CARE Ethiopia

Using Analysis of Climate Change Vulnerability and Adaptive Capacity for Program Decision-Making

Lessons from CARE Ethiopia's Experience

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Angie Dazé
Consultant
For CARE Ethiopia
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Executive Summary

Recognizing the implications of climate change for poverty reduction and social justice in Ethiopia, CARE Ethiopia is taking concrete action to integrate climate change across its program portfolio. Participatory analysis of climate change vulnerability and adaptive capacity has proven to be an important first step, providing valuable insights into rural people's experiences of climate change, how climate-related shocks and stresses affect their livelihoods and how they are currently responding. This analysis, conducted with communities and local stakeholders, has enabled CARE and its partners to better understand the opportunities for adaptation and the barriers people face in increasing their resilience and adaptive capacity.

This report aims to share what CARE Ethiopia has learned so far from its efforts to integrate analysis of climate change vulnerability and adaptive capacity into program decision-making. It draws on the analysis conducted in different livelihood zones across the country, illustrated by detailed profiles of specific communities in each zone. Collectively, the findings of these analyses yield insights that are relevant for all development programs aiming to integrate climate change:

Climate-related hazards can no longer be treated as an anomaly.

Climate-related shocks and stresses are occurring more frequently in all of the communities studied. With this trend expected to continue, programs that aim to reduce poverty and increase food security must increasingly address climate-related hazards as characteristic of the context, rather than as an anomaly. This demands more effective and sustainable responses to crises, as well as better integration of risk management in livelihoods and food security programming.

Climate change is not a 'component' of programming.

While having a climate change 'component' in programs may make sense in terms of project management and ensuring that this critical issue is explicitly addressed, a major learning outcome from CARE Ethiopia's analysis is that climate change cannot be tackled in isolation from livelihoods and food security. In addition to highlighting priorities for targeted action to address climate change, the CVCA analysis must inform interventions in other areas, including humanitarian action, to ensure that efforts to promote sustainable livelihoods and improve food security are resilient and sustainable over the longer term and do not inadvertently increase vulnerability to climate change.

Climate change adaptation is inextricably linked with sustainable natural resource management.

The analyses show that the most direct manifestation of climate change from the perspective of communities is its impact on the availability and quality of water, pasture and fertile land for crop production. It is also clear that people's responses to resource scarcity often result in further environmental degradation. In rural communities, the natural resource base will continue to be the foundation of livelihoods and ecosystem health will be a key determinant of resilience to climate extremes and capacity to adapt to change over time. Sustainable management of natural resources is therefore a critical enabler for climate change adaptation and must be a key priority for programs aiming to build climate resilience.

Adaptation to climate change requires options, not 'solutions'.

Development actors often endeavor to offer 'solutions' for reducing poverty, in the form of improved seeds, particular agricultural practices or access to markets, for example. In the context of increasing uncertainty associated with climate change, there is a need to increase the range of options available to people to secure their livelihoods and manage risks. Programs must therefore move away from promoting particular strategies and focus efforts on opening up the options available to women and men to enable adaptive management of livelihoods.

Informed decision-making is key to adaptive capacity.

Different livelihood options will make sense at different times, based on the weather conditions, seasonal forecasts, availability of resources to invest and market conditions, among other factors. For people to effectively manage climate-related risks to their livelihoods, they must have access to information, as well as the skills to analyze the information, weighing costs, benefits and risks, to make good decisions about how to invest their resources. Building these skills requires development actors to work with communities in new ways, facilitating learning processes that involve analysis, critical thinking and forward-looking decision-making.

Efforts to increase social equity must underpin adaptation efforts.

People's social positions, including those related to gender, have a strong influence over their vulnerability to climate change and the adaptation options available to them. Consequently, equity in access to resources, opportunities and benefits must be an underlying principle in order to effectively build resilience and support adaptation. To support this, analysis of vulnerability and adaptive capacity must facilitate dialogue on the barriers facing particularly vulnerable social groups and identify specific actions to overcome these barriers and ensure equitable approaches to adaptation.

A better understanding of cultural and social barriers to adaptive action is needed.

Informed decision-making is a critical element of adaptive capacity, however it is important to also acknowledge the role that social and cultural norms play in determining who has the power to make decisions, how these decisions are made and what options are deemed appropriate. The CVCA analyses conducted by CARE Ethiopia have provided some insights into these dynamics, however a better understanding of these issues and how they relate to gender, ethnicity and socio-economic positions will enable more inclusive and effective approaches to build adaptive capacity.

Short case studies are provided to demonstrate how CARE Ethiopia has acted on these findings, to ensure that the organization is maximizing its impact in terms of reducing climate risks and building adaptive capacity for the future. The results provide a strong case for participatory analysis of vulnerability and adaptive capacity as a basis for integrating climate change considerations into programming in an equitable and empowering way.

Acronyms and Terms

ACCFP	African Climate Change Fellowship Program
ACCRA	Africa Climate Change Resilience Alliance
ATA	Agricultural Transformation Agency
CNCRE	Carbon Neutral Climate Resilient Economy
CRGE	Climate Resilient Green Economy
CRS	Catholic Relief Service
CSI	Climate Smart Initiative
CVCA	Climate Vulnerability and Capacity Analysis
CBPWD	Community Based Participatory Watershed Development
DA	Development Agent
Enset	'False banana', an important staple crop
EPA	Environmental Protection Agency
EPACC	Ethiopia Programme of Adaptation to Climate Change
EWC	Early Warning Committee
FEG	Food Economy Group
IPCC	Intergovernmental Panel on Climate Change
GoE	Government of the Federal Democratic Republic of Ethiopia
GRAD	Graduation with Resilience to Achieve Sustainable Development
GWI	Global Water Initiative
HABP	Household Asset Building Program
IISD	International Institute for Sustainable Development
IUCN	International Union for the Conservation of Nature
Kebele	Village
khat	A shrub native to East Africa with leaves that release a stimulant when chewed
LAP	Learning and Practice Alliance
masl	Meters above sea level
MoA	Ministry of Agriculture
NAPA	National Adaptation Programme of Action
NAMA	Nationally Appropriate Mitigation Actions
NGO	Non-Governmental Organization
ORDA	Organization for Rehabilitation and Development in Amhara
PRIME	Pastoralist Areas Resilience Improvement through Market Expansion
PSNP	Productive Safety Net Program
REST	Relief Society of Tigray
SAA	Social Analysis and Action
SCUK	Save the Children UK
SNV	Netherlands Development Organization
SNNPR	Southern Nations, Nationalities and Peoples Region
START	Global Change System for Analysis, Research and Training
UNDP	United Nations Development Program
USAID	United States Agency for International Development
Woreda	District

Introduction

Climate change is increasingly recognized as a critical issue to be addressed in order to achieve equitable and sustainable development in Ethiopia. The country experiences significant climate variability and frequent extremes, both of which are expected to increase as climate change becomes more apparent. In rural areas, high levels of poverty and heavy dependence on natural resource-based livelihoods, among other factors, yield high vulnerability to the impacts of climate change. Faced with increasing uncertainty and climate extremes, women and men in rural communities are seeking new ways to manage risks, secure their livelihoods and build more resilient communities. Climate change also demands adjustments to the systems and institutions that influence the options available to women and men to enable adaptation over time.

For all of these reasons, CARE Ethiopia is increasingly committed to integrating climate change across its program portfolio. To inform this process, analysis of climate change vulnerability and adaptive capacity has been conducted with communities and local stakeholders across a range of livelihood zones. These participatory analyses have provided important insights into rural people's experiences of climate change, how climate-related shocks and stresses affect their livelihoods and how they are currently responding. They have helped CARE and its partners to better understand the opportunities for adaptation and the barriers people face in increasing their resilience and adaptive capacity. This has led to adjustments in existing project designs and has informed priorities for future programming for CARE and its partners, including government. Finally, they have begun the process of raising community awareness of climate change and its implications for livelihoods, uncertainty and risks into the future.

This report aims to share what CARE Ethiopia has learned so far from its efforts to integrate analysis of climate change vulnerability and adaptive capacity into programming. It provides a snapshot of the findings from the analysis in different livelihood zones, illustrated by detailed profiles of specific communities in each zone. These findings are analyzed in terms of their implications for development programming. Case studies are provided to demonstrate how the analysis has been used in program decision-making to ensure that CARE Ethiopia is maximizing its impact in terms of reducing climate risks and building adaptive capacity for the future.

The Projects

This report draws on analysis and planning undertaken by the following projects implemented by CARE Ethiopia:

Climate Smart Initiative (CSI)

The Climate Smart Initiative (CSI) is a multi-donor trust-funded component of two important food security programs in Ethiopia - the Productive Safety Net Program (PSNP) and the Household Asset Building Program (HABP). This second phase of CSI is designed to ensure that these programs become climate smart through the systematic integration of the implications of climate change in program activities. It will pilot climate smart activities and will draw together lessons to ensure that the next generation of resilience building programs will enable the Government of Ethiopia to better manage risks related to climate change. CSI is implemented through the existing PSNP and HABP systems and structures. A consortium of CARE, SNV, Farm Africa, ORDA, REST, Mercy Corps, ITAD, IDS and Cornell University is responsible for providing technical assistance to the program.

