ACCRA
AFRICA CLIMATE CHANGE RESILIENCE ALLIANCE

Preparing for the future?
Understanding the Influence of Development Interventions on Adaptive Capacity at Local Level in Ethiopia.

Africa Climate Change Resilience Alliance (ACCRA) Ethiopia Synthesis Report

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Cover picture: Densa, an active and innovative woman farmer in Wokin kebele and member of the Oxfam GB/ORDA malt barley marketing project.


ACCRA in Ethiopia is a research and capacity building consortium of Oxfam GB,
Overseas Development Institute (ODI), Care International, Save the Children UK,
the Government of Ethiopia Disaster Risk Management and Food Security Sector and Haramaya University.
It works in Uganda and Mozambique where World Vision International is also a consortium member.

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Contents

Background and acknowledgments

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Abbreviations

ACCRA	Africa Climate Change Resilience Alliance
AMJ	April May June
ANRS	Afar National Regional State
asl	Above Sea Level
CAHWs	Community Animal Health Workers
DFiD	UK's Department for International Development
DJF	December, January, February
DRR	Disaster Risk Reduction
ENSO	El Niño Southern Oscillation
GCM	Global Climate Model
GDP	Gross Domestic Product
HAB	Household Asset Building Programme
HIBRET	Household Asset Building and Rural Empowerment for Transformation (CARE intervention)
ITCZ	Inter-Tropical Convergence Zone
JAS	July August September
KA	Kebele Association
LAC	Local Adaptive Capacity Framework
MDG	Millennium Development Goal
NGO	Non Governmental Organisation
NMA	National Meteorological Agency
ORDA	Organisation for Rehabilitation and Development in Amhara
PCDP	Pastoral Community Development Programme
PILLAR	Preparedness Improves Livelihood Resilience (Save the Children UK intervention)
PSNP	Productive Safety Net Programme
SCUK	Save the Children UK
SMC	Sorghum Maize and Chat Livelihood Zone
SNNPR	Southern Nations, Nationalities and People's Region
SRES	Intergovernmental panel on climate change Special Report on Emissions Scenarios
VSLA	Village Saving and Lending Association

Executive Summary

> "In the old days, there was plenty of grass in this area. We simply released our animals into the grass which was more than 3m tall ... Now we don't move our animals the way we used to because there are far fewer animals. Some buy feed for their animals, some have enclosures and Government support has increased. Compared to the past, we have peace and security, and access to school and health services. But we are getting poorer because of environmental changes and because we have fewer animals. *AK, 68, Ander Kello*

Ethiopia is currently ranked 11th of 233 countries and other political jurisdictions in terms of its vulnerability to physical climate impacts, and 9th in terms of overall vulnerability, which is physical impacts adjusted for coping ability (CGD, 2011). Yet little is known about its people's adaptive capacity at individual and community level, or how existing interventions influence a community's ability to adapt.

Recognising the complex relationship between climate and development, research conducted by the Africa Climate Change Resilience Alliance (ACCRA) seeks to explore how development interventions impact on adaptive capacity at the local level in Ethiopia, Uganda and Mozambique. It does so using the Local Adaptive Capacity framework (LAC), depicting adaptive capacity as composed of five interrelated characteristics, namely: the assets base; knowledge and information; institutions and entitlement; innovation; and flexible forward-looking governance. Primary and secondary data was gathered from three research sites in three Ethiopian Regions, namely Ander Kello in Afar Region, Kase-hija in Oromia Region and Wokin in Amhara Region. This report is a synthesis of the key findings.

ACCRA's research finds that although interventions by governments and development partners are impacting, and in some cases contributing positively to, the characteristics of adaptive capacity, they often fall short of their full potential to enhance the capacity of households and local communities to adapt by not appreciating and maximising their contributions across all five characteristics of adaptive capacity. The LAC framework shows that the analysis of poverty and vulnerability and resulting development interventions typically focus on only one or two of the five dimensions, principally broadening the asset base and to a lesser extent institutional arrangements. This often ignores underlying institutional barriers that prevent some households from accessing those assets. Institutional barriers and power structures that increase the vulnerability of some households are insufficiently analysed and understood, and therefore interventions fail to contribute to improved livelihoods for some households; interventions are often carried out in isolation, different actors do not consult each other sufficiently, which leads to duplication and inefficiency, and different actors are not learning sufficiently from experiences of others.

The research concludes that, by using the LAC framework, more focused interventions could be developed that target both immediate development needs and longer-term adaptation requirements. Interventions can combine different approaches – disaster management, social protection and livelihoods promotion – all of which are necessary. This will only become more important given anticipated climatic and other changes.

Key findings and recommendations

Development interventions need to do more to support people's own agency

> "We will continue helping each other until the end. If I have only a cow which is pregnant and my fellow brother comes for help, I will promise to give him the calf when it gets born. We know we are getting poor together, but we also know we won't starve to death while our clan members are having something to eat. We survived the past horrible years because of this culture and we will continue to do so." *Man in Ander Kello*

In a changing world, sustainability means being able to adapt continuously and forever. Sustainable development cannot be achieved by bringing people to a given state, but only by giving them the

ability to adapt to future change autonomously. Enhancing agency must therefore be at the heart of any development intervention and particularly of interventions aimed at strengthening adaptation and adaptive capacity. Development interventions need to focus on the process that is required for enhancing agency, and avoid undermining people's and communities' own initiatives.

Development partners need to reassess the scale and scope of their interventions

> "The rain is in the hands of God, but the road is in the hands of the Government. We can't do anything about the rain, but the Government could help us by building us road and bringing us telecommunication service." *Farmer, Kase-hija*

The justification for working primarily at the village level is based on the desire to achieve greatest impact given the constraints of staffing and finance. However, much of the vulnerability at local level is determined or affected by structures and processes far beyond the local level. Without addressing the stressors emanating from higher levels, efforts to improve the asset base and the institutional set-up locally are likely to fail. Current project interventions are maintaining existing systems, but are not contributing enough to building adaptive capacity. Part of the reason for this limited focus is that most development efforts concentrate on outputs (not outcomes), and are dominated by the provision of hardware, while insufficient attention is given to the dynamic processes of change such as the use of information in decision-making, the development of equitable institutions, the fostering of local innovation and improved accountability in governance structures.

Development partners need to better use information and knowledge for evidence-based decision making and project design

> 'I am the first person who tried application of fertiliser on a farm land in Finote Selam. I am also the first to have good number of beehives, poultry and a eucalyptus plantation. I have never received food aid, rather I receive advice and information.' *Better-off farmer, Dabat*

The ACCRA research found that projects are not being designed using the best possible information, prediction and scenario analysis. This is true both of longer-term shifts (e.g. climate variability and change) and short-term changes (e.g. specific seasonal weather forecasts). More than once findings were ambivalent on whether or not an introduced technology is leading to better adaptation to future conditions or to maladaptation. There is a need for more sophisticated analysis of current vulnerabilities and what causes and maintains them. This should be expanded to include constraints to adaptive capacity.

Building adaptive capacity requires a continuous process of learning, change and innovation

> "It was like a wind which blows fast, as a shadow disappearing suddenly and a girl walking away from my face. We have seen it going away before we realize how important the technology was" *Farmer talking about water harvesting technology in Kase-hija*

In order to prepare households and communities better for dealing with the projected impacts of greater climatic variability and extremes in future, innovation and strengthening innovative capacity must take centre stage in any development initiative. Innovation is understood as a process of experimentation and exploration of practices, techniques or new organisational forms. The ACCRA research suggests that local residents have made a number of innovations, but these have not been replicated, in part because the idea that poor and poorly educated farmers and pastoralists might be capable of experimenting and learning for themselves was not found to be well ingrained among development actors. For innovation, a set of requirements was found to be necessary and includes: An awareness that the current situation needs to change, a sense of being in a position to change that situation, access to appropriate information about different options that can be used to solve particular problems, access to resources to invest in testing new things or to act as a safety net in case of failure, and an enabling policy and institutional environments which encourage and promote innovation. Development partners need to be better aware of what role they have to play with regards to supporting these requirements.

Section 1: Exploring the characteristics of adaptive capacity

Exploring the characteristics of adaptive capacity

Responding to climate change is a principal development challenge (Boyd et al 2009). The impacts of observed and projected changes on global and regional climate are likely to have significant implications for ecosystems and the livelihoods of the communities who depend on them (Tompkins & Adger 2004). For Africa, and Ethiopia in particular, these impacts need to be considered in the context of wider development pressures such as, amongst others, widespread poverty and inequality, marginalisation, rapid population growth, and management of scarce natural resources. Each of these overlaps and is likely to be exacerbated by a changing climate. In light of this, it is vital that policy-makers and development planners understand how best to reduce vulnerability to climate change impacts, and ensure that communities have the capacity to adapt to changes over time.

This paper syntheses key findings from the Africa Climate Change Resilience Alliance's (ACCRA) research in Ethiopia. Section one explores key concepts and provides background to ACCRA. It goes on to explain the research methodology and introduces the project's analytical tool, the Local Adaptive Capacity Framework (LAC). Section two highlights key climate and development challenges for Ethiopia as well as describing some of the main development interventions in each of three research sites. Section three draws on research findings to explore how development interventions are impacting on the characteristics of adaptive capacity. Finally, section four provides an insight into what ACCRA's research means for development practice.

1.1 Why focus on adaptive capacity?

ACCRA has evolved considerably since its inception in 2009 in response to a call from the UK government (DfID) to generate evidence of how Disaster Risk Reduction (DRR), Social Protection and Livelihoods approaches build resilience to climate change. Why then is ACCRA now focusing on adaptive capacity?

Discussions within the ACCRA consortium, with the DfID-funded Strengthening Climate Resilience consortium and experts in the fields of DDR, Livelihoods, Social Protection and Climate Change Adaptation approaches associated with the study led to two clear challenges. First, that a narrow focus on humanitarian interventions and a narrow definition of resilience – the ability to 'bounce back' after a shock – doesn't deliver what is required by communities faced with climate change.

There are many other development challenges and uncertainties beyond those that are weather-related: both communities and systems need to learn how to adapt to these uncertainties and changes. However, the term 'resilience' is hotly debated and many people have taken to using a broader definition, with widely differing interpretations of what it means. Secondly, one of the biggest challenges within development programming is how to ensure that individuals and societies can adapt beyond the programme-cycle of an intervention. This is crucial to climate change adaptation because there is no end-point to adapt to: people need to acquire the capacity to adapt for generations to come. The challenge to development practice is how to meet immediate needs while also building the capacity to adapt in the future. The ACCRA consortium decided, in agreement with DFID, to reflect this need for long term flexibility and focus instead on the capacity to adapt. ACCRA's research focused on providing insights into the requirements that allow people and communities to build their own 'adaptive capacity' with a view to supporting this additional challenge to development practice.

'Adaptive capacity' refers to the potential of individuals and societies to respond to change; as such, it is not possible directly to measure adaptive capacity. Instead, ACCRA's research investigated the characteristics that are considered to contribute to the adaptive capacity of a system in a particular context. These are the five characteristics that make up the LAC framework (see Section 1.3 for a detailed description) that was used to frame ACCRA's research. We investigated the impact of development interventions (DRR, Social Protection, and Livelihoods) on people's and communities' adaptive capacity in order to: understand how different programming approaches either build or undermine adaptive capacity; understand how programmes that do not specifically target the impacts of climate variability and change can still improve

people's capacity to adapt in the future; and to learn how to improve interventions in all programme approaches towards building adaptive capacity. The conclusions are intended to support governments' and development actors' design and implementation of both humanitarian and development interventions, and policies that increase poor and vulnerable communities' resilience and their wider adaptive capacity.

1.2 Understanding adaptive capacity and the adaptation process

Nearly all societies and their activities are sensitive to the climate in one way or another. This is largely because where people live and how they generate their livelihood and wealth are influenced by their surrounding climate (Adger et al., 2003). Variability and uncertainty in the climate is inherent, and human societies have often had to deal with, and respond to, unforeseen variation in climate or weather extremes. However, the ways in which societies have coped to date, and the range of these coping mechanisms, may not be sufficient to deal with the new challenges brought about by climate change (van Aalst et al., 2008). Societies most vulnerable will not only be those that experience the greatest impacts, but those most sensitive and least able to adapt to changing climate and development pressures. For many communities in developing countries, already challenged in dealing with current climate conditions, responding to future climate variables will require them to modify their characteristics, and potentially transform their structure and how they organise themselves in order to successfully adapt. Importantly, communities face the challenge not only of responding to changes in climate, but of changing development pressures too, such as shifting patterns of internal/external migration, changing economic models and rapid population growth.

Communities that are able to anticipate, deal with and respond quickly to climate change are considered to have high 'adaptive capacity' (Smit and Wandel, 2006). Broadly speaking, adaptive capacity relates to the capacity of a person or community to respond and adapt to the likely impact of changing shocks and stresses (Lim and Spanger-Siegfried 2004). More specifically, in the context of climate change, it denotes the ability of a system to adjust, modify or change its characteristics or actions to moderate potential damage, take advantage of opportunities or cope with the consequences of a changing climate (IPCC, 2007; Brooks, 2003).

Crucially, adaptive capacity refers to the potential to adapt, as and when needed, and not necessarily the act of adapting, or its outcome. Adaptive capacity is multi-dimensional and the elements that make up an individual's adaptive capacity are not entirely agreed. It essentially relates to whether people have the right tools and the necessary enabling environment to allow them to adapt successfully over the long term. Also important to bear in mind is that adaptive capacity is context-specific and varies from country to country, community to community, between social groups and individuals, and over time (Smit and Wandel, 2006). It is the combination of development choices, adaptation actions and local capacities that allows for effective action at the local level (Kuriakose et al., 2009).

The concept of adaptation is relatively easy to describe in principle, but hard to depict in practice and in detail. In the context of this study, adaptation refers to the process by which communities reduce the adverse effects of shocks and stresses, including climate change, on their livelihoods and well-being, and take advantage of new opportunities provided by a changing environment (TERI, 2007). More specifically, it can be described as 'adjustments in natural or human systems in response to actual or expected climatic stimuli or their effects, which moderate harm or exploit beneficial opportunities' (IPCC, 2001b, p.72). Adaptation does not occur instantaneously; a person or community requires agency, ability and willingness to realise their adaptive capacity and adapt successfully (Adger et al., 2004).

Adaptation terminology in this report
This report has looked at the changes that people have made to what they do or how they do it, without distinction between the stimuli or process for the change, and without reference to whether or not the change has been successful. Therefore the terms, adapt, adapting and adaptation have been used throughout the report in this way. It is important to highlight that this is distinct from the goal of climate change adaptation, which is that people are better adapted to a changed or changing climate. Climate change adaptation in practice refers to actions that people and institutions make in anticipation of, or in response to, a changing climate, and refers only to those changes that are successful, appropriate and sustainable. Changes that are not successful, appropriate and sustainable in the light of climate change are considered 'maladaptation' (see Figure 2).

Figure 1: Adaption terminology in this report

Actions taken to adapt to climate variability and change can take many forms. In this report we describe a number of different types of adaptation at the local level (see Figure 2). With this in mind, adaptation can occur as a result of deliberate planning, known as 'planned adaptation', or from spontaneous action as a result of changing shocks and trends, known as 'autonomous adaptation'. In terms of the degree of change, adaptation can occur as small, 'incremental' changes in livelihoods and practices, or more 'transformational' actions, requiring fundamental shifts in a system's functions and objectives (Smith et al., 2010). Important to note is that not all actions taken to adapt will be successful (see Figure 1). In some cases adaptation actions can increase an individual's vulnerability in the longer term, resulting in maladaptation (see Figure 2). Though the various types of adaptation are blurred and actions may constitute more than one type of adaptation, having a thorough understanding of these different types is useful in helping us to characterise how people respond to change, as well as to better explore the barriers to successful and sustainable adaptation.

Type of Adaptation	Description
Autonomous Adaptation	Adaptation that that occurs naturally by private actors without intervention of public agencies. Often, autonomous adaptation does not constitute a conscious response to climatic stimuli, but is triggered by ecological changes in natural systems and by market or welfare changes in human systems.
Planned Adaptation	Adaptation actions that are result of a deliberate policy decision or action on the part of public agencies.
Incremental Adaptation	Adaptation that results in small incremental changes, generally aimed at enabling a person or community to maintain its functional objectives under changing conditions.
Transformational Adaptation	Adaptation that results in a change in the individual or community's primary structure and function.
Maladaptation	An adaptive response made without consideration for interdependent systems which may, inadvertently, increase risks to other systems that are sensitive to climate change.

Figure 2: Different types of adaptation at the local level

1.3 The Africa Climate Change Resilience Alliance (ACCRA)

Because building adaptive capacity is a conscious requirement of adaptation, we need to learn how to support it effectively. An alliance of five development partners – Oxfam GB, the Overseas Development Institute, Save the Children, World Vision UK, and CARE – the ACCRA consortium aims to understand how development interventions are contributing to adaptive capacity at the community level. It conducts research in three countries, Ethiopia, Mozambique and Uganda. ACCRA seeks to explore how development interventions – whether in the form of DRR, Social Protection or Livelihoods programmes – are influencing adaptive capacity at the local level, and what more can be done to best support it.

ACCRA has four key objectives:

a) To understand how existing DRR, Social Protection and Livelihoods projects by ACCRA members build adaptive capacity to climate change in beneficiaries, and how these approaches can be strengthened.

b) To use the findings to influence donors, development partners and civil society to improve future planning/action.

c) To work with local and national governments to enhance the capacity to implement interventions that can build communities' adaptive capacity.

d) To encourage learning across countries and disciplines.

Grounding these objectives is done through the use of the LAC framework[1]. The LAC draws on extensive consultations with academics, policy-makers and practitioners, and is tested in pilot studies in each of the three countries. Most assessments of adaptive capacity have focused on assets and capital as indicators (Dulal et al., 2010). While useful in helping us to understand what resources people need to adapt, these asset-oriented approaches tend to mask the role of processes and functions (Jones et al., 2010). Understanding adaptive capacity, therefore, requires that we also recognise the importance of various intangible processes, such as decision-making and governance, the fostering of innovation and experimentation and exploiting new opportunities, and the structure of institutions and entitlements, for example. This means moving away from simply looking at what a system has that enables it to adapt, to recognising what a system does that enables it to adapt (WRI, 2009). Understanding what development activities are doing to support this capacity, and what can be done to further enhance it, will be crucial to strengthening adaptive capacity.

The LAC framework incorporates intangible and dynamic dimensions of adaptive capacity, as well as more tangible capital and resource-based components, into an analysis of adaptive capacity at the local level. ACCRA's research recognises that it is not feasible to measure the 'potential' of people and societies directly. Instead, the LAC proposes that the capacity to adapt at the community level will be broadly similar in all groups, and separated into five distinct, yet interrelated, characteristics: the asset base; institutions and entitlements; knowledge and information; innovation; and flexible, forward-looking decision-making (see Figure 3 and Figure 4).

