ACCRA
AFRICA CLIMATE CHANGE RESILIENCE ALLIANCE

Understanding adaptive capacity at the local level in Mozambique

Africa Climate Change Resilience Alliance (ACCRA) Mozambique Synthesis Report

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Cover picture: Water Point – Caia District

ACCRA is a consortium initiative of Oxfam GB, Overseas Development Institute (ODI), Care International, Save the Children UK and World Vision International. ACCRA is active in Ethiopia, Mozambique and Uganda and is funded by the UK Department for International Development (DFID) and the Climate Development and Knowledge Network (CDKN).

Contents

Background and acknowledgments

This paper was written by Dr Alex Arnall, who visited the districts of Chibuto and Caia, with the support of the consortium members' field office team, and representatives of the INGC and MICOA at all levels. The paper was edited by Tom Fuller.

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Abbreviations

ACCRA	Africa Climate Change Resilience Alliance
CCA	Climate change adaptation
DFID	UK Department for International Development
DRR	Disaster riskr eduction
INGC	National Institute of Disasters Management (Instituto Nacional de Gestão de Calamidades)
LAC	Local Adaptive Capacity framework
NGO	Non-government organisation

Meboi community discussion during a seasonal exercise

Executive summary

Mozambique faces both a rapidly changing climate and development pressures. At the local level, many communities do not have the necessary tools, resources or capacity to adapt, and will require support from government and other development actors. Though most development interventions do not seek directly to address climate change, the impacts of development projects are likely to influence the ability of individuals and communities to respond and adapt. However, few development actors have considered how their interventions are influencing communities' adaptive capacity, or what can be done to further enhance it.

Research by the Africa Climate Change Resilience Alliance (ACCRA) seeks to explore how existing disaster risk reduction (DRR), social protection and sustainable livelihood interventions affect adaptive capacity at the local level in Mozambique. It does so through the use of the Local Adaptive Capacity framework, which considers five characteristics of adaptive capacity: the asset base; knowledge and information; institutions and entitlement; innovation; and flexible, forward-looking decision-making. ACCRA's research in Mozambique focuses on two of these, namely 'knowledge and information', and 'innovation'. Research was conducted in two case study sites: Chibuto District in the southern province of Gaza, and Caia District in the central province of Sofala. This report is a synthesis of key findings from this research. It aims to inform and influence the work of development partners – government, NGOs and civil society – in supporting those communities that are most vulnerable and least able to adapt to a changing climate.

ACCRA's key findings and recommendations are as follows:

1. Most farmers in Caia and Chibuto Districts believe that their responses to irregular rains, droughts and floods, which are often restricted to changing the timing of planting and harvesting, are inadequate. Instead, they would like to be able to access different land for farming in higher areas or river valleys, but are unable to do so due to land access restrictions. As a result, many households are taking up supplementary livelihood activities in response to climate and developmental pressures. Many of these activities are unsustainable, and are often only possible for wealthier people.

2. Well-supported livelihood groups consisting of more innovative farmers are relatively effective at gathering and assimilating external information. This is because such organisations provide members with space to share, test and experiment with new ideas, which helps the development of an adaptive local environment. The major problem with these groups is the actual and perceived exclusions that limit the effectiveness of knowledge dissemination to the wider community. For example, in Chibuto and Caia, many programme beneficiaries were reluctant to pass externally provided information to the wider population unless they derived clear benefits in return for their investment of time and effort.

3. Development organisations tend to assume that the means by which communities are enabled to adapt primarily comes from outside. The many autonomous adaptations observed in the case study communities were rarely taken into account by development organisations. Even when programmes invested in local initiatives, ommunity-based groups were expected to adapt their activities and aspirations according to external criteria.

4. More attention is required on how to build the strength, role and capability of community beneficiaries in developing their own adaptive capacity. This requires helping people to recognise and overcome the numerous structural, social, economic, cultural and political barriers that they face. While many development interventions are already helping with the removal of such obstacles, they can also unwittingly make them worse. In the communities studied, this was a potential problem in three main areas: socioeconomic heterogeneity, intra-community power, and the wider political economy.

5.Government and development agencies need to identify existing social, economic and political divisions and tensions at community and higher levels, and consider how their interventions may affect and be affected by them. As adaptive capacity is context-specific, the particular mix of strategies that would help remove barriers to local people's ability to find their own solutions varies. To better understand the context in which interventions will take place, more investment should be made in preliminary research.

6. Helping farmers in Caia and Chibuto overcome institutional barriers to land acquisition in new agro-ecological zones could significantly improve their adaptive capacity. NGOs should raise community awareness of land rights and laws, as well as how traditional land management methods interact with these. They should also press for improved information flows between stakeholders involved in the management of land, and facilitate consultation by decision-makers with district- and community-level stakeholders on how to interact with the private sector.

7. Wider transformational changes have been observed in trends of reduced male migration, the monetisation of local economies and the 'feminisation' of agriculture. These processes are poorly understood in the context of adaptive capacity and climate change; more research is required on these topics in rural Mozambique.

8.The release of 'pulses' from dammed bodies of water in order to facilitate irrigation or upstream navigation can take small-scale farmers by surprise and damage their crops. Government bodies and development agencies must investigate local impacts and work to develop early warning systems in order to protect farmers and their livelihoods.

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 that depend on them (Adger et al., 2002). For Africa – and Mozambique in particular – these impacts need to be considered in the context of wider development pressures, including widespread poverty, marginalisation, and the management of scarce natural resources. Each overlaps with, and is likely to be exacerbated by, a changing climate. It is vital that policy-makers and development planners understand how to reduce vulnerability to climate change, and ensure that communities have the capacity to adapt over time.

This paper contains key findings from the Africa Climate Change Resilience Alliance's (ACCRA) research in Mozambique. Section 1 explores key concepts and provides background to ACCRA. It also explains the research methodology and introduces the project's analytical tool, the Local Adaptive Capacity (LAC) framework. Section 2 highlights key climate and development challenges for Mozambique, as well as describing the main development interventions at the two research sites – Chibuto and Caia Districts. Section 3 draws on research findings to explore how communities are responding to change and how development interventions are affecting the characteristics of adaptive capacity. Finally, section 4 provides insight into what ACCRA's research means for development practice in Mozambique and beyond.

1.1 Why focus on adaptive capacity?

An alliance of five development partners – Oxfam GB, the Overseas Development Institute, Save the Children, World Vision UK, and CARE – the ACCRA consortium has evolved since its inception in 2009 in response to a call from the UK government's Department for International Development (DFID) to find evidence of how disaster risk reduction (DRR), social protection and livelihoods approaches can build resilience to climate change.

