were looking for resources, for animals but now it is totally changed to a political mission*" (28-year-old man of medium wealth). The long-term effect of this prolonged conflict on vulnerability is that grazing areas on the eastern side of the Awash River are now unsafe, constraining pastoral livelihoods. This is an issue which is beyond the scope of the clan leaders and local administrators to solve and where it is necessary to turn to the government. However, despite some attempts at mediating in negotiations, the government is perceived as not very active or successful. Several studies describe how since 1991 political power and access to resources have been tied to an ethnic group or clan's control over territory (Vaughan, 2006; Ali, 2008; Hagmann and Mulugeta, 2008). Pastoral use of land, and hence claim to this land, has become political, driving domination by one group over land rather than the interaction and fluidity required in pastoral migratory strategies in the face of variable climate and grazing. This backdrop helps us better understand the conflict between the Afar and Issa, which is felt as an increasing threat both to the Afar as a group, and to the ability to graze animals during drought and hence sustain their herds. The Issa Somali are often seen by the Afar as being favoured both in historical relations to imperial and government regimes and through current political strongholds in Djibouti and Somalia (Ali, 2008). The situation among Somali and Issa groups is likely to be highly differentiated and complex with regard to political influence and vulnerability, however, since herds have declined dramatically in the Somali region, too (GebreMichael and Kifle, 2008). Causes of conflict may be difficult to address locally since they are tied to the ethnic federalism and state formation itself.

The flooding and conflict constraining grazing together are the two major processes driving current vulnerability in the two sites, as illustrated by the adverse impacts of recent droughts. Development schemes and the Afar–Issa conflict also indirectly affect other Afar groups whose grazing lands are not directly lost. For example, when people from other places are forced to migrate to Uwwa, because of drought or the closing of the dam on the Awash, this may cause conflict: '*The damming of the Awash has affected us as people are migrating from Awash river and finished our grass*' (50-year-old man, medium wealth). Migration connected to drought can also lead to other types of conflict, mentioned by Uwwa residents to be increasing. When Burka residents were forced by drought to move to the highlands of the Amhara ethnic groups and graze in the vicinity of the farms, this led to conflict. This is a situation acknowledged by the Afar in Burka as unavoidable, even if unfortunate. However, these less 'political' conflicts seem easier to handle through local traditional and government institutions. The potential conflicts are being mediated by different institutions, and the ability to protect the interests of the clan seems particularly valued. For example, when asked which clan is the best to interact with, several informants (belonging to a different clan) identified Ma'asaara as the best clan both because they were identified as the original clan in the area, 'the first on the land', and because they were 'good to argue for their people'. The local government seemed to also be appreciated by some informants for its ability to negotiate and solve border conflicts between the Amhara and Afar regions.

Adaptation to multiple stressors

Despite potential conflicts, interaction with neighbouring groups through trade and sharing of grazing lands is generally peaceful and has been a key part of pastoral livelihoods. Such interaction is integral to strategies to adapt to climatic and ecological variability in the short term and the multiple stressors in the long term. Residents of Uwwa in particular trade with 'highlanders' (Amhara, Oromo, Tigrinya) and mentioned that trade was an im-

portant adaptation to multiple stressors. In addition, the Afar in Mille recount how their livelihoods are changing and influencing their interactions with other groups in terms of increasingly taking up trading, or opening up shops. The sale of goats and butter to highlanders is important to many. The Afar are also receiving commission from highlanders' production of charcoal and wood for construction purposes from local forests.

The increase in trade as a response to loss of herds and income shows the potential of pastoralist groups to reorganise their activities and adapt to and survive further exposure to multiple stressors. Increasing trade is not unproblematic as a response, however. Generally, the trading and interaction with these groups from the highlands are seen as beneficial, but there are also problems. Some people perceive that highlanders control the food market and make the price of food higher. Uwwa residents expressed that their economic context was deteriorating, arguing that their economies are increasingly affected by an unfavourable evolution of the markets. All other items they purchase (food, clothing, etc.) have dramatically increased in price while animal products have not, leaving them disadvantaged in relation to the market.

In Mille, a similar evolution of prices was quantified by an informants:

"There is a great change in the market prices. Before we were getting 50 kilograms of grain for 150 ETB [$9] but now it's 250 ETB [$15]. Everything is expensive" (25-year-old poor man).

Others claimed prices had climbed even more, from 90 ETB [$5] to 300 ETB [$18] for 50 kilograms of grain. These deteriorating conditions compound the pressure on mutual support systems:

"Everything in the market is at a high price – it has become extremely difficult to get what we need… Due to high prices, the character of marketing has changed and our lives are changing, we cannot afford to help each other like we used to."

(23-year-old man, very poor)

Some of these changes in prices may be temporary since the price of livestock often falls while the price of food increases during drought. Trade may become more profitable when rains return. The accounts above nevertheless show the precariousness of relying on trade alone as a drought income since this is precisely when trade relations are most disadvantageous and prices and market conditions can most easily be controlled by traders from outside.

In addition, the production of charcoal and construction wood is not without problems, as the cutting of live trees is contributing to environmental degradation. There are specific rules for most types of natural resource use: for instance the cutting of live trees is forbidden, as is grass-cutting on communal land. Nevertheless, drought and vulnerability means that the Afar have little choice but to let the practice continue: '*Even though we want to make a solution for charcoal, there are those who use charcoal for income. Therefore the elders and clan elders try to make solution for those who are cutting without consideration*' (43-year-old woman, poor).

Traditional law includes the *fiama/mahisso* system where a traditional association leader can punish those violating laws regarding management of grazing land, water sources, migration routes and trees. Clans also have a tradition of *desso/maganna*, where grazing land is reserved for hard times and to prevent over-grazing. This system also regulates interaction between clans and households in the use of common grazing areas. Traditional environmental management systems are under pressure, and a key question is the extent to which they can adapt to the increasing vulnerability context and sustain their legitimacy, key to effective management of local resources in the long run.