The underlying assumption behind the framework is that positive impacts on each of these characteristics should enhance the system's adaptive capacity (Jones et al., 2010). Research was conducted in the three countries to assess each of the five characteristics. Three sites were selected, drilling down into a range of livelihoods, vulnerabilities and capacities across each country. Results were then synthesised to draw common lessons and learning, in order to inform development practice. Key findings from research activities across the three Ethiopian sites – Ander Kello, Kase-hija and Wokin – are analysed in the following sections.

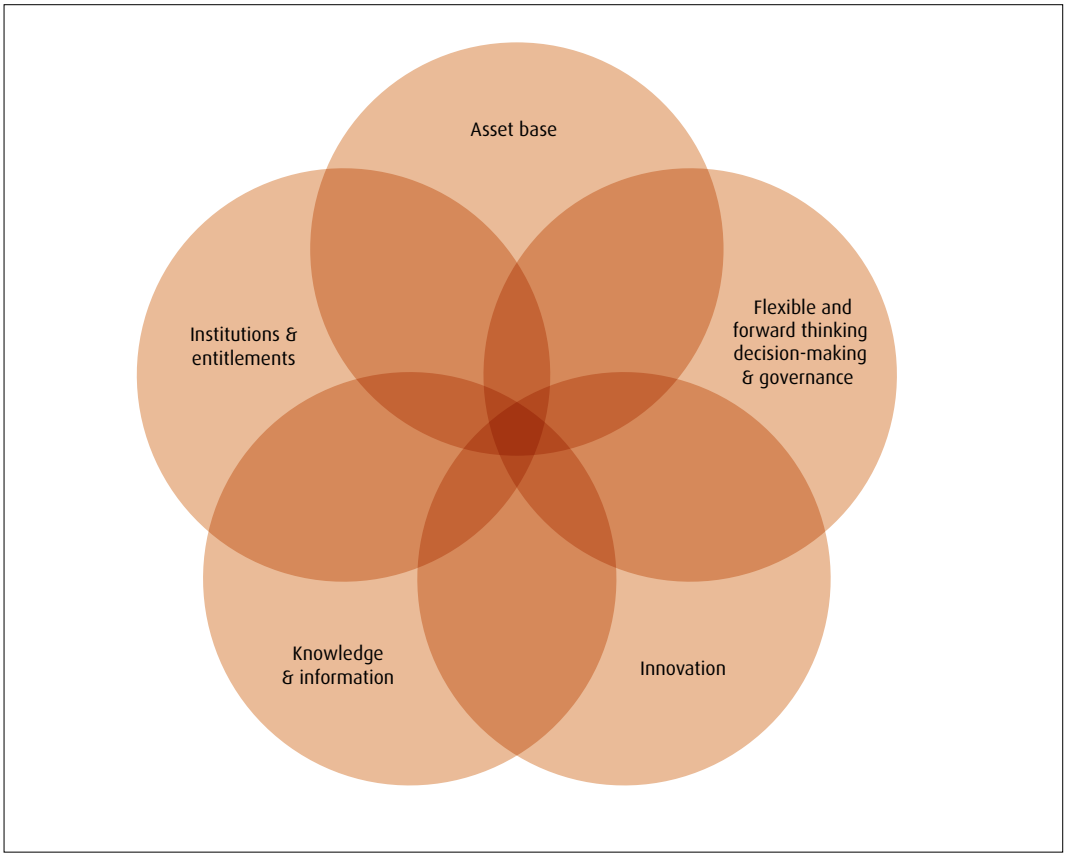


Figure 3: Relationship between characteristics of adaptive capacity at the local level

Adaptive capacity at the local level	
Characteristic	**Features that reflect a high adaptive capacity**
Asset base	Availability of key assets that allow the system to respond to evolving circumstances
Institutions and entitlements	Existence of an appropriate and evolving institutional environment that allows fair access and entitlement to key assets and capitals
Knowledge and information	The system has the ability to collect, analyse and disseminate knowledge and information in support of adaptation activities
Innovation	The system creates an enabling environment to foster innovation, experimentation and the ability to explore niche solutions in order to take advantage of new opportunities
Flexible forward-looking decision-making and governance	The system is able to anticipate, incorporate and respond to changes with regards to its governance structures and future planning

Figure 4: LAC's characteristics and features

1.4 Scope and methodology of the research in Ethiopia

ACCRA's research in Ethiopia aims to explore how rural people are affected by climate hazards, variability and change and how interventions – both by projects and the government – are affecting adaptive capacity at the household and community level. The premise behind ACCRA's research is not to identify and measure all impacts of interventions on people's capacity to adapt, but rather to highlight where development interventions may contribute to – or prevent – adaptive capacity.

Following the development of the programme's conceptual framework and research guidance, the in-country researched kicked off with an inception workshop bringing together experts from academia, government, civil society and NGOs to discuss the LAC and adapt it to the Ethiopian context. This was followed by the development and testing of the research protocol, analysis of available secondary data, an intensive period of field work in the three research sites, data analysis and the production of site reports presenting the wealth of collected information, which form the basis for this synthesis report.

Prior to research in the three sites, the LAC research protocol was tested in West Hararghe.

1.5 Research approach and methods

Different data sources, both primary and secondary, were used for this study. Secondary data sources include project documents such as reports, plans and evaluations and different government documents from districts[2], Regional and Federal level offices, including policies and strategic plans. Research reports and other relevant studies conducted in the area were also consulted. Meteorological data from the National Meteorological Agency (NMA) was analysed to assess local climatic conditions[3].

A team of researchers from Haramaya University spent around three weeks in each of the research sites, with two field work periods at different times of the year to capture seasonal difference. An intensive process of participatory research and validation, including both beneficiaries of interventions and non-beneficiaries, was conducted with at least 17 focus group discussions and 32 key informant interviews in each site at community and district levels. Key informants included government and NGO staff, representatives of different community groups and representatives of the private sector, where present. A number of participatory research tools were employed to collect data, including seasonal calendars, wealth ranking, time lines, community maps, institutional analyses and hazard maps[4]. Various validation activities were also conducted with communities and government officials at district, regional and national level.

Respondents were grouped into different categories according to set criteria (e.g. gender, age, wealth, livelihood group). Selection of respondents was based on the list of households in the community provided by local leaders. In Wokin and Kase-hija, a wealth ranking exercise was carried out with the intention to assist in identifying existing social and economic livelihood groups in the study site in order to represent them adequately in the different focus group discussions and key informant interviews. Such a wealth ranking, however, was not possible in the pastoralist site of Ander Kello as village inhabitants refused to classify households based on their wealth in fear of jeopardising benefits received through the PSNP. In this village, households were only differentiated based on livelihoods (e.g. pastoralists, agro-pastoralists). A simple sampling frame was followed to arrive at the numbers of respondents for the different exercises as recommended in the research protocol.

Launching the research in Chifra. In each research site, a training session on the key concepts being addressed by the research was held for district staff prior to starting the research.

A focus group in Wokin kebele, male farmers discuss the affecting their lives.

Adopted Field Strategy

1. Local facilitators were used for assisting in research and interpreting in interviews
2. Researchers were introduced to community and local leaders by consortium member operating in the area
3. Lists of contact people was secured from consortium member prior to field work
4. Compilation of relevant secondary information and meteorological data analysis was done before field work
5. First phase of field work was carried out between September 2010 and January 2011
6. Collected information was reviewed and preliminary analysis made to guide subsequent data collection
7. Research findings were validated with the participation of Regional and Federal officials in May 2011
8. Second phase of research conducted between March 2011 and April 2011 to fill gaps and capture information that is sensitive to seasonality
9. Data analysed and site reports produced
10. Site reports analysed and this synthesis report produced

1.6 Limitations

Given the fieldwork took place in only three sites, the ACCRA research did not intend to be a representative study of the district or a specific agro-ecological zone. Rather ACCRA has used a qualitative approach with small sample sizes and limited baseline data. We did not therefore aim to be statistically representative or to conduct rigorous impact assessments of project activities. Rather we intended to generate a rich discussion and insights about the features of adaptive capacity.

Section 2: Understanding the Ethiopian context

Understanding the Ethiopian context

2.1 Understanding vulnerability in Ethiopia

Ethiopia is among those countries considered to be most vulnerable to the impacts of climate change (CGD, 2011). Climate change is a significant threat to Ethiopia's development. Changing patterns and intensities of rainfall and increasing temperatures will have consequences for all Ethiopians, but especially for the more than 70 million poor people whose survival depends on rain-fed agriculture (farming and/or pastoralism).

Reasons for Ethiopia's vulnerability are manifold. Its geographical location and topography entail high vulnerability to the impacts of climate change. The highlands are dominated by sedentary crop farming, while many lowland areas are characterised by mobile pastoralism, with increasing numbers of agro-pastoralists in areas between the two. Highlands above 1,500 m asl are the favoured settlement areas, with around 90 percent of the population living here (Yacob Arsano et al., 2004). Ethiopia has about 16.4 million hectares of arable land (14.6 percent of its total land area), of which about 8 million hectares are currently used for crop production (Deressa, 2006).

Historically Ethiopia has been prone to extreme weather variability. Rainfall is highly erratic, most rain falls with high intensity and there is a high degree of variability in both when and where it falls. Since the early 1980s, the country has suffered seven major droughts – five of which have led to severe food insecurity – in addition to dozens of local droughts (World Bank, 2010). One of the reasons for this pronounced vulnerability is the extremely low level of water resources management, either in the form of watershed management or investment in multipurpose water infrastructure, which could potentially include hydropower production, irrigation systems and storage adequate to mitigate both drought and floods. Less than 5 percent (about 200,000 hectares) of the estimated potential 3.7 million hectares of irrigable land in Ethiopia is under irrigation (World Bank, 2006), and water storage capacity has been estimated at only 40m^3 per capita[5] (Grey and Sadoff, 2006).

Agriculture

Agriculture is dominated by rain-fed small-scale farming, primarily based on traditional technologies. Modern inputs, in particular fertilisers, are comparably low at an average of 81 kg/ha (Daniel Zerfu & Larson, 2011). Small-scale subsistence farming (about 8 million peasant households) accounts for 95 percent of the total area under crops and more than 90 percent of total agricultural output. Although the arable area has expanded slightly in recent years, population growth has outpaced this expansion. Average landholding per household has dropped to below 1 ha. Average yields remain low, at only 2.1 t/ha for maize, 1.7 t/ha for wheat, 1.4 t/ha for teff and 1.25 t/ha for barley (Rashid et al., 2010). Although the importance of agriculture, as measured in terms of its contribution to GDP, has decreased in recent decades, the overwhelming majority of the population is still mainly rural and depends heavily on agricultural income.

The dominant structure of the agricultural sector in the highlands is household-based, small-scale and subsistence-oriented. Land is not only the primary means for ensuring a livelihood, but often – and particularly for richer households – also a means of accumulating wealth and social status, and transferring them between generations (Deininger & Binswanger, 1999). Farming practices aim for minimal risks and optimal returns via a complex mixed system, involving both a variety of crops and livestock. The composition of the household defines the level of production as well as most of the available labour force. In the majority of households, most farming tasks are performed by family labour, but employing daily labourers from the community is also common amongst richer households. Collaborative work and reciprocal exchange are important for specific time-consuming tasks (e.g. clearing land, ploughing, harvesting).

Livestock

Ethiopia has the largest livestock population in Africa and the tenth largest in the world. Livestock is an integral part of the farming systems in the country, and the source of social and economic values such as food, power, fuel, cash income, security and investment. The livestock sector is estimated to contribute approximately 12 to 15 percent to total GDP and about 25 to 30 percent to agricultural GDP (Deressa, 2006). The livestock sector is the second largest foreign exchange earner after coffee, and in 2006 the

country earned $121 million from livestock and related products[6] (IIED and SOS Sahel, 2010). In 2008, the direct value of livestock and livestock products from pastoralism was estimated to be $1.22 billion per annum, with an estimated additional $458 million per annum from other activities (SOS Sahel Ethiopia 2008).

Pressure on grazing land in Wokin kebele, Dabat.

Much of the income generated by livestock comes from pastoral production, the dominant land use in Ethiopia's lowlands (below 1,500m asl). Of the estimated 1.4 million people in Afar region, 90 percent are pastoralists and 10 percent agro-pastoralists, while of Somali region's 4.4 million people, 85 percent are pastoralists, and the remainder agro-pastoralists, farmers and urban dwellers. Pastoralists also represent a significant proportion of the population in Oromia and SNNPR's arid lowlands (Nassef, 2010). Crop farming is limited in Ethiopia's pastoral regions, and constitutes less than 1 percent of Afar's land area and only slightly more than 5 percent of Somali Region's land area (Ibid).

Natural resources and resource degradation

Degradation of land and soil degradation, deforestation and overgrazing are as old as human settlement itself, but significantly accelerated by population pressure in recent years. Soil degradation is assumed to have played an important role in the decline of several ancient civilisations in northern and central parts of Ethiopia. Soil degradation is especially severe in areas of early settlement and agriculture such as Tigray, Wello, Gonder and northern Shewa. It is no coincidence that these areas were most affected by the droughts in the mid-1970s and mid-1980s (Ludi, 2004a)

Soil loss rates in Ethiopia are highest on cultivated land, and are estimated at 42 t/ha per year on average. Total soil loss from all land is estimated at almost 1.5 billion tons per year, of which 45 percent originates from cropland alone (Hurni, 1993). Of this soil loss, it is estimated that about 90 percent is deposited downslope, while the remaining 10 percent of sediments are leaving Ethiopia (ibid.). Overall, the impact of

soil erosion in reducing soil depth, reducing water storage and removing nutrients, and hence reducing soil productivity locally, are significant. As population pressure increases, more marginal areas and areas that were previously used for grazing are converted to arable land, leading to further soil erosion. Animals have to be fed for a longer period of the year from crop residues, which are thus lacking as a soil conditioner (Ludi, 2004a).

With increasing population and diminishing forest resources, fuelwood requirements exceeded the natural regeneration capacities of remaining forests. Today, forest resources account for only 4.6 percent of the total land area. Because indigenous forest resources are very few and decreasing, people are forced to use animal dung as fuel. Organic matter is thus not brought back to the soil, leading to further soil degradation. To overcome shortages of timber and fuelwood, Eucalyptus was introduced in the 1890s, and is increasingly planted around homesteads, both for consumption and as an important cash crop (Ludi, 2004b).

Overgrazing is a serious problem in the densely populated areas of the northern and central highlands and in dry lowland areas. Livestock are vulnerable because feed resources are extremely limited, rangelands are under increasing pressure and rangeland degradation is widespread as a result of overgrazing, the encroachment of crop farming and the spread of invasive plant species (Ludi, 2004b).

Demographics

With over 80 million inhabitants[7], Ethiopia is the second most populous country and the fifth-largest economy in sub-Saharan Africa. The majority of the Ethiopian population is still rural (83 percent). Disparities between urban and rural areas are extremely pronounced: while 90 percent of the urban population comes from the richest wealth quintile, this is only 10 percent in rural areas (Demographic and Health Survey, quoted in Evans & Steven, 2011). Population growth peaked in the early 1990s, when it reached a rate of 3.3 percent a year. It is currently around 2.5 percent per year and is not expected to fall below 2 percent until after 2025. Health standards are improving, though from a low base. Life expectancy has increased from 40 years at birth in 1950 to 55 years today (global average 68.9 years). Infant mortality has more than halved over the last fifty years; fertility levels were around seven live births per woman until 1990, then started to fall sharply to 4.8 births today. Rates are projected to reach replacement level around mid-century (ibid.).

Economy

Ethiopia has experienced strong economic growth in recent years. With real GDP growth at or near double digit levels since 2003/04, the country has consistently outperformed most other countries in Africa. Official figures show real GDP growth averaged 11.2 percent p.a. during the 2003/04 to 2008/09 period, putting Ethiopia among the fastest growing economies in sub-Saharan Africa. Although IMF (IMF, 2011) estimated growth rates around 7.5 percent in 2010–11, lower than government estimates of 11.4 percent, this growth performance is still in excess of the population growth rate and the 7 percent rate required for attaining the MDG goal of halving poverty by 2015 (AFDB, 2010). GDP per capita has steadily increased over the last decade, from $117 in 2000 to $319 in 2008 (UN Data). Although agriculture is still extremely important, the service sector has, for the first time in the country's history, overtaken agriculture as the largest sector, accounting for 45.1 percent of GDP in 2008/09, followed by agriculture at 43.2 percent, and industry at just 13.0 percent (Access Capitals, 2010).

The link between climate and GDP in Ethiopia is shown in Figure 5. However, the association of economic declines following poor rainfall does not imply causality. As Conway & Schipper (2010) point out, food insecurity is a chronic and complex problem that stems from political, social, environmental and cultural sources and a number of socio-economic droughts are recorded even when there is no meteorological drought. Although they conclude that some relationship between rainfall and GDP can be detected, they also note that the relationship becomes weaker after 2000, primarily because of a greater diversity of the Ethiopian economy and a concentration of drought in southern and south-eastern Ethiopia, areas with relatively low agricultural productivity and contribution to GDP.

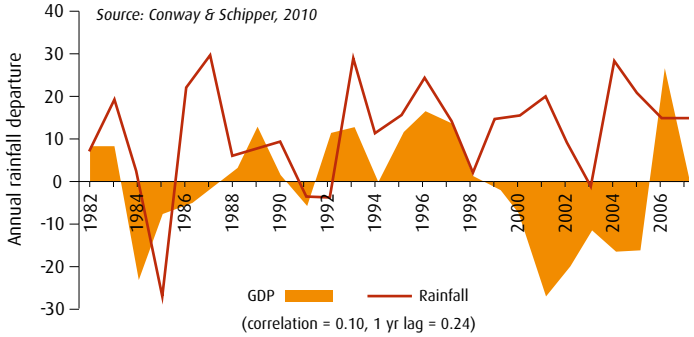


Figure 5: Ethiopia rainfall and GDP growth. Source; Conway & Schipper, 2010

Summary – Factors contributing to Ethiopia's vulnerability

Despite a number of positive trends that are important in reducing Ethiopia's vulnerability to climate change, for example solid leadership of the climate change agenda by the Prime Minister, increasing recognition by some development partners that addressing negative impacts of climate change needs more and focused attention, strong economic growth and a transition and diversification of the economy away from agriculture, improved access to socio-economic services such as education, health, markets or credit for larger parts of the population, and decreasing poverty head-count, Ethiopia is currently ranked 11th of 233 countries and other political jurisdictions in terms of vulnerability to physical climate impacts and 9th in terms of overall vulnerability, which is physical impacts adjusted for coping ability (CGD, 2011)[8].