Graduation with Resilience to Achieve Sustainable Development (GRAD)

The GRAD project aims to improve food security in rural communities in Ethiopia's highland areas by enhancing livelihood options, improving community and household resilience and strengthening the enabling environment to ensure scale and sustainability of the approach. As part of its overall approach, the project explicitly aims to support adaptation and build resilience to climate change. It is funded by the Feed the Future program of the United States Agency for International Development (USAID). GRAD works in 16 Woredas in four regions: Tigray, Amhara, Oromia and SNNPR. It is implemented by a consortium led by CARE and including Catholic Relief Service (CRS), ORDA, REST, Agri-Service, SNV and Tufts University.

Global Water Initiative (GWI)

GWI is a global program supported by the Howard G. Buffett Foundation. The GWI East Africa program works in Ethiopia, Kenya and Tanzania. In Ethiopia, GWI seeks to transform food security through smarter and increased investments in water for agriculture, especially for women farmers. Its goal is for smallholder farmers to become more resilient to shocks and to achieve greater food security through more sustainable access to and productive use of water. Through action research that informs advocacy, the program seeks to promote investment in innovative techniques, technologies and financing mechanisms for more effective management and utilization of water for smallholder farming, thereby building climate resilience of farmers and of the agricultural sector.

Pastoralist Areas Resilience Improvement and Market Expansion (PRIME)

The PRIME project aims to increase household incomes and to enhance resilience through market linkages. This includes specific actions to increase community capacity to adapt to a changing climate, through increased access to climate information and support for analysis and planning processes to increase adaptive capacity. PRIME is implemented by a consortium consisting of Mercy Corps, CARE, Kimetrica, SOS Sahel, Pastoralist Concern (PC), Haramaya University, the Afar Integrated Sustainable Development Association (AISDA) and the Aged and Children Pastoralist Association (ACPA). The project will benefit more than 250,000 households in the Afar, Oromia and Somali Regions of Ethiopia.

CARE Ethiopia's Approach to Climate Change Vulnerability and Capacity Analysis

CARE's Climate Vulnerability and Capacity Analysis (CVCA) Handbook was designed to guide practitioners in undertaking a participatory analysis of climate change risks, impacts and existing responses in order to better understand climate change vulnerability and adaptive capacity. It has been applied by CARE and other organizations in more than 20 countries in Asia, Africa, Latin America and the Caribbean and the Middle East. The process has been found to be a useful first step in empowering communities to manage climate risks, as well as to understand the implications of climate change for the effectiveness and sustainability of development programs.

CARE Ethiopia sees participatory analysis of target communities' climate vulnerability and adaptive capacity as a critical foundation for integrating climate change into programs. Vulnerability to climate change refers to the potential of a system to be adversely affected by the pressures or changes associated with climate change. It is determined by a variety of factors, including exposure to climate variability and extremes and sensitivity to these fluctuations. Vulnerability is moderated by adaptive capacity, which is the ability to adjust to potential damage, to take advantage of opportunities, or to respond to the consequences of climate variability and change. In human systems, adaptive capacity is based on processes and capacities that enable ongoing management of the change and uncertainty associated with climate change. This includes access to information, flexible and forward-looking decision-making processes and the ability to innovate to adapt to changing circumstances and manage shocks. Adaptive capacity at the community, household and individual level is strongly influenced by access to resources, services and institutions and quality of governance. As such, it varies within communities and households, based on gender, age, social positions and economic status.

To better understand these dynamics, CARE Ethiopia has prioritized analysis of vulnerability and adaptive capacity in projects aiming to achieve results in climate-sensitive areas, notably food security and water. While all of the projects used the CVCA framework and tools as the basis for their analysis, each adapted the process and tools to their particular programming context, project design and operational constraints. For example, GRAD and CSI adopted simplified processes that were feasible within the projects' operational constraints, while PRIME linked the CVCA process to analysis of natural resources and markets. This flexibility was essential in ensuring that the analysis was appropriate to the context and useful for decision-making.

The analysis was facilitated by CARE and partners in a sample of communities across six different geographic regions, covering a range of ecosystems and livelihood zones, as shown in the table below.

Table 1: Climate vulnerability and capacity analyses facilitated by CARE Ethiopia and partners

Regions	Zones	Woredas/Rangeland Systems[1]
Tigray	Mehakelegnaw (Central)	Tanqua Abergele, Kola Temben, Ahferom
	Misraqawi (Eastern)	Gulomekeda
	Debubawi (Southern)	Raya Azebo, Raya Alamata, Enda Mekoni, Ofla
Afar	Zone 1	Dubti, Elidar
	Zone 3	*Amibara, Gewane, Burimodayto, Awash, Fental, Dulecha, Argoba*
	Zone 4	Ewa
Amhara	South Gondar	Lay Gayint, Libo Kem Kem, Dera, Farta, Tach Gayint, Simada
	North Wello	Gidan, Kobo
Oromia	South West Shewa	Goro
	West Arsi	Arsi Negelle
	Arsi	Ziway Dugda
	West Haraghe	Dharo Labu, Mieso
	Bale	Dello Mena, Sawena
	Guji	*Wadera, Gorodola, Liben*
	Borana	*Yabello, Teltele, Arero, Dhas, Moyale, Miyo, Dilo, Dire*
SNNPR	Guraghe	Meskan, Mareko
	Hadiya	Soro
	Wolayita	Damot Gale
	Sidama	Loka Abaya, Shebedino, Hawassa Zuriya, Hawila Tula
	Gamo Gofa	Demba Gofa
	Alaba	Alaba
	Konso	Konso
Somali	Liben	*Filtu, Dollo Odo*
	Jijiga	Gursum, Harshin

The projects defined the scope of the analysis in different ways, using administrative boundaries, rangeland systems or watersheds as the unit of analysis. The PRIME project also applied the community analysis to market systems, analyzing the vulnerability and adaptive capacity of members of a community who were producers within a particular value chain, such as dairy, crop farming or livestock. These differing approaches have enabled learning about the participatory analysis process as well as the dynamics of vulnerability and adaptive capacity.

Community members were engaged in the analysis through a series of focus group discussions, using participatory tools such as hazard and resource mapping, seasonal calendars and historical timelines. These tools were used as a basis for discussions on livelihoods, risks and changes in

[1] The PRIME project conducted its analysis at the level of rangeland systems, which generally cover parts of more than one Woreda. These are noted in *italics* in the table.

temperature, rainfall patterns and other environmental indicators. The process also explored people's current response strategies to manage risks and changes, evaluating the effectiveness and sustainability of these strategies. Focus group discussions were held separately with groups of women and men (and in some cases women in female-headed households) to draw out gender differences in vulnerability and adaptive capacity. The process also included engagement of other local stakeholders, including local government representatives such as Kebele-level Development Agents (DAs), representatives of community-based organizations, local government institutions and non-governmental organizations (NGOs) active in the targeted area.

The data was analyzed against a series of key questions, for example:

- What are the most important livelihood resources for women and men?
- What are the most important climate-related hazards affecting livelihoods of women and men?
- What are the impacts of these hazards on livelihoods?
- How are people currently preparing for and responding to these impacts?
- How effective and sustainable are these preparedness and response strategies?
- What changes in the climate/environment have communities observed?
- What are the opportunities and barriers for adaptation?
- Which social and livelihood groups are most vulnerable to climate change impacts and why?
- Which institutions and processes are important in enabling adaptation?
- What are the gaps in current programming from a climate change perspective?

Figure 1: CARE Ethiopia sees participatory analysis of target communities' climate vulnerability and adaptive capacity as a critical foundation for integrating climate change into programs.

The analysis was summarized in reports at the Kebele, Woreda or rangeland system level. These reports have served as an important reference for the program teams, as well as for local stakeholders involved in development planning. The results of the analysis have been used in a variety of ways as a basis for action on adaptation in communities, including development of community visions for resilience, identification of adaptation options and planning for their implementation.

Each project encountered certain challenges in undertaking the CVCA process. The complexity of climate change - its causes and effects and the uncertainties associated with future projections - presents a communication challenge, particularly for community facilitators who are not experts on the topic. The reality of climate change can be alarming, requiring thoughtful and sensitive facilitation to ensure that communities feel empowered rather than discouraged by the dialogue. Community members and other stakeholders have many demands on their time, making it difficult to coordinate the appropriate level of dialogue without over-burdening participants. This, combined with resource constraints, limited the scope and depth of the analysis in some cases, with the risk that important issues, particularly related to gender and social differentiations in vulnerability, may have been obscured. Despite these challenges, the analyses have yielded useful insights into the factors influencing climate change vulnerability and adaptive capacity in the target communities, and the process has been a valuable learning experience for the CARE staff, partners and local government and civil society institutions involved.