Discussions involving the ACCRA consortium, the DFID-funded Strengthening Climate Resilience consortium, and external experts highlighted two clear challenges. First, a narrow focus on humanitarian interventions and a narrow definition of resilience – the ability to 'bounce back' after a shock – does not deliver what is required by communities facing climate change. Instead, communities and systems need to adapt to challenges and uncertainties (both weather-related and beyond). However, the term 'resilience' is debated; many people now use a broader definition, with widely differing interpretations.

Secondly, one of the biggest challenges in development programming is ensuring that individuals and societies can adapt after an intervention has ended. This is crucial for climate change adaptation (CCA) programmes, because there is no end-point for the adaptation: people need to acquire the capacity to adapt for generations to come. The challenge for development practitioners, therefore, is how to meet immediate needs while also building the capacity to adapt in the future. ACCRA decided, in agreement with DFID, to reflect this need for long-term flexibility by focusing on adaptive capacity. 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). ACCRA's research – in Ethiopia, Mozambique and Uganda – aims to provide insight into how to enable individuals and communities to build their own adaptive capacity, and to understand how development interventions contribute to adaptive capacity at the community level.

As the term refers to the potential of individuals and groups to respond to change, adaptive capacity cannot be directly measured. Instead, ACCRA's research investigated the key characteristics that contribute to the adaptive capacity of a system in a particular context (see Section 1.3 for a detailed description). We investigated the impact of development interventions (DRR, Social Protection, and Livelihoods) on individuals' 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
- learn how to improve interventions in all programme approaches in order to build adaptive capacity.

The conclusions of this report are intended to support the design and implementation of humanitarian and development interventions by governments and NGOs, as well as policies that increase poor and vulnerable communities' resilience and adaptive capacity.

1.2 Understanding 'adaptive capacity' and 'adaptation'

People's environments, livelihoods and sources of wealth are influenced by climate (Adger, 2003). Variability and uncertainty in the climate is inevitable, and human societies have often had to face, and respond to, unforeseen variation in climate or weather extremes. However, the ways in which societies have coped to date, and the range of coping mechanisms employed, might not be sufficient to deal with the new challenges brought about by climate change (Van Aalst et al., 2008). The most vulnerable societies 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, which are already challenged by current climatic conditions, responding effectively to future variations will require them to modify certain characteristics and potentially transform social structures. Importantly, communities face the challenge of not only responding to changes in climate, but also other development pressures, such as shifts in economic models or patterns of migration.

Crucially, adaptive capacity refers to the potential to adapt, not necessarily the act of adapting or its outcome. 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). Thus, 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).

Adaptive capacity is multi-dimensional and its elements are not entirely agreed, although there is broad consensus that it relates to the extent to which people have the necessary tools and an environment that allows them to adapt successfully in the long term. It is context-specific, so varies from country to country, community to community, between social groups and individuals, and over time (ibid.). Practically, a combination of development choices, adaptations and local capacity is required for effective action at the local level (Kuriakose et al., 2009).

In the context of this report, the term 'adaptation' refers to *adjustments by individuals and communities in response to actual or expected adverse effects of shocks and stresses on their livelihoods and well-being, which moderate harm or exploit beneficial opportunities* (see IPCC, 2001 and TERI, 2007 for other example definitions).

This report investigates the changes that people have made to what they do and/or how they do it, without considering the stimuli or process for change, nor evaluating whether or not the change was successful. The terms 'adapt', 'adapting' and 'adaptation' are used throughout the report in this way. It is important to note that they are used differently to their role in climate change adaptation (CCA), in which 'adaptation' refers specifically to successful and sustainable actions by people and institutions in anticipation of, or in response to, a changing climate.

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 1).

Right: Discussing the seasonal calendar – Caia district

Type of Adaptation	Description
Autonomous adaptation	Adaptation that that occurs naturally, undertaken 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 the 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 their functional objectives under changing conditions.
Transformational adaptation	Adaptation that results in a change in an 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 1: Different types of adaptation at the local level

While actions will often constitute more than one type of adaptation, having a thorough understanding of these different types of adaptation is useful for characterising how people respond to change, and exploring the barriers to successful and sustainable adaptation.

1.3 The Local Adaptive Capacity framework

ACCRA's four key objectives:

1. To understand how existing DRR, social protection and livelihoods projects by ACCRA members build adaptive capacity to climate change, and how this can be strengthened.
2. To use its findings to influence donors, development partners and civil society to improve future planning and action.
3. To work with local and national governments to enhance the capacity to implement interventions that can build communities' adaptive capacity.
4. To encourage learning across countries and disciplines.

These objectives are grounded through the use of the LAC framework, which has been developed through extensive consultation with academics, policy-makers and practitioners, and has been tested in pilot studies in Ethiopia, Mozambique and Uganda. Most assessments of adaptive capacity have focused on assets and capital as indicators (Dulal et al., 2010). While useful for understanding the resources needed for adaptation, such approaches tend to mask the role of processes and functions (Jones et al., 2010).

Understanding adaptive capacity therefore, requires recognising the importance of various intangible processes, including decision-making and governance; the fostering of innovation, experimentation and the exploitation of new opportunities; and the structure of institutions and entitlements. Rather than considering only what a system has, it is important to recognise what a system does that enables it to adapt (WRI, 2009). ACCRA seeks to understand how development activities are supporting this capacity, and what can be done to further enhance it.

The LAC framework incorporates both tangible and intangible dimensions 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 framework proposes that the capacity to adapt at the community level will be broadly similar in all groups, and is separated into five distinct, yet interrelated, characteristics (see Figures 2 and 3):

- the asset base;
- institutions and entitlements;
- knowledge and information;
- innovation; and
- flexible forward-looking decision-making and governance

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).