Reasons are:

- Ethiopia's economy will remain highly vulnerable to exogenous shocks mainly because it is highly dependent on primary commodities and rain-fed small-scale agriculture. Although the service sector is increasingly important, agriculture still accounts for 43 percent GDP and 85 percent employment (Byerlee et al., 2007, Access Capitals, 2010). Agriculture remains the largest source of growth, though mounting pressure on land, both in respect to quantity and quality, puts considerable limits on productivity growth. Although urban growth is faster than rural, population growth has resulted in increasing numbers of rural dwellers, leading to average size of landholdings falling by more than half since the 1960s. Even if productivity were to increase by a factor of three, the average farm would not produce enough food for a family of five *(Samuel Gebreselassie, 2006)*.
- A number of factors contribute to chronic food insecurity in Ethiopia. Agriculture is primarily rain-fed, subsistence-oriented and characterised by low inputs and low outputs. Pastoral areas struggle with rangeland degradation, cyclical drought and historic under-investment. In addition, severe land degradation with 72 percent of the population living in areas that suffer from human induced degradation (HDR, 2011), ongoing deforestation estimated at 141,000 ha of forest per year, (FAO, 2005), and overgrazing are significant constraints to the sector. As a result, chronic food insecurity affects around 7.5 million Ethiopians who are reliant on food transfers from the Productive Safety Net Programme (PSNP), receiving direct transfers of food and/or cash for 3-9 months of the year, irrespective of the presence of unusual climatic or economic shocks (Conway & Schipper, 2011).
- The population growth rate is 2.5 percent per annum, resulting in a doubling of the population in less than 30 years. Ethiopia's population is projected to reach 174 million by 2050. This rapid population growth has so far been substantially rural, with Ethiopia likely to be one of the least urbanised country in the world by 2050 (UN Department of Economics and Social Affairs). Despite considerable improvements, human development is still very low and Ethiopia is only ranked 157 out of 169 countries (UNData).
- Capacity of government, civil society and the private sector to address negative impacts of climate change is low and finances to invest in sound development and targeted adaptation interventions are limited, although aid flows have recently started to increase.

2.2 Understanding Ethiopia's climate

Ethiopia's climate is tropical in the south-eastern and north-eastern lowlands, but much cooler in the central highlands. Average temperatures range from 5°C (November to January) over the northern and central highlands to about 37°C (March to June) in the north-east (Afar) and the south-eastern lowlands (World Bank, 2006; McSweeney et al., 2007).

Seasonal rainfall is driven by the migration of the Inter-Tropical Convergence Zone (ITCZ), reaching its northern-most position over northern Ethiopia around July–August, and its southern-most position over southern Kenya in January and February. This oscillation of the ITCZ characterises the rainy seasons over Ethiopia, with a main wet season (Kiremt) from mid-June to end-September. Northern and north-eastern regions, including the eastern Escarpment and parts of the south-eastern Highlands, have a secondary wet season with sporadic, and much less abundant, rainfall from mid-February to May (Belg). Southern parts of Ethiopia have two distinct wet seasons in April to June (Gu/Genna/Sugum season) and October–December/January (Deyr/Sapie/Dadaa season).

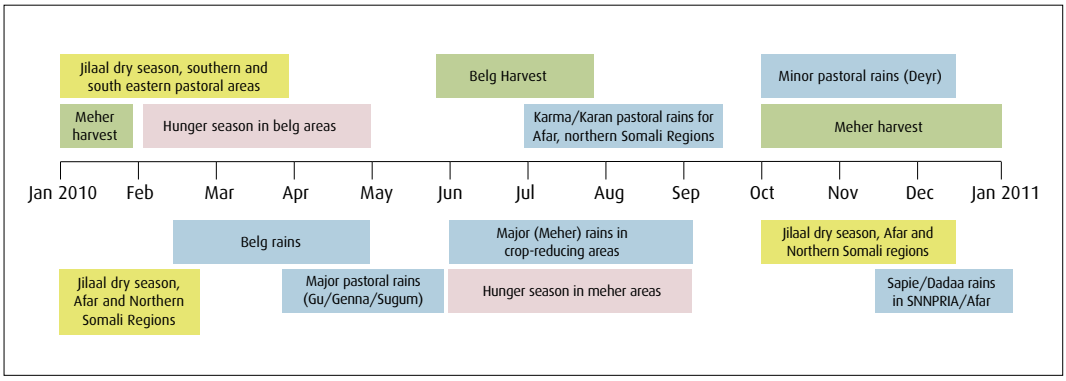


Figure 6: Seasonal Calendar and Critical Events. Source: USAID/Famine Early Warning Systems Network (FEWSNET).

The ITCZ's movement is influenced by variations in Indian Ocean surface temperatures and varies from year to year, leading to variations in the onset and duration of the rainfall season from year to year, including the occurrence of drought. Warming sea surface temperatures particularly in the south-western Indian Ocean may be linked to decreasing rains in equatorial and subtropical eastern Africa, including Ethiopia (Funk et al., 2005). The other major driver of rainfall is related to the El Niño Southern Oscillation (ENSO), with warm phases associated with reduced rainfall during the main rainy season from July to September (JAS) in northern and central Ethiopia, causing severe drought (Mc Sweeney et al., 2007).

2.2.1. Recent climate trends

Mean annual temperature has increased by 1.3°C between 1960 and 2006, at an average rate of 0.28°C per decade and 0.32°C during JAS (McSweeney et al., 2007). Hot days (i.e. temperatures exceeded on 10 percent of days/nights of a specific region and season) have become increasingly frequent, as have hot nights. The number of cold days has decreased significantly throughout the year, except for December, January and February (DJF), and cold nights are much less common in all seasons (McSweeney et al., 2007).

In terms of precipitation, strong inter-annual and inter-decadal variability makes it difficult to detect long-term trends. There is no statistically significant trend in observed mean rainfall in any season in Ethiopia between 1960 and 2006. Decreases in JAS rainfall observed in the 1980s recovered in the 1990 and 2000s. One key problem in analysing rainfall over Ethiopia is the paucity of data (McSweeney et al., 2007). Conway et al. (2007) find a slight negative trend for the February to April season (Belg) for 1981–2000 of 0.32–1.31mm per month. For the June to August season (Kiremt) and for October and November, monthly precipitation shows a slight positive trend of 0.52–1.81mm for 1981–2000. Both authors note that these average national figures obscure significant regional differences in rainfall trends.

There are significant differences in different regions of the country, with some parts having relatively stable rainfall and others showing strong declines. A study of seasonal rainfall trends by Funk et al. (2005) identified some notable features (see Figure 7[9]):

- On a national scale, the March-to-September rainfall totals (upper-right) exhibit a 20-year variation (wet in the mid-1970s and mid-1990s, dry in the mid-1980s and mid-2000s).
- Regional time series suggest variations from this pattern. In north-west (green) Ethiopia rainfall has been fairly constant over the period of record, with a decline in the mid-1980s followed by gradual recovery to the present. In the south-west (red) an overall decline since the 1960s is found, with a steep drop after 1996.
- Of most concern from a food security perspective is the post-1980 decline in the March–September south-east/eastern (orange) rainfall and the post-1996 decline in the north-east (yellow).

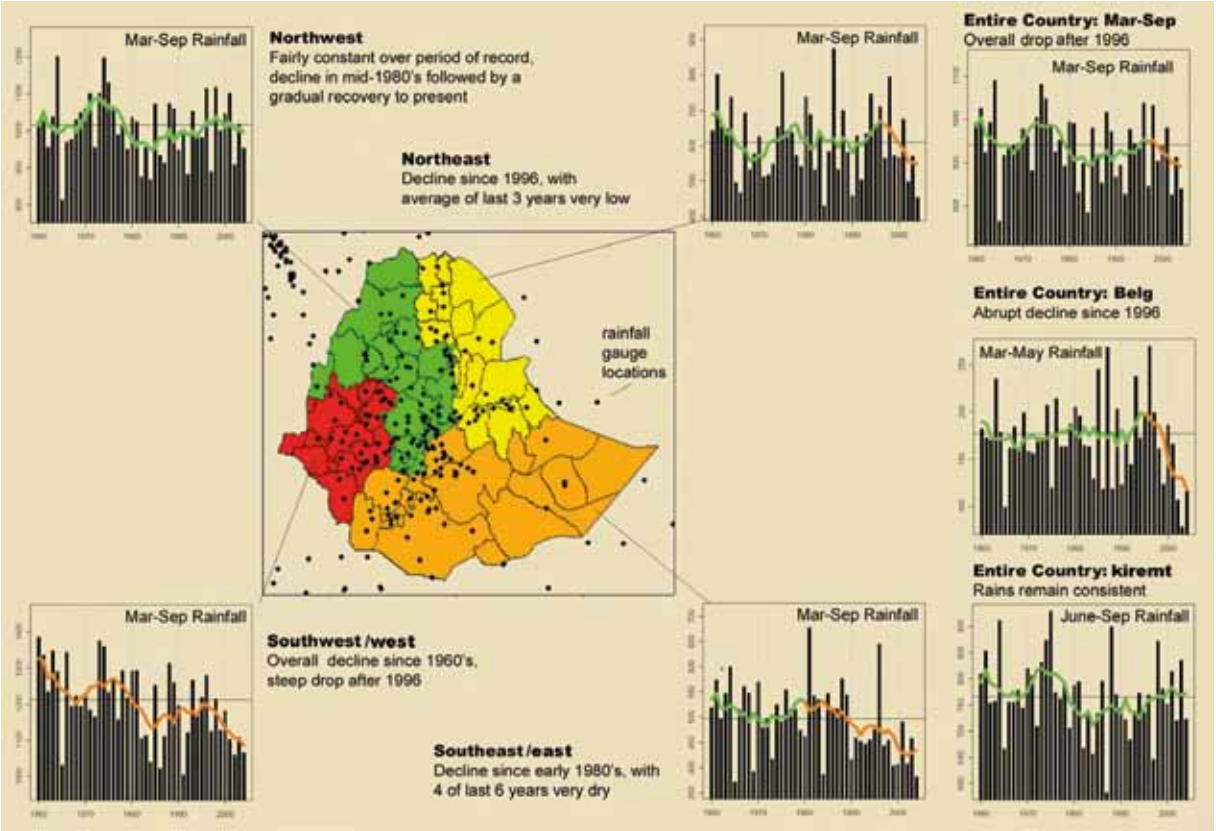


Figure 7: Time series of March–September rainfall at national level (right column) and for four regions (left and centre). Black bars show seasonal rainfall. Heavy coloured lines show running seven-year means. Orange lines denote rainfall tendencies likely to increase food insecurity (Funk et al., 2005).

2.2.2 Climate change scenarios

Conway et al. (2007) report a number of climate change scenarios, based on 18 Global Climate Models (GCMs) and different SRES emission scenarios, and conclude that there is high confidence in:

- A warming in all four seasons in all regions of Ethiopia (central, east, north, south-west).
- Annual warming over the whole of Ethiopia by the 2020s of 1.2°C, with a range of 0.7°C–2.3°C.
- Annual warming over the whole of Ethiopia by the 2050s of 2.2°C, with a range of 1.4°C–2.9°C.
- Relatively modest regional differences.

They further conclude that this warming is associated with more frequent heat-wave events and higher temperatures, likely leading to higher rates of evaporation and, other influences unchanged, higher rates of surface water evaporation and higher soil moisture deficits.

There is less confidence with regards to rainfall predictions based on GCMs:

- Models show differing responses in the mean annual rainfall change over Ethiopia, with some models predicting more, others less, rainfall.
- Modest changes in mean annual rainfall are shown in all models for the 2020s.
- By the 2050s, average changes are generally larger, but still modest: for the whole of Ethiopia, average rainfall may change by +1 to +6 percent depending on emission level.
- There is a tendency for models to suggest wetter conditions over Ethiopia by the 2080s, with annual changes in the order of +20 percent.

Temperature	Precipitation
Mean annual temperatures are projected to increase by 1.1°C to 3.1°C by the 2060s and 1.5°C to 5.1°C by the 2090s. All projections indicate substantial increases in the frequency of days and nights that are considered 'hot'. All projections indicate decreases in the frequency of days and nights that are considered 'cold'. Cold nights decrease in frequency more rapidly than cold days, not occurring at all in most model projections by the 2090s under the highest emissions scenario (A2).	Projections from different models in the ensemble are broadly consistent in indicating increases in annual rainfall in Ethiopia, mainly due to increases in the short rainy season (PND) in southern Ethiopia. Projections of change in the rainy seasons AMJ and JAS, which affect large parts of Ethiopia – and main cropping areas – are more mixed, but tend towards slight increases in the south-west and decreases in the north-east. The models are broadly consistent in indicating increases in the proportion of total rainfall that falls in 'heavy' events, with annual changes ranging from -1 to +8 percent. The largest increases are seen in JAS and OND rainfall. The models in the ensemble are broadly consistent in indicating increases in the magnitude of 1- and 5-day rainfall maxima.

Table 3: Summarised outputs of GCM model projections of the future climate for Ethiopia. (Source: McSweeney et al., 2007)

While climate change is certainly a key challenge for Ethiopia, its impacts need to be seen in light of a great variety of other drivers of uncertainty and pressures facing Ethiopia's development and individuals, as summarised in Section 2.1. Internal drivers such as population growth resulting in decreasing availability of arable land per household, degradation and even depletion of natural resources undermining the prospect of agricultural growth, changing land use patterns, competition over the allocation of strategic resources such as water, conflicts or humanitarian disasters, and externally-induced drivers such as food and fuel price hikes, worsening terms of trade or conflict in neighbouring countries spilling over the border, all contribute to Ethiopia's vulnerability. The ability of Ethiopians to adapt to climate variability and change will not only depend on the impacts of these other developments and pressures, but they themselves will be influenced by, or result from, climate variability and change. In the end, climate change will add another layer of complexity to already complex development challenges.

2.3 Background of the three ACCRA research sites

The three sites selected in Ethiopia represent different agro-ecological zones, different livelihoods, different degrees of market access and different threats posed by climate variability and change. After an intensive consultation process with key informants and among consortium members, the three communities (Ander Kello, Kase-hija and Wokin)[10] were selected (see Table 4). A brief description of each site and the interventions that were assessed is provided below.

Site	Ander Kello	Kase-hija	Wokin
District	Chifra	Gemechis	Dabat
Region	Afar	Oromia	Amhara
Agro-ecology	Dry Kolla[11]/lowland	Kolla/lowland	Dega/highland
Main climate hazard	Cyclical drought	Drought, flood	Erratic rainfall, flood, hailstorms
Main source of livelihood	Pastoralism, increasing agro-pastoralism	Mixed crop cultivation, Khat important cash crop	Mixed crop cultivation, livestock important, increasingly market-orientated
NGO studied	Save the Children UK	CARE Ethiopia	Oxfam GB and ORDA
Key programme	PILLAR - Preparedness Improves Livelihood Resilience	Household Asset Building and Rural Empowerment for Transformation (HIBRET), which includes implementation of the Productive Safety Net Programme (PSNP)[12]	Agricultural Scale Up Programme
Focus of interventions	Disaster Risk Reduction	Social protection and sustainable livelihoods	Sustainable livelihoods
Partnership arrangement	SCUK is working in partnership with government staff, uses experts from district. At local level, SCUK is also directly engaged in implementation, service delivery and engagement with community	CARE employs its own community facilitator at KA level to cover 3 KAs. Otherwise close collaboration with Development Agents and other government staff in implementation of PSNP.	ORDA has own agricultural expert at district level, but otherwise works closely with government experts. Use government Development Agents in interactions with communities at local level

Table 4: Summary of research sites

Figure 8: Approximate locations of ACCRA research sites

2.3.1 Ander Kello Kebele, Chifra District

Ander Kello in Chifra district is found in Zone 1 of the Afar National Regional State (ANRS) in the eastern lowlands of Ethiopia. The total land area of Chifra District is estimated to be 3,291km2, with an average altitude of 825masl (Kene, 2008). Chifra town, the administrative centre of the Chifra District, is situated along the Mile–Woldiya road, 102km from Mile and 160km from Semera, the Afar Regional Capital.

The climate of the district is arid to semi-arid with a temperature range of 28–40°C, two rain seasons, namely Karma (long rain season) from mid-July to mid October and Sugum (short rain season) from March to end-April. Dadaa is another very short period of rain in January. The annual rainfall in the District ranges from 200 to 600mm (SCUK, 2007). The bi-modal rainfall pattern is illustrated in Figure 9 using data from Mille meteorological station, which is around 98km from the study site.

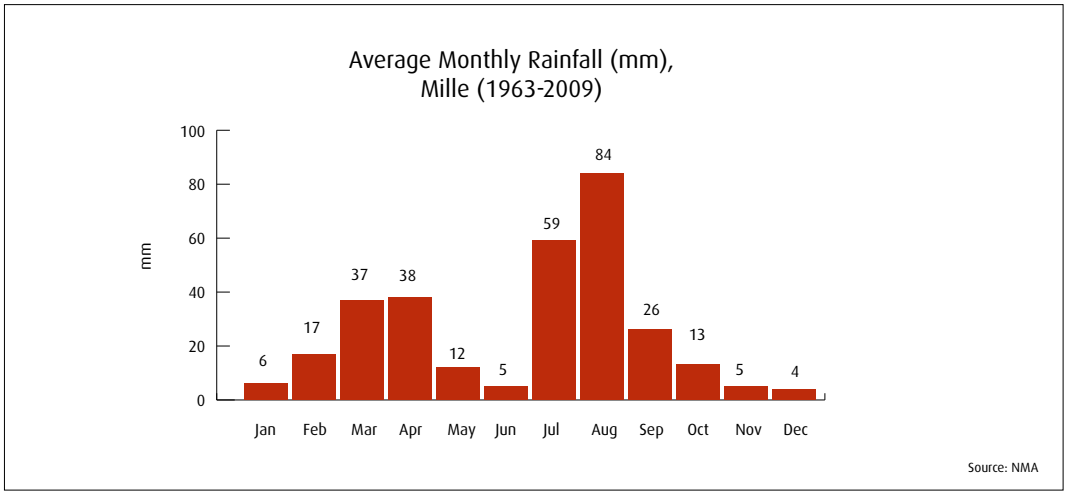


Figure 9: Average monthly rainfall (mm) at Mille Meteorological Station 1963-2009

Chifra District has a total population of 91,078 (CSA, 2008), making it, with 60 persons/km2, one of the most densely populated Districts in Afar Region (average 25 persons/km2) (Kene, 2008). Around 61 percent of the total population are pastoralists and the rest agro-pastoralist. In terms of wealth distribution, 38 percent of the population is classified as poor, 40 percent middle and 22 percent better-off (ibid). Poor households purchase 53 percent of their annual food needs, better-off households 47 percent. Food aid contributes one-third to all food requirements of poor households. Livestock sales are the main source of income for all households. Poor households additionally are engaged in self-employment such as the collection and sale of firewood, which contributes approximately 15 percent to their income (SCUK, DPPBFB, DPPA, 2008).

A woman in the settlement of Ander Kello

The district is part of the 'Araamis ke Adaar pastoral' livelihood zone, which is predominantly livestock based, including cattle, goat, sheep and camels (SCUK, DPPBFB, DDPA, 2008). The number of livestock in the District is estimated to be 352,316 cattle, 342,286 sheep, 306,720 goats, 126,349 camels and 24,977 donkeys (ARBoFED, 2009). Crop cultivation is increasingly important in three of the 19 Kebeles of Chifra District, but still small-scale. The total land area under crop production during the 2009 cropping season was 656 ha, of which 536 ha was irrigated. Major crops grown are maize and sesame (PAPDB, 2010).