Climate Change in Ethiopia

Ethiopia has diverse topography, ranging from lowlands at sea level to a high, mountainous plateau with peaks over 4600 meters above sea level (masl), yielding significant climatic variation across the country. Five main agro-climatic zones have been identified.

Figure 2: Climate change is adversely affecting lives and livelihoods of Ethiopian farmers. If they can use modern farming approaches and technologies, they can fend off climate change perils.

The characteristics of these different zones are presented in the table below.

Table 2: Ethiopia's Agro-Climatic Zones

Name of Zone	Description	Altitude (masl)	Average Temperatures (˚C)	Annual Rainfall (mm)
Wurch	Cold, moist	More than 3200	Less than 11.5	900-220
Dega	Cool, humid	2400-3200	11.5-17.5	900-1200
Weyna-Dega	Cool, sub-humid	1500-2300	16.0-20.0	800-1200
Kolla	Warm, semi-arid	500-1500	20.0-27.5	200-800
Bereha	Hot, arid	Less than 500	More than 27.5	Less than 200

Most of the country experiences a single rainy season, which typically occurs from June to September. In some parts of northern and central Ethiopia, a second rainy season may occur from February to May, usually with more sporadic rainfall and less overall than in the main wet season. In the southern regions, there are two wet seasons, with the main rains occurring in March to May and lesser ones in October to December. There is significant temporal variability in rainfall, both seasonally and from year to year. This variability leads to frequent extremes in terms of both high intensity rainfall and drought periods. Ethiopia has experienced eight major droughts since the early 1980s.

In recent years, a warming trend has been observed across the country, with an increase in the number of hot days and nights and a decrease in the number cold days and nights. The mean annual temperature increased by 1.3˚C from 1960-2006, with the greatest rate of increase during the July-September period. Because of the high rainfall variability over years and over decades, it is difficult to establish long-term trends in rainfall with available data. There is little evidence of a changing trend in the frequency or intensity of extreme weather events.

Analysis of a range of climate models predicted a continued rise in temperatures across all seasons in the coming decades. The increase in mean annual temperature is projected to be 0.7-2.3˚C by the 2020s and 1.4-2.9˚C by the 2050s. It is expected that this warming will lead to increased frequency of heat wave events and higher evapo-transpiration rates. The projections for rainfall are less clear, with some models predicting an increase in annual rainfall and others a decrease, however there seems to be a trend towards a slight increase, at approximately 0.4% by the 2020s and 1% by the 2050s. There will be regional differences in rainfall trends, with different climatic zones experiencing changes of different magnitude and direction, and the potential for decreases in some parts of the country in certain seasons. There is potential for heavier rainfall events and an increase in the frequency and intensity of drought and flood events in the future. CARE's analysis suggests that climate change is already exacerbating Ethiopia's existing rainfall variability, leading to increasing uncertainty about the timing and amount of rainfall.

The Government of the Federal Democratic Republic of Ethiopia (GoE) is responding to the challenge of climate change through a number of key policy decisions. The linkages between climate change and sustainable development are articulated in the Climate-Resilient Green Economy (CRGE) Strategy, which lays out the GoE priorities for reducing greenhouse gas emissions while safeguarding economic growth, as well as for reducing the country's vulnerability to climate change. The strategy includes four pillars: improving crop and livestock production practices to increase farmer income and food security, while reducing emissions;

protecting and re-establishing forests; expanding renewable energy; and implementing energy-efficient technologies in transport, industry and buildings. Initial identification of priorities for adaptation was undertaken through the development of the country's National Adaptation Programme of Action (NAPA) in 2007. In 2011, the GoE developed the Ethiopia Programme of Adaptation to Climate Change (EPACC), which is seen as a sequel to the NAPA. This document identifies climate risks and adaptation options across a range of socio-economic sectors, as well as the institutions responsible for managing these risks. The EPACC will be operationalized through regional and sectoral adaptation strategies, which are in varying stages of development and implementation. The country is also in the process of developing its strategy for Nationally Appropriate Mitigation Actions (NAMAs).

Analysis of Climate Change Vulnerability and Adaptive Capacity

Livelihoods in Ethiopia can be broadly divided into pastoral, agro-pastoral and crop production zones. Within these zones there is considerable diversity in terms of the types of livestock raised and crops produced, and significant movement of households and communities along the continuum of livelihood systems from settled crop production to mobile livestock herding. There is also wide variation in terms of culture, ethnicity and access to information, resources, services and markets. All of these factors are relevant in determining climate change vulnerability and adaptive capacity.

The following sections summarize CARE's analysis of vulnerability and adaptive capacity with communities in six different agro-climatic zones: the northern lowlands agricultural zone in Tigray Region, the northern highlands agricultural zone in Amhara Region, the north-eastern agro-pastoral zone in Afar Region, the southern agricultural zone in SNPPR and the southern pastoral zone in Oromia Region. For each of these areas, a general description of the livelihood zone is provided, followed by a profile of a particular community or livelihood system that provides a more detailed picture of people's observations and perceptions with respect to climate change and its impacts on their lives and livelihoods. The profiled communities are typical within their area, however it must be noted that they are not intended to represent the situation across the entire livelihood zone or region, as each community and livelihood system has its own particular characteristics. That said, the specific situations of these four diverse communities provide insights into the differences and common challenges among the livelihood zones and illustrate the importance of participatory, context-specific analysis to support effective integration of climate change into development programs.

The Northern Lowlands Agricultural Zone

The Mehakelegnaw Zone of Tigray Region is in the centre of the region, bordering Eritrea to the north and the Amhara Region to the south. This is a sparsely populated lowland region, with undulating topography including hills, valleys and plains. The vegetation consists of bush scrub, acacia trees and riverine forests. The area receives 350-500 mm of rainfall on average each year, mostly falling in the main rainy season from mid-June to mid-September. There is another small rainy season from mid-March to May, but there is insufficient rainfall during this period to support agriculture. Consequently, people rely on the June to September rains to produce their crops.

Admis watershed is found in Tanqua Abergele Woreda, in the Middle Tekeze livelihood zone. Agricultural land is plentiful, but the quality of the soil is poor and yields are low if fertilizer is not used. The main crops grown are sorghum, maize, sesame and teff, which is the main

cash crop. Most households also keep livestock, primarily cattle and shoats, for milk, food and income. Migration for agricultural labour opportunities is practiced by most households. The area is chronically food insecure, due to the combined effects of poor soil fertility, limited access to inputs and recurrent drought. The poorest households do not have the land or other resources to grow crops to meet their food needs and are required to purchase approximately 40% of the food they consume. These households are supported by the PSNP program, which provides up to 20% of their cash income in a good year.

Communities in the Admis watershed identified erratic rainfall and flood as the most important climate-related hazards affecting their livelihoods. Erratic rainfall manifests in a number of different ways: late arrival of rains, heavy rainfall events, long dry spells during the rainy season and early ending to the season. This has led to increasing uncertainty about the timing and amount of rains, making it difficult for the communities to decide when and what to plant. Erratic rainfall affects crop productivity, leading to shortages of staple foods such as maize and sorghum and of feed for livestock. When possible, community members plant crops with short maturation periods in an attempt to work with the shorter rainy seasons, however supplies of these seed varieties are limited in this area. Replanting crops after dry spells is another strategy, but this requires significant investment in inputs, including labour, so this is not an option for more vulnerable members of the community.

Floods occur in this watershed every two to three years, according to the community members. When flooding occurs, it can cause damage to settlements and to water harvesting structures that have been constructed to address water shortages. They also impact crop production, inundating crops, damaging cultivated land and causing siltation of fields. Similarly, floods affect availability of fodder for livestock, with implications for animal health and productivity. Livestock diseases are perceived to occur in relation to flood events and in some cases livestock are lost to the floods.

Deforestation is another critical issue affecting livelihoods in the Admis watershed. Loss of tree cover has many negative impacts on the watershed, with significant implications for resilience and sustainability of livelihoods over the longer term. Quality of agricultural land is affected by increased erosion, loss of soil fertility and increased run-off, all exacerbated by deforestation. With reduced vegetative cover, the supply of wild fodder is limited, forcing farmers to produce more themselves. Demand for firewood for fuel remains high as people do not have access to other sources of energy, increasing pressure on the trees that remain and forcing community members (usually women) to travel longer distances to get fuel for household use. Some efforts have been made to plant trees, but these have had limited success to date.

People in the Admis watershed have a number of different strategies that they employ to manage the impacts of climate hazards and other shocks, and the scarcity that results. A number of different types of earth structures are constructed, with different purposes including soil and water conservation, water harvesting and flood diversion. When crops fail, some community members seek opportunities to engage in paid labour to make money. Sale of livestock to buy food is another common strategy. It was noted by communities that households headed by women are most affected by shocks because they generally have limited labour and other resources to invest in responding to shocks.