Another major adaptation to the decline in herds among the Afar is the taking up of cultivation. An important socio-economic change identified by Mille residents was that, despite their preference for mobile pastoralism as a way of life and livelihood, they perceive that government plans are toward sedentarisation, rather than being pastoralist-oriented. Indeed, some people went on to explain that this government orientation combined with all the other changes would force them to become farmers. Such a change was dependent on the government providing water that could support reliable irrigation for crops: "*I prefer to be a pastoralist but due to the challenges, if we get equipment like water pump from the government, I would try to do farming*" (45-year old man, herder of medium wealth, Mille). Several respondents suggested that the government supply tools, seeds, advice and pumps that would enable them to farm maize as an additional income:

"We firstly want a solution to the flood affecting us worse each year. Secondly, if the government gives us motor/generator, we can pump water from the Awash River to do farming – in the Derg years there was a huge government farm here producing bananas – this was good for us all."

(35-year old woman, very poor)

Afar girl assisting in farming

Such a surprising contradiction between what was identified as a preferred lifestyle (pastoralism) and what was presented as a possible adaptation can only be partly explained by the history of cultivation in the area, with the previous banana plantation still holding some appeal. An important element is also the economic trend that favours agricultural produce over animal products such as meat and milk/butter: as mentioned above, at least during the past couple of years, the prices of agricultural products such as grains have increased disproportionately in relation to the prices for animal products. A conscious government prioritisation of cultivation interacts with changes in land tenure and national politics of resource control, driving the enclosure of land for farming in the Awash valley of Afar in particular (Gedamu et al., 1999). As described in detail by Kassa (2001), influential individuals in the local community, such as clan leaders, set aside floodplain lands for farming. By enclosing communal areas or land that has reverted from state farming to clan management, individuals gain sanctioned control over areas of land that are key for drought grazing. The incomes from farming go to the individual, or, typically, the farmer abandons the farm because of poor harvests after a few years and rents it out to a commercial investor from outside the community for a good income. This de facto privatisation of land is often accepted locally because it is done by a member of the community (rather than by an outsider) and often one who is influential through higher levels of education or political/clan leadership. The individual may also employ local people or share some of the incomes with key people in the community. Such enclosure is forcefully argued as a community adaptation strategy in the face of declining herds and grazing lands: farming can constitute a form of community diversification of incomes and adaptation of livelihood systems in the face of multiple stressors. Taking up irrigated agriculture has also been reported as a response to drought and loss of livestock elsewhere in Afar (Gedamu et al., 1999). Crucially, the enclosure of land by a local prevents other groups (of a different clan or ethnic origin) from taking control over the land; that is, it ensures that control over land remains local. The threat of outside groups taking control of key lands is likely to feel increasingly real given the shift to ethnic territoriality since 1991, as explained earlier.

Nevertheless, even if enclosure of farmlands may give good incomes and potential adaptation to climatic variability to some individuals, it represents a maladaptation to the community as a whole – that is an adaptation that in effect increases rather than reduces vulnerability - since the majority lose access to key drought grazing resources. It therefore further undermines the adaptive capacity of pastoralism in the area. It may also contribute to increasing internal tensions and competition for land resources between those who control the farmland and those excluded from the land (and its incomes), as explained by Kassa (2001). De facto privatisation of land is also likely to increase local inequities, since the development favours those who are influential and can secure access to the enclosed lands or its incomes, while those who lose access to key resources are most likely to have to reduce their herds or leave livestock herding altogether.

2.3 The context for pastoral vulnerability and adaptation in Ethiopia: Afar and Somali regions

The vulnerability context, though specific to the two study sites in Afar, is driven by several processes common to a wider pastoralist context in Ethiopia. Many of the long-term changes and adaptations observed in the Afar sites were also taking place in the Somali sites. Two group interviews and 12 key informant interviews were carried out in two *kebeles* in Adadley (Adadilo) District in Gode zone using similar methodology to that used in Afar ,with an interview team led by OWDA (Ogaden Welfare and Development Association). The two *kebeles* are located about 25 km from Gode town. They were selected because they are drought prone and are both pastoral and agro-pastoral; hence they may be prone to some of the same pressures to shift to farming as in Afar. There are only seasonal streams and farming is rain-fed. Rainfall in the region is bimodal, falling in April–June and October–December, but is highly unreliable (GebreMichael and Kifle, 2008). The two *kebeles* are both inhabited by the Tolmoge and Wafato clans (belonging to the Ogaden clan) in different proportions and experience regular conflicts. These clans are hence different from the Issa clans that are in conflict with the Afar. Drought and conflict feature prominently in the local history of named dramatic events (see Table 3) and the area also experienced a severe drought in 2009.

Table 3/ Named events in recent local history in the Somali sites

Year	Local name	Description
1974	*Dabadheer* 'the long tailed drought'	Many pastoralists became destitute. The area received external aid for the first time. Some migrated to Somalia
1984	*Qama'eer* 'the hard drought'	Major loss of livestock and famine. Received external aid
1986	*Dagalkii Abdallaha iyo Awlyahan* 'the Abdalla – Awlyahan conflict'	Violent conflict over clan land ownership claims
1990/91	*Qixii* 'arrival of refugees'	Influx of refugees after regime collapse in Somalia
1994	*Kebele* 1: *Hurgufa* 'sweeping drought' *Kebele* 2: *Sima* 'equaliser'	Severe loss of drought affecting cattle, smallstock and camels The better-off and poor became more similar in wealth as everyone lost almost all their livestock
1999–2000	*Dabagunud* 'the extended drought'	Many lost their livestock, had to leave pastoralism and move to other areas (urban and peri-urban settlements)

Decline of pastoralism across contexts

A comparison of the Afar and Somali sites reveal that some of the main processes driving vulnerability are similar in both sites, even if some of the local manifestations and responses differ. This indicates that, despite the differing contexts, there are some processes that may be important more generally for pastoralism in Ethiopia. Table 4 summarises the climatic stresses, multiple processes of change, and short-term and long-term responses to these, in the two areas.