Development interventions in Ander Kello, Chifra

The European Commission Humanitarian Aid and Civil Protection (ECHO)-funded PILLAR project was established under ECHO's Drought Preparedness Program. Its specific objective was to improve drought preparedness through protecting and diversifying the livelihood assets of pastoralists in the drought-prone areas of southern and eastern Ethiopia. There have been three phases of the project so far, PILLAR I started in 2007, PILLAR II, which was implemented for 15 months (April 2009 – June 2010), and PILLAR Plus, launched in September 2010, covering selected Districts in Afar and Somali Region. The research focused specifically on PILLAR II project activities in Ander Kello kebele. PILLAR II was organised around four main result areas. These were:

Result 1: Enhanced community capacity and resilience to cope with drought and vulnerability.
This included support to animal health services, though training 40 community based animal health workers and de-worming and vaccination campaigns for 317,203 livestock. As well as work on Natural resource management through the creation of area enclosures and forage production groups (53 women in Ander Kello). Income diversification was also supported through the creation of livestock marketing (27 women in Ander Kello) and cereal trading groups (not in Ander Kello), irrigated agriculture was also promoted through the construction of a pond and irrigation canals and establishment of women farming group.

Result 2: Increased capacity of state and non-state actors in livelihoods-based food security and early warning information management systems.
Training for CAHWs to collect and compile early warning data at community level was carried out. SCUK staff entered the data into a simple software programme used to analyse and produce reports. However, data timeliness has been a problem; the system was not functional at the time of the research and the information was not used by the District experts.

Result 3: Harmonised and improved coordination between government and NGOs in drought preparedness response.
A common approach was developed for livestock health care during drought among District staff and NGOs working in Chifra and staff were trained on the national guidelines for relief interventions in pastoralist areas. District-level emergency disease response teams were formed.

Result 4: Reduced impact of drought on pastoral livelihoods.
Within PILLAR II funding, this activity was not implemented in Afar, as it was designed to respond to the rain failure in Somali region. However, an emergency response programme was implemented which helped support communities to maintain their critical assets during poor Sugum rains in 2010 in consultation with the District administration and experts, this programme conducted vaccination campaigns, distributed mineral blocks (livestock feed supplement), rehabilitated water points, implemented commercial de-stocking and supported women through the distribution of pack animals for water carrying.

Other development interventions in Ander Kello kebele include:

- The PSNP, implemented by SCUK in partnership with the government, targeting 24,720 beneficiaries in the district (approx. 27 percent of the total District population) and 1,220 people in Ander Kello.
- The Pastoral Community Development Programme (PCDP), a multi-year, World Bank-funded project focusing on improving basic service delivery through construction of schools, health posts and veterinary clinics managed through a community investment fund, strengthening the early warning system of the district and developing and implementing the District Disaster Prevention Strategic Investment Plan.

2.3.2 Kase-hija Kebele, Gemechis District

Kase-hija Kebele, in Gemechis District, is found in West Hararghe Zone in Oromia Region. It is characterised as lowland (Kolla) (GDFEDO, 2008). It is 48km from the District capital, Kuni, and comprises 1,999 ha. Gemechis is a relatively new District, established only in 2004. It is located 17km from the Zonal capital, Chiro, and 343km from Addis Ababa. Its topography is varied, and includes three different agro-ecological zones. The District has two rainy seasons, Belg, which extends from March to May, and Kiremt, lasting from July to September. Mean annual rainfall in Mieso, the nearest meteorological station, which is 77km from the study site, is 745mm.

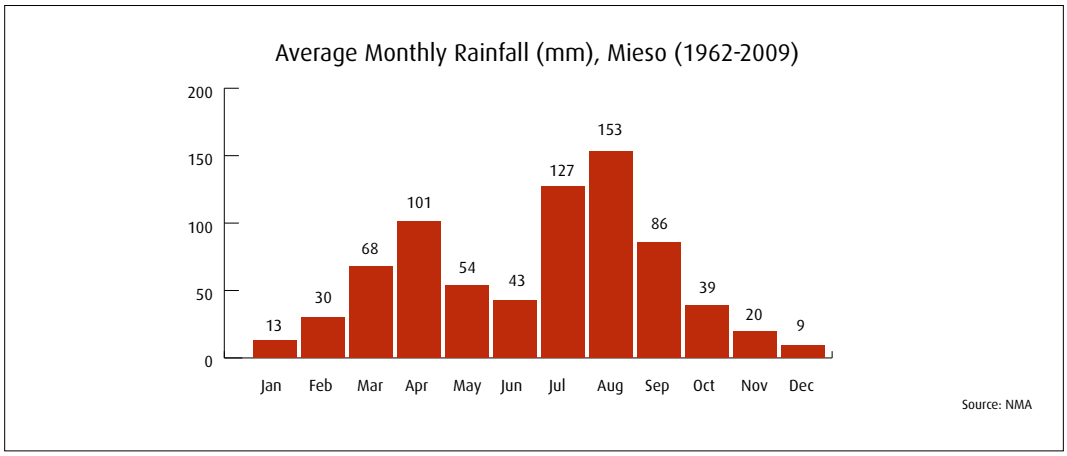
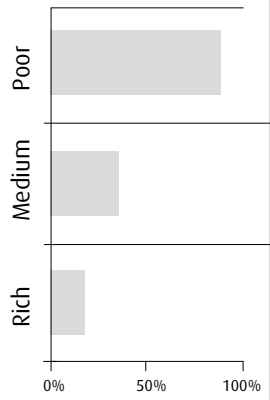


Figure 10: Average monthly rainfall (mm) at Meiso Meteorological Station 1962-2009

The natural forest area in Gemechis District has been reduced to 5,350 ha (6.7 percent), all of which is concentrated in highland areas (WHZFEDO, 2008). Inhabitants of Kase-hija report significant deforestation over the last 35–40 years. Potable water coverage in rural areas was 28.1 percent in 2007/08, which is very low (GDWO, 2010). In Kase-hija, the main source of water is Kase Spring. Motorised pumps distribute the water to four public tap stands. At the time of the study, two of the four water points were not working due to poor maintenance. Some people have their own pipes and sell water to others. Others, especially the poor, fetch water from the spring itself, as they are unable to afford water from private suppliers. The community has high irrigation potential from three sources: Kase, Burka Jini and Dagaga rivers. While Kase River is permanent and has a diversion irrigation system built by the government in the mid-1980s, Burka Jini and Degaga rivers are seasonal and flow only for a few months during the wet season. Around half of the households in Kase-hija Kebele and 18 of the 116 households in Hajedin village have access to irrigation water. Gemechis District has significantly increased investment in rural road construction over the last three years. Nevertheless, Kase-hija has a very poor road connection, with roads impassable during the rainy season and difficult to use during the dry season. There is no mobile or landline telephone connection in the Kebele.

Gemechis District has a total population of 180,170. Kase-hija Kebele has 1,545 households and a population of 10,455 (GDFEDO, 2008). Hajedin, a village within Kase-hija, which was the focus of data collection for this study, has 126 households and a population of 793. The District falls into two livelihood zones[13]: the sorghum, maize & chat[14] (SMC) livelihood zone and Chercher/Gololcha coffee, chat & maize (CGC) livelihood zones. Kase-hija falls within the SMC Livelihood Zone. Households with access to irrigation have chat and also plant vegetables (carrots, onions, red beet) and fruit (bananas, sugarcane, coffee). Sweet potato is widely cultivated and is considered an important 'survival crop' during droughts. Richer households also keep livestock, with cattle, sheep and goats the most popular. Petty trading, sale of firewood and labouring are important sources of additional income (DPPA/LIU 2009).

As part of the field research, the population of Hajedin village were ranked by wealth status. The definitions were generated by the community and reflect local perceptions of wealth. Of the 126 households in Hajedin village, 17 were classified as rich, 30 as medium and 79 households were considered poor.



Wealth Food Characteristics		
Livestock	**Farmland**	**Food security**
0–1 ox	Landless, or non-irrigable land or could not plough their land due to health or age reasons	Cover their food deficit by engaging in labour market and food aid
3–10 cows, 2 oxen	Non-irrigable land	Produce up to six quintals which will feed a family for most of the year. Food shortfalls are covered by livestock sales.
10+ cows, 3–4 oxen	At least 1 ha of land and 0.5 ha of irrigable land	Produce enough to feed the family for the whole year

Table 5: Wealth ranking in Hajedin village

Development interventions in Kase-hija, Gemechis District

CARE Ethiopia has been operational in West Hararghe Zone since 1984 and is one of the NGOs involved in the implementation of the government's PSNP. The PSNP sits within the wider HIBRET programme, which has been operational since December 2004 and aims to assist 167,602 people.

Project goals are to reduce food insecurity and increase community resilience. The objectives are:

1. to protect household assets and community resources; and
2. to increase agricultural output through integrated natural resource management and strengthened civil society.

Under the first objective, the programme provides monthly food transfers for chronically food insecure households. These are provided in return for labour on public works (to 22,390 people – about 12 percent of the total population of Gemechis District) or as direct support for those unable to work (2,000 people – about 1 percent of the total population). The public works activities aim to enhance community assets, and take the form of soil and water conservation activities and the construction of basic infrastructure (feeder roads, health centres, classrooms etc.). Support is also provided for effective and timely community preparation, mitigation and response to shocks and emergencies. Early warning systems have been established in 13 Kebeles with emergency preparedness plans developed in 24 Kebeles.

Under the second objective, in Gemechis District as a whole, 1,073 farmers have been trained in improved agricultural practices, such as making compost and improved traditional storage, home horticulture production and drip irrigation practices. New seed varieties have been distributed and links with seed suppliers improved. Efforts to strengthen community-based natural resource management have focused on area closure and watershed management, accompanied by efforts to promote honey, fruit and fodder production as livelihood options for 29 landless groups using the conserved land.

In Kase-hija Kebele, two hectares of mountainous land have been enclosed and soil and water conservation activities carried out with 3.9km of bunds constructed, and over 30,000 tree seedlings planted. The project has also constructed one new school and maintained ten class rooms. An early warning committee with eight members has been formed and training was given for 20 other community members on early warning.

Under Objective 2, in Kase-hija, the project has distributed new maize and haricot bean varieties, vegetable seeds and fruit seedlings, and promoted compost making, backyard gardening and the use of improved stoves. Village Saving and Lending Associations (VSLA) were established and a number of groups, including Landless, Vegetable, Handicraft and Seed Production, were organised and strengthened.

Soil and water conservation activities in Kase-hija kebele

2.3.3 Wokin Kebele, Dabat District

Dabat District is in North Gonder Zone, Amhara Regional State. It has 26 Kebeles and covers an area of 122,328 ha. This study was conducted in Wokin Kebele, which is 13km from Dabat Town on the main road to Debark (DWARDO, 2010). Some activities focused on Finote Selam village within the Kebele.

The altitude of the District ranges from 1,500 to 3,200m asl. Its agro-ecology includes highland (Dega, 52 percent), midland (Weyna Dega, 14 percent) and lowland (Kolla, 34 percent) (DWARDO, 2010)[15]. Wokin Kebele is found in the mostly undulating Dega agro-ecological zone (Discussion with Kebele Vice Chairman).

Dabat District is well endowed with water resources for both productive and domestic purposes. There are ten perennial rivers with an irrigation potential of 6,519ha. However, so far less than 6 percent (382ha) of this potential is utilised. In Wokin Kebele, there are 13 springs and five rivers, and about 55.5ha of land is under irrigation, and used by 295 farmers (NGZWRDO, 2010).

Dabat District receives its main rainfall from March to October. Rain in March and April plays a critical role in land preparation for planting in May (early crops) and June. The major rainfall extends from June to September, although less frequent and smaller amounts of rainfall are still expected in October. Early maturing crops are harvested from mid-September and a second crop (Belg) is planted in flat areas where the crop is expected to grow on residual soil moisture and the small rains that follow in October. Major crop

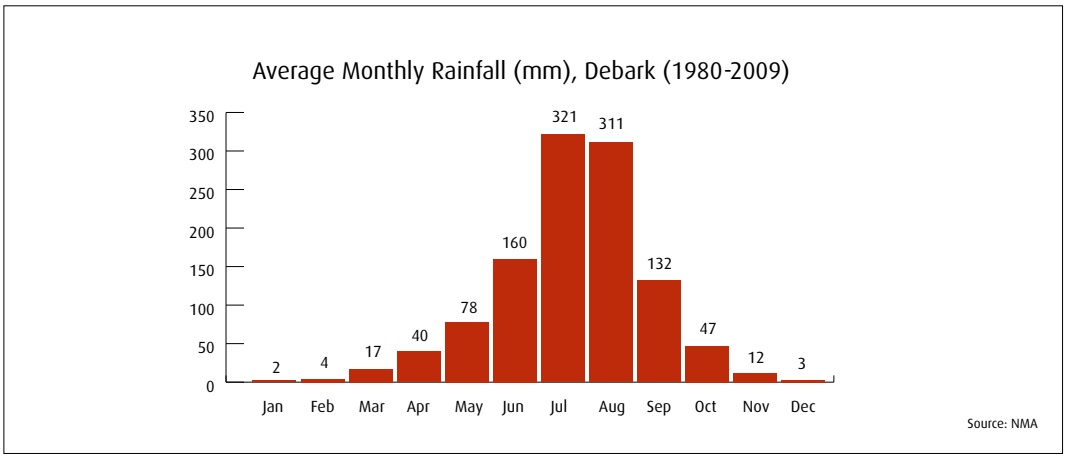


Figure 11: Average monthly rainfall (mm) at Debark Meteorological Station 1980-2009

harvest extends from October to December. Figure 11 shows average monthly rainfall, taken from Debark Meteorological station, 15km north of the study site.

Dabat District has a total population of 144,652, with an average household size of 4.5. The population of Wokin Kebele is 10,304. Average land holding per household is 0.87 ha (DWFEDO, 2009). Finote Selam village is located in the highland part of Wokin Kebele, with a population of 420 households. Some 130 households (31 percent) in Finote Selam are dependent on PSNP to supplement their annual food requirements.

The wealth ranking conducted with the community in the study area showed that there are five categories. Out of the 420 households, the majority (67 percent) were found to be poor and very poor, 25 percent were classified as medium and 8 percent were identified as rich; 29 percent of all households were classified as landless and 13 percent (54) were women-headed households.

	Livelihoods
Rich (8%)	Diversified livelihood options because own broad range of assets, including access to irrigable land. Good contacts with local development agents and ability to buy inputs, use improved technologies such as improved seeds and fertiliser. Ability to expand access to land through renting and sharecropping. Able to produce surplus for sale. Produce additional fodder for their animals from rented crop land. Additional income from sale of eucalyptus tree, renting town house and sale of livestock.
Medium (25%)	Livelihood depends mainly on farming. Moderate access to improved farm technologies. Can produce enough to cover family needs for the whole year; no need to engage in the labour market, borrow money or deplete assets such as livestock Additional income from sale of eucalyptus trees. In stress times, they sell livestock and/or receive remittances from relatives in town.
Poor and very poor (67%)	Livelihood depends mainly on farming; poor access to modern farm technologies because of limited capacity to buy necessary inputs and limited connection to extension agents. Rent out land as they may not have the resource such as oxen, labour or seed to farm on their own. Depend on alternative livelihoods outside farming such as daily labour, borrowing money from local lenders at high interest, etc. to complement own production. A significant number depend on PSNP.
Landless (29%)	Livelihood depends on a combination of income sources: rent land or engage in sharecropping; daily labour (local farms and in nearby towns and/or seasonal migration to large cities and commercial farms). Livestock is an important asset especially during stress times. Trapped in poverty as limited prospect of getting own land
Women-headed households (13%)	Livelihood mainly depends on farming. Either rent out their land or enter into sharecropping arrangements as they are not allowed to plough. Depend on labour support from male relatives.

Table 6: Wealth ranking in Fnote Selam

Development interventions in Wokin, Dabat District

In 2007, Oxfam began an Agricultural Scale Up Programme. This 12-year programme aims to empower and improve the lives of one million smallholder farmers through policy influencing, enhancing market access and improving gender equity in three regions of Ethiopia. In Dabat district Oxfam began a partnership with ORDA (Organisation for Rehabilitation and Development in Amhara) in October 2007 with a focus on two value chains: malt barley and honey.

Malt Barley Value Chain: Implementation strategies included organising farmers into clusters and providing basic training and technical support on malt barley basic seed production and linking malt barely producers with markets via malt factories. In the 2010 cropping season, 143 households in Dabat District participated in barley seed multiplication and 836 in malt grain production, of which 71 and 415 households were women-headed, respectively. In Finote Selam village, 66 households participated in seed multiplication and 148 in malt barley gain production.

Apiculture: The objective was to improve the income of smallholder beekeepers through modernising beekeeping practices, organising beekeepers into cooperatives and linking them with private sector and cooperative unions. The intervention was implemented from March 2008 to April 2009. The main activities undertaken were training of technical staff and beneficiaries, supply of inputs (e.g. modern honey production accessories and forage seeds), establishment and strengthening of honey producers' cooperatives and follow-up and technical support. 220 farmers from Dabat District, who had traditional beehives and who were willing to join the cooperative, were selected.

Rainfall failure and food price rises in 2007/08 threatened to undermine the Agricultural Scale Up Programme. Alongside efforts to increase cash incomes through market-focused interventions, Oxfam and ORDA ran an Emergency and Livelihood Response Project between 15 October 2008 and 30 October 2009. The objectives of the project were: duction and purchasing power, and

- to enhance smallholder farmers' resilience to soaring food prices through increased agricultural pro
- to enhance the productive capacities and governance of the agriculture sector to ensure sustainability.

The project carried out cash for work activities to strengthen the agricultural and marketing infrastructure, including the construction of irrigation schemes, diffused light stores (for seed potatoes), grain stores and rural roads. In Wokin, it focused on the construction of a honey collection centre. The project also created savings and credit groups for women and provided DRM training.

Other development interventions in Dabat District include:

- An ORDA–Save the Children Norway collaboration on an Integrated Food Security Project, aimed at contributing to food security and overall social wellbeing. It was being implemented in ten Kebeles in Dabat District, including Wokin Kebele. Some of the beneficiaries of this intervention are also beneficiaries of the malt barley and apiculture development interventions by ORDA/Oxfam.
- The government of Ethiopia with support from donors has been implementing the PSNP programme since 2005 to protect and improve the lives of the most vulnerable and poorest rural households. Dabat District has a total of 33,554 beneficiaries, of whom 2,167 are from Wokin Kebele (NGZFSDPPC, 2010). Some PSNP beneficiaries are also beneficiaries of ORDA/Oxfam interventions.
- The Household Asset Building Program was also being implemented to facilitate graduation from the PSNP. Up to June 2010, 412 male and 81 female beneficiaries had been provided with loans (ARFSDPPC, 2010). The programme has been operational in Wokin Kebele, providing credit for the purchase and fattening of sheep.
- An Austrian government-funded Sustainable Natural Resource Management Programme (SNRMP), with the aim of contributing to sustainable rural development and improving food security for smallholder farmers through the rational use and conservation of natural resources. In Fnote Selam Village the programme is promoting area enclosure and gully rehabilitation, and some households are engaged in livestock fattening through credit support (ARBFED, 2007).