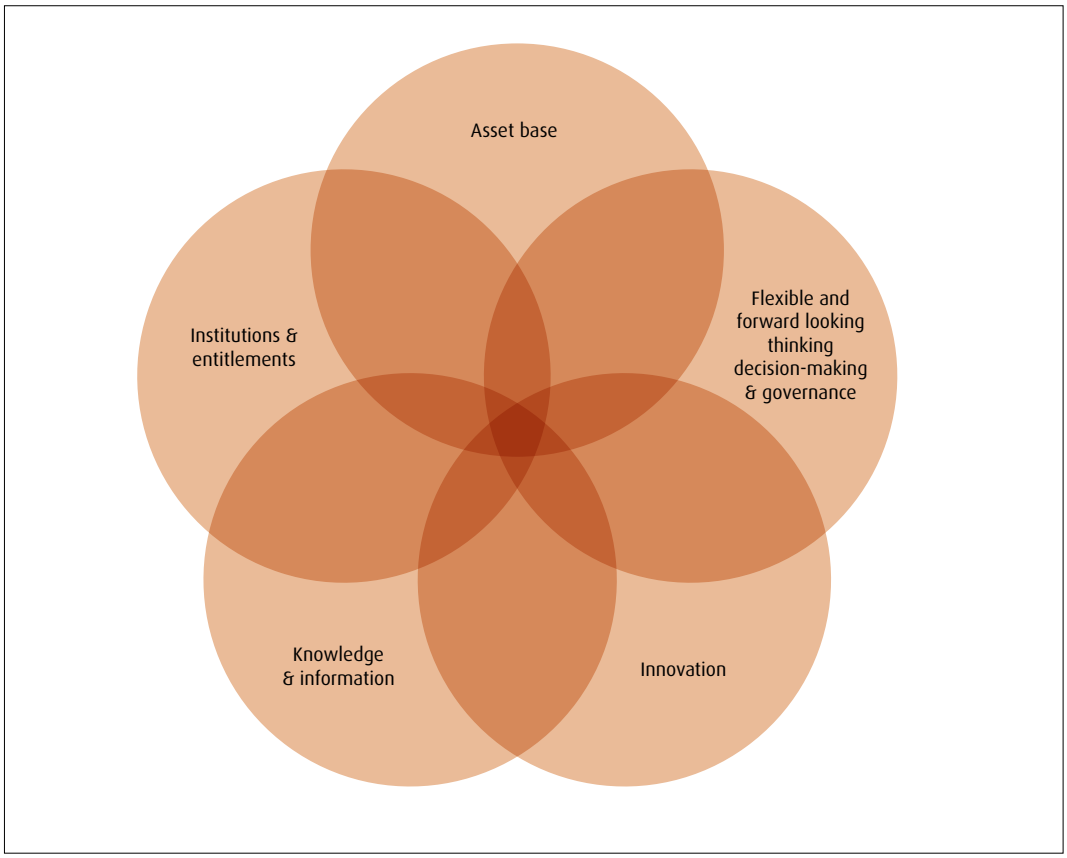


Figure 2: Relationship between characteristics of adaptive capacity at the local level

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 3: Adaptive capacity at the local level

1.4 ACCRA's research in Mozambique

ACCRA's research in Mozambique focuses on two aspects of the LAC framework: knowledge and information, and innovation. The interactions between these factors and rural development interventions are not well understood in this country, but will prove crucial in determining adaptive capacity. However, as the five characteristics of the LAC framework are interconnected, the study also relates to the other three components as necessary. Research was conducted in two case study sites: Chibuto District in the southern province of Gaza, and Caia District in the central province of Sofala. The sites were selected following consultation with local stakeholders, including the government and development NGOs.

Following development of ACCRA's framework and research guidance, a national validation workshop was conducted in Maputo, Mozambique in April 2010. This brought together government, NGOs and community representatives to test the LAC framework components and adapt them to the national context. A first phase of data collection was undertaken between November 2010 and March 2011. Fieldwork for the second phase took place in July and August 2011.

Primary data were collected in two ways. Firstly, key informant interviews were conducted with representatives of the case study communities, district governments and NGOs operating in the study areas. Secondly, focus groups were held with community members according to set criteria, with representation for men, women, and youth groups. The selection of respondents was preceded by a wealth-ranking exercise of households, carried out with the guidance of community leaders. Wealth-ranking helped to ensure that all socio-economic sections of the community were represented. Group activities were conducted with men and women separately, as well as with different wealth and livelihood groups.

Secondary data were collected from planning and reporting documents produced by national and district governments, and development agencies. Available meteorological data from the Mozambique National Institute of Meteorology were analysed.

Section 2: National and local context

National and local context

Since the early 1990s, macroeconomic reform, donor assistance and political stability in Mozambique have resulted in rapid improvements in the country's economic growth rates and poverty reduction. However, Mozambique remains dependent upon foreign assistance for much of its annual budget, and most of its population lives below the poverty line. In the 2011 UN Human Development Report, Mozambique was ranked 184th out of 187 countries.

Over 80% of Mozambique's population depends on small-scale, rain-fed agriculture (ISDR, 2009). The best soils are located in the country's extensive network of low-lying floodplains; however, these regularly experience flooding, which can overwhelm local coping capacities (Brouwer and Nhassengo, 2006). Mozambique is subject to frequent periods of drought, particularly in the internal southern and central regions, while cyclones regularly strike coastal districts in the summer. In 2000, widespread flooding in southern and central regions of the country resulted in 700 deaths, 491,000 displaced people, and millions of dollars worth of damage (World Bank, 2000).

Since this traumatic event, significant efforts by the government and donors to install early warning systems in high-risk areas, particularly the Limpopo and Zambezi Rivers, have lessened the impacts of floods. However, a wide range of socioeconomic factors, such as widespread malnutrition and HIV infection, coupled with rudimentary schooling and medical facilities mean that Mozambique remains highly vulnerable to external shocks and stresses, with limited capacity to adapt to changes. Climate change therefore presents a major challenge to sustainable development in Mozambique.

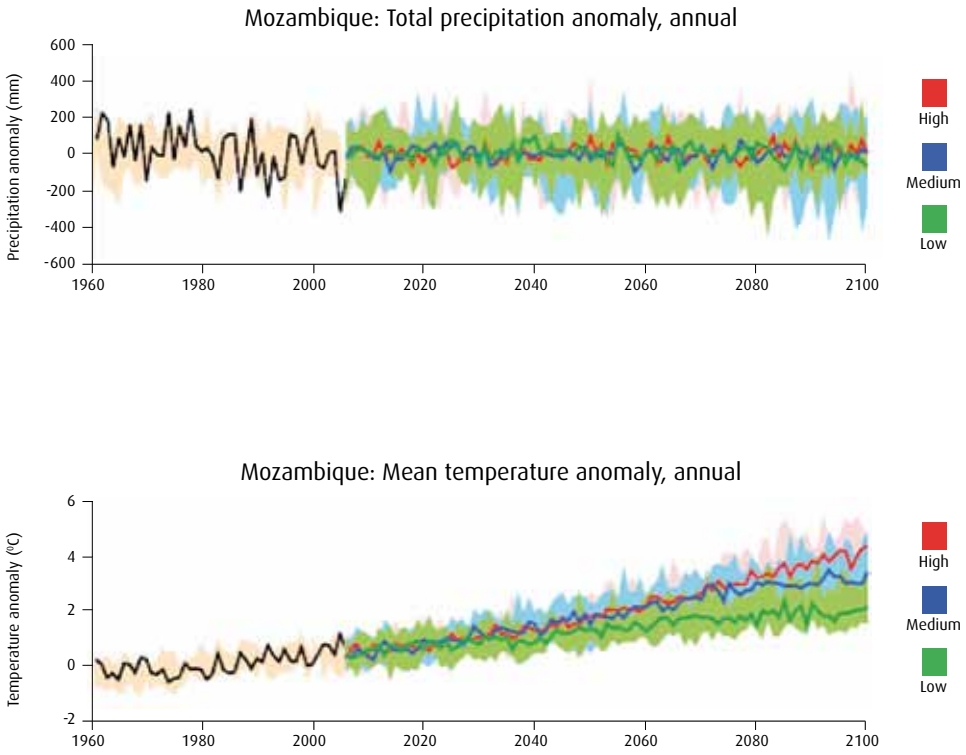
2.1 Mozambique's climate

Mozambique's climate is tropical to sub-tropical with two seasons: a wet summer from October to March and a cooler, dry winter from April to September. Average temperatures vary between 25-27°C (summer) and 20-25°C (winter) in the lowland parts of the country, and 20-25°C (summer) and 15-20°C (winter) in the inland and higher altitude northern regions. Rainfall varies considerably by region, with the wetter North receiving 150-300mm of rainfall per month, the south compared to 50-150mm in (McSweeney et al., 2011).