To improve the ability of communities in this watershed to manage climate risks, a number of strategies were identified. To directly confront the impacts of flooding and erratic rainfall, community members prioritized increased investment in structures such as flood diversion canals, half-moon structures that conserve soil moisture and terraces on hillsides to reduce erosion and run-off. Tree planting, specifically multi-purpose perennial trees such as Jatropha

and Maringa, will generate multiple benefits for the local ecosystem and community livelihoods. Introduction of alternative fuel sources will help to sustain reforestation efforts, while also reducing women's workloads in relation to gathering firewood for fuel. These actions represent initial steps towards building longer-term capacity to manage risks and changes.

The Northern Highlands Agricultural Zone

South Gondar Zone is found in the highlands of Amhara region in the northern part of Ethiopia. Farta Woreda is found in the centre of South Gondar Zone, bordered on the south by Este, on the west by Fogera, on the north by Ebenat, and on the east by Lay Gayint. The topography in Farta is hilly to mountainous, with altitudes ranging from 1900 to over 4000 masl. Only 29% of the Woreda is flat, with 45% gently sloped and 26% steeply sloped. The main land uses are crop cultivation, which accounts for approximately 65% of the total area, and grazing and browsing for livestock, which takes up approximately 10%. Settlements cover 8% and wastelands 17%. Only 0.6% of the land area is forested, mostly with eucalyptus trees.

Farta falls within the Guna Highland Barley, Potato and Sheep Livelihood Zone, characterized by fertile clay soils and high population density. Wealth is determined by the amount of land and livestock owned. The poorest households own and cultivate less than 0.5 hectares of land. They own 2-4 chickens and 2- 4 sheep and less than 90 Eucalyptus trees. In contrast, the wealthiest households cultivate approximately 1.5-2 hectares of land and own 8 to 16 sheep and 2-4 chickens, as well as oxen, cattle and horses. These two categories each represent approximately 20% of the population in Farta, with the remaining 60% characterized as poor or middle wealth households.

Crop production is the major source of food and cash for households in Farta, generally practiced in combination with livestock rearing. Farmers plant a mix of cereals such as barley, wheat, teff, sorghum and maize, beans including chickpeas and field beans, oil crops and root and tuber vegetables such as potatoes. With a favourable climate and good soils, even the poorest households in this zone are able to meet the bulk of their annual food requirements from their own production in good years. When this is not the case, most often due to climate variability or crop pests, livestock are used as a source of cash and security.

The climate in Farta is temperate, with a mean annual temperature of 15.5°C. The mean maximum and minimum temperatures are 21°C and 9.6°C, with the warm season occurring from February to May and the colder season from June to January. The Woreda receives an average of 1570 mm of rainfall annually. The rains typically begin in March but the majority of the rain falls between May and the middle of September. Analysis of temperature data from the local meteorological station at Debretador shows that the mean annual maximum temperature has been rising at a rate of approximately 0.42°C per decade since the 1980s, while the minimum temperature has been declining by 0.35 °C per decade. The rainfall data from Debretador reveals a trend of increasing inter-annual variability, particularly in the March to May period. Although average annual rainfall has decreased at a rate of 13 mm per decade, this trend was not found to be statistically significant.

When asked about their observations of climate change, community members in Farta suggested that local temperatures are warmer than they used to be. They described increasingly variable and unpredictable rainfall over the last 15-20 years. These observations are consistent with the meteorological data. In terms of climate related hazards, erratic rainfall was cited as the most serious hazard in terms of both frequency and severity, followed by hailstorms, flooding and drought. Community members feel that these hazards are occurring more frequently in recent years, and they expect that this trend will continue.

The people of Farta feel that these changes have had a significant impact on their crop production, referring to 'the good old days', when the rains were predictable and sufficient to support good harvests of both cereals and root crops. Now, however, they cannot rely on the rains and their crop production is suffering. The community also described changes in milk production of livestock due to less availability of natural pasture, which they link to the changing rainfall patterns. Hailstorms and floods cause damage to crops, pasture lands, homes and infrastructure. The secondary effects of these impacts include reduced food availability, decreased household income, human and animal disease and unexpected costs for food, livestock feed and health care. Over time, this undermines the household asset base and reduces the scope for actions that can build resilience to shocks and stresses. Looking forward, the community is most concerned about the impact of climate change on availability of labour, livestock, crops and land.

There is awareness among the community members that their own practices also play a role in determining their vulnerability to climate change. They recognize that the impacts of climate change interact with the effects of human activities such as deforestation, forest degradation, cultivation of marginal lands and overgrazing. All of these activities have a negative impact on the quality and availability of critical natural resources including water, pasture and fertile land for crop production. These interactions can create a vicious cycle, wherein people are driven by crisis to engage in unsustainable practices, while these practices undermine community resilience over time.

Within the community, people who are disadvantaged in terms of mobility and access to information, services and resources are considered to be more vulnerable than others. In Farta, this includes persons with disabilities, the elderly and poor female heads of households. These social groups generally have less access to and control over productive resources, are limited in terms of labour and face challenges in accessing information that may be easily available to their neighbours. As a result, their livelihoods tend to be more sensitive to shocks and their ability to make changes to improve their situation may be limited. Further, they often have less influence over household and community decision-making.

During the community dialogues, several issues emerged as important for managing current climate risks and increasing adaptive capacity for the future. Sustainable management of natural resources, notably land, will increase the asset base available to communities to improve their livelihoods and build resilience to shocks and stresses. Access to early warning and disaster preparedness information, with appropriate support from local institutions, will improve people's ability to anticipate and prepare for weather-related shocks. Related to this is information on longer-term climate change projections to facilitate informed decision-making and a more forward-looking approach to livelihoods. To support adaptive action, people require access to critical services such as infrastructure, markets and financial services. Equitable access for the most vulnerable social groups must be ensured to build the climate resilience of the community as a whole.

The North-Eastern Agro-Pastoral Zone

Afar Region covers the lowlands in the northeastern part of the country, with a majority population of Afar ethnicity. Afar Zone 3 is located in the southernmost part of the region, bordering the Oromia and Somali regions to the south and east and Zones 1 and 5 of Afar to the north and west. The landscape of Zone 3 is dominated by land covered in shrubs (38% of the land area), exposed soil and/or rock (36%) and grasslands (19%). Less than 1% of the zone is cultivated. While the region is mostly arid and semi-arid, the Awash River provides a

permanent water source and there are wetlands along its banks. The river floods during heavy rainfall events, forcing people to move to higher ground further away during the wet season.

The Amibara rangeland system incorporates areas of Amibara Woreda, which is located in the middle of Zone 3. Livestock rearing is the dominant livelihood strategy, occupying approximately 90% of the population. In the Amibara system, cattle and goats are the most common livestock kept. Livestock provides milk, meat and butter for family consumption, as well as hides and skins that are used in the household. They are also used as a source of barter and cash. The Awash River is an important resource for livestock production in this area, providing water for livestock, as well as fertile grazing zones along the riverbanks. There is clear delineation of wet and dry season grazing areas to ensure access to water and pasture throughout the year, however increasing water scarcity has affected the utilization of dry season grazing zones in recent years.

Afar Region has an arid to semi-arid climate, with average annual rainfall of less than 500 mm in the southern part of the region, where the Amibara rangeland system is located. The key climate-related hazards affecting the Amibara system are droughts, flooding and erratic rainfall. Drought leads to low crop productivity, due to both lack of moisture and increased incidence of crop diseases and pests. Livestock productivity also suffers from lack of water and fodder, leading to low prices for animals that are sold. These direct impacts cause food shortages and reduced household incomes and in the longer term can lead to malnutrition. Mobility is a key strategy to manage the impacts of droughts, with male family members moving with the herds to other areas where pasture and water are available (Mount Asebot in the case of the Amibara pastoralists and Zone 5 for those in Gelalo). However, travelling unusually long distances in times of drought is hard on families and herds. Further, expansion of farming in the area is increasingly encroaching on land that was traditionally used for grazing. Conflict, often linked to a competition for control over resources or for territorial expansion, further exacerbates vulnerability.

The major impact of flooding is damage to infrastructure such as roads and irrigation canals, causing interruptions in transportation, access to markets and other services and reducing effectiveness of irrigation systems. Floods may also damage crops and farmland and cause loss of livestock. When communities are able to receive a flood warning, they move away from the flood zones adjacent to the river. Erratic rainfall mainly affects crop production, causing decreased productivity and wasting the labour and other resources that were invested in planting crops. Food shortages and loss of incomes result. At present, community members in this area do not have strategies in place to manage this. Other important hazards include livestock disease and proliferation of invasive plant species such as *Prosopis juliflora*, which creates an impenetrable thicket that takes over pasture and farm lands.

In this already harsh environment, there are strong traditional systems in place that support people in managing risks to livelihoods. The *Dagu* system is a traditional communication system that disseminates information on the status of pasture lands and water resources, conflict areas and looted animals. The community early warning system (EWS), called *Remri* or *Hutukebieya*, tracks indicators including rainfall, droughts and floods as well as incidence of conflict, human disease and animal death. These two systems are perceived to be quite effective and people trust the information they receive (in contrast with the formal EWS, which is seen as ineffective and irrelevant due to a number of problems with its design and operation). The community also has a social support system whereby individuals and households that find themselves in crisis are supported by other community groups with food, loans and re-stocking of their herds.