In both the Somali and Afar sites, respondents report climatic changes over time, with drought as a key livelihood concern along with the decline of rangelands. In other studies in the Somali region too, people recount how both rainy seasons increasingly fail while rainfall is highly localised, though these changes are not necessarily detected in aggregate climate data (GebreMichael and Kifle, 2008). Similar observations have been made elsewhere in Ethiopia (Meze-Hausken, 2004). Together with reduced access to drought grazing areas, this has led to a decline of pastoralism over time. In both areas, people recount how many families are unable to restock after drought, having to leave pastoralism altogether. In the Afar sites, in particular in Mille, this process is speeded up and exacerbated by conflict with the Issa and the flooding and loss of rangelands resulting from the recent damming of the Awash. Afar informants often explained the conflict with the Issa as being driven by drought and the loss of access to some pastures they perceived as their own. Changing land rights was confirmed by Somali informants from Adadley district as an underlying tension, deriving from long-lasting feuds over land ownership between them and the Abdalla Tollomoge clan. Nevertheless, higher level violent conflict could also be triggered by specific events that seemed, for the Somali pastoralists, to be disconnected from environmental conditions. Their violent conflict with the Abdalla in 1986 is a telling example in this sense (see Box 4).

Box 4/ Conflict in the Somali site

1986 was identified as 'Dagaalkii Abdallaha iyo Awlyahan ka' (or Adballa and Awlyahan conflict, Alwyan being the local Somali clan). In a group discussion on 24 October 2010, people explained the nature of this conflict: a violent conflict between the two clans over clan feuds and land ownership claims. Harus village was the epicentre of the conflict. The killing by the Abdalla Tollomogue clan of Nur and Ibrahim Ugas Abdi, sons of a local chief, escalated low-scale existing conflict and skirmishes into a major war, involving hundreds of fighters on both sides.

Such tensions appear to be manageable through negotiations using traditional leaders and the local government administration. In the Somali site, respondents reported peaceful interaction over grazing lands to be increasing. Studies from elsewhere in Somali Region recount how pastoralists and agro-pastoralists find peaceful sharing arrangements during times of drought, benefiting asset-poor agro-pastoralists in particular (Bogale and Korf, 2009). However, when interaction between groups is connected to regional and national politics of resource control and political power, such as in the Afar–Issa conflict, such local mechanisms are insufficient.

Implications for destitution, inequity and vulnerability

The decline of pastoralism has important implications for vulnerability and equity. First of all, pastoralism is a form of resource management that is well adapted to climatic variability and change, and its decline probably reduces the adaptive capacity of the community as a whole. Second, those pushed out of pastoralism are often destitute and very vulnerable, relying on networks of mutual support or forms of trade that are precarious in terms of levels of income, unreliable prices and demand controlled by actors outside the community. The systems of mutual support, though very different in nature (one religious and based on wealth-sharing and the other more pragmatic and based on loans of livestock), are reported as under stress and weakening in both sites. This is probably in part due to the general impoverishment of the community, a key vulnerability concern. A critical question is the extent to which such systems can adapt and reorganise to continue to provide a safety network for the poorest once the most critical drought has ceased. Although loss of livestock is nearly universal with a reduction in large herd owners and 'everyone becoming more equal', especially in the Afar site, inequity may still increase because of the creation of destitute groups. The Somali site appears to have more alternative incomes through established trade. Trade, including petty trade by women, as well as reliance on food aid, is reported to be increasing in the Somali region (GebreMichael and Kifle, 2008); nevertheless, many in this site are pushed into migration to towns and collection of forest products for a living.

Third and critically, many of the responses to multiple stressors seem to reinforce the decline of pastoralism, and the increase in vulnerability and inequity. Enclosure of land for private use is a process taking place in both Afar and Somali, though in slightly different forms. In the Somali site, people gather grass either from temporary enclosures or from the open areas where the rain water is retained for a while and they sell it to people with domestic animals living in Gode town. Some families also enclose land for their own grazing, for collection of forest products for sale, or for farming. This observation indicates that it may not be just the memory of the banana plantation that drives the wish among some of the Mille respondents to turn to farming; the Somali respondents also express that the government should provide tools and pumps for irrigation farming as an alternative to pastoralism.

A respondent laments: *"We have a lot of stagnant water brought by the upstream Adadle seasonal rivers and extensive land suitable for irrigation… If the government provides us with water pumps and other agricultural supports we could have produced food and fodder and helped ourselves".*
(30-year-old woman, medium wealth)

Significantly, the fact that inputs are perceived to be required from the state in order for individuals to start farming indicates that this activity may have incomes that are too marginal to support the required capital investments by individuals. While enclosures, whether for farming or grass production, may provide an additional income for a family in the face of drought and declining pastures and herds, it severely diminishes the adaptive capacity of the community because it excludes remaining pastoralists from key drought grazing resources. An interesting question is the local institutional dynamics that allow the enclosure of communal drought grazing resources, the extent to which they are unintentionally supported by agricultural policies and political systems, and whether or not such dynamics can be altered to instead protect key communal resources. In particular, the importance of clans and ethnic groups occupying land in order to secure political power and land access seems to provide a communal justification for allowing private enclosures in Afar. In the current ethnic

Box 5/ Institutions for wealth redistribution

The institutions for mutual support in the Somali site appear much more elaborate than in Afar, and importantly, not connected to the religious argument (as *zakka*). However, according to respondents, these institutions are decreasing in importance, confirming the finding from the Afar sites. Traditional Somali mechanisms include *Hologoyn*, the giving of livestock to someone who has lost his through misfortune; *Irmansi*, the giving of lactating animals to families without such animals; and Hirsi, the collecting of milk to give to poor families. A key informant expressed that these practices were common in the past but now decreasing. 'Drought and life miseries have become very common and everyone is busy with his own problems and the tendency of helping each other is disappearing' (26-year-old man, vulnerable). It can be difficult to gauge such change. In Mille there was no clear agreement regarding any reduction in *zakka*; one reason for this could be that people may overstate its importance (explain how things should be rather than how they are in practice) since it is religiously prescribed and related to being a good Muslim. If these more pragmatic institutions in the Somali site also decline, it points to a situation of institutional change, where some arrangements that ensured adaptation are suspended or abandoned in recognition of the limits to the adaptation that such arrangements can provide. This flexibility in the institution of redistribution may be a valuable adaptation in itself since, had it continued indefinitely, it could force all into poverty.

federalism system, clan leaders are also afforded increased influence and power through connections with the formal government administration, meaning that checks and balances to their actions and accountability to the local population may diminish. In order to prevent maladaptation, it is important that the adaptive capacity of the community as a whole, rather than individual interests, takes precedence. Enclosing private land may increase social inequity if this option is only available for the most influential in the community. In the Somali site, the local government administration banned private enclosures because it benefited only a small number of individuals and created tension between people.