Heavy rainfall events are associated with the northerly passage of tropical cyclones along the Mozambique Channel, but can vary significantly from year to year, sometimes resulting in droughts or floods. Another important source of variability is the Indian Ocean's sea surface temperatures, which cause warmer and drier conditions in the wet season in their warm phase (El Niño), and relatively cold and wet conditions in their cold phase (La Niña).

This variability can mask changing trends in climate. Recent data show a decrease in mean annual rainfall over Mozambique at an average rate of 2.5mm per month (3.1%) per decade between 1960 and 2006. This is largely due to decreases in rainfall between December and February of 6.3mm per month (3.4%) per decade (UNDP, 2010). There is also evidence of a later start to the rainy season, and an increase in dry days in the northeast.

Changing trends are more clear for temperatures, with mean annual temperature increasing by 0.6°C between 1960 and 2006. This increase has been observed for the summer months, December to August, at a rate of 0.15-0.16°C per decade (McSweeney et al., 2011). Current climate models project that annual temperatures across Mozambique will have increased by 1.0–2.8°C by the 2060s, and 1.4–4.6°C by the 2090s, relative to the 1961-1999 mean climate (Figure 4). However, it is important to note that the accuracy of climate trend analysis in Mozambique is limited by the large distances between weather stations, with only one per 29,000km² (compared to, for example, one per 1,017 km² in South Africa) (INGC, 2009).



Black line: mean of observed data (1960–2006)
Brown shading: range of model simulations across 15 climate models for 1960–2006
Coloured lines: median of ensemble projections of climate under high, medium and low emissions scenarios
Coloured shading: range of ensemble projections of climate under high, medium and low emissions scenarios
Coloured bars: range of means (2090–2100) simulated by the 15 models, for each emission scenario high (SRES A2), medium (SRES A1B) and low (SRES B1).

Figure 4: Mean annual temperature and precipitation anomaly

Substantial changes in annual rainfall are not predicted. However, the difference between models is considerable, with projections ranging from from a 15% reduction to a 34% increase in average annual precipitation (McSweeney et al., 2011). Seasonally, the projections show a more coherent picture, tending towards decreases in dry season rainfall, offset partially by increases in wet seasons. The models consistently project increases in the proportion of rainfall that falls in heavy downpours – up to 15% by the 2090s. When compared to changes in evaporation rate, the models suggest that the dry season will become drier across the country by around 2055.

While changes in the intensity and tracks of tropical cyclones are difficult to predict, there is some evidence to suggest that they are likely to become more intense as a result of higher sea-surface temperatures (Christensen et al., 2007).

While some of these changes have the potential to be positive – for example, increased rainfall in the north could result in increased water resources – there will be no benefit unless capacity exists to manage such resources. With this in mind, the overall impacts of climate change will likely be negative, especially in

the long term. Changes predicted from 2050, such as possible delays in the onset of rains in the already drought-prone south, will not have positive side effects.

2.2 Background to ACCRA study sites

The two case study communities, located in Chibuto and Caia Districts, were selected to illustrate a range of livelihood activities and exposure to climatic hazards. These are summarised in Figure 5.

Site	Region	Principle climate hazard	Main sources of livelihood	Main NGO activities
Chibuto	South (Gaza Province)	Drought	Agriculture for subsistence crop production; cattle-rearing; migrant labour	Food and seed distribution; micro-credit; livelihood diversification
Caia	Centre (Sofala Province)	Flood	Agriculture for subsistence crop production and cash income; casual farm labour	Livelihood diversification

Figure 5: Summarised characteristics of both research sites

Chibuto and Caia are dominated by major river systems: the Limpopo River Basin and the Zambezi River Basin, respectively. These regions have at least two agro-ecological areas: low zones (zona baixas) close to the river, and elevated high zones (zona altas) farther away (FEWS NET, 2000). Low zones tend to have higher population density, better soils, and are more likely to flood. Agriculture is only possible in the rainy season in high zones because of the sandier soil's poor water retention of the low zones' sandier soil However, flood recession agriculture takes place in the dry season in low zones, with the cultivation of cash crops such as tomatoes, cabbage and lettuce.

Small-scale farmers traditionally live in dispersed homesteads in low areas close to their farms, moving temporarily to higher zones of land during rainy season floods. However, a complex succession of government-led interventions during Mozambique's colonial and socialist eras, including relocation, villagisation and communalisation (Coelho, 1982, Bowen, 1989), has disrupted this model some settlements are now permanently located in the elevated zones close to the river valleys. The situation was further complicated by the extensive displacement of people in rural areas due to the civil war in the 1980s (Myers, 1994, O'Laughlin, 1995). During the same period, the selling of state farms into the 'private' and 'family' sectors resulted in a relatively unregulated reorganisation of land rights among small-scale farmers (West and Myers, 1996).

Since 2000, a succession of major floods alongside growing concerns over climate change has led to a series of government resettlement programmes. These are designed to reduce exposure to floods by moving people permanently to the high zone from settlements deemed to be at 'flood risk'. Farmers living in resettlement villages are being encouraged by the government to access new land in the high zone for use during the wet season (when the risk of flooding in the low area is greatest), but to 'commute' to and from their low zone fields during the dry season, when the rich, moisture-retaining soils can be used free from the threat of flooding. To date, resettlement has mainly occurred out of the Zambezi and Limpopo valleys, although it has also taken place in other areas, including the Save and Incomati river basins. In spite of the scale of the programmes, there is little data available on the numbers moved or socioeconomic impact.

2.2.1 Case study 1: Chibuto District

Chibuto District, Gaza Province, covers an area of 5,700 km^{2,} and is home to around 200,000 people (Chibuto District Government, 2005). It consists of six Administrative Posts: Malehice, Godide, Alto-Changane, Changanine, Tchaimite and Chibuto, which contains the District Town of Chibuto.