Malt barley and honey participants in Wokin kebele

2.4 Changing climates in the three research sites

Although the three research sites are in quite different geographical and climatic areas of Ethiopia, ranging from the semi-arid and hot lowlands in Ander Kello to the cool and relatively rainfall-secure highland in Wokin, respondents in all sites identified distinct perceived changes to the local climate in the recent past. Patterns of change differ, although in all sites respondents identified increasing temperatures, particularly at night, and changes in seasonality, i.e. changes in the onset and duration of rainfall as well as greater variability and uncertainty in rainfall patterns. All respondents agreed that such changes had profound implications for their livelihoods.

These reported changes in the local climate can also be detected in meteorological data from nearby weather stations. Caution, however, is required in the interpretation of the following figures, as accurate long-term meteorological data is not readily available; even where formal weather stations exist, data gaps are significant and do not allow any further statistical analysis. As weather data was available for none of the research sites, data from meteorological stations some 15km to 100km away had to be used as a proxy. The trends reported in the data, therefore, cannot be interpreted as directly reflecting the climate in the research sites, but may only serve as useful indicators of temperature and rainfall trends.

2.4.1 Mille Meteorological Station[16]

Long-term mean maximum temperature ranged from 35.9–39.5°C, with a mean value of 37.5°C. No trend in mean maximum temperature can be detected, though it seems that positive and negative anomalies have decreased in the last decade. Unlike maximum temperature, the mean minimum temperature shows an increasing trend for the period 1979–2009. Minimum temperatures appear to be lower before the mid-1980s, after which they increase to slightly below 25°C. Why this happened cannot be explained as no further information is available to assess whether this is a reflection of temperature increases or changing equipment.

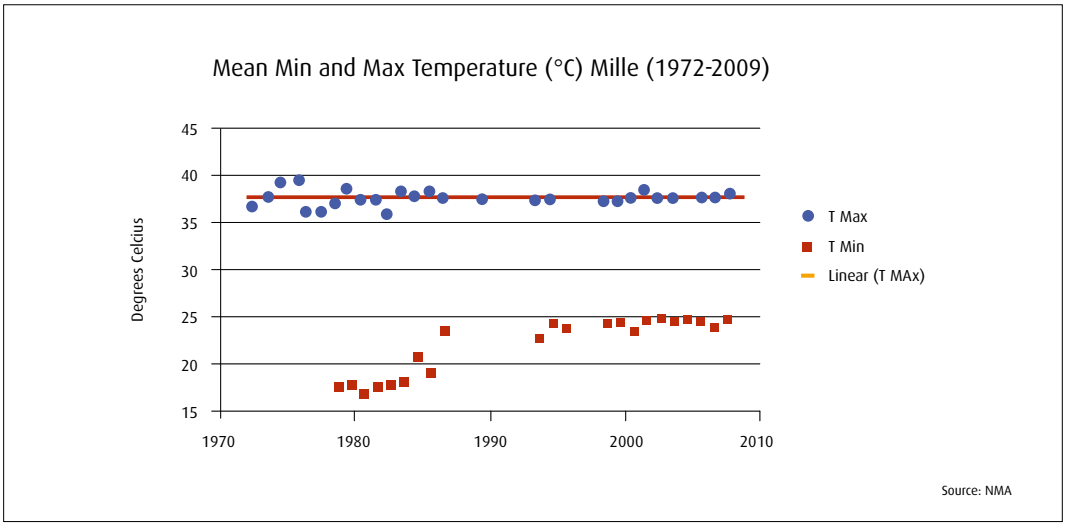


Figure 12: Mean minimum and maximum temperatures in Mille 1972-2009

Mean annual rainfall in Mille has been recorded at 306.5 mm (±112 mm), of which 34 percent is received from February to May and 55 percent from July to September. The 42-year mean rainfall ranged from 131mm to 662mm, with a coefficient of variation of 37 percent. No trend can be detected over the 42 years considered in this analysis (Figure 13).

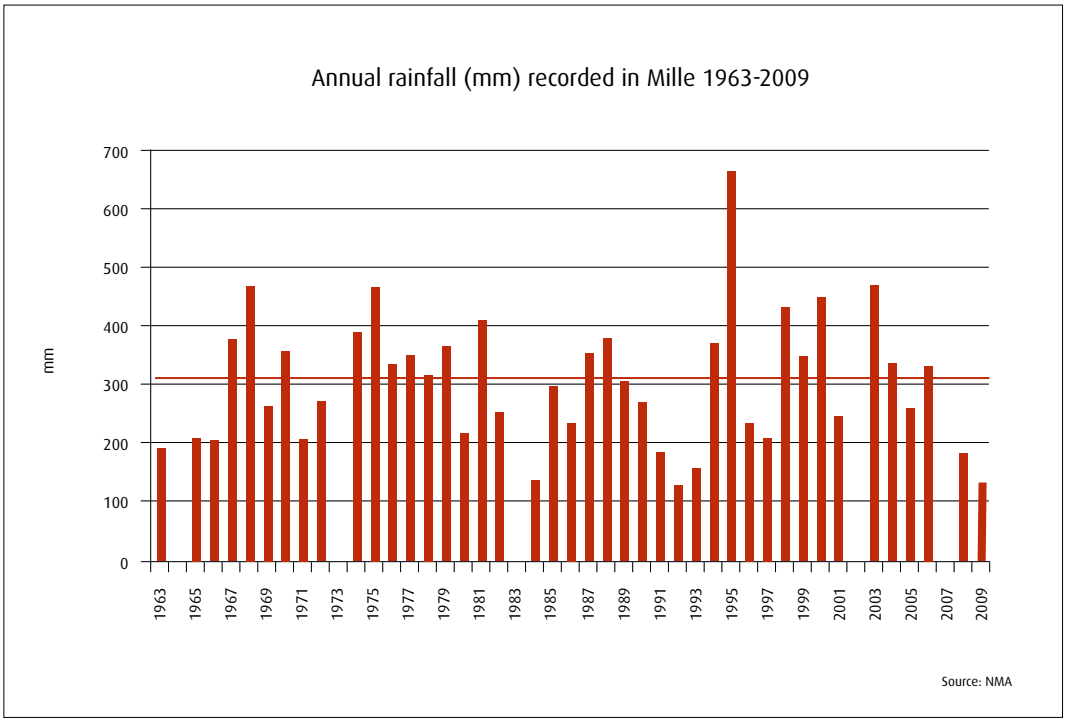


Figure 13: Annual rainfall (mm) recorded in Mille 1963-2009

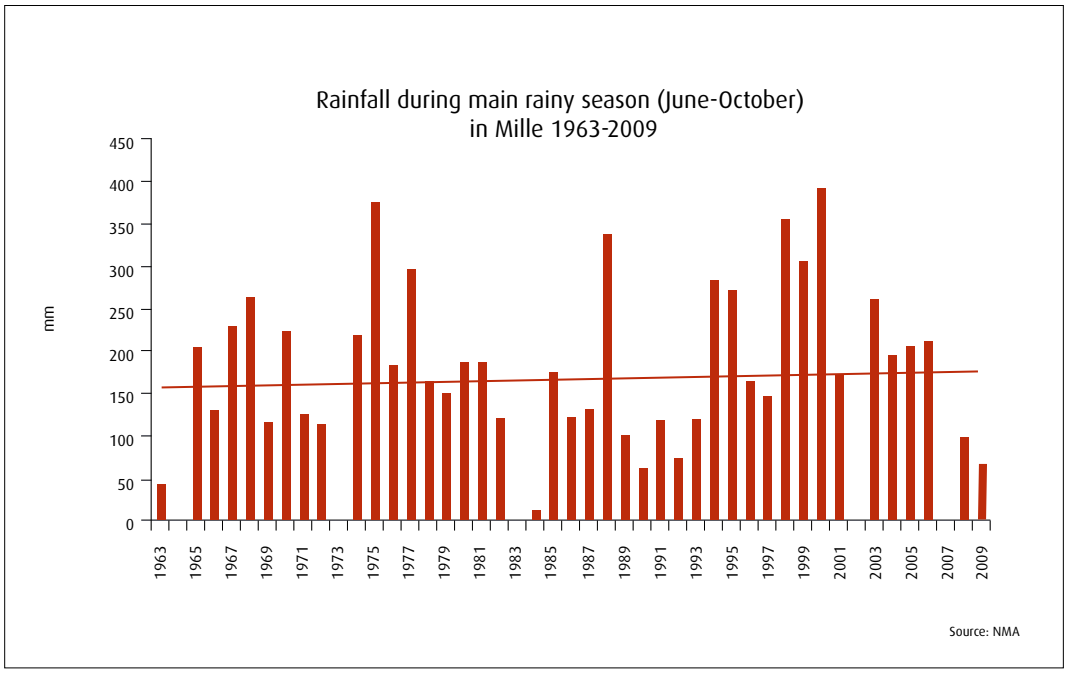


Figure 14: Rainfall during main rainy season (June–October) in Mille 1963-2009

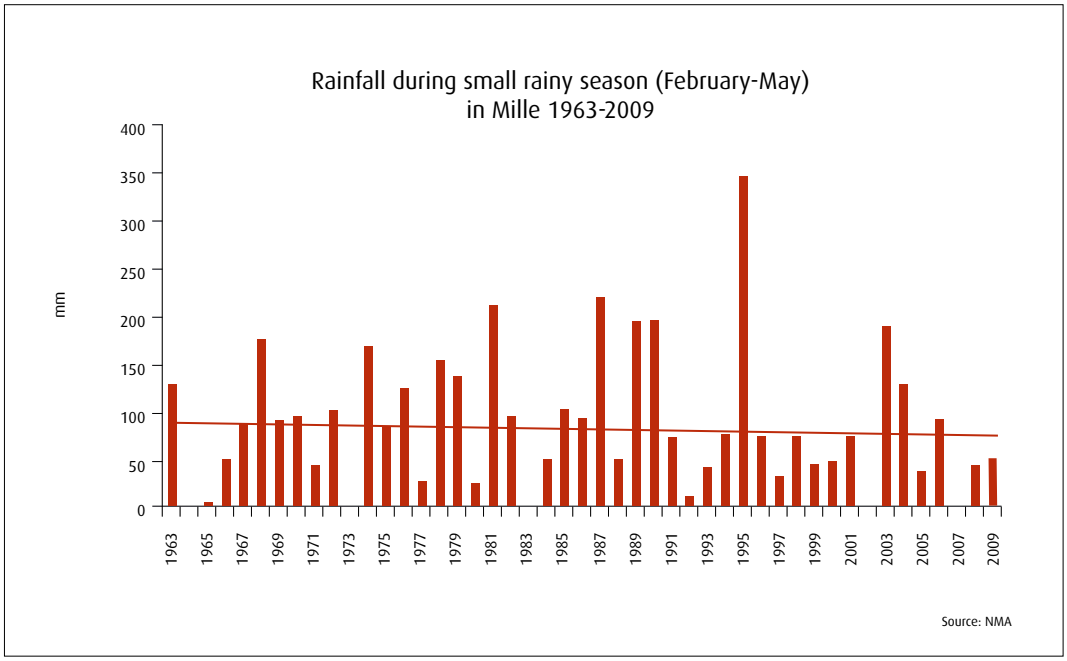


Figure 15: Rainfall during small rainy season (February–May) in Mille 1963-2009

While there is a slight increase in rainfall during the June to October rainy season and a slight decrease during the February to May rainy period, none of the trends was statistically significant. No trend could be detected in the number of rainy days per year, though a slight increase of maximum rainfall per rainy day was found.

2.4.2 Mieso Meteorological Station[17]

Mieso meteorological station is 77km from the study area. However, it had to be used because stations closer to the research site, including Asebe Teferi, Hirna and Bedessa, lack long-term and continuous weather records.

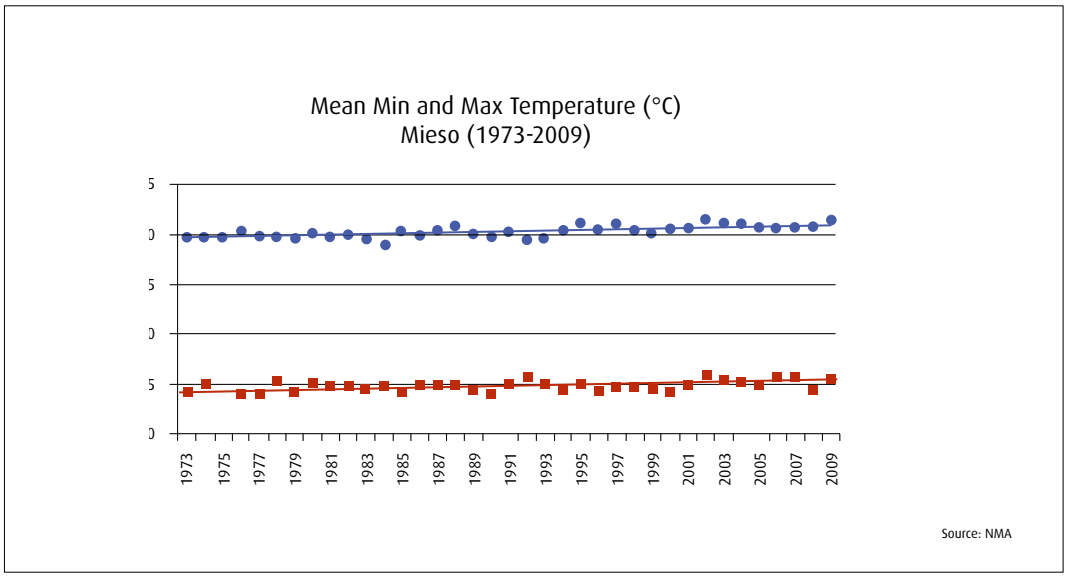


Figure 16: Mean minimum and maximum temperatures in Mieso (1973–2009)

Long-term mean maximum temperatures in Mieso ranged from 29.1°C to 31.6°C, with an average of 30.4°C. The majority of positive temperature anomalies occurred after 1993, indicating warmer days after 1993 in comparison to the period between 1973 and 1993. Long-term minimum temperatures ranged from 14.1°C to 15.9°C, with a mean value of 14.8°C. A slight increase in mean minimum temperatures could be detected, with increasing anomaly after 1990, indicating a slight warming of nights. Extreme maximum temperatures declined over the 37-year period.

The long-term rainfall in Mieso shows a bi-modal pattern typical for the Eastern Highlands of Ethiopia. The small rainy season in spring (Belg) extends from March to May and the main rainy season (Kiremt) lasts from July to September. Mean annual rainfall in Mieso was recorded at 745mm, with 30 percent of rainfall occurring during Belg and 38 percent during Kiremt. Data for the period 1962 to 2009 indicated below-average rainfall in 1969, 1973, 1984, 1986, 1992, 1995 and 2002, while years with above-average rainfall were recorded in 1967, 1968, 1996 and 1997. Overall, variability is high with a coefficient of variation of 27 percent. Monthly rainfall has slightly increased for the months of April and September and slightly decreased for February, July and August, but none of these trends is significant. Although no trend could be detected of increasing rainfall amounts per day, a shift of days with maximum rainfall from July/August to September/October could be identified.

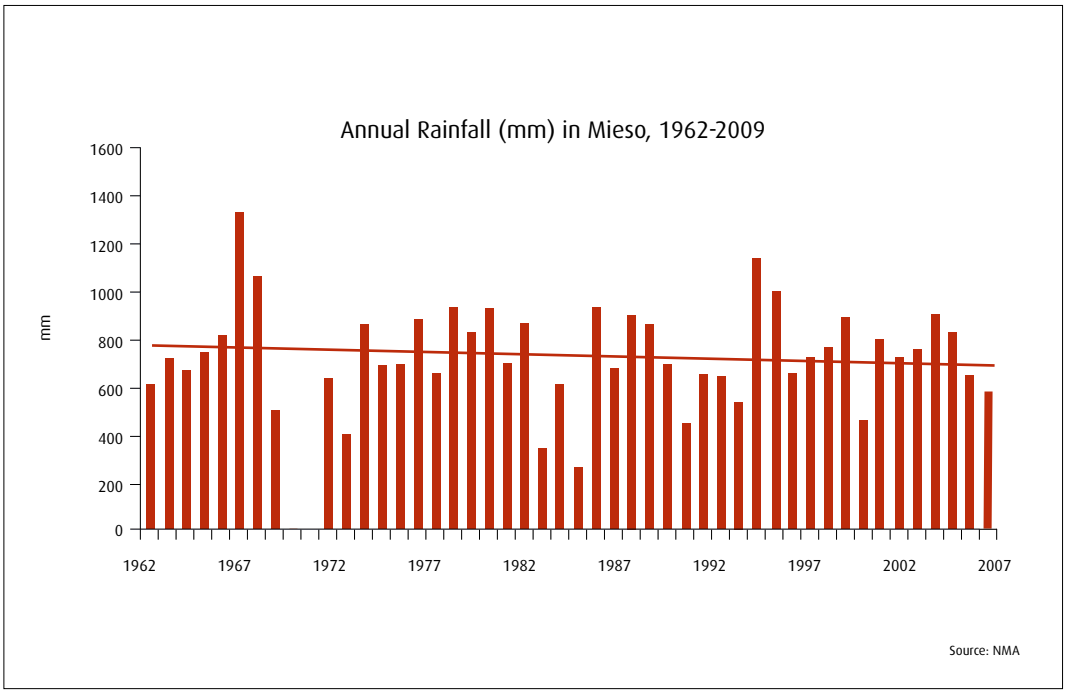


Figure 17: Annual rainfall in Mieso, 1962–2009

2.4.3 Debark Meteorological Station[18]

Mean maximum temperatures recorded in Debark ranged from 17.9°C to 20.9°C with a mean value of 19.8°C. Mean minimum temperatures ranged from 7.5°C to 9.0°C with a mean value of 8.4°C. A slight increase in both mean minimum and mean maximum temperatures can be detected. In terms of magnitude, the 1980s had higher maximum temperatures than the years before or after. An increase in minimum temperatures was observed after 1994, which corresponds with respondents' perceptions of a decreased incidence of frost.