Another process that may reinforce vulnerability and the decline of pastoralism is the increased cutting of branches and collection of fodder and forest products for own consumption and sale both during drought in the short term and by those pushed out of pastoralism in the long term. Vegetation may replenish with the return of the rains, but if the local rules governing drought reserves and rangeland management are not implemented over longer time periods, rangelands may deteriorate in quality contributing to the need to migrate even further and to declining herds. It should be borne in mind that many of those who collect forest products are the most destitute and vulnerable, and unless they can return to pastoralism or other viable livelihood options are found, simply excluding people from the collection of forest products may increase vulnerability and inequity. The reorganisation of social institutions, both in providing mutual support and in managing natural resources, appears key for adaptive capacity in the long term.

Observations in both sites indicate that pastoralism, mobility and trade have been the cornerstones of adaptive capacity, and that pastoralists flexibly reorganise both herds and income sources with changing climatic and social conditions. However, the livelihood activities into which many are now pushed more permanently with the decline of pastoralism are not socially or environmentally sustainable in the long term. A central issue for adaptive capacity is therefore the extent to which pastoralists can regain their rights of access to key resources such as grazing and water in the face of structural factors such as increased territoriality for political reasons and the policy prioritisation of 'modern' agriculture. Unless such developments are addressed at a government level, there may be limits to the ability of local level efforts, such as community-based adaptation, to strengthen adaptive capacity. In both sites, there have been some development interventions, such as provision of water and veterinary/health facilities that clearly address some of the compounding factors during drought and which may slow the decline of pastoralism. However, so far, many of these efforts have been driven by NGOs rather than government efforts. Future larger-scale government efforts may learn and build on existing experiences in terms of their effect on vulnerability, equity and adaptive capacity at the community (rather than individual) level.

Box 6/ Maladaptation and sustainable adaptation

Maladaptation signifies a type of adaptation to a change that results in negative consequences that are counterproductive to the purpose of reducing vulnerability and greenhouse gas emissions. Barnett and O'Neill (2010) identify five types of maladaptation. These are actions that:

1. Increase emissions of greenhouse gases
2. Disproportionately burden the most vulnerable
3. Have high opportunity costs
4. Reduce incentive to adapt
5. Lead to path dependency

The lessons from Afar and Somali suggest that current some of the current adaptations to multiple stressors may contribute to reducing society's adaptive capacity overall and that of the vulnerable in particular, increase emissions of greenhouse gases, lead to depletion of rangeland resources, and create a precarious path dependency. In order to be more effective, adaptations need to contribute to more socially and environmentally sustainable pathways (Eriksen et al., 2011).

Afar man cuts tree branchers

Table 4. Multiple stressors, vulnerability and adaptation in Afar and Somali sites

Feature	Afar	Somali
Climatic stressors	Increased frequency and severity of droughts Rains fail more often, especially winter and short rains Rains come at the wrong time, often late Increasing temperatures, the hot period starts earlier and lasts longer Shorter cool period Rains more geographically localised More frequent and severe floods	Less rainfall, shorter rainy season and longer dry seasons More frequent droughts Rainy season is unpredictable Increasing temperatures
Key compounding factors during recent drought	Disease, especially during drought Price increase and less control over markets	Disease, especially during drought Price increase, markets less predictable Government ban on cross-border trade
Drought responses	Migration with cattle (Dubte, Amhara and Issa buffer zone) Send scouts to find grass and water Herd splitting Sale of animals and animal products Sale of charcoal, fuelwood and construction materials Trade Assistance from relatives and social networks Food aid	Migration of herds Herd splitting Sale of livestock and milk Sale of charcoal, fuelwood and construction materials Reducing food consumption Collecting bush products Sale of grass from enclosures Trade Assistance from relatives and social networks Food aid
Least vulnerable during drought	Those with a lot of livestock Those able to move with livestock (physically strong) Those with camels and goats (hardy) and a diversity of livestock (can split herds)	Relatively wealthier people Those with camels and sheep (hardy animals) and families with enough man-power to take herds to distant places Communities with diversified incomes

Feature	Afar	Somali
Most vulnerable during drought	Those physically unfit to walk far (children, pregnant women, old) The poor/destitute depending on systems of mutual support and food aid	Poor families, in particular cattle and sheep herders Poor families with few options and who depend on systems of mutual support
Longer-term changes	Those lacking assets and man-power Increasing conflicts with Issa and with highlanders Good interaction and cooperation between many clans Loss of dry season pastures to agriculture and development schemes Degradation of rangelands due to drought/ flood and cutting Alien invasive species Less grass and forest, more bush Loss of viability of pastoralism Declining herds Weakening of systems of mutual support (*zakka*)	Those who own no livestock Clan feuds, disputes over land ownership, local politics Good interaction and cooperation between many clans Loss of dry season pastures to enclosures Growing concerns of deforestation due to drought and cutting of trees New species appear that are not good for livestock. Valuable species disappear Loss of viability of pastoralism Declining herds Elaborate systems of mutual support, declining
Adaptation to multiple stressors	Migrate further Continuous use of drought grazing reserves, weakened implementation of rules restricting use of rangeland and tree resources Change in herd composition (from grazers such as cattle and sheep to drought resistant browsers, esp camels and goats) Trade and production of charcoal Marginal involvement in trade of products (milk, butter) Search for jobs outside pastoralism Increased interest in farming Increased reliance on food aid	Some migrate further, some enclose rangelands and migrate less with cattle Purchasing animal feeds Increasing positive interaction with other clans over grazing and water access Change in herd composition (from grazers such as cattle to drought resistant browsers, especially camels and goats) Petty trade, trade in livestock, fuel wood, local construction materials Decreasing dependence on pastoralism, migration to towns, casual employment Collection and sale bush products such as firewood and grasses by the destitute Fencing in of rangelands and sell products from these enclosures Increased interest in farming Increased reliance on food aid

3/ Towards sustainable adaptation

The features of the two cases described above are highly relevant to the four normative principles of sustainable adaptation. Their connections to sustainable adaptation are summarised in Table 5.