Alongside pastoral mobility, these traditional systems provide an important foundation for community adaptation to climate change, however they are increasingly challenged by recurrent drought and resource degradation. With repeated shocks, communities are less and less able to redistribute resources to support more households that have lost their livestock or other assets. This has exacerbated vulnerability and led to increased dependence on external aid mechanisms, which are not sufficient to meet the needs and may undermine longer-term resilience with inappropriate or poorly timed responses.

Access to markets and services was identified as another major challenge affecting livelihoods in Amibara. People have to travel long distances to reach markets and are not in a position to buy and sell at optimal prices. This creates a burden on women who are tasked with going to the market and represents a barrier for people with reduced mobility. While there are health and veterinary clinics within the Amibara rangeland system, these facilities lack the equipment, supplies and human resources needed to effectively serve communities. There are tensions between the formal and customary institutions, each of which have representation from Kebele to regional level. Traditionally, the customary institutions managed land and water resources, however their power has eroded in favour of the formal structures, which lack capacity at the local level to effectively manage these critical resources.

The importance of savings, both cash and other resources such as food and livestock feed, emerged as an important theme in the dialogues, particularly with women's groups. Savings act as a form of insurance when shocks and stresses occur, enabling households to protect their asset base. However, there are currently a number of barriers to this practice. Firstly, in order for households to be able to save, they must be able to generate a surplus, which is less and less common in recent years, due to climate variability and to barriers in access to markets that could help to improve productivity and increase income generation from production. Awareness on the importance of savings is low and there are socio-cultural perceptions that discourage savings. Finally, financial services that can support savings are largely absent. Overcoming these barriers is a high priority for resilience building.

The Southern Agricultural Zone

Sidama Zone is located in the Southern Nations, Nationalities and Peoples Region (SNNPR) in south-central Ethiopia, approximately 275 km south of Addis Ababa. It is a densely populated and highly cultivated area, divided into three main livelihood zones based on altitude. Sidama is characterized by its traditional production systems, which combine agro-forestry and livestock production. Key staple crops include Enset in the higher-altitude areas and maize in the lowlands. Coffee and khat are important cash crops. CARE conducted analysis with communities in four Woredas in Sidama: Loka Abaya, Hawassa Zuriya, Hawila Tula and Shebedino.

The Sidama Coffee Livelihood Zone, where Shebedino is located, is in the middle hills of Sidama, at altitudes of 1700-2300 masl. The majority of land in the zone is cultivated, leaving very little natural forest and communal grazing lands. Households practice integrated farming, combining production of eucalyptus, fruit and coffee trees with staple crops and livestock, notably cows. Enset is the most important staple crop and coffee is the primary cash crop. Households prioritize coffee production over food crops, meaning that production is rarely enough to meet food needs over the year, even in good years. The result is high dependence on markets, making farming households vulnerable to price fluctuations for both staple foods and for coffee. Access to markets is relatively good thanks to a network of roads that are accessible year-round.

The amount of land allocated for coffee production is an important indicator of wealth in this zone. The better-off households, representing about 20% of the population, cultivate approximately 1 ha of coffee. Poor households cultivate 0.125-0.25 ha, representing approximately half of the land area owned. The poorest 15% of the population own very little land and may have just a few coffee trees amongst their other crops. These households do not tend to own any livestock, while the wealthiest own up to 8 cattle, 3 shoats and 1 donkey on average. Approximately 40% of the population is characterized as middle income, cultivating 0.5-0.75 ha of coffee and owning a few livestock.

CARE's analysis in Shebedino focused on getting a better understanding of livelihoods, climate risks and existing responses to manage these risks. There were distinct differences between women and men in terms of the livelihood resources they identified as most important. Women prioritized food crops, particularly Enset but also other fruits and vegetables, poultry and cash savings. On the other hand, men focused on cash income, beehives, trees and cash crops including coffee and khat. These differing preoccupations provide insights into the roles and division of labour within households, with men focusing on earning income and women more focused on feeding the family, which takes up significant time but does not provide much in the way of financial returns.

The most important climate-related hazards affecting people in Shebedino are erratic rainfall, flooding and drought. Community members describe a number of different manifestations of erratic rainfall, including uncertainty about the timing of the rains, shortening of the rainy season and increasing variability in the intensity and amount of rainfall. When this variability becomes extreme, it causes droughts and heavy rainfall events leading to floods.

Droughts, floods and erratic rainfall have a negative effect on crop productivity for both food and cash crops, in the worst cases causing crop failure. Given the reliance on coffee for household income in these communities, crop failures can be devastating, leading to price fluctuations, indebtedness and food insecurity. In these situations, access to water for domestic use is also a challenge, due to scarcity in the event of low rainfall or drought and due to contamination due to floods.

Livestock also suffer the effects of droughts and erratic rainfall due to difficulties in accessing water and fodder, leading to poor animal health, weight loss and sometimes death. Floods cause injury or death of animals, particularly poultry and shoats, and inhibit access to fodder. Transportation to schools, markets and health clinics may be interrupted by significant flood events. The longer-term effects of floods on land include soil erosion and creation of gullies and gorges. Repeated climate-related shocks can lead to children leaving school, depletion of household assets, malnutrition and poor human health.

When faced with crop and livestock losses, and the resultant impacts on household income, the women and men of Shebedino are sometimes forced to rely on borrowing money from relatives or friends or on food aid. To avoid this situation, they have a number of strategies to protect their livelihoods. These include increasing production of enset, which is viewed as a drought-tolerant crop, and engaging in off-farm income generating strategies such as casual labour and selling charcoal and firewood. Livestock are fed with crop residues or purchased fodder, and are sold when cash is needed. Some households keep reserves of grains, crop residues and cash that can be drawn on in times of scarcity. Important longer-term actions include water harvesting and conservation measures, tree planting and structural protection measures to divert floodwaters.

The major barrier to adaptation in Shebedino is a lack of access to information that would facilitate effective climate risk management. This includes climate and weather information as

well as information on markets and other services. Strengthening access to information, in a way that is equitable in terms of access for women and men and for different wealth groups, is an essential step in supporting adaptation. For the poorest households, a lack of resources to invest in new or adjusted livelihood strategies is a significant constraint. There is a clear need to develop buffers in the form of savings that can be accessed when shocks and stresses occur, so development of rural financial services, including village-level savings and credit groups, was identified as a priority for building adaptive capacity. The effectiveness of efforts to improve access to climate information and financial services will be maximized by parallel adjustments in livelihood strategies to reduce risks and improve the quality and availability of climate-sensitive resources, for example through practices to increase soil fertility on agricultural land and to improve management of water resources.

Figure 3: Analysis of livelihood types in Ethiopia with the CVCA tool entails considerable diversity. a) Access to early warning and disaster preparedness information, with appropriate support from local institutions, will improve people's ability to anticipate and prepare for weather-related shocks. b) The effects of rainfall variability on livestock include feed and water shortages, disease and death of weaker or young animals. c) Maintaining a large herd in Borana is an important indicator of wealth, so pastoral households may be reluctant to sell their animals until they are in crisis. d) The major barrier to adaptation in Shebedino is a lack of access to information that would facilitate effective climate risk management.

The Southern Pastoral Zone

The Borana Zone is found in eastern Oromia region, sharing borders with SNNPR to the west, the Somali region to the east and Kenya to the south. The area is primarily inhabited by pastoralists of Oromo ethnicity, who comprise almost 90% of the population. The Dire rangeland system, incorporating parts of Dire, Dhas, Miyo and Arero Woredas, is in the southernmost part of the zone. It falls within the Borana-Guji Cattle Pastoral Livelihood Zone, which covers a large, sparsely populated lowland area between the borders of SNNPR and Kenya.

This is an arid and semi-arid zone, with altitudes less than 1500 masl. The area receives only 400-500 mm of rainfall per year on average, falling during two rainy seasons—the long rains in March to May and the short rains from September or October to November. The households in this zone are almost exclusively reliant on livestock rearing for food and income. They raise camels, cattle, sheep and goats, which are used to produce milk for household consumption and are sold for cash. Meat is usually consumed during holidays and during ritual ceremonies. There is significant variation in the number of livestock owned, with very poor households owning only 5-7 cattle and 3-5 goats, while the better-off households may own 10-15 camels, 110-130 cattle, 40-60 goats and 2-4 donkeys.