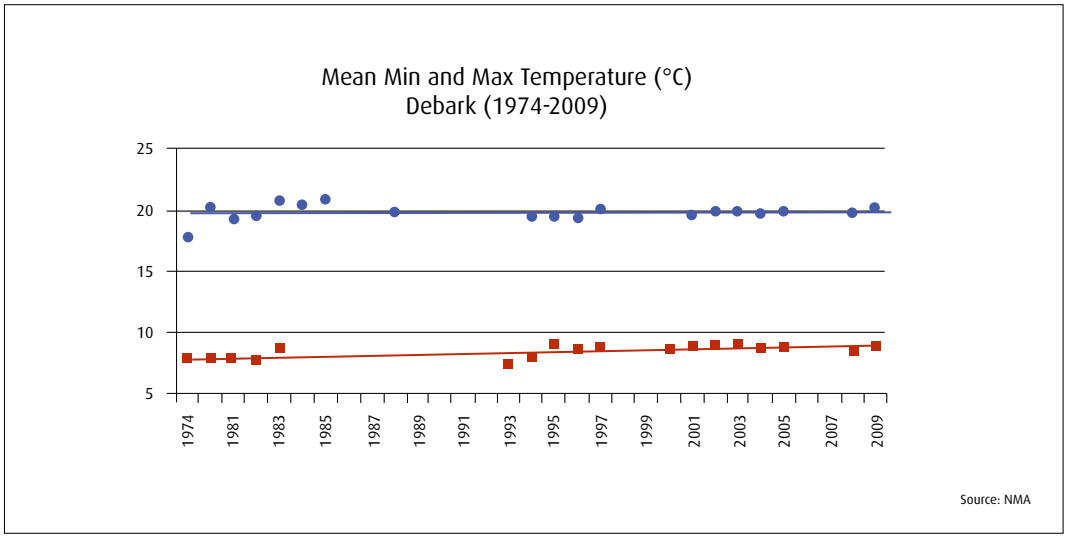


Figure 18: Mean minimum and mean maximum temperatures in Debark, 1974–2009

In terms of rainfall, long-term records indicate average annual rainfall of 1,126mm and an annual variability of 24 percent for Debark Meteorological Station. There is only one rainy season in Debark, lasting from May to September. During this period, 89 percent of annual rainfall is recorded.

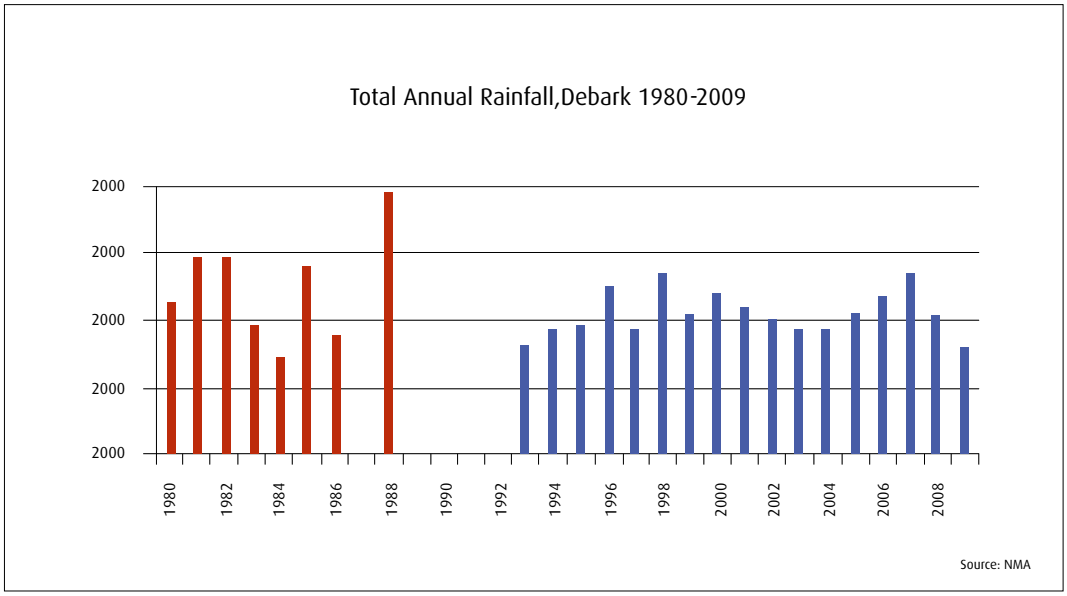


Figure 19: Total annual rainfall Debark (1980-2009)

Whilst there was no change in rainfall amounts in the main rainy months (June, July and August), there was a slight decreasing trend in the amount of rain falling at the beginning (May) and at the end (September) of the rainy season. A slight decrease in rainfall can also be detected for March, which is an important period for land preparation, while there seems to be a small increase in rainfall in November, which might have negative impacts as it coincides with the harvest of major crops.

Section 3: Exploring adaptive capacity at the local level

Exploring adaptive capacity at the local level

This section explores and synthesises key findings from the three ACCRA research sites. In the first part, people's responses to hazards and change are explored. The second section asks more specifically how development interventions contribute to strengthening the adaptive capacity of individuals and communities.

3.1 People's responses to hazards and change

ACCRA research captured local perceptions of both hazards[19] and long-term trends which communities felt had impacted on their livelihoods. The research then used responses to weather-related shocks and trends to assess adaptive capacity more generally, and how it has been affected by project interventions. Table 7 depicts the five top-ranked hazards in each of the three research sites, whereas Figure 20 shows community perception of long-term trends.

Ander Kello	Kase-hija	Wokin
Drought	Drought	Flood
Erratic rainfall	Heat	Uneven distribution of rainfall
Animal diseases	Poor infrastructure (roads)	Water-logging
Shortage of water	Human diseases	Hail storms
Human diseases	Weeds	Shortage of water

Table 7: The five top-ranked hazards in the three ACCRA research sites. Source: FGD in the three research sites

Conducting a community timeline exercise in Wokin kebele

	1960s	1970s	1980s	1990s	2000s
Ander Kello, Chifra					
Rainfall amount			Decreasing		
Rainfall distribution			Becomes more erratic in space and time		
Temperature			Increasing		
Pasture condition	Decreasing				
Livestock numbers				Decreasing	
Mobility				Decreasing	
Kase-hija, Gemechis					
Rainfall amount				Decreasing	
Rainfall distribution				Rainfall season shortening	
Temperature				Increasing	
Forest cover		Deforestation increased and species disappeared			
Farmland size				Decreasing	
Irrigation	Traditional		Modern with increasing demand		
Invasive species				Partinium invading the area	
Wokin, Dabat					
Rainfall amount				Feb-May rainfall becomes irregular	
Frost	Frost decreasing over time				
Temperature				Increasing since 1985	
Indigenous forest cover	Declined to <1% from 70% in 1940s				
Soil fertility		Declining			
Crop pests				Increasing since 1985	

Figure 20: Some of the key climate and development stresses identified in each site through the community timeline exercise. Source: FGD in the three research sites

In all three ACCRA research sites, weather-related hazards – droughts or floods – were ranked highest by all focus groups. In all sites, respondents agreed that the impact of stresses on their livelihoods has increased over time. But they also agreed that their ability to react and adjust had changed. Respondents in all sites observed that the impacts of climatic hazards, stresses and shocks are felt indirectly. For example, more uncertain rains and below-average rainfall in the past few years in Ander Kello have been felt in the form of decreasing rangeland productivity, which has led to reduced numbers of livestock, the spread of invasive plant species, decreasing water availability, increasing incidence of livestock diseases and worsening terms of trade. In Kase-hija, seasonal change and pressure on land are felt in terms of decreased productivity, the increased need for seasonal migration with livestock and increasing food insecurity.

> In the old days, there was plenty of grass in this area. We simply released our animals into the grass which was more than 3m tall ... Now we don't move our animals the way we used to because there are far fewer animals. Some buy feed for their animals, some have enclosures and Government support has increased. Compared to the past, we have peace and security, and access to school and health services. But we are getting poorer because of environmental changes and because we have fewer animals. *A K, 68, Ander Kello*

Whilst there was broad agreement between women and men in this ranking, particularly in relation to covariate weather-related hazards that affect all community members, there were also some important

differences across wealth and livelihood groups and gender in how hazards were ranked, and how their impacts were described. For example, women and agro-pastoralists in Ander Kello ranked shortage of water higher than men. Women were also more concerned by human disease, while pastoralist men were more concerned with animal diseases. Both men and women, however, highlighted that traditional re-stocking mechanisms had weakened due to declines in herd sizes, making it more difficult for households to give animals to other households affected by livestock loss. In Kase-hija, poor women ranked shortage of grazing land quite high, reflecting the increasing pressure on them to migrate with livestock for several months during the dry season to reach better pasture land. Married women in Kase-hija also noted the decline in wealth-sharing to help households cope with shocks, whereas men felt that this had not changed. In Wokin, both poor men and women ranked hail storms as the second major hazard; as they only have a single plot of land, its destruction would make them extremely vulnerable. Richer households are more likely to have more than one plot, which means hail damage in one area is less significant. In all three sites, women noted the psychological stress they faced due to the difficulty of providing food and water for the household during in times of climate hazards.

Children reflected the concerns of their parents, but also spoke of specific impacts affecting them. For example, in Ander Kello drought often meant being forced to leave school to search for pasture. In Kase-hija, children highlighted increasing temperatures wilting crops and intense rain and flooding threatening them when they were looking after livestock. In Wokin, children said strong winds, hail and intense rain made live difficult when away from the village with grazing animals.

People reported a wide range of responses, ranging from small incremental changes to existing structures and systems to deep and major changes to systems, including livelihoods ('transformative adaptation'). However, some of these adaptation strategies are being undermined by developments in other areas, such as increasing pressure on natural resources, the erosion of local institutions and government policies.

Coping with immediate hazards often meant calling on the support of relatives, neighbours and traditional institutions. In all three sites traditional support institutions were set up to deal with particular, individual shocks, such as fire, theft or the death of a family member, rather than weather-related shocks which impact upon the entire community. Perspectives on social support networks obviously depended on who was speaking and where they were from. In Wokin, the 1991 land redistribution changed the way poverty was perceived and may have weakened social support mechanisms:

> The government distributed land equally to all of us [in 1991]. If I am rich, it is because I worked hard. Others are poor because they are not working as hard as I am. So, why should I support anyone? Even if they are my relatives they could earn as much as I do had they been working hard. *Rich farmer, Wokin*

In Ander Kello, the Afar community is organised into clans who feel a strong social obligation to assist each other.

> We will continue helping each other until the end. If I have only a cow which is pregnant and my fellow brother comes for help, I will promise to give him the calf when it gets born. We know we are getting poor together, but we also know we won't starve to death while our clan members are having something to eat. We survived the past horrible years because of this culture and we will continue to do so. *Man in Ander Kello*

In all three sites, communities have developed livelihood strategies with in-built adaptive capacity that has historically allowed them to thrive in a highly variable climate. For example, in the pastoral/agro-pastoral Ander Kello, people respond to drought by changing their temporary migration routes. If such adjustments are no longer available, people start selling livestock. However some long-term development pressures make these traditional strategies inadequate and so communities shift resources within the

Pastoralists in Ander Kello report preferences for browsers given shortages of pasture.

The CARE community facilitator discusses preferences for short maturing maize with Haramaya researcher

system. For example, as a result of ongoing rangeland degradation coupled with more frequent droughts, households report changing their herd composition, reducing the number of grazers (sheep and cattle) in favour of more resistant browsers (goats, camel). However ultimately these pressures are such that pastoral households look for more radical solutions and in some cases have changed their livelihoods more fundamentally and become increasingly engaged in crop cultivation. However, all these changes also lead to changing institutional arrangements. Crop cultivation in such semi-arid environments relies on irrigation, which prevents livestock from accessing water at critical times. Smaller herds make longer migration less attractive, and private enclosures for fodder production more attractive. In Ander Kello this trend is still limited, though increasing, but in other pastoral areas the spread of private enclosures to produce fodder has inhibited the movement of animals and increasingly leads to conflict with livestock keepers (Flintan 2011). This highlights the importance of strengthening capacity to evaluate adaptation options and avoid maladaptive choices which will ultimately limit people's livelihoods.

In Kase-hija, perceived changes in rainfall patterns have led people to replace long-maturing sorghum varieties that have increasingly failed due to water stress at critical times, and replaced them with shorter-maturing maize varieties, promoted and made available by the extension system, but probably also made more attractive because of buoyant markets for maize. Inhabitants of Kase-hija are increasingly investing in small-scale irrigation and have expanded irrigation infrastructure. New institutions have developed that allow households without their own irrigable land to plant sweet potato on the irrigable land of other households during the dry season or in times of stress.

In Wokin, inhabitants are adapting to increased flooding, which, they say, is a result of changing rainfall but also of changing land use and grazing patterns by investing in soil conservation, building check dams around farmland to give protection from runoff from adjacent land, constructing better drainage systems and stabilising and rehabilitating gullies. As pressure on arable land increases and agricultural production stagnates or declines, households are adopting supplementary livelihood activities such as planting Eucalyptus as a cash crop or growing horticulture crops for sale. Communities now realise that whilst Eucalyptus is a valuable source of additional income, it cannot be planted near to cropping areas or water points, therefore they highlight that without proper management it could be considered maladaptation.

Access to roads and markets can make a significant difference to how people deal with climate variability and stress. In Wokin, households can diversify their livelihood activities and therefore spread risks, whereas the very poor road connection in Kase-hija prevents people from engaging in high-value cash-crop production, with the exception of chat[20].

> The rain is in the hands of God, but the road is in the hands of the Government. We can't do anything about the rain, but the Government could help us by building us road and bringing us telecommunication service. *Farmer, Kase-hija*

Having access to roads and markets has also meant that people in Wokin can engage in daily labour or self-employment, which, they feel, helps them to deal more effectively with stress and shocks. In Ander Kello, pastoralists noted that they had not seen significant livelihood benefits as a result of better infrastructure and services and better market prices, mainly because they had fewer animals to sell.

Access to a range of assets helps to diversify livelihoods and so to deal with climatic variability. In the two agricultural sites, respondents mentioned that having different plots in different agro-ecological niches helps in dealing with climatic hazards, such as flooding or hailstorm, whilst having access to communal grazing land, albeit increasingly degraded, helps with keeping livestock, which is not only a productive asset but an important means of savings. In Kase-hija in particular, being able to access irrigation water was described repeatedly as a key determinant of wealth accumulation in a changing climate as it allows two to three cropping seasons and decreased dependence on rainfall. In Ander Kello, livestock are still the major productive asset and rainfed agriculture has largely failed to produce any significant return on investment. However, those who access irrigated crop land have a more diverse range of livelihood

options. Currently these are small areas that are under irrigation and which may help some households to adapt, but as the amount of irrigated land increases, the analysis of the role irrigation plays in adaptation and resilience may change, because irrigated agriculture is at the expense of livestock production on communal grazing land. In many contexts it became clear that the availability of assets like grazing land is in itself not enough without the institutions that guarantee access to them (see Box 1).

People reported that the impacts of climate stress and shocks are becoming worse, in large part due to factors independent of the climate: increasing population, decreasing availability of and access to natural resources, decreasing landholdings and increasing costs of inputs and basic consumer goods. Local adaptations documented in all three sites are a reaction to multiple pressures. Such insights will help in designing development interventions that reflect the reality that adaptation decisions are usually a response to a variety of social, economic and environmental factors.

3.2 How development interventions support adaptive capacity

None of the development interventions in the three sites was designed with a special focus on climate change, adaptation or adaptive capacity, though they all have a bearing on the capacity of households and communities to deal with changing climatic conditions. In all research sites respondents highlighted how project interventions have helped households deal with climate variability and change, mainly by increasing their asset base. Whilst contributions had also been made in the area of 'institutions and entitlements', the other three characteristics, 'knowledge and information', 'innovation' and 'flexible and forward-looking decision making and governance', received much less attention.

3.2.1. Development interventions and the asset base

The ability of a community to cope with and respond to change depends heavily on access to, and control over, key assets (Daze et al., 2009). Typically, it is the poorest that are most vulnerable to the impacts of climate change and wider developmental pressures, in large parts because of limited access to key assets. Having access to a diverse set of assets – particularly of assets that are substitutable in the case of disruption or degradation - usually increases the ability to cope with climate variability and change and wider development pressures. For example, in Wokin, over a quarter of households are landless and are heavily dependent on safety nets, on daily labour and on limited and degraded communal grazing land for rearing their few livestock. They have very limited options and little attention is given by development actors to their constraints. This limits their adaptive capacity. In contrast in Kase-hija, communities with access to irrigable land and livestock had more diversified and more resilient options in the case of poor rainfall.

Respondents pointed out that development project activities have contributed to strengthening and diversifying the asset base on which they rely. Examples include interventions targeted at individual households, specific groups of households within a community[21] and communities as a whole. Interventions can also be grouped into those that are aimed at protecting key assets, and those that are aimed at diversifying the asset base upon which households depend. The former include the establishment of village savings and credit associations (Kase-hija) or activities carried out under the Productive Safety Net Programme (PSNP), such as investments in soil and water conservation using food or cash-for-work approaches (all sites). The latter includes activities which introduce new agricultural technologies or practices and which try to improve incomes through marketing. Examples include the development of a small-scale irrigation scheme and the formation of a women's group to engage in horticulture production, including skills development and training (Ander Kello) or the establishment of malt barley production clusters (Wokin). Some interventions accompanied work on assets with support for the establishment of related institutions – for example in Wokin besides providing barley seeds and training on how to produce high-quality malt barley, links with the beer brewery have also been established. However, the research findings were ambivalent as to whether the mechanisms for scaling up or achieving sustainability of some of the strategies being promoted was well-understood by the implementers. For example the promotion of irrigated agriculture and rangeland enclosure in pastoral areas could potentially be considered a maladaptation, if, in the long term, it restricts mobility

Creating a stone bund in Ander Kello

The role of the government in protecting key assets and strengthening livelihoods was stressed in all sites. These activities are rarely related to climate variability and change but focus on the provision of infrastructure such as roads, and services such as education, health, adult training and skills development, agricultural extension and business development support. These assets and services are considered crucial in enabling people to respond to a changing climate or other hazards. However, respondents also observed that local government provision of these services is often inadequate, mainly because of shortage of human and financial capacity. For example, although agricultural extension agents are posted in the villages, inputs are not always timely or provided in sufficient quantities. Significant investment is still needed to meet the basic needs of communities in these areas. So far limited time has been spent on thinking about how such services can take risks associated with the changing climate into consideration, but ultimately this is needed to ensure that these services contribute towards building adaptive capacity and avoid potential maladaptation.

Although the findings do not suggest that wealth differences directly correlate with innovation or people's willingness to experiment and change, there is evidence from all research sites that those with more assets are more likely to adopt externally promoted innovation packages, which tend to be input-intensive, and depend on improved seeds or fertiliser. Explanations given for this include the broader asset base of the better-off households and thus their greater ability to take risks, but respondents also stressed that the better social status of wealthier households gives them better access to information and new knowledge provided by agricultural extension agents at community level, and agricultural experts at District level. Better-off households could also more easily access the credit necessary for agricultural intensification programmes based on costly inputs such as artificial fertilisers and improved seeds.