First, the vulnerability context, although closely connected to climatic events such as drought, flood and perceived climatic changes, is driven by multiple environmental and social processes. These include sedentarisation and pressure to 'modernise' toward farming that relies on expansion of irrigation agriculture, general trends also observed elsewhere in pastoral areas in Ethiopia (Hagmann and Mulugeta, 2008). In addition, although smaller-scale localised conflicts are managed through negotiations, the state has so far been unable to provide security and arbitration in larger-scale conflicts (such as Afar–Issa), contributing to drought vulnerability. There is also a need to expand provision of basic water, health and veterinary services to address factors that compound the effect of drought. At the same time, droughts and loss of grazing land force people to increase their mobility, processes contributing to increased risk of conflict and disease. Along with a lack of effective systems of support for restocking and ensuring viable mobility, pastoralists are becoming cumulatively more vulnerable. Unless some of these development patterns are revisited, policies are unlikely to get to the root causes of vulnerability.

Second, there are differentiated interests and strategies within the pastoral communities, between population groups and between pastoralists and the government. The government prioritises modernisation and cultivation, as manifested in the damming of the Awash and development of irrigation agriculture (GebreMichael and Kifle, 2008). Some of these developments are seen by pastoralists as threatening their interests, in particular access to pastures, while reinforcing a mutual suspicion and the perception that pastoralists are not consulted in development. At the same time, however, individuals within pastoralist communities want to engage in irrigation agriculture and benefit from enclosing land. While representing a diversification of livelihoods, it undermines access to drought grazing by other groups in the community. In effect, in its present form and extent, this development is a maladaptation that may create inequities and undermine pastoralism over time. A real risk is that power and resource appropriation being linked to control over land as well as the strong relationships between clan leaders/influential individuals and government administration can be reinforced if adaptation policy measures involve a disbursement of development funds through these same structures.

Third, local knowledge and customs have been critical in managing environmental variability. However, as demonstrated in this study, such rules come under pressure when droughts are severe. Moreover, these systems are undermined by increasing climatic unpredictability, marginalisation and destitution, forcing people to migrate further and use up emergency grazing areas and cut trees. The system is also weakened by the fact that it operates in parallel with the formal law system rather than as an integrated part of the law system. A separate study conducted by APDA in 2009/2010 suggested that the practice of Afar traditional law is diminishing as a result of the deterioration of pastoralist lifestyles and the displacement of pastoralists which disrupts clan land-use boundaries (APDA, 2010). It is unclear whether formal laws and administrative systems are offering support to these customary laws at the moment and whether this can be done in ways that do not hijack or delegitimise customary institutions or cause favouritism and inequities. In addition, informal social mechanisms of support are weakened by a near universal destitution process leaving very few individuals wealthy enough to be able to help others. Increased crisis migration with livestock is also undermining social cohesion and communal decision-making as people increasingly have to fend for themselves through individual decision-making. A critical question is whether these traditional institutions and informal relations are restored if climatic conditions improve and the current crisis is ameliorated. Traditional knowledge can also be reinforced with formal research to raise indigenous trees, shrubs and grass well adapted to the local dry climate.

Fourth, findings of the current study of the Afar and Somali challenge the way that global–local linkages have been conceptualised so far. While pastoralists contribute little to global environmental or social problems, they are at the receiving end of many global strategies to respond to climate change, and potentially unfavourably so. For example, irrigated sugar cane production limits a key Afar drought-coping mechanism, the accessing of drought grazing near the Awash, at the same time as it leads to increased risk of floods. If used for the production of biofuel, irrigated sugarcane plantations may nevertheless be portrayed as a climate change measure to reduce global emissions from fossil fuels. In order to support social and environmental sustainable pathways, it is imperative that climate measures do not increase the vulnerability of population groups, however.

The pastoralists interviewed have a keen moral and global conscience regarding their environmental management practices and the potential impact on the wider community. Such a conscience can be built upon carefully as adaptation options are explored that maintain a moral and environmental balance, avoiding severe negative impacts on other groups or on environmental integrity and hence contributing to sustainable pathways. Wealthier societies may have something to learn from pastoralists. Nevertheless, it is critical that the moral conscience is not co-opted by any influential individuals to further particular vested interests. A question of global relevance is the extent to which promoting the switch from pastoralism to farming, and the related switch from communal to private land management systems, may increase energy-intensive production forms and hence greenhouse gas emissions (as well as increasing vulnerability).

Critically, the vulnerability context and people's responses vary between places and change over time. Therefore, sustainable adaptation does not pertain to identifying a particular 'sustainable' practice or action, but to develop a set of actions that contribute to socially and environmentally sustainable development pathways. The four normative principles can guide adaptation responses, and this study exemplifies the practical implications in an Ethiopian pastoralist context. Hence pastoral pathways – past, present and future - can provide lessons for the type of societal transformations required to tackle the climate change problem.

An agro-pastoral Somali woman farming her fields

Table 5/ Implications of pastoral vulnerability for how sustainable adaptation pathways can be supported in practice