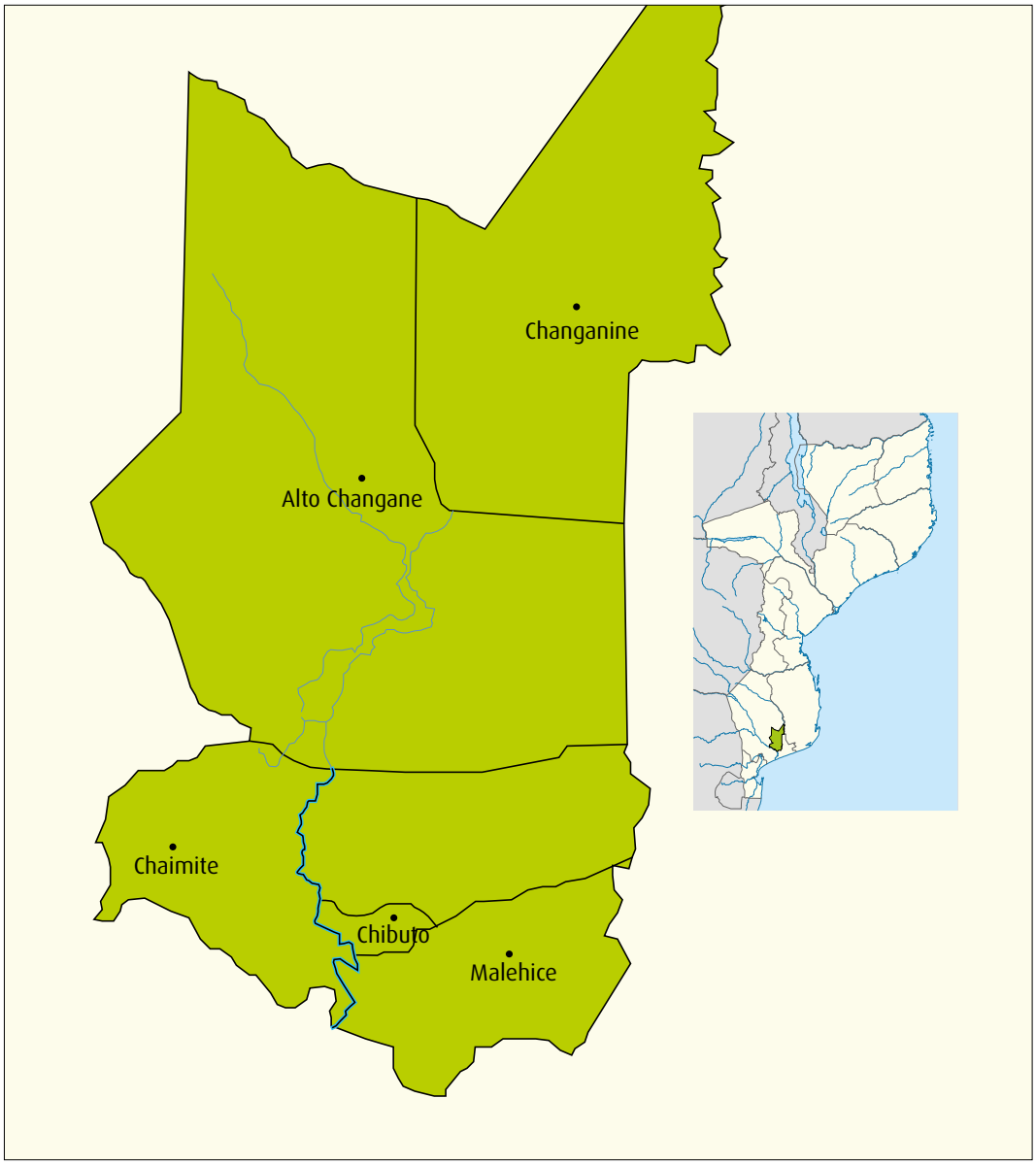


Figure 6: Map of Chibuto District

The Limpopo river is important for both crops and cattle-rearing. More minor rivers include the Changane, Chégua and Jatingué, none of which flow in the dry season. Livelihoods in Chibuto are predominantly based on the cultivation of traditional crops such as maize, cassava, groundnuts and beans, although cash crops such as tomatoes, cabbage and lettuce are also grown on riversides. The region has long supplied labour to South Africa, and young men still regularly travel in search of work, although demand has declined in recent year,s (FEWS NET, 2000). As a result of such emigration, only around 43 % of the district's residents

are male (Chibuto District Government, 2005). Therefore, small-scale agriculture in southern Mozambique has been becoming primarily women's work, and is closely associated with the raising of children (Bowen, 1989). Gaza Province has a long tradition of cattle ranching and cow ownership. The civil war and, more recently, floods, resulted in extensive losses of animals (Mattick, 2000), although numbers have begun to recover since 2000.

Household wealth differentiation is based on household size and cultivated land area, with larger, better-off families typically farming between seven and 13 hectares; poorer, smaller families typically cultivate five or six hectares. Another important indicator of wealth is livestock holdings, with the best-off households often owning the most valuable animals: cattle, including plough oxen. Poorer households possess very few or no animals, and are often restricted to chickens.

Chibuto District's climate is predominantly tropical dry, and the rainy season is the main period for agricultural production. The district receives limited and often irregular rainfall, varying on average between 400mm and 600mm across most of the district, to more than 700mm along the coast (Chibuto District Government, 2005). Extreme events, such as storms, droughts and floods, vary in frequency, timing and intensity. Recent Capacity and Vulnerability Assessments carried out by development agencies show that Chibuto District was subject to drought between 2005 and 2008, while the 2010–2011 growing season was widely regarded as good for agriculture.

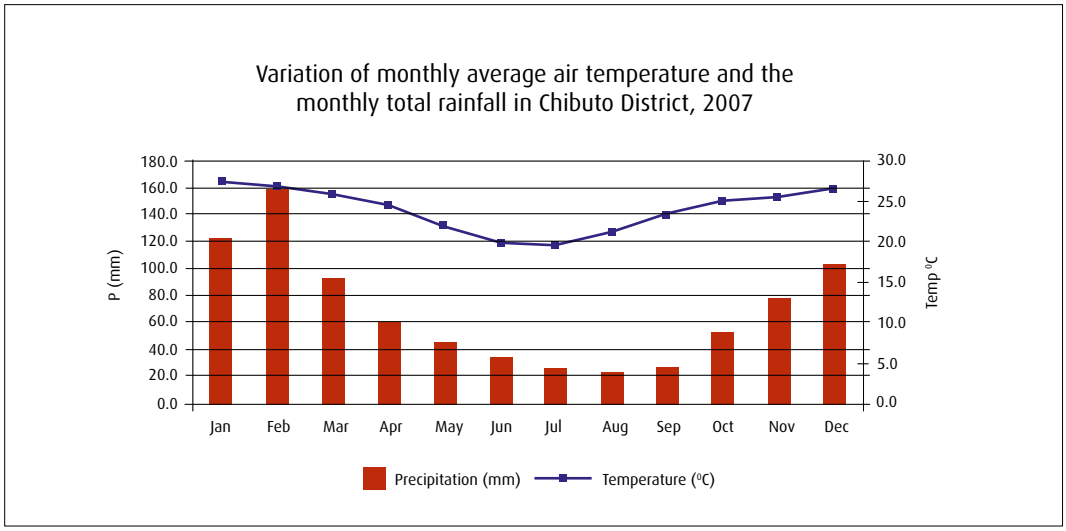


Figure 7: Variation of monthly average air temperature and the monthly total rainfall, Chibuto District, 2007.