The Dire system comprises 33 Kebeles, each of which has its own primary school, health post and veterinary post. Secondary schools are found in most Kebeles. There are major markets for livestock and other goods in Dubuluki, Mega, HIddi and Boku. In terms of water sources, the rangeland system comprises 46 ponds, 21 traditional wells and 14 boreholes with mechanical pumps, which offer an important source of water in the dry season. Migration for water and pasture is core to the way of life in this zone, usually occurring during the long dry season and during the long rains. In normal years, dry season grazing areas for the Dire pastoralists are found in neighbouring areas, including across the border in Kenya. In drought years, they move to grazing areas and water points further away, for example in the Arero forest zone to the northeast. During the rainy season they move to the southern or eastern parts of the Dire rangeland system area, or to neighbouring rangeland systems (Golbo in the south and Woyama in the east). Generally speaking, the men of the household move with the herds, while the women stay behind to look after the family and any weak animals left behind.

Community representatives from the Dire rangeland system identified droughts, floods and erratic rainfall as the climate-related hazards presenting the biggest risk to their livelihoods. They observe that droughts and erratic rainfall are increasing in severity over the last 15-20 years. While they feel that overall rainfall has decreased, the incidence of flood has increased, indicating that variability is increasing. Conflict and livestock disease are also important risks with indirect links to climate change, as they are perceived to occur in association with droughts and erratic rainfall.

Given the reliance on livestock, the biggest concern with respect to climate change is the effects on animal health and productivity. Erratic rainfall and drought reduce the availability of water and fodder for animals, leading to slaughter of calves to save their mothers and/or to sales of livestock when market prices are low or when the animals are emaciated and have poor market value. In extreme cases, animals die from lack of water and/or food. While cattle diseases are becoming less prevalent, camel and goat diseases are occurring more frequently. Collectively, these issues have important negative implications for household food security and resilience. Some strategies have been developed to avoid these negative coping strategies, including diversification of livestock within the herd (for example, to include more drought-tolerant camels and shoats), communal enclosures for grazing and hay-making. At present, however, these strategies are only practiced on a limited scale.

Traditionally, pastoral communities in this area had internal social security systems that helped to protect more vulnerable community members, for example through provision of livestock from better-off households to households affected by a hazard, either as a donation or as a long-term loan. This enabled the affected household to begin rebuilding their herd after losses had been experienced. Unfortunately, as in Afar, these indigenous systems have been undermined by recurrent shocks and by external aid mechanisms and are no longer functional.

It is recognized by communities and local development actors that improved management of grazing lands is key to increasing the resilience of the communities in the Dire rangeland system. The customary institutions in this area are very active, and have been collaborating with the Kebele governments to improve management of land and water resources within this system. At the local level, there are clear and vibrant institutional arrangements that have enabled NRM approaches that integrate traditional range management practices, such as rotational grazing and herd splitting. Efforts have also been made to strengthen land use planning processes and to open mobility corridors to ensure free movement of herds between grazing areas, however there are still challenges in addressing these issues at the rangeland system level as there is no clear institutional structure at this scale.

Early Warning Committees (EWCs) exist in the Kebeles and Woredas making up the Dire rangeland system, however these are not very effective due to inadequate communication systems (both from the central government to the EWCs and from the EWCs to community members). As a result, confidence in the early warning information is low and people do not trust it as a tool for decision-making. Community members identified a need to strengthen communication and collaboration between the local EWCs and the early warning information providers, as well as the capacity of EWCs to communicate the information in a timely and useful manner. Improving linkages between traditional early warning systems and the external system may aid in improving the credibility of information provided.

There are also social and cultural barriers to adaptive actions in the Borana Zone. Maintaining a large herd is an important indicator of wealth, so pastoral households may be reluctant to sell their animals until they are in crisis. Concerns about prestige may also hinder diversification of herds, as wealthier households are more likely to invest in cattle than in shoats and camels. Gender inequalities constrain women's access to resources and services and limit their opportunities to take action to improve their livelihoods and enhance household food security. Past responses to crises have yielded a certain amount of dependence on external aid, which may also inhibit actions that would enable improved incomes and better management of climate risks.

The Southern Agro-Pastoral Zone

Jijiga Zone is found in the northern part of Somali Region, bordering Oromia Region to the west and Somalia to the east. Gursum Woreda is the smallest and westernmost district of the zone, tucked between Jijiga Woreda and the border with Oromia. Gursum is an agro-pastoral area in the plains, falling within the Jijiga Agro-Pastoral Livelihood Zone. This livelihood zone has fertile black clay soils and experiences two rainy seasons per year: the heavier rains from mid-July to mid-October and the small rains from mid-March to mid-May. Both of these rainy seasons are important for crop cultivation and regeneration of pasture for livestock. In normal years, there is enough water available to support both human needs and livestock.

Most households in this zone, even poorer ones, have similar landholdings, usually including some agricultural land and some grazing land. What differs is the amount of land cultivated, which is greater for better-off households with more resources to invest. Specific staple crops

are cultivated in the two rainy seasons, with sorghum and maize planted during the longer rains and barley and short-maturing maize during the short rains. Some households also grow groundnuts, chickpeas, oats, lentils potatoes, onions, garlic and *khat*, which is a cash crop. The main livestock are shoats and cattle, which are fed from local pastures, stored fodder and crop residues. When poor rainfall makes this impossible, people move with their herds to grazing areas in neighbouring zones of Ethiopia and Somalia.

The community dialogues revealed that communities in Gursum are grappling with a number of climate-related hazards related to rainfall variability. They characterize these as: low intensity and erratic rainfall during the short rainy season; complete failure of the long rainy season; heavy rains and flooding. Each of these scenarios yields different impacts on important community livelihood resources, notably cereal crops, groundnut crops, livestock and drinking water.

Maize and groundnut crops are highly sensitive to fluctuations in rainfall, which cause poor harvests or, in the worst cases, complete crop failure. Sorghum is more drought-tolerant and represents a back-up plan when there is insufficient rainfall. Heavy rain and flooding cause seeds to decay in the ground, damage to seedlings, soil erosion and, in the case of flooding, siltation of agricultural land with longer-term implications for crop production. The effects of rainfall variability on livestock include feed and water shortages, disease and death of weaker or young animals. Drinking water supplies are affected in terms of both availability and quality, leading to shortages and forcing women to travel long distances to fetch water from nearby communities.

When these shocks and stresses occur, people do their best to maintain their production, by re-planting crops or replacing them with sorghum, sheltering livestock, creating flood diversions and clearing sediments from agricultural land. When crops are lost, they sell assets and labour (including by teenage girls) and borrow from relatives to get cash to meet household needs. The PSNP provides food and cash supports, which represent an important safety net, however these programs are not seen as effective in meeting the needs.

Facilitating access to information emerged as a high priority to support community members in Gursum in better managing climate-related risks to their livelihoods. The key information need identified through the community dialogues is seasonal weather forecasts, which would allow people to make more informed decisions about what to plant and when. Alongside this information, capacity development at household and community level is needed to make people aware of appropriate options for different weather scenarios and of the optimal ways to invest their resources based on the forecasts. This must be backed up with efforts to increase access to productive resources and services (such as financial services and markets) that will open up options for people to act on the information.

Implications for Programming

The community and rangeland system profiles demonstrate the diversity of contexts where CARE Ethiopia is working, the importance of climate impacts in relation to food security and poverty reduction and what can be learned from participatory analysis of climate change vulnerability and adaptive capacity. This section considers the implications of this learning for programming, with a focus on what needs to be done differently to take climate change into account.

Climate-related hazards can no longer be treated as an anomaly.

Climate-related shocks and stresses are a defining feature of livelihoods in Ethiopia, across ecosystems and livelihood zones. While climate extremes such as droughts and floods are not a new phenomenon, community observations suggest that these shocks are occurring more frequently. The analysis also shows that recurrent shocks have undermined the household asset base and led to growing pressures on natural resources, leaving the poorest households increasingly vulnerable. With this trend expected to continue, programs that aim to reduce poverty and increase food security must increasingly address climate-related hazards as characteristic of the context, rather than as an anomaly. This inevitably leads to an increased focus on measures that build resilience to shocks, in order to move people away from crisis-driven decision-making and coping strategies that undermine future potential. This has implications for both humanitarian action and longer-term development programming, demanding more effective and sustainable responses to crises and better integration of risk management in livelihoods and food security programming.

Climate change is not a 'component' of programming.

Most of the CARE Ethiopia programs that have conducted CVCA analysis have done so because they have a specific climate change 'component' in their program, and in some cases, a specific budget line for climate change activities. While this makes sense in terms of project management and ensuring that this critical issue is explicitly addressed, a major learning outcome from CARE Ethiopia's analysis is that climate change cannot be tackled in isolation from livelihoods and food security. In addition to highlighting priorities for targeted action to address climate risks, the climate change analysis must inform interventions by the government and relevant actors in other areas, including humanitarian action, to ensure that efforts to promote sustainable livelihoods and improve food security are resilient and sustainable over the longer term and do not inadvertently increase vulnerability to climate change.

Climate change adaptation is inextricably linked with sustainable natural resource management.