Normative principles of sustainable adaptation	Key features in the Afar and Somali sites	Implications for actions to support sustainable adaptation pathways
Recognize the context for vulnerability, including multiple stressors	Exposure to climatic events, their impacts and coping strategies closely linked in daily life	Recognise and support pastoralist mechanisms to manage climate variability, such as facilitating mobility and trade
	Importance of climate variability for pastoralist activities	Address multiple stressors that exacerbate drought/flood effects, such as animal and human disease; establish mobile education, health and veterinary units and mechanisms to restock and recover from previous droughts/floods
	Increased variability (geographic and seasonal) described by respondents, making it difficult to plan grazing	
	Severe impacts of human and animal disease and conflict	
	Loss of drought grazing areas to private enclosures of farmland and rangelands	Reinstate or strengthen systems that secure communal access to drought grazing areas, limiting privatisation
	Cumulative vulnerability, loss of animals leading to further losses and lack of coping options in consecutive droughts, inability to restock, long-term decline in animal numbers due to droughts and declining grazing/browsing	Support efforts and traditional mechanisms to manage trees and drought grazing areas, as well as identify ways of strengthening the rehabilitation of these areas
	Destitution: people forced out of pastoralism into urban migration, farming, charcoal production and sale of forest products	Address destitution (restocking, social measures) and strengthen alternative livelihoods in order to decrease use of charcoal production as crisis income
	Weakening ability of social relations of reciprocity to act as safety net since very few pastoralists are rich enough to assist those who are poor	Identify ways to support or buffer social network systems in times of severe stress, work with traditional and religious leaders
	Flooding resulting from damming of river and rains causing loss of lives and livelihoods and environmental degradation in Mille	Revise management of dam to avoid severe flooding and loss of grazing land, identify ways to provide compensation for land lost to dam in terms of new grazing areas, rights and income opportunities
	Increased need for mobility leading to insecurity, such as the adverse impacts of Issa-Afar conflicts in Mille	Address structural causes of conflict, such as features of ethnic territoriality and a lack of security.
	Trade as adaptation, limited by unfavourable market conditions	Facilitate regulated fair trading systems and markets infrastructure; establish minimum prices, guaranteed purchase of pastoralists' products
Acknowledge that different values and interests affect adaptation outcomes	Government drive to modernise, expand farming and sedentarise vs. pastoralist wish to restock and increase their mobility	Rethink development interventions such as the dam in terms of effects on different pastoralist groups
		Strengthen pastoralism and niche livelihood options based on sustainable management of local resources and fair trading arrangements
	Individual privatisation of drought grazing land through enclosures for farming and collection of rangeland resources vs. communal need for access to drought grazing	Reverse current privatisation of land and strengthen customary and formal systems to ensure communal access to drought grazing areas.
		Avoid supporting livelihood options that require enclosure of drought grazing lands; avoid development plans (e.g. dams) that exacerbate vulnerability of pastoralists and may become maladaptations (irrigated cash-crops).

Normative principles of sustainable adaptation	Key features in the Afar and Somali sites	Implications for actions to support sustainable adaptation pathways
Acknowledge that different values and interests affect adaptation outcomes (*contd.*)	Use of forest products during drought and by the destitute, negotiated through customary institutions Trade relations between groups, perceived unfair prices and lack of market control Negotiation between groups and clans regarding drought grazing, violent conflict between Mille Afar with Somali Issa over land, potentially linked to political process of ethnic federalism Migration (due to drought and the dam) leading to conflict between Uwwa Afar and Amhara groups and neighbouring Afar groups Little influence of most pastoralists in shaping state development interventions, while some clans or groups potentially more powerful and with better links to government administration Formal government administration and customary institutions operating partly in parallel	Balance the need for forest product-based livelihoods and longer-term environmental integrity and drought grazing for those still in pastoralism, for example by negotiation through customary institutions. Acknowledge differing interests and power relations between groups Recognise the need for interaction between several ethnic groups sharing the same land, and the need for fluidity in use and occupation. Examine the potential for legislation or development interventions that ameliorate the current territorialisation of power and competition between ethnic groups Strengthen customary and state mechanisms to resolve conflicts, fostering cooperation between the two, accountability to the local population, and more general (less selective) access of people to government administrations Include the knowledge and problem understanding of customary institutions in decision making processes regarding adaptation and development
Integrate local knowledge into adaptation responses	Detailed knowledge of climatic events, local climatic conditions, grazing lands and ways to forecast the weather; increasing unpredictability of the weather a challenge to indigenous systems of forecasting and planning Traditional law regulating management of natural resources and strategies to manage drought, such as preserving trees and drought grazing areas	Integrate scientific and traditional meteorology and ecological knowledge to strengthen each other Recognise traditional resource management and drought management strategies when considering land allocations to development or other state purposes; recognise that customary institutions must not be undermined through co-option or selective support by the state
Consider potential feedbacks between local and global processes	'Global' or moral conscience present: people's sins against moral custom as well as environmental degradation perceived as cause of deteriorating climate conditions Expansion of irrigation agriculture requiring increased energy use, potentially locking development into high-emission technologies, land and water requirements negatively affecting other groups and areas Impact of global/Northern climate priorities such as biofuel production on local vulnerability through expanded irrigated cultivation of sugar/biofuel crops	Build on global and moral conscience in fostering development that does not adversely affect others; ensure that drought is not co-opted by particular interest groups/ influential people to convince people to take actions that achieve vested interests and hidden agendas Build on and develop local technologies, practices and resources for a common equitable development; avoid development options that are expensive, high-energy and benefit only a few individuals at the expense of the larger community Consider the conflicting and converging interests between pastoral needs and global demand for biofuel; prioritise the needs and rights of local people in shaping any biofuel production schemes including the distribution of costs and benefits

Afar girl in front of her house

4/ Lessons from pastoral pathways

The features of Ethiopian pastoralism, as exemplified by Afar and Somali, have some specific and perhaps surprising implications for how climate change adaptation can be supported. The cases illustrate a very particular aspect of pastoral vulnerability to climate change; that is, their vulnerability is placed at an intersection between several powerful discourses, which have been described as: pastoral groups and dryland areas are inherently violent; resource scarcity causes conflict; pastoral overgrazing and mismanagement cause environmental degradation (Hagmann and Mulugeta 2008; Benjaminsen, 2008); and climate change adaptation is a matter of technology change and adjustment of inappropriate practices in the face of identified future changes in climatic conditions (Eriksen and Lind, 2009; Eriksen et al., 2011). The cases of Afar and Somali comprehensively discredit these discourses. They illustrate the need for approaches to adaptation intervention based on a different type of understanding in order for development and adaptation policies for pastoral areas to contribute to the reduction of vulnerability and strengthening of social equity and environmental integrity. Some of the problems pastoralists face stem from development approaches based on the discourses listed above and are unlikely to be solved with only technological change or adjustment to local practices. Measures based on conventional pastoral and climate change discourses may even reinforce and exacerbate vulnerability, inequity and environmental degradation.