Case study research was conducted in a *povoação*[1] (hereafter referred to as a 'community') in the Administrative Post of Godide, 25km from Chibuto town. The locality is generally considered to be poorly integrated into the nation's main market centres due to its remoteness and poor roads. According to District authorities, the case study community has a population of approximately 3,800. Livelihoods are predominantly based on rain-fed subsistence agriculture in the high zone, and residents are restricted to one harvest per year, as they do not have access to land in the low area. As a result, they are vulnerable to drought, and often experience periods of hunger between December and March before the main, rain-fed harvest take place in April. These problems are exacerbated when the rains, which normally started in September, are delayed, which is reported to occur approximately once every three years (Chibuto District Government, 2005). Rains are sometimes postponed until November.

[1]Administratively, Mozambique consists of ten provinces. which are divided into 128 districts. Below this level are localities then povoações.

At least ten NGOs have run development programmes in Chibuto District in recent years. By far the most significant is an international NGO that has been present for ten years and has implemented an integrated programme covering health, education, agriculture and microcredit. According to local respondents, the most important activities in the case study community were the formation of microcredit and livelihood groups, and seed distribution. In total, six groups were present at the time of research (four of which were involved in micro-credit), engaging approximately 120 people. Distribution of faster-growing seed varieties for maize and groundnuts had occurred annually at the start of the growing season. Although these programmes are not explicitly designed to address climate change, there is potential for them to affect local adaptive capacity, including the use of information and knowledge, and the ability to innovate.

2.2.2 Case study 2: Caia District

Caia District, Sofala Province, covers an area of 3,542km^2, and contains three Administrative Posts: Murraça, Sena and Caia town. Almost 116,000 inhabitants were counted in the 2007 District census; approximately 61,000 (53%) were female and 55,000 male. The eastern region of the district is dominated by the flood plain system of the Zambezi River and its tributaries.

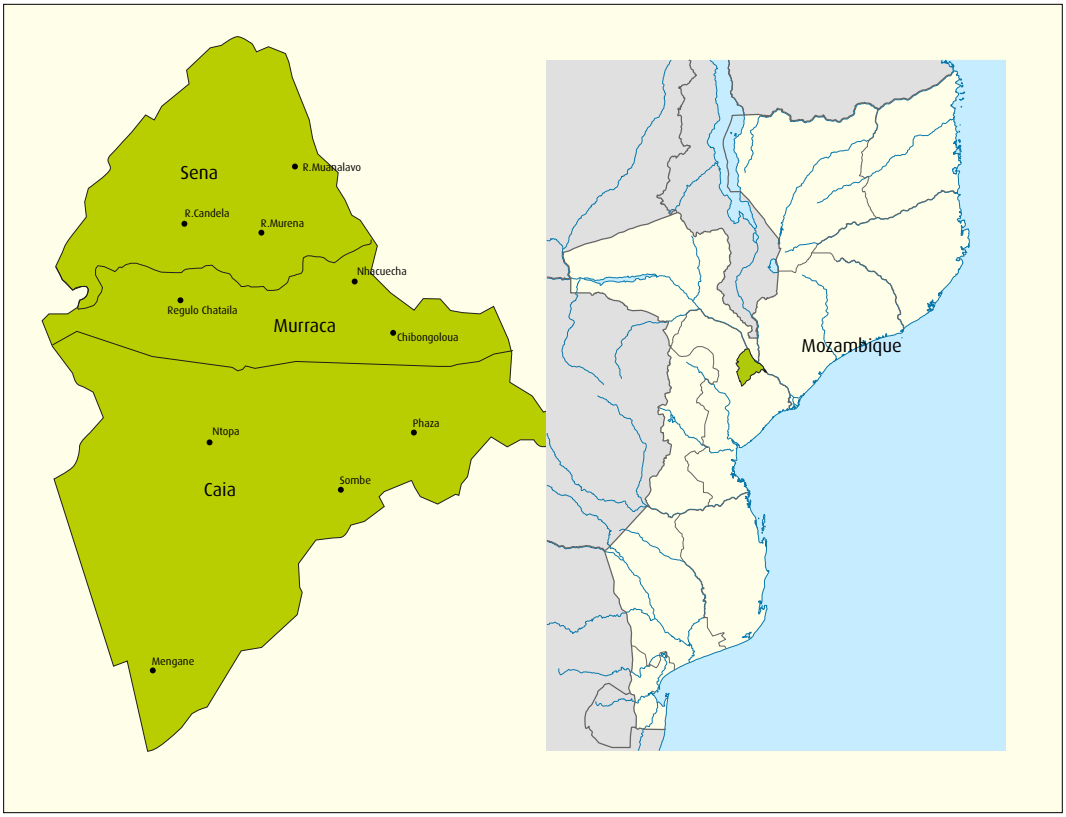


Figure 8: Map of Caia District

As in Chibuto, rain-fed agriculture is the main livelihood activity. The eastern region of the district is dominated by the flood plain system of the Zambezi River and its tributaries. For most families, the dominant consumption year is set by the main rain-fed harvest, between April and July. A second, subsidiary agricultural harvest comes from flood recession cropping on river banks, with harvest occurring between August and September. A third peak season is determined by fishing, for which the main income-earning period is between January and April, when river waters tend to be highest (USAID, 2008). Sesame is the best crop for income, although vegetables grown on the fertile river margins are highly valued.

In comparison to Gaza Province, there is less male migration out of rural areas, which is reflected in a higher proportion of men. This in turn suggests greater male involvement in agriculture compared to Chibuto District.

Cattle are highly valued for both transport services and as a 'saving' mechanism for sale during hard times. The area of land cultivated and the number of livestock owned are the primary determinants of wealth differentiation in the area, with poorer families typically cultivating less than one hectare of land and rarely owning animals. Better-off families typically cultivate three to five hectares, and own between ten and twenty goats (ibid.). Marketing infrastructure in the district is not well developed, although physical access is relatively easy. Local key informants described how the region has become increasingly integrated into the nation's main market centres since the late 1980s. This has created outlets for surplus production and resulted in increasing cash crop cultivation, facilitated by government and agency-led interventions.