> 'I am the first person who tried application of fertiliser on a farm land in Finote Selam. I am also the first to have good number of beehives, poultry and a eucalyptus plantation. I have never received food aid, rather I receive advice and information.'
> Better-off farmer, Dabat

Asset-poor and vulnerable households in all three sites have benefited from the Productive Safety Net Programme, which has prevented them from having to migrate or sell key productive assets to meet basic household needs. However, this support is rarely sufficient to lift recipients out of poverty. Valuable community assets have also been built, for instance through hillside enclosures, afforestation and soil and water conservation schemes. However, from the research in Kase-hija, it is clear that there are limitations in the scale of this work, considering that PSNP has been in operation in the area for five years. In Wokin, the lack of an overall watershed plan or suitable biological materials for soil bunds has undermined the sustainability of public works activities.

It is not part of the PSNP design to directly support households to engage in new activities to transform their livelihoods, for example by moving out of agriculture into rural non-farm employment. Whilst the Household Asset Building programme could in theory do this through the provision of credit, in reality this credit appears to be mostly used to supplement traditional livelihoods with the purchase of additional livestock. This raises the same question which the use of irrigation in pastoral areas raised: when is support to adaptation positive? Just as it can be asked whether it is better in the long term to support pastoralism as a resilient livelihood or to promote irrigation for crop farming, which inherently undermines pastoralist livestock rearing systems, so it can be asked whether it is positive to support people in poverty in their existing livelihoods, as the PSNP has done, or whether this is maladaptation. The support provided might have prevented households from engaging in more radical transformative adaptation. Whether the PSNP has thus help to trap households in increasingly unviable livelihoods or has helped them to avoid complete destitution is a matter of debate that cannot be further explored in this report. Worryingly, it is not clear that a sufficiently in-depth analysis of this question underlies actual development interventions.

3.2.2 Development interventions and institutional development

Adaptation to change is influenced and shaped by social processes. Understanding how people react and respond to changes and shocks requires an understanding of the social environment, shaped by a set of informal and formal institutions that influence behaviour. Broadly speaking, institutions are the 'rules of the game' of a society, and organisations are the players. Institutions and organisations include the formal (e.g. laws, government regulations and statutory bodies such as the police and the courts) and the informal (e.g. norms of behaviour, codes of conduct, indigenous community organisations and religious organisations).

The institutional environment in Ethiopia is highly complex and characterised by a pluralism of formal and informal institutions, sometimes overlapping and competing with each other. Examples are gender roles and responsibilities, including norms that prevent women from ploughing land, religious rules and regulations, for example the number of religious holidays in Orthodox Christian areas, and the rules governing access to natural resources such as arable land, grazing land and irrigation water. Most of these rules have their own enforcement mechanisms. These kinds of rules are often labelled 'traditional', though this is misleading since they are far from unchanging. Gender roles, for example, change as more girls receive education, some religious rules are questioned by the government, insisting that farmers should observe fewer holidays, and local rules over access to natural resources are overlaid by formal laws that govern how land is allocated.

In all research sites, respondents highlighted the importance of local institutions in influencing their responses to shocks and stresses, particularly though their role in governing entitlements to assets. Although land is owned by the state and people only have usufruct user rights, local institutions are decisive in organising the use of the land. For example, in sites dominated by crop cultivation, local institutions are responsible for dealing with sharecropping arrangements (e.g. defining which party contributes how much labour and which

share of the crop they receive), rental arrangements and inheritance arrangements. In pastoral areas, use of rangeland, livestock migration patterns and private enclosures are governed by local institutions dominated by the clan system. Access to irrigation water from locally developed schemes such as in Kase-hija and Wokin is also usually governed through local institutions (water committees). How these institutions function determines which households get more water, and which ones lose out (see Box 1).

What happens when institutions are neglected: the case of Kase-hija's irrigation scheme

Although communities in Kase-hija had a functioning irrigation system, they still expressed regret that CARE's HIBRET project did not work on irrigation – because of the institutional dimension. Access to irrigation water was the main determinant for improved livelihoods and food security. The physical availability of water is not the same as having access to it, and it is the institutional management of any irrigation scheme which determines who actually benefits. In Kase-hija, as usually happens in Ethiopia, communities were organised into user committees. These committees are supposed to ensure that user in each village gets water every month, each farmer getting water for 2–3 hours.

Farmers complained that bribes are paid to the leaders of the water committees, so those who cannot afford to pay bribes (i.e. poor people) and people of low social standing (such as female-headed households) do not get irrigation water at all or only in limited quantities. The incentives for excluding the poor increase as demand for water increases for cash crop production. Communities believe that available water is declining due to deforestation around the source and irregular rainfall. This only increases the need for an institution that can manage water in an equitable and sustainable way.

Box 1 What happens when institutions are neglected: the case of Kase-hija's irrigation scheme

Local institutions and the way rules are enforced are crucial for understanding differences in adaptive capacity within a community. In the worst case they may even prevent certain groups from adapting and thus make them more vulnerable to stresses and shocks. Rules such as the right to free-graze livestock after harvest on crop residues increases the capital of some (livestock-owning) households, but may undermine efforts to increase natural capital through soil and water conservation (of benefit to farmers). To analyse the contribution of local institutions to adaptive capacity, a much stronger focus will have to be placed in future on understanding underlying power structures that shape institutions. The tendency of organisations (NGOs and government) to discuss problems and interventions in terms of 'the community' as if this were a homogenous unit is an illustration of the lack of attention to power relations and the way in which institutions mediate access to assets and knowledge.

Marginalised groups – in particular women, but also the very poor and landless youth – face considerable discrimination, which reduces their ability to adapt to stresses and shocks. In all research sites, community politics and decision-making is heavily male-dominated. Although in all three sites very resolute and outspoken women were found, they seldom influenced decisions or debates, and access to crucial resources, such as irrigation water in Kase-hija, is skewed towards male-headed households (see Box 1). Although formal government structures are often dominated by better-educated young or middle-aged inhabitants, informal structures and decision-making are solidly in the hands of elder male inhabitants. In the case of formal government services such as agricultural extension, women reported receiving hardly any specific information or technology advice targeted at activities which are typically in the women's domain, and that they need to have their husbands present in discussions with agricultural extension agents. The biggest restriction women face in terms of productive livelihood activities, however, is that they are discouraged from ploughing by persistent social norms, which means that female-headed households have to depend on sons or male relatives for land preparation. This puts them in a very disadvantaged position as the timing of land preparation is late, which reduces productivity. Female-headed households are often forced to enter into unfavourable sharecropping arrangements, further undermining their ability to cope and adapt. Women reported that, in times of hardship, institutional barriers are increased and they are subject to considerable work and livelihood pressures. Not only do they have to carry out their normal household chores, such as caring for children and the elderly or cooking, but labour-intensive tasks such as collecting fuel wood and water often become more demanding. Without support from male household members, women are often forced to remove children from school, which in the long term will undermine their ability to adopt new livelihood activities and adapt to changes.

A mixed picture emerges in the way development interventions addressed marginalisation by local institutions. While there is evidence of some support for people who are marginalised (for example through the establishment of women-only savings and credit associations in Kase-hija, by targeting the poor and vulnerable in the PSNP in Kase-hija and Wokin[22] or through women's groups in Ander Kello), there is much less evidence of attempts to address institutional marginalisation itself. The formation of groups – women's savings and credit groups, landless groups engaged in natural resource conservation and its productive use or women's farming and livestock marketing groups – has provided a valued space for discussion, collective action and risk sharing. There is less evidence, however, that these groups influence local decision-making or are sufficiently strong and unified to challenge restrictive institutions. That said, they have enhanced agency among group members mainly through the provision of valuable assets to help members respond to stress and shocks. However, just establishing a group of marginalised people without addressing the institutional barriers and power structures that determine their marginal status will not be sufficient to enhance their agency or adaptive capacity.

Institutions can also support or constrain innovation. As discussed below (see 3.2.4) interventions which introduced innovations sometimes ignored the institutional dimension, leading the project to fail once the direct support of the NGO had ended. For example, the introduction of enclosures in pastoral Ander Kello successfully demonstrated how quickly rangeland can regenerate when not disturbed by grazing animals, but it did not successfully work at the institutional level, necessary to support the management

A woman in Kase-hija explains the importance of savings to her trading business

of the enclosure. Thus, while respondents admired the quick regeneration of the vegetation during the dry season, they reverted back to old practices of free grazing as there were no institutions in place that would have allowed the continued exclusion of livestock or the sharing of the created assets (grass). Cultural values have also rewarded conformity rather than innovation (i.e. deviation from established norms), as discussed below. The research did not find examples where outside interventions had made any attempt to address such institutional constraints.

3.2.3 Development interventions and knowledge and information

There are some positive examples in all three sites of development interventions promoting knowledge sharing through the development of groups that share risk and provide a platform for shared learning. Sometimes this was the explicit objective of the groups (e.g. groups to encourage experimentation with agriculture and spread the risk of failure in Ander Kello), but often the groups were set up with other objectives, e.g. the promotion of savings and credit groups in Kase-hija, women's livestock marketing groups in Ander Kello or the malt marketing groups in Wokin. The link between social organisation, knowledge and innovation has already been noted. Although these links were not always appreciated by agencies, sometimes with negative impacts on project successes, at other times any added social organisation has had positive reported benefits in knowledge flows. Group members reported learning new ideas of many kinds, from productive technologies (e.g. fattening sheep) to marketing.

Communities noted the importance of traditional knowledge in decision-making, but also the increasing challenges to these traditional methods in the face of perceived changes in seasonality and natural resource degradation. Traditional weather forecasting methods were not seen as particularly reliable anymore. However, the information provided by the National Meteorological Agency via radio was also not trusted or used. Although seasonal forecasts are available, information is not passed down to districts and end-

users. Farmers and pastoralists thus have no reliable source of long-term weather forecasting to aid their planning. This problem was not being addressed by development interventions in any of the research sites.

Communities and households can adapt much better if they have reliable information both about what they need to adapt to (trends, predictions of prices, climate, etc.) and about their current options (available technologies, prevailing prices, etc). Agencies are not focussing on this dimension of development, and there are signs that they themselves are not using information adequately in designing their own interventions. For example, support for crop cultivation in Ander Kello is based on the assumption that irrigation water will continue to be available in sufficient quantity. Current projections of climate variability and change suggest that this might not be the case. The findings thus indicate two issues. First, agencies do not see their role as providing information to their 'beneficiaries' or helping them to analyse its implications, e.g. to help the population of Ander Kello to make its own mind up about the advantages and disadvantages of relying on irrigation. This could not be done without engaging with the ways in which such decisions get taken, and the power relations involved – the institutional framework. In other words, dealing with one dimension of adaptive capacity almost always entails engaging with others. Second, if agencies (NGOs or governmental) are basing interventions on inadequate or insufficient information, they might undermine adaptive capacity by encouraging the adoption of livelihood strategies that in the longer run prove to be examples of maladaptation.

3.2.4 Development interventions and innovation

ACCRA research found a number of innovations initiated by local residents. Examples include the local adaptation of an introduced technology, the broad-bed maker, to local conditions in Wokin; the initiation of fruit and fodder production and apiculture in Ander Kello; and water harvesting and local irrigation systems in Kase-hija. However, successful innovations are rarely scaled up or shared beyond the community level. There are a variety of reasons for this, including limited access to skills, lack of resources to replicate innovations, inadequate awareness and communication of successful practices, risk aversion (fuelled by negative experiences), or the wish not to deviate from traditional norms and customs. External interventions tended to assume that innovations are externally provided. The ACCRA research did not find examples of projects which had tried to address constraints to local innovation or to the wider diffusion and uptake of experimentation and innovation. This is clearly deeply ingrained. Even the ACCRA research team sometimes found it difficult to take seriously people's own capacity to find, adapt or generate innovation. This is indicative of a deeper developmental problem, discussed further in 4.1.

Most project interventions focused on the poorest and the vulnerable. In Wokin, however, project interventions were deliberately targeted at those who had land in a particular area or who were already engaged in bee-keeping. Ultimately this meant better-off households were targeted who were able to engage in new enterprises and practices such as malt and seed barley production. (This still equates innovation with the early adoption of an externally provided technology.) Research further suggests that those most likely to adopt new practices not only have above-average assets, but have social networks that enable them to access information and knowledge from sources beyond the village (for example, by having relatives in larger towns), have travelled to areas beyond their village of residence (for example because they were serving in the army) or are able to access information from experts at the district level. These factors which foster the innovation and adoption of new practices were not assessed by projects and did not inform the planning of development interventions. Research from all three sites suggests that it is not the introduction of new technologies and practices that is lacking, but that development interventions fail to support an enabling environment that allows autonomous innovation and experimentation, which ultimately would mean new technologies were more appropriate and sustainable. The institutional framework that supports innovation was not considered by projects, and the previous example of establishing pasture enclosures in Ander Kello (see 3.1.2) is an example of how this tends to lead to unsustainable change. There were also examples where agricultural research was producing useful ideas, but the focus on getting set technology packages adopted was overriding local testing and adaptation.

Vegetable production in Kase-hija was severely limited by lack of market

3.2.5 Development interventions and governance

There is limited evidence from the research sites that development interventions provided support to improve the flexibility or forward-looking nature of governance. Whilst all projects worked with local government and developed and agreed their project design together with Regional Government officials, the extent to which they contributed to flexibility or forward-looking governance was limited. There are several factors explaining this. In Ander Kello and Wokin, the possibility of sustaining joint work with the government was hampered by short funding cycles of projects. Projects did not prioritise governance, focusing instead on delivering hardware and providing limited time for staff to engage in joint work with local government officials. 'Governance' is not only conducted by governments, central or local. Local institutions also exert governance, and much of the commentary on 'development interventions and institutions' is entirely relevant here. Projects saw their role as providing services (e.g. training), technologies (e.g. improved seeds) or hardware (e.g. irrigation pond). They did not choose to address underlying factors which had caused the lack of services or technology streams, such as the governance of the extension system or how agricultural research priorities are set. The overall development assistance environment encourages NGO projects to support the government's development agenda, rather than challenging it and asking whether it is leading to maladaption, whether equity is being subverted or whether innovation is being stifled by top-down approaches.

Section 4: Lessons from the ACCRA research for development interventions

Lessons learnt from the ACCRA research for development interventions

Despite considerable achievements in improving people's livelihoods in all three sites, development interventions are not enhancing the capacity of households and communities to adapt to future change. Projects were designed and implemented with specific development objectives and outcomes in mind, and with little consideration for adaptive capacity that would better enable people to adapt to diverse development challenges or to specific climatic impacts that were already being felt. Opportunities to achieve the same project outcomes in ways which enhanced adaptive capacity were not taken. Neither government services nor NGOs properly appreciated the importance of four of the five dimensions of adaptive capacity or their interconnectedness. Other reasons for this failure relate to the following areas, which will be discussed in more detail in the sections below:

1. Insufficient support towards enhancing local people's agency.
2. Projects are limited in scope and scale.
3. Inadequate use of information and knowledge (which would include the analysis of climate impacts and projections needed for Climate Change Adaptation).
4. Insufficient learning and innovation.
5. Poor assessment of activities.

Even during this research, agencies argued that they 'cannot be expected to deal with everything' in what are sometimes small projects. This reveals a continued adherence to a model of interventions that depicts them as linear, mirroring a simplistic log-frame where inputs lead to set outputs which bring about predetermined outcomes. Such a model has long been critiqued but still remains prevalent in donor and NGO monitoring and reporting requirements and is therefore prioritised by the managers of projects. Whether or not agencies are aware of it, the outcomes of their interventions will always be mediated by institutions and power relations and there are always unintended impacts – both positive and negative. Agencies can choose to ignore this complex reality but they cannot make it disappear. However small the project, if an agency wants to achieve its objectives it has to be aware of the myriad dimensions of its intervention. If it takes the need for sustainability seriously, it is also bound to consider adaptive capacity, since all project outputs will necessarily need to be adapted and changed over time as contexts inevitably change. Taking adaptive capacity seriously means, for example, using the five lenses described in section 1 to analyse the possible impact of an intervention and ensuring that the project design maximises its contribution[23]. All the characteristics of adaptive capacity will always be relevant to every project, however small: the choice is merely whether or not to be aware of them.

4.1 Supporting people's own agency

In a changing world, sustainability means being able to adapt. Sustainable development cannot be achieved by bringing people to a given state, but only by giving them the ability to adapt to future change autonomously. Enhancing agency must therefore be at the heart of any development intervention and particularly of interventions aimed at strengthening adaptation and adaptive capacity. Agency is key to allowing people to make informed decisions about the use of assets and to negotiate access to the assets and resources they need to make a living. Agency is needed to access and use information and knowledge. Agency is also key to holding government and development partners to account and encouraging them to make informed and forward-looking decisions.

There are examples of considerable leadership and initiative by residents in improving their situation. In Kase-hija, for example, farmers have extended an irrigation scheme established some 30 years ago, building a dam to store water and extending the channels to irrigate additional areas. Extending the system was not an easy task – it has taken the community seven attempts to finally get things right. At times the majority of residents wanted to give up, but a few individuals championed the work, against all odds and despite receiving no support from irrigation experts. However, these examples are too rare,

Communities in Ander Kello dig irrigation canals on their own initiative

and are not routinely encouraged. Initiative is undermined by limited participation and a perception by decision-makers that they know best what farmers and pastoralists need. This attitude leads government and development partners to supply packages of technologies which they expect farmers to adopt, whatever their specific needs or the local circumstances and without giving any opportunity for end-users to say what they think would support them best. This puts farmers and pastoralists at the mercy of government and development partner staff and stifles their ability to hold them to account. It also leads people to expect everything to come from outside and solutions to be delivered without their own contribution. Examples can be found in all three research sites. In Ander Kello, for example, people often said that 'they needed the government to provide' irrigation water or livestock health services.

> First I planted maize, then I started growing grass for the goats. There was no water nearby and I struggled to keep the plants alive by carrying water from far water points. When I started cultivation and refused my daughters marriage, the community called me 'crazy'. I wasn't crazy, but I decided to focus on my farming. Farmer, Ander Kello

Agency can be supported in various ways. Supporting social organisations that encourage the sharing of ideas and the spreading of risk is one way, and has already been discussed above. It is important to identify the constraints to agency, which may come from within or outside the community. In some communities social pressure was preventing agency, with people being excluded for innovating; external actors need to find ways to support agency without being seen to be in conflict with local customs and norms.

An innovative farmers' compound in Ander Kello

Group formation, however, is not free of difficulties. There are dangers of elite capture by influential individuals as well as corruption; groups can be inefficient and transaction costs high, all of which undermine the credibility of the group. Across the different groups studied in this research, success meant having a clear sense of purpose and effective governance, choosing activities that were economically important to the group's members and being able to scale up and support people in larger numbers. Attention also needs to be paid to the local social system so as to avoid social exclusion, as happened with some groups in Ander Kello, where groups are often dominated by members of influential clans.

Taking on board agency will require a major paradigm shift in how local people are perceived and treated. Development actors will have to learn to trust people in new ways, to see their role as supporting people's own life 'projects' and to stop trying to determine how they should use the assets, information and opportunities they have. This message is not new, but is yet to be taken seriously, despite the ubiquitous rhetoric of participation.