Ethiopian policies pay increasing attention both to climate change adaptation and the development of pastoral areas. Insights from this study can provide some guidance for how these efforts can be further developed. Understanding of vulnerability fundamentally shapes the types of adaptation and development intervention that can be formulated and implemented. A key lesson from the identification of potential measures required to achieve sustainable adaptation in the context of Ethiopian pastoralism is that implementing measures at a single level only, whether the national policy level or community response level, is insufficient. Instead, an understanding of vulnerability and social and environmental sustainability must permeate actions at all scales from the local to the international in order to shift development pathways and effectively adapt to climate change. The way such measures can potentially complement each other is exemplified in Table 6.

The case of pastoralism among the Afar and Somali also has several specific lessons that may be applicable to a wider context regarding features of adaptation and development policies that are required to achieve more sustainable development pathways in terms of social equity and environmental integrity. First, some of the processes perceived to exert the most severe stress on local livelihoods, undermining ability to face droughts and climatic changes, are actually unintended consequences of development interventions. The case of Mille is an important example, where the damming of the Awash River led to regular flooding. Second, there is a disconnect between local values and aspirations and national policy ambitions to modernize through farming. This leads to distrust and very different perceptions as to the types of development intervention required locally. The government is not perceived as present and supportive of local needs nor are development decisions understood as being influenced by pastoralists. This means that the indigenous knowledge and customary rules and laws used in managing climatic and environmental variability change inherent in local institutions are unlikely to be integrated in official adaptation responses and may even be unintentionally undermined by development and climate change policy efforts. As a result, the disconnect may diminish adaptive capacity through the decline of pastoralism, weakening of social institutions, and increasing destitution and inequities. Third, the resulting responses to climate change and other long-term changes to some extent actually reinforce vulnerability, in particular the enclosure and de facto privatisation of key communal drought resources. In addition, the severe vulnerability context and destitution are putting social institutions under pressure, making the predicament of the most vulnerable even more precarious. As demonstrated by the case of Ethiopian pastoralism, a shift is required in development and economic and political structures if socially and environmentally sustainable pathways are to be found. Viewing development through the lens of climate change vulnerability and adaptation may contribute to identifying and shifting to such pathways. In particular, pastoral pathways as described here provide valuable lessons for how the concept of sustainable adaptation can be realized in practice.

Table 6/ Exemplification of adaptation actions at different geographic scales

Normative principles of sustainable adaptation	Local level actions	Regional level actions (including regional adaptation plans)	National level policies (including development policies and NAPA*)	International mechanisms (including the Climate convention, environmental and trade agreements)
Recognize the context for vulnerability, including multiple stressors	Rethink local power structures and institutions that allow privatisation of communal lands	Develop rules to regulate enclosure of communal grazing lands	Question irrigation as development strategy, strengthen pastoral rights to key adaptation resources	Highlight consequences of development paradigms for vulnerability and emissions, such as privatization of land and shifting from pastoralism to farming
	Provision of water, and mobile health, veterinary and education units that reduce compounding effects during drought	Develop systems to support restocking after drought	Critically examine how the system of ethnic federalism can be reformed to better address clan-based territoriality, conflicts and limits to mobility; support trade and interaction between ethnic groups and clans	Highlight the need for community-based adaptation to be supported through shifts in regional and national development pathways
Acknowledge that different values and interests affect adaptation outcomes	Strengthen local democratic processes to ensure greater equity and local accountability; prioritise the adaptive capacity of the community as a whole, the pastoral system and the most vulnerable over individuals' vested interests	Include local knowledge and problem perceptions in adaptation policy development Include local and pastoral concerns in governing development schemes, such as regulation of the dam to avoid flooding	Address disconnect between local values and national policy ambitions; develop effective mechanisms to include local knowledge and problem perceptions in adaptation policy development and decision-making	Guide national development of mechanisms for disbursement of adaptation funding that ensure that current inequities or exploitative power relations are not reinforced
Integrate local knowledge into adaptation responses	Strengthen local institutions for environmental management and mutual support	Develop safety networks to buffer social institutions during times of stress	Identify ways to integrate formal and traditional law regarding environmental management Develop niche dryland resources and markets; increase investment in research and promotion of indigenous tree species	Include local knowledge in scientific assessments and policy processes; identify ways in which local customary institutions, development practitioners and the international research community together can examine the climate change problem
Consider potential feedbacks between local and global processes	Build on a moral conscience; develop local technologies, practices and technologies that enhance community level adaptive capacity without adversely affecting other communities or environmental integrity	Avoid development schemes or livelihood transformations that increase inequity and vulnerability	Critically assess development strategies to avoid being locked into unsustainable pathways (diminishing adaptive capacity, exacerbating impoverishment among vulnerable groups and increasing emissions)	Consider how global climate change policies and investment patterns may promote global production of biofuels over local reduction of vulnerability; address investment systems that promote energy- and water-intensive forms of agricultural production as well as privatization of resources

**NAPA, National Adaptation Programme of Action*

Goats – the means of survival

References

Afar Pastoralist Development Association (2010) Development Fund, Norway. Environmental Protection in the Hands of Traditional Leadership – Preparation Phase. Report written July 20th, 2010.

Ali, H.H. (2008) *Historical Perspectives of the Afar and Issa-Somali conflict in North-Eastern Ethiopia*. Master's thesis, Department of International Environment and Development Studies, Norwegian University of Life Sciences, Ås.

Barnett, J. and O'Neill, S. (2010) Maladaptation. *Global Environmental Change* 20(2), 211-213.

Benjaminsen, T.A. (2008) Does supply-induced scarcity drive violent conflicts in the African Sahel? The case of the Tuareg rebellion in northern Mali. *Journal of Peace Research* 45(6), 831-848.

Bogale, A. and Korf, B. (2009) Resource entitlement and mobility of pastoralists in the Yerer and Daketa Valleys, Eastern Ethiopia. *Human Ecology* 37, 453-462.

Boko, M., Niang, I., Nyong, A., Vogel, C., Githeko, A., Medany, M., Osman-Elasha, B., Tabo, R. and Yanda, P. (2007) *Africa. Climate Change 2007: Impacts, Adaptation and Vulnerability. Contribution of Working Group II to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change*, M.L. Parry, O.F. Canziani, J.P. Palutikof, P.J. van der Linden and C.E. Hanson (eds.), Cambridge University Press, Cambridge, UK, 433-467.