The Cahora Bassa dam, constructed upstream from Caia in 1974, has significantly dampened the natural peaks and troughs caused by the annual cycle of floods in the Zambezi valley (Beilfuss and Brown, 2010; Scodanibbio and Manez, 2005). This has disrupted people's ability to anticipate and respond to the swell and ebb of the river system (Justiça Ambiental, 2011). For example, according to local key informants, the loss of predictable annual flooding in the river valley has resulted in many of its tributaries drying up. This has caused small-scale farmers and fishermen to move closer to the Zambezi's main channel to make a living, which is considerably more dangerous during the rainy season. In addition, dry season floods caused by releases of water 'pulses' to irrigate large commercial sugarcane farms and upstream navigation are taking small-scale farmers by surprise and damaging their crops.

In general, Caia's climate is semi-arid towards the north of the district and semi-tropical towards the interior and the south (Caia District Government, 2005). The annual average precipitation is 987mm, much greater than Chibuto; 80-95% of this falls between November and March.

According to the Caia District government (2005), since 2002, rainfall has been both more irregular and lower than normal, although this was not verifiable due to major gaps in meteorological data 1965. However, both drought and flood present significant ongoing risks to agriculture (Thá and Deager, 2008). Major floods in 2000, 2001 and 2007 led to the resettlement of about 20,400 people in Caia District, about 15 % of the total district population (personal communication, Caia District Government, 2011). The resettlement programme in Caia was coordinated by the District Services for Planning and Infrastructure (*Serviço Distrital de Planeamento e Infra-estrutura*) and was led by the National Institute for the Management of Disasters (*Instituto Nacional de Gestão de Calamidades; INGC*).

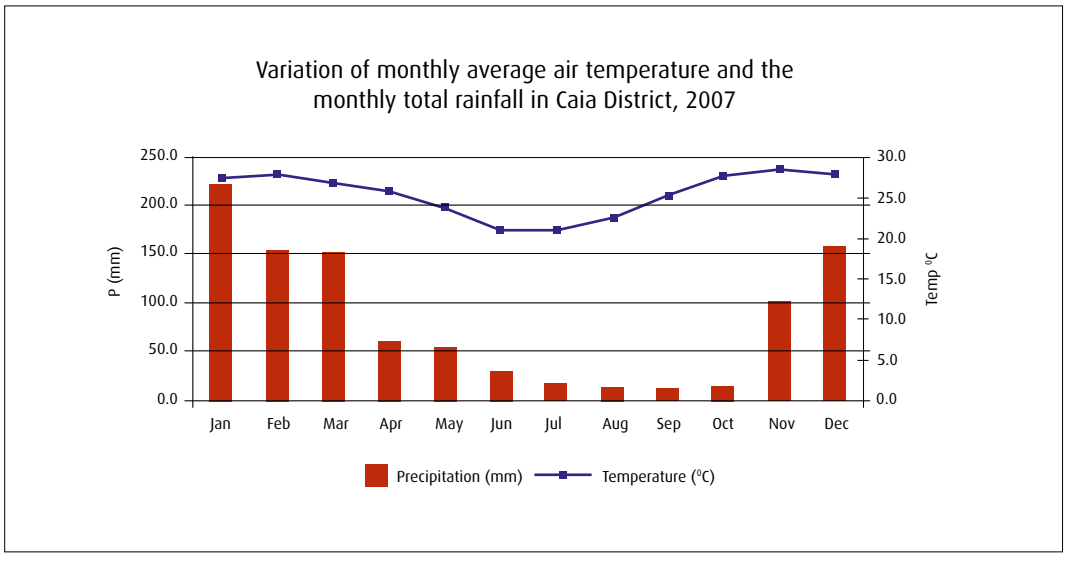


Figure 9: Variation of monthly average air temperature and the monthly total rainfall, Caia District, 2007

Research was conducted in a resettlement community in the Administrative Post of Sena, 17km from Sena town. According to local authorities, the community has a population of around 4,300 people (900 households). Since 2008, an international NGO has invested significant resources in a livelihoods project facilitating the creation of groups in this area's high zone. At the time of the research, some 200 people were involved in 14 such groups – containing 200 people, which were organised into four livelihood activities: animal traction, fish trading, goat rearing, and vegetable production with irrigation. These allowed community members to embark on livelihood projects of their own choosing, with the aim of increasing and diversifying income, in order to increase resilience to floods, drought and the impacts of climate change.

As stated in Section 2.2, resettled farmers are, in theory, able to access new land in high zones on which to safely carry out rain-fed cultivation during the rainy season, but practice recession agriculture during the dry season. According to local key informants, combined high- and low-zone farming is a relatively successful strategy for those able to work two farms. Resettlement areas are often located alongside main roads, resulting in greater access to markets and government and NGO services, such as schools and health centres. The Zambezi region has witnessed a range of donor-sponsored community-based development programmes in the past few years designed to support the resettlement process. Many of these interventions are structural and concern infrastructure development, such as construction of water pumps and improved housing.

Community committee, Caia district

Section 3: Exploring adaptive capacity at the local level

Exploring adaptive capacity at the local level

This section describes the key findings from Chibuto and Caia Districts. It highlights common features and important differences, and provides an overview of the impact of development interventions on people's adaptive capacity.

3.1 What changes concern the communities?

Respondents in both communities experienced periodic hazards. Those in Chibuto, for example, believed that the weather had become increasingly unpredictable in recent years, with delays in the rains increasing in severity and frequency. Irregular rains delayed the cultivation season (thus prolonging hunger) and affected water availability for cattle. Other hazards reported included outbreaks of cattle and goat diseases, approximately every two years, crop pests and disease. In Caia, respondents stated that increasingly severe rainy season flooding destroyed many people's crops before they could harvest them. While some blamed the Cahora Bassa dam for these changes, while others blamed alterations in climate. As stated in Section 2.2.2, it is not possible to compare perceptions of climate change with meteorological information, due to gaps in local data sets. Furthermore, scientists have not yet attempted to attribute the increasing occurrence of floods in Mozambique to anthropogenic climate change (Goodness, 2011).

3.2 How are people responding to change?

Responses to the changes described above were observed in the case study communities across a range of livelihood activities and socioeconomic groups.

3.2.1 Incremental adaptations

Relatively few adjustments to agricultural practice resulting from flood and drought were found. Most of those reported involved changes to the timing of planting or harvesting in an effort to avoid external shocks, and were taken in anticipation. Many responses to flooding were only implementable once farmers received advance warning via the community radio.

Chibuto (irregular and delayed rainfall)	Caia (floods)
50-50: If the rains come early in August, only plant half your seeds. Plant the rest in September or October, when the rainy season is more established.	**Wait and see:** Delay planting crops in the first growing season (October to March) until flooding risk has reduced, or floods pass.
Delay: When rains first arrive, delay planting by four to five days to ensure that they are not a 'false-start'.	**Early harvest:** Harvest as many crops as possible before floods arrive.
Storage for food: Plant only 80% of your maize seed; put the rest aside. The stored seed can be eaten in the event of a bad agricultural year.	**Replant:** Dig up particularly valuable crops that cannot be harvested and replant them in the high zone.