It is clear from the CVCA analyses that the most direct manifestation of climate change from the perspective of communities is its impact on the availability and quality of water, pasture and fertile land for crop production. It is also apparent that people's responses to resource scarcity often result in further environmental degradation, for example through overgrazing, charcoal production for cash and crop cultivation in communal grazing areas. Particularly in pastoral contexts, issues of access to and control over resources cut across communities and administrative borders, requiring a broader view of the linkages between sustainable natural resource management and climate change. In rural communities, the natural resource base will continue to be the foundation of livelihoods and ecosystem health will be a key determinant of resilience to climate extremes and capacity to adapt to change over time. Sustainable management of natural resources is therefore a critical enabler for climate change adaptation and must be a key priority for programs aiming to build climate resilience.

Adaptation to climate change requires options, not 'solutions'.

Development actors often endeavor to offer 'solutions' for reducing poverty, in the form of improved seeds, particular agricultural practices or access to markets, for example. The CVCA analyses have revealed that the biggest climate-related challenge people are facing is increasing uncertainty about rainfall and weather conditions. In the context of increasing uncertainty, there is a need to increase the range of options available to people to secure their livelihoods

and manage risks. This involves options within existing livelihood strategies, for example different crop varieties that are suited to different climate conditions or diversification of the make up of livestock herds. It also involves opportunities to diversify livelihoods to include less climate-sensitive strategies, such as petty trading. In the pastoral context, it will often be about improving options for accessing the resources needed to maintain herds, particularly water, fodder and veterinary services. As noted above, savings are also key in managing shocks and stresses. Programs must therefore move away from promoting particular strategies and focus efforts on opening up the options available to women and men to enable adaptive management of livelihoods, as well as contingency planning for times when primary strategies fail.

Informed decision-making is key to adaptive capacity.

With more options comes the need to choose among them. Different livelihood options will make sense at different times, based on the weather conditions, seasonal forecasts, availability of resources to invest and market conditions, among other factors. For people to effectively manage climate-related risks to their livelihoods, they must first have access to the needed information, including but not limited to early warnings, climate information and market information. Communication systems must be designed provide this information in ways that are relevant and equitably accessible for poor women, socially excluded groups and community members with mobility issues who may face barriers in access. However access is only a first step – in order to use the information effectively, they must also have the skills to analyze the information, weighing costs, benefits and risks, to make good decisions about how to invest their resources. Building these skills requires development actors to work with communities in new ways, facilitating learning processes that involve analysis, critical thinking and forward-looking decision-making. Approaches such as the CVCA and Participatory Scenario Planning represent good examples of this type of learning process.

Efforts to increase social equity must underpin adaptation efforts.

People's social positions, including those related to gender, have a strong influence over their vulnerability to climate change and the adaptation options available to them. Technologies such as drought-resistant seeds or irrigation systems are only useful to those who have land to cultivate and the power to decide how they will use it. Information is a critical resource for adaptation, which may or may not reach all members of the community depending on how it is communicated. Adaptation actions by one group may influence the availability of resources for another, making them more vulnerable to climate-related shocks and stresses. Consequently, equity in access to resources, opportunities and benefits must be an underlying principle in order to effectively build resilience and support adaptation. To support this, analysis of vulnerability and adaptive capacity must facilitate dialogue on the barriers facing particularly vulnerable social groups and identify specific actions to overcome these barriers and ensure equitable approaches to adaptation.

A better understanding of cultural and social barriers to adaptive action is needed.

Informed decision-making is a critical element of adaptive capacity, however it is important to also acknowledge the role that social and cultural norms play in determining who has the power to make decisions, how these decisions are made and what options are deemed appropriate. The CVCA analyses conducted by CARE Ethiopia have provided some insights into these dynamics, for example the cultural barriers to savings in pastoral communities and the role that prestige plays in decision-making. It also revealed inequalities in decision-making power within and between communities. These are helpful insights to inform how programs

engage with stakeholders on decision-making processes related to adaptation, however a better understanding of these dynamics and how they relate to gender, ethnicity and socio-economic positions will enable more inclusive and effective approaches to build adaptive capacity.

Integrating the Analysis into Programs

CARE Ethiopia is actively making adjustments to its approaches to address issues emerging from the climate vulnerability and capacity analyses. The following program profiles provide snapshots of some of the changes in thinking and approaches that have resulted from this process. While these efforts do not address all of the implications discussed above, they represent important and concrete steps towards ensuring that programs are genuinely reducing vulnerability to climate change, particularly for the poorest women and men.

Understanding the role of small-scale irrigation in managing rainfall variability

GWI's CVCA analysis in South Gondar highlighted the impacts of increasingly erratic rainfall on crop production. Given the heavy dependence on crop agriculture in this zone, this trend has important implications for food insecurity. For sustainable livelihoods in this zone, improved management of water for agriculture is a clear priority, both to increase farm productivity and to enable management of current variability and changes in rainfall patterns over the longer term. In this regard, small-scale irrigation has been identified as a promising option for poor households. GWI is undertaking an action research initiative to better understand the potential costs and benefits of this technology and to identify strategies for scaling up good practices.

GWI's action research approach aims to bring together different stakeholders in Learning and Practice Alliances (LPAs) that explore different aspects of water for agriculture. The LPA on small-scale irrigation will include Zonal and Woreda-level representatives from government offices such as agriculture, irrigation, water, cooperatives and enterprise promotion and women's affairs. It will also involve NGOs working on agriculture and water management, as well as researchers from Bahir Dar and Debetabor Universities. The research will pilot a model for sustainable irrigation service provision that has been developed by the Agricultural Transformation Agency (ATA) of the MoA, adapting it to the specific context of the project target area.

Members of the LPA will work with government extension agents and a group of 'champion farmers' identified by the project to better understand the existing capacity for small-scale irrigation and to identify gaps in skills and knowledge for effective use of the technology. This will explore issues including irrigation water management and sustainability and choice and use of irrigation technologies, as well as farming and post-harvest management practices. Farmer Training Centers in the area will establish demonstration sites for small-scale irrigation and irrigated crop production. Good practices will be disseminated using Farmer Field Days, exposure visits and community radio programs. A monitoring system will be put in place to assess, record and measure change over time amongst the champion farmers as a result of implementing the new techniques. The system will track progress in terms of food security, capacity to invest and other impacts related to marketing of produce and income levels within the household. It will also evaluate the effectiveness of irrigation in helping farmers to manage rainfall fluctuations, as well as changes in availability of water for irrigation over time.

The research will also explore the technical dimensions of small-scale irrigations, including an assessment of shallow groundwater and seasonal run-off as potential sources for irrigation

water. Different technologies for water pumping, harvesting and storage will be examined in terms of opportunities and constraints for adoption in South Gondar, including existing supply chains and bottlenecks for irrigation technologies. The costs and benefits of these different technologies will be analyzed and context-specific recommendations made.

It is early days for this phase of the GWI program in Ethiopia, which is in its first year of implementation. However, the CVCA analysis has already proven useful in understanding climate change impacts on water and in identifying research priorities. Management of climate risks in water for agriculture will continue to be a theme as the program moves forward on its research and advocacy agenda. It is hoped that the process will contribute to evidence-based decisions that create an enabling environment for smallholder farmers to increase their climate resilience.

Communicating the implications of climate change for income generating activities and value chains

GRAD used a simplified CVCA process to conduct its analysis, which was designed to inform the program's approaches to building community and household resilience. The program aims to improve food security for chronically and transitory food insecure households. The CVCA analysis revealed the importance of climate change as a factor leading to food insecurity. GRAD target households are largely dependent on agriculture and consequently their livelihoods are very sensitive to climate extremes such as droughts and floods, as well as to increasing uncertainty in rainfall patterns. Recurrent shocks and stresses degrade the household asset base and leave people in an increasingly vulnerable situation. Using the CVCA results, GRAD is working with local stakeholders to address the challenges facing the most vulnerable households, for example through pilot implementation of irrigation systems and introduction of drought-resistant and early maturing crops.

The CVCA analysis has also proven very important in identifying and evaluating livelihood options. There are two main dimensions to GRAD's work on expanding livelihood options: engaging people in value chains and promoting alternative income generating activities (IGAs). Engaging poor women and men in agriculture-based value chains can make a significant contribution to improving household income and purchasing power. However, when production is affected by climate-related shocks and stresses, people may find themselves in a precarious situation, particularly if they have relied on credit to cover the costs of inputs. The CVCA analysis process yielded a better understanding of the potential risks associated with this type of activity, and led the GRAD team to conduct climate screenings on the value chains being promoted in order to deepen this awareness.

The process involved a review of each stage in the value chain, from inputs and production through post-harvest management, aggregation and processing to wholesale and retail marketing. The resources needed at each stage were identified, and the sensitivity of these resources to climate impacts identified through the CVCA process was evaluated.[2] This enabled the team to identify those aspects of the value chain that are particularly sensitive, and to identify measures to reduce this sensitivity where possible. One of the value chains that was identified as particularly climate-sensitive was red beans, which are cultivated for sale at local markets to collectors, who in turn sell to wholesalers.