Conway, D. and Schipper, L. (2010) Adaptation to climate change in Africa: challenges and opportunities identified from Ethiopia. *Global Environmental Change* 21(1), 227-237 (doi:10.1016/j.gloenvcha.2010.07.013).

Davies, J. (2006) Capitalisation, commoditisation and obligation among Ethiopia's Afar pastoralists. *Nomadic Peoples* 10(1), 29-52.

Davies, J. and Bennett, R. (2009) Livelihood adaptation to risk: constraints and opportunities for pastoral development in Ethiopia's Afar region. *The Journal of Development Studies* 43(3), 490-511.

Eriksen, S. and Lind, J. (2009) Adaptation as a political process: adjusting to drought and conflict in Kenya's drylands. *Environmental Management*, 43(5), 817-835 (doi: 10.1007/s00267-008-9189-0).

Eriksen, S., Aldunce, P., Bahinipati, C., Martins, R., Molefe, J., Nhemachena, C.R., O'Brien, K., Olorunfemi, F., Park, J., Sygna, L. and Ulsrud, K. (2011) When not every response to climate change is a good one: Identifying principles for sustainable adaptation. *Climate and Development* 3(1), 7-20.

FDRE (2008) *Summary and Statistical Report of the 2007 Population and Housing Census. Population Size by Age and Sex.* Federal Democratic Republic of Ethiopia, Population Census Commission, Addis Ababa.

GebreMichael, Y. and Kifle, M. (2008) *Local Innovation in Climate Adaptation by Ethiopian Pastoralists.* Prolinnova-Ethiopia and Pastoralists Forum Ethiopia (PFE) Intermediate Report. Addis Ababa.

Gedamu, F., Kassa, G., Ado, S. and Bibiso, B. (1999) *Pastoralism in the Afar Region of Ethiopia*. ALARM Working Paper No. 9, Centre for Basic Research, Kampala.

Hagmann, T. (2005) Beyond clannishness and colonialism: understanding political disorder in Ethiopia's Somali Region, 1991-2004. *Journal of Modern African Studies* 43(4), 509-536.

Hagmann, T. and Mulugeta, A. (2008) Pastoral conflicts and statebuilding in the Ethiopian lowlands. *Afrika Spectrum* 43(1), 19-37.

Kassa, G. (2001) Resource conflicts among the Afar in North-East Ethiopia. In: M.A.M. Salih, T. Dietz and A.G.M. Ahmed (eds), *African Pastoralism: Conflict, Institutions and Government.* Pluto Press, London, pp.145-171.

Kebebew, F., Dsegaye, D. and Synnevåg, G. (2001) *Traditional Coping Strategies of the Afar and Borana Pastoralists in Response to Drought*. Drylands Coordination Group Report No. 17. Ås, Norway.

Leichenko, R. and O'Brien, K.L. (2008) *Environmental Change and Globalization: Double Exposures*. Oxford University Press, Oxford.

Macro International Inc. (2008) *Ethiopia Atlas of Key Demographic and Health Indicators, 2005*. Calverton, Maryland (http://pdf.usaid.gov/pdf_docs/PNADM636.pdf, accessed 7 June 2011).

Meze-Hausken, E. (2004) Contrasting climate variability and meteorological drought with perceived drought and climate change in northern Ethiopia. *Climate Research* 27, 19-31.

O'Brien, K.L., Eriksen, S., Schjolden, A. and Nygaard, L.P. (2007) Why different interpretations of vulnerability matter in climate change discourses. *Climate Policy* 7, 73-88.

Shiferaw, H., Teketay, D. and Nemomissa, S. (2004) Some biological characteristics that foster the invasion of Prosopis juliflora (Sw.) DC. at Middle Awash Rift Valley Area, north-eastern Ethiopia. *Journal of Arid Environments* 58(2), 135-154.

Tadege, A., ed. (2007) Climate Change Adaptation Programme of Action (NAPA), of Ethiopia The Federal Democratic Republic of Ethiopia, Ministry of Water Resources, National Meteorological Agency, Addis Ababa http://unfccc.int/resource/docs/napa/eth01.pdf

Simonsen, G. (1996) *The Wossama Afar. A Study of Natural Resource Management of a Pastoral Group in North- Eastern Ethiopia.* Master's thesis, Department of International Environment and Development Studies, Norwegian University of Life Sciences, Ås.

Tafere, K. (2006) *Indigenous Institutions of Conflict Resolution Among the Ab'ala Afar of North-Eastern Ethiopia*. Social Anthropology Dissertation Series No. 11, Addis Ababa University.

Tesfay, Y. and Tafere, K. (2004) *Indigenous Rangeland Resources and Conflict Management by the North Afar Pastoral Groups in Ethiopia.* Drylands Coordination Group Report No. 31, Oslo.

Tsegaye, D., Balehegn, M., Gebrehiwot, K., Haile, M., Gebresamuel, G., Tilahun, M. and Aynekulu, E. (2007) *The Role of Garsa (Dobera glabra) for Household Food Security at Times of Food Shortage in Abaàla Wereda, North Afar: Ecological Adaptation and Socio-economic Value.* Drylands Coordination Group Report No. 49, Oslo.

Tsegaye, D., Haile, M. and Moe, S.R. (2010a) The effect of land use on the recruitment and population structure of the important food and fodder plant, Dobera glabra (Forssk.) Poir., in northern Afar. *Journal of Arid Environments* 74(9), 1074-1082.

Tsegaye, D., Moe, S.R., Vedeld, P. and Aynekulu, E. (2010b) Land-use/cover dynamics in Northern Afar rangelands, Ethiopia. *Agriculture, Ecosystems and Environment* 139, 174-180.

Vaughan, S. (2006) Responses to ethnic federalism in Ethiopia's Southern Region. In: D. Turton (ed.), *Ethnic Federalism: The Ethiopian Experience in Comparative Perspective.* James Currey, Oxford; Ohio University Press, Athens, OH; University of Addis Ababa Press, Addis Ababa, pp. 181-207.

Ziervogel, G., Bharwani, S. and Downing, T.E. (2006) Adapting to climate variability: pumpkins, people and policy. *Natural Resources Forum* 30(4), 294-305 (doi: 10.1111/j.1477-8947.2006.00121.x).