4.2 Reassessing the scale and scope of project interventions

The justification for working primarily at the village level is based on the desire to achieve greatest impact given the constraints of staffing and finance. However, much of the vulnerability at local level is mediated by structures and processes far beyond the local level. Without addressing the stressors emanating from higher levels, efforts to improve the asset base and the institutional set-up locally in the hope of enhancing the adaptive capacity of households and communities are likely to fail. Of course, small projects cannot work at every level and cover every factor that contributes to vulnerability. Nonetheless, significant gains could be made by understanding adaptive capacity in all its dimensions, focusing activities more strategically and enhancing collaboration and coordination with other initiatives so that the overall efforts of the government and development partners address adaptive capacity as a whole.

Helping residents to protect their assets and improve their livelihoods is laudable, but not sufficient. In all sites, pressure on available arable land and natural resources is already considerable and is only going to increase. More focus is needed on interventions beyond agriculture. Current project interventions are maintaining existing systems, but are not contributing enough to building adaptive capacity. Part of the reason for this limited focus is that most development efforts concentrate on outputs (not outcomes), and are dominated by the provision of hardware. Expenditure and monitoring focus on increasing the number of irrigation channels, not on ensuring that everyone receives their fair share of irrigation water.

At the same time, the role of the private sector as a rural service-provider is rarely considered by NGOs. Whilst the private sector is in its infancy in all research sites and a reliance on the state or NGOs in input supply, there is reduced flexibility in supply chains and this leads to less choice and reliability. The late provision of inputs, after the time they are needed by farmers, was common. In Wokin and Kase-hija, improved inputs provided by the extension services were in short supply and no alternative sources were available. Geographical remoteness and limited purchasing power of residents means it has not yet been profitable for private sector to engage in input supply in the research sites. In the ACCRA research sites, neither the government nor NGOs have shown an instinct for fostering competition and encouraging private input suppliers, which would be more responsive to local demands or other circumstances such as changing climate. Whilst private animal health workers had been trained in Ander Kello, their drug supplies were rapidly exhausted in offering free treatments and could not be easily re-stocked. More efforts to train both animal health workers and their clients to perceive the service as a business, alongside efforts to establish a more effective drug supply chain could have improved the sustainability of this service.

It is striking how often it is said that the private sector is entirely absent in rural Ethiopia, despite the fact that almost the entire rural population buys and sells goods at mutually agreed prices for private profit. Until it is more widely recognised that farmers and pastoralists are the private sector it is unlikely that it will enjoy greater support.

Reassessing scale and scope of interventions does not mean that NGOs have to do everything themselves, but rather, they should aim to leverage change through influencing governments or fostering sustainable businesses through support to the private sector. Unfortunately, development actors (Government, donors and NGOs) do not give adequate attention to dynamic processes of change such as the use of information in decision-making, the development of equitable institutions, the fostering of local innovation and improved accountability in governance structures. Many of the ways in which these software aspects could be improved have low input costs but require time and highly qualified staff. Taking this challenge on board requires a change in how projects are budgeted, financed, staffed and monitored. It will be very hard to make these changes if project interventions continue to have a very short lifespan, rarely as much as three years, and often with changing priorities during the project's life.

4.3 Enhancing the use of information and knowledge for evidence-based decision-making and project design

More than once in this report, it has been left open whether or not an introduced technology is leading to better adaptation to future conditions or to maladaptation. Although all predictions remain uncertain, projects need to be designed based on a thorough analysis of predicted trends and their implications – trends in population demographics, in world and local price movements, in technology and communication development and, of course, in climate change. The ACCRA research found that projects are not being designed using the best possible information, prediction and scenario analysis. This is true both of longer-term shifts (e.g. climate variability and change) and short-term changes (e.g. specific seasonal weather forecasts). The latter are not available at local level. Whilst some information is disseminated to regional offices, it rarely reaches the district or community level. NGOs do not analyse this information routinely and do not use it to plan project interventions in the sites studied. Weather forecasts are mainly used for predicting emergency food needs in planning for a humanitarian response.

There is also a need for more sophisticated analysis of current vulnerabilities and what causes and maintains them. This should be expanded to include constraints to adaptive capacity. Entry points for interventions can come from looking at institutional barriers to livelihoods and adaptive capacity, understanding who lacks knowledge and information and why, barriers to innovation and issues of governance.

Projects need to ensure not only that they use the best possible information, but also that it is more widely adopted by others, especially state services and policy-makers. This includes using both broader and more locally specific knowledge, e.g. using better assessment of weather patterns in Kase-hija to select more appropriate crop varieties, using climate prediction and analysis to develop appropriate livelihood strategies for pastoralists and agro-pastoralists in Ander Kello and to avoid maladaptation by encouraging reliance on a technology (e.g. irrigation) that may not be sustainable. This involves information being made available and used both by those designing policy and interventions (government, civil servants, NGOs, etc.) and local people themselves. The lack of reliable weather forecasting for farmers and pastoralists has already been noted (see section 3.2.3). Helping farmers analyse for themselves the implications of a particular weather forecast (or, for example, predicted price movements) would combine support for agency with support for knowledge and evidence-based decision-making.

A number of less successful development interventions could have greatly benefited had they been designed using available information and the experiences of similar interventions elsewhere in Ethiopia. Examples include the design of soil and water conservation practices or rangeland enclosures, where technical interventions, without adequate institutions are prone to fail. This could cover many dimensions relevant to project success: institutions and institutional barriers (e.g. best practices for irrigation water allocation and governance, management of rangeland enclosures), technical aspects of interventions (e.g. best practices in the construction of ponds, irrigation schemes), organisational aspects (e.g. the timeframe of project interventions, the quality and capacity of staff, available time to engage in lengthy processes, strengths and weaknesses of local organisations).

Local government officials in Chifra, Afar discuss the ACCRA research findings on policy constraints to adaptation and risk reduction

4.4 Building adaptive capacity at individual and community level requires a continuous process of learning, change and innovation and an enabling policy environment

In order to prepare residents and households better for dealing with the projected impacts of greater climatic variability and extremes in future, innovation and strengthening innovative capacity must take centre stage in any development initiative. Innovation here is understood as a process of experimentation and exploration of practices, techniques or new organisational forms; innovation systems are defined as networks of organisations, enterprises and individuals that focus on bringing new products, processes and forms of organisation into use. They not only create knowledge, but they also provide access to knowledge, create demand for new knowledge, share knowledge and foster learning (Rajalahti et al., 2008).

The ACCRA research suggests that local residents have made a number of innovations, but these have not been replicated (as discussed in section 3). For people to be innovative, they need to have:

- an awareness that the current situation needs to change;
- a sense of being in a position to change that situation (having agency);
- access to appropriate information about the different options that could be used – individually or in combination – to solve particular problems;
- access to resources to test new things and a safety net to fall back on in case of failure; and
- an enabling environment which encourages and promotes innovation. (This includes both the broader policy environment and the local cultural context.)

As discussed above, the research found that projects had not identified or set out to address these conditions, even though some interventions had an indirect impact on them. The idea that poor and poorly educated farmers and pastoralists might be capable of experimenting and learning for themselves was not found to be well ingrained among development actors. A substantial body of literature exists on innovation and farmer experimentation, and on how to support it, but it is ignored by most development interventions.

An awareness that the current situation needs to change

Residents in all three research sites point out that their livelihoods are under increasing stress and that they see clear signs of this in their natural environment (e.g. decreasing spring discharge, rangeland degradation, diminishing and degrading grazing land, diminishing land productivity).

A sense of being in a position to change that situation

Not all community members felt that they were able to change their situation. In all three sites, there is a sense of hopelessness in the face of a great variety and magnitude of problems beyond their influence, implying that people see future changes as being 'in the hands of God'. Many respondents placed more responsibility for the improvement of their livelihoods and their development on outsiders (government experts, development partners) than on themselves. A much better understanding of when and why people delegate responsibility and when and why they perceive that something can be influenced or changed by themselves is needed in order to support local residents to enable them to develop agency for change.

Access to appropriate information about different options that can be used to solve particular problems

An awareness of different options is usually required to inspire individuals to experiment. Those village residents that have been to areas beyond their village have often brought back new ideas and have started experimenting in their village. The current approach of the agricultural extension system is to offer farmers and pastoralists 'fixed packages' of inputs and training on specific new technologies, and

many projects mirror this approach. Whilst some technologies have been widely adopted, others are unlikely to be taken up unless their value can be better demonstrated and supply and demand problems are resolved. In general, farmers and pastoralists are not in a position to assess the suitability of proposed new technologies or practices because they lack adequate and appropriate information.

Access to resources to invest in testing new things or to act as a safety net in case of failure
In all three sites, better-off households were more likely to adopt new technologies than poor households, as they could invest in resources such as water pumps, tree seedlings, beehives or improved seeds without endangering their immediate livelihood prospects. In Kase-hija and Ander Kello, project interventions tried to overcome this by, for example, initiating savings groups for poor households. Work to remove barriers to adoption, though, still rests on the assumption that what is being promoted is right and right for everyone. The idea has rarely been considered that, if the richer are the ones adopting what is being promoted, this may indicate that what is being promoted is relevant to the better-off and not to the poor. Apart from addressing barriers of investment capital and risk, there is also a need to invest in supporting the poor with the skills and knowledge to make informed decisions about when and how to experiment and invest, instead of expecting them only to adopt off-the-shelf packages.

Enabling policy and institutional environments which encourage and promote innovation
An enabling environment to encourage innovation is necessary at local level, as well as at higher levels. Better links are needed between local communities and the agricultural research and extension system at regional and federal level. Despite the national extension policy being described as a Participatory Demonstration and Training Extension System (PADTES), research has shown that extension packages are in fact formulated at Federal or Regional level and there is limited capacity at District and Community level for involving communities in decision-making, resulting in disempowering local residents to find solutions to their problems (EEA/EEPRI 2006, Belay 2003). In Wokin and Kase-hija, there was evidence that this was still the case, and in Ander Kello, there was limited evidence of agricultural extension advice reaching pastoral communities.

4.5 Enhancing the assessment of planned interventions and strengthening forward-looking decision-making and governance

Given that climate conditions are expected to become less favourable in many parts of Ethiopia, and that greater uncertainty and more extreme events are likely, any proposed new intervention needs to be carefully assessed as to whether it will actually contribute to enhancing adaptive capacity or to climate change adaptation, or whether it rather leads to maladaptation. This might require reassessing the validity of the assumptions underpinning specific project objectives. This might also require considerable changes to the way projects work and are managed, for example by building learning from past activities into any project activity, aligning activities more strongly with government systems and structures and engaging over longer periods to support change processes and adjust interventions in light of changing circumstances. Generally, the research suggests that, although development interventions are routinely evaluated, they still focus too much on repeating familiar activities regardless of impacts. Plans do not sufficiently consider potential future changes – whether climate-related or as a result of broader economic, social and demographic changes.

Decision-making processes need to include a strong forward-looking component, allowing decision-makers to make informed and sustainable choices. One example relates to increased efforts to sedentarise mobile pastoralists. Whether this will be successful in future given anticipated climate variability and change has so far not been sufficiently assessed, but there are concerns about the impact of this on those pastoralists who remain mobile and who can only exploit arid areas if they also have access to certain dry-season grazing areas. Increasing attention to crop production might be a viable option for some households in the immediate term, but whether this is represents a successful livelihood in future, and whether it is a viable approach at a wider population level, is uncertain.

Box 2: Which route leads to maladaption?	
Two perspectives were heard on how to react to the degraded rangeland: move away from relying on grazing livestock on the rangeland, or work to improve it. Which strategy will prove more resilient to climate change?	
Our village used to be green and rich with livestock pasture. Now all that is gone. With it, our livestock production deteriorated significantly. We can't continue this way. We have to change (and) turn to agriculture. Our land is fertile; we only need Government to bring us irrigation water.	We are experts. We know how to rear animals. The Government needs to tap this potential and develop the livestock economy with us... Government can assist us by developing our grazing land. We have extensive grazing land which used to be very productive in the past and highly degraded now.

Box 2: Which route leads to maladaption?

It is clear that much more attention needs to be paid to government development planning – both central and local. NGOs also need to give greater emphasis to integrating their own activities with local government processes. However, though it was clear that whilst this area is crucial, it was beyond the scope of ACCRA research to analyse the functioning of central or local government. This research therefore identifies this as a key area for further effort, but cannot make any specific recommendations.

4.7 Conclusion

Research in the three sites in Ethiopia provides ample evidence that development interventions can contribute to adaptive capacity at household and community level. Yet the findings also show that interventions do not recognise the importance of adaptive capacity, and their analysis of poverty and vulnerability only considers one or two dimensions, principally broadening the asset base. This usually occurs without addressing the underlying institutional barriers that prevent some households from accessing those assets. There are also suggestions that institutional barriers and power structures that increase the vulnerability of some households are insufficiently analysed and understood, and therefore interventions fail to contribute to improved livelihoods for some households; interventions are often carried out in isolation, different actors do not consult each other sufficiently, which leads to duplication and inefficiency, and different actors are not learning sufficiently from experiences of others.

The research concludes that, by using the LAC framework developed by ACCRA to assess contributions to adaptive capacity, more focused interventions could be developed that target both immediate development needs and longer-term adaptation requirements, based on forward-looking anticipation of changes and threats. Interventions can combine different approaches – disaster management, social protection and livelihoods promotion – all of which are necessary to adequately support local residents and address their development needs. This will only become more important given anticipated climatic and other changes.

Endnotes

1. For more information on the LAC framework and its characteristics see Jones et al. 2010 or access the consultation document on the ACCRA website: http://community.eldis.org/accra/

2. In the Ethiopian context known as Wereda.

3. The study compares analysis of meteorological data with that of community perceptions, the meteorological rainfall and temperature records used for climate analysis for Kase-hija and Ander Kello Kebeles were obtained from meteorological stations that are far (>50 Km) from the studied sites and the data used for all three sites had a number of missing years which makes it harder to identify trends. In addition, some data, such as hourly rainfall which could be used to analyse rainfall intensity, was not available.

4. Ludi et al., 2010, ACCRA research protocol.

5. In comparison, South Africa has a water storage capacity per capita of around 750 m^3 (World Bank, 2006)

6. This income relates to officially recorded exports only but is most likely to be much higher if non-official exports were considered as well.

7. The 2007 census gave a population of 74 million (CSA 2008); UNDP (2010) estimated the population to be 85 million in 2010.

8. See www.cgdev.org/section/topics/climate_change/mapping_the_impacts_of_climate_change for details.

9. These general statements should be read with caution, as pooling of data from several meteorological stations (most of them with missing data) masks important location-specific weather patterns.

10. In the Ethiopian context known as Kebele Associations (KA).

11. See Annex 1 for more information on Ethiopian agro-ecological classifications

12. Whilst the Productive Safety Net Programme (PSNP) was presented and discussed with respondents in all three sites. Only in Kase-hija was it a major focus of the study,

13. As defined by the Household Economy Analysis methodology (HLA, 2010).

14. A flowering plant native to Ethiopia which contains an amphetamine-like stimulant and is chewed widely across Ethiopia, but particularly in the eastern parts of Oromia and Somali region. East and West Hararghe Zones are main producing areas of this highly valuable cash crop, which in the 2008-2009 financial year accounted for $139.2 million in export earnings (Reuters, July 21st 2009)

15. See annex 1 for more information on Ethiopian agro-ecological classifications

16. Temperature data available for 1979 – 2009, rainfall data for 1963 – 2009. Years were excluded from the analysis if values are missing for more than three days. Trend lines shown in the figures are only indicative because of missing values.

17. Temperature data available for 1973 – 2009, rainfall data for 1962 – 2009. Years were excluded from the analysis if values are missing for more than three days. Trend lines shown in the figures are only indicative because of missing values.

18. Temperature data available for 1980 – 2009, rainfall data for 1980 – 2009. Years were excluded from the analysis if values are missing for more than three days. Trend lines shown in the figures are only indicative because of missing values.

19. Respondents did not always distinguish problems from hazards. Both concepts fall under 'chigger' or its equivalent in Afar and Oromifaa

20. A mild stimulant which has an increasing demand and can command a high price for export. Therefore traders are prepared to travel long distances over rough terrain to access it during the dry season, when it can be grown under irrigation in Kase-hija, but may not be as plentiful in other areas which harvest during the wet season.

21. When using the term 'community' in this report, it usually refers to a village.

22. The PSNP is operational in Ander Kello, but the community refuses to participate in targeting so transfers are shared equally between all households in the community.

23. Other frameworks for thinking about adaptive capacity may use slightly different 'lenses'.

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Annex 1: Classification of Ethiopian Agro-ecological zones

Agro-ecological zonation system, based on field observations. (Hurni 1986)			
Altitude metres above sea level: More than 3700m	A = Main crops C = Traditional conservation S = Soils on slopes T = Natural trees		**High Wurch** A = None (frost limited) C = None S = Black soils, little undisturbed T = Mountain grassland
Altitude metres above sea level: 3700-3200m		**Moist Wurch** A = Only barley, 1 cropping season per year C = Drainage rare S = Black soils, degraded T = Erica, Hypercium	**Wet Wurch** A = Only barley, 2 cropping seasons per year C = Widespread drainage ditches S = Black soils, highly degraded T = Erica, Hypercium
Altitude metres above sea level: 3200 – 2300m		**Moist Dega** A = Barley, wheat and pulses, 1 cropping C = Some traditional terracing S = Brown clay soils T = Juniperus, Hagenia, Podocarpus	**Wet Dega** A = Barley, wheat, nug, pulses, 2 cropping seasons per year C = Drainage ditches widespread S = Dark brown clay soils T = Juniperus, Hagenia, Podocarpus, Bamboo
Altitude metres above sea level: 2300 -1500m	**Dry Weyna Dega** A = Wheat, tef, rarely maize C = Terracing widespread S = Light brown to yellow soils T= Acacia trees	**Moist Weyna Dega** A = Maize, sorghum, tef, enset rare, wheat, nug, barley C = Traditional terracing S = Red, brown soils T = Acacia, Cordia, Ficus	**Wet Weyna Dega** A = Tef, maize, enset in western parts, nug, barley C = Drainage widespread S = Red clay soils, deeply weathered, gullies widespread T = Many varieties, Ficus, Cordia, Acacia, Bamboo
Altitude metres above sea level: 1500 – 500m	**Dry Kolla** A = Sorghum rare, tef C = Water retention terraces S = Yellow sandy soils T = Acacia bushes and trees	**Moist Kolla** A = Sorghum, rarely tef, nug, dagussa, groundnut C = Terracing widespread S = Yellow silty soils T = Acacia, Eyrythrina, Codia, Ficus	
Altitude metres above sea level: Less than 500m	**Berha** A = None except irrigation areas C = None S = Yellow sandy soils T = Acacia bushes		
	Less than 900 mm	900-1400 mm	More than 1400 mm
	Annual rainfall (mm)		

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