[2] The approach used draws on the approach of the CRiSTAL tool developed by the International Institute for Sustainable Development (IISD), the International Union for the Conservation of Nature (IUCN), Helvetas (Swiss Intercooperation) and the Stockholm Environment Institute (SEI). For more information on CRiSTAL, please see: http://www.iisd.org/cristaltool/

Climate change impacts, notably increasing drought and heavy rain, as well as erratic rainfall patterns, have high impacts on a number of resources contributing to this value chain, including agricultural land, organic fertilizers and pesticides, water and materials for drying and threshing.

There are some steps that can be taken to reduce this sensitivity, for example, selecting varieties in line with seasonal forecasts: high yielding varieties may do well in a year where good rainfall is predicted, while it may be more beneficial to plant drought-resistant varieties when a bad rainfall year is expected. Practices to improve soil moisture and fertility, such as mulching and tree planting around fields, may improve yields and help to protect against rainfall fluctuations. In flood-prone areas, protecting red bean fields with flood diversion structures and raising processing and storage facilities above flood levels may be good investments to avoid losses.

While these measures may to some extent reduce the degree of impact of climate hazards and changes on the red bean value chain, the GRAD team concluded that communication about risk must be part of the strategy for engaging people in value chains. This is to ensure that potential participants understand the risks as well as the opportunities, making it clear that while profits may be high in good years, bad years due to weather-related hazards and changes are expected to occur more frequently and they may face significant losses in these years. This allows people to evaluate the benefits against the risks and make an informed decision about investing in this value chain. The team is also communicating the importance of cash savings to create a buffer for households to manage shocks and stresses to livelihoods.

The exercise also made clear the importance of combining work on value chains with other interventions in order to support people in developing livelihoods that are sustainable and resilient in a changing climate. Complementary activities identified by GRAD include facilitating access to seasonal forecasts for value chain participants to promote planning and ensure timely planting and ongoing access to water for red beans. The team is also promoting other income generating strategies that are less sensitive to climate impacts, to ensure that people are not reliant on a single value chain. Finally, recognizing the need for informed and timely action when shocks occur, the project is working with the Woreda-level government to strengthen early warning systems.

Integrating climate change into Community Based Participatory Watershed Development

CSI adapted the CVCA process to conduct analysis in 212 Kebeles located in six different regions of Ethiopia. The analysis was designed as an entry point for integrating climate smart planning within the PSNP/HABP planning process, which is conducted in line with the national guideline for Community Based Participatory Watershed Development (CBPWD). The participatory CBPWD process is facilitated by DAs and brings together Woreda officials, community leaders and representatives of different social groups within communities. It involves a number of context analysis tools, including participatory mapping and transects, problem identification and ranking, socio-economic surveys and biophysical assessments and mapping. This analysis is used as a basis for identification of development activities that address the emerging priorities.

Generally speaking, PSNP/HABP activities focus on technologies and infrastructure that improve productivity and management of important community resources such as land and water. This includes measures such as soil or stone bunds to stabilize slopes, ponds to gather and store rainwater and check dams to divert run off and prevent flooding. Taking a watershed approach enables analysis of interactions between measures in different communities within a single watershed, ensuring that activities in neighbouring communities are complementary. The PSNP and HABP programs also incorporate livelihoods interventions such as agro-forestry, forage

development and improved farming practices. Implementation of actions occurs through community work parties, establishment of community groups and linkages with external sources of funding such as the PSNP and other development initiatives. The DAs and Woreda government representatives provide training and technical assistance for implementation of activities.

Taking a climate smart approach to watershed planning requires explicit integration of climate change considerations throughout the analysis and planning process. Pilot implementation of CVCA by CSI revealed a number of gaps in the CBPWD process with respect to climate-related risks, as well as the social dimensions of vulnerability, notably gender inequality. Because the CVCA process was conducted with focus groups of men, women in male-headed households and women in female-headed households, it enabled the team to highlight differential vulnerability to climate change and the potential for inequities in opportunities and benefits arising from CBPWD activities. Integration of participatory climate change analysis into the process would begin to address these gaps, helping to ensure that activities are inclusive, sustainable over the longer term, that they support people in managing climate risks and that they don't inadvertently increase vulnerability to climate change.

CSI experience to date has shown that there is potential to integrate elements of the CVCA process in the overall CBPWD process, however to do this effectively will require additional investments in capacity development and resources for the process. The analysis has informed prioritization of PSNP/HABP activities that address climate risks. These activities are currently being implemented on a pilot basis in the targeted communities and will be monitored to evaluate the effects on climate change vulnerability and adaptive capacity. At the same time, CSI has catalyzed a process of adapting the CBPWD process to reflect the realities of climate change. Efforts are underway to integrate elements of the CVCA and climate change adaptation planning in the CBPWD guidelines, which are currently under review by the Ministry of Agriculture, using evidence from the pilot initiatives.

Addressing socio-cultural and behavioral barriers to adaptation

PRIME conducted CVCA analysis for different grazing systems within its target regions, linking the climate change analysis to natural resource management by incorporating tools such as resource mapping. Undertaking the analysis at the level of rangeland systems, which incorporate multiple Kebeles, enabled the team to better understand the complex linkages between natural resource quality and availability, climate change impacts and pastoral people's responses to those impacts, including mobility. The analysis revealed that barriers to adaptation can be broadly categorized as: access to information and knowledge; access to resources; decision-making processes; financial and technological; and socio-cultural and behavioral barriers. It also found that adaptation interventions tend to focus on information, financial and technological components, which are comparatively easier to address than issues around decision-making, behavior and social and cultural norms.

Social Analysis and Action (SAA) is an approach to working with communities to catalyze a process of collective exploration and reflection, to address how social and behavioral conditions perpetuate development challenges. Originally designed to address issues related to sexual and reproductive health, the process aims to facilitate individual and community actions that support more equitable social norms and behaviors that promote positive change. The SAA community dialogue process is iterative and comprises three major dimensions: exploration and analysis; understanding and seeing things differently; and action for behavioral and social change. CARE Ethiopia has adapted the SAA approach to a variety of contexts and types of programming. Building on this, PRIME is currently adapting it to address the underlying drivers

of vulnerability to climate change and the socio-cultural and behavioral factors that limit adaptive capacity.

By using SAA, PRIME hopes to enable communities to identify connections between social and behavioral factors, vulnerability to climate change and food insecurity. The process will explore issues such as the lack of savings culture in pastoral communities, which represents an important obstacle to resilience building. Decision-making processes will be unpacked to build understanding of attitudinal factors that govern how people respond to climate variability and change, and to highlight social dynamics that may lead to increased vulnerability, for example the pressure to maximize herd size and the resultant reluctance to sell livestock until a crisis occurs. Positive practices, for example rotational dry and wet season grazing and customary management of water points, will be highlighted and promoted, with emphasis on their value for risk management.

The SAA dialogues will also delve into the social and cultural norms that determine acceptable behavior, and how these norms establish restrictions on adaptive action by certain groups based on gender, age, disability and/or ethnicity. Related to this is the issue of entitlements to natural resources, opportunities and services. Equity in these entitlements is a fundamental characteristic of adaptive capacity, as they determine the options available to people to build resilience, manage risks and adapt to change over the longer term. These issues cannot be resolved solely through action at the community level, as they also require supportive policies and responsible action by institutions. Even within an enabling environment, however, significant progress is needed to overcome the intra-community (and intra-household) dynamics that inhibit equitable access.

The adjustment of the SAA tool is an important step in the evolution of CARE Ethiopia's thinking on climate change adaptation. Issues around decision-making, behavior and social and cultural norms - and how these influence reactions to shocks, stresses and change over time - are fundamental to adaptation, yet they are often neglected in adaptation initiatives and debates. This type of iterative tool is compatible with the process-oriented nature of adaptation, enabling participants to strengthen their analytical skills and incorporate new information and knowledge throughout the series of dialogues. Finally, by bringing together different community members in dialogue and reflection, it has the potential to expose inequalities that limit the adaptive capacity of some community members and to identify actions to redress them.

Conclusions

Integrating climate change into development programming adds a considerable layer of complexity to already complicated processes. CARE Ethiopia is in the midst of a longer-term learning process on how to do this and what difference it makes for the resilience and adaptive capacity of people and for the sustainability of its programs. The experiences and lessons summarized in this report are one output of this process, reflecting the organization's commitment to share its learning, even when many questions and challenges remain. The community profiles demonstrate that climate variability and change are critical issues affecting food and livelihood security in poor communities. They also reveal the underlying causes of vulnerability to climate-related shocks and stresses, notably those related to gender and social inequality, barriers in access to information and services and governance of natural resources and community affairs. The program case studies illustrate the difference that the analysis has made, providing a strong case for participatory analysis of vulnerability and adaptive capacity as a basis for integrating climate change considerations into programming in an equitable and empowering way.

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/CARE.Ethiopia

Contact

CARE Ethiopia Head Office
Behind Lex Plaza Building/
In front of Ha Ge'ez Restaurant
+251-116-18-32-94
+251-116-18-32-95
4710
Addis Ababa