Figure 10: Responses to flood and drought impacts

In general, respondents regarded these responses to be of limited effectiveness. For example, the 'wait and see' response could set back harvests until the following year, or even risked farmers missing the entire low zone cultivation season. Other responses, such as 'early harvest', were designed to minimise losses, but were clearly options of last resort. As an alternative, many respondents in Chibuto and Caia stated that their preferred response would be to access farmland in new areas. For example, in Chibuto, a number of respondents were aware of the advantages of cultivation in thelow zone, which was largely regarded as being safe from flooding, and expressed a desire to carry out dry season crop production there. However,

they were unable to do this due to losing land rights during the civil war, when many people had to abandon the area for the safer district town of Chibuto. In Caia, many respondents that had undergone relocation to the high zone reported being unable to access new land on which to grow crops. This was because much of the surrounding high zone land was already claimed by large-scale commercial farms for the production of cotton. Therefore, in both communities, an inability to make land claims in new agro-ecological zones was limiting people's abilities to respond to period flood and drought hazards.

"You can use the land [in the high area] if you want, but it is not to be trusted." (Community leader)

"The high area belongs to the companies. You can try to grow something there, but it can be taken away from you." (Farming association president)

"There is no space in the high area. If we use the land, then we are told that it must be cotton as this is what the landowners want. But there is little money in it for us. We would prefer to grow something different." (Sesame farmer)

Figure 11: Residents speak about their inability to secure land in the high zones.

Apart from small-scale agricultural responses, a number of other incremental livelihood adaptations (see Figure 1) were observed. As described in Section 2.2.1, crop production complemented by limited livestock production was the basis of livelihoods in Chibuto. Many respondents, however, reported the increasing adoption of supplementary livelihood activities to earn extra cash, such as brewing and distilling, seasonal employment in agriculture, and self-employment (e.g. collection and sale of grasses for house construction). Poorer households, in particular, described themselves as increasingly dependent on alternative income sources, although they were caught up in the 'double bind' that drought often reduced such opportunities. Many better-off households were able to sell animals as a first defence against periodic hazards. However, this group also considered itself to be vulnerable to external shocks and stresses, particularly when water sources for cattle became scarce.

This contrasts with the case study group in Caia, where resettlement of the population led to new market opportunities for respondents from better-off households. For example, a number of interviewees described how they set up small businesses along the road and in the nearby towns of Sena and Caia following relocation out of the floodplain. Respondents from poorer households, however, remained largely dependent on agricultural labour to supplement earnings from cash crops. They stated that reliance on this income source had increased since 2000, when floods became more frequent.

3.2.2 Transformational adaptations

The main example of a transformational adapatation was found in Chibuto, where respondents reported that due to new visa restrictions and a reduction in mining jobs in South Africa, many men were seeking employment closer to home, such as in Maputo and Chibuto town, or engaging in seasonal migration after the agricultural season in June. Those returning from South Africa with significant savings could invest in cattle or small businesses, while those with little financial capital often resorted to making a living via supplementary income sources. Similarly, in Caia, respondents described how the gradual monetisation of the local economy was leading to greater cash crop production. One farmer stated:

> "A long time ago we did not produce crops for sale. We inherited this culture from our ancestors: that we should only produce enough to eat. Now the people have educated themselves, and they want to gain money. Now people come to the community and encourage us to plant vegetables as these are things that they need".

Many informants attributed the recent introduction of sesame to rising prices and increasing demand from traders who often came into the community. Since 2001, the monetisation process had been accelerated by the resettlement of the population from the Zambezi river valley, which was relatively inaccessible, to the high zone along a major road. In general, respondents were positive about the increasing importance of money in their day-to-day lives, as they regarded it as a more convenient system than barter and exchange. However, some informants commented that the greater emphasis on cultivating cash crops on river margins had destabilised the river bank in some areas, making crops more vulnerable to floods.

3.2.3 Summary of responses to changes

The above analysis points to a complex picture of change and response, which can be separated into three main categories:

1. Many of the responses to periodic hazards, including flood and drought, were adaptive in the sense that they allowed people to maintain livelihood systems under conditions of change. However, some strategies – such as harvesting grasses for sale – were problematic under conditions of local scarcity and drought, and were unlikely to be sustainable or successful in the long run. These limitations highlight a clear role for external agencies and government to enter communities and help to facilitate a more adaptive local environment. In general, poorer households were more limited in their ability to respond to, and take advantage of, change than better-off households. This suggests that socioeconomic difference should be taken into account by agencies and government personnel conducting interventions to build local capacity.

2. Many respondents expressed a desire to implement a more transformational form of agricultural adaptation that would involve gaining access to agricultural plots in new agro-ecological zones. However, most were unable to do this due to land rights. This situation was complicated in the Caia case study community by a government resettlement programme that had considerably altered entitlements to local resources. A number of positive impacts were observed, such as improved market access for better-off households; however, the considerable risks involved in community relocation in general (Cernea, 1997), and the presence of the Cahora Bassa dam as a driver of vulnerability to flooding in particular, raises questions about the effectiveness and suitability of such a top-down adaptation strategy. These issues suggest that, in addition to facilitating adaptation at the local community level, agencies and government should also pay attention to the wider political economy in which communities are situated.

3. Many respondents believed that longer-term structural processes of change, such as the 'feminisation of agriculture' (FAO, 2008) identified in Gaza Province, are likely to have important implications for their future ability to adapt. Although detailed investigation of responses is beyond the scope of this study, some changes might facilitative long-term climate change adaptation, while others might be maladaptive. Many of these processes are, at present, poorly understood and represent an important area for future research.

3.3 How development interventions affect adaptive capacity

As outlined in section 1.4, ACCRA's research in Mozambique set out to explore the interactions between the NGO inventions described in section 2.2 and two characteristics of the LAC framework: knowledgeand information, and innovation. The analysis that follows also refers to the three other aspects of the LAC as appropriate: the asset base, institutions and entitlements, and flexible forward-looking decision-making and governance.

3.3.1 Knowledge and information

A system is considered to have high adaptive capacity if it has the ability to collect, analyse and disseminate information and knowledge. Information provided to the case study communities by NGOs was usually 'injected' directly into specially formed groups with the expectation that it would disseminate to the wider population at a later stage. In most instances, this information did not relate to climate, but could be expected to have an effect on adaptive capacity. For example, training on group-based management

Community meeting - Caia district

of natural resources can increase a community's capacity for collective action, thus increasing adaptive potential (Adger, 2003). In other cases, the information provided was specifically intended to help groups respond to the effects of drought and flood. For example, members of an animal traction group in Caia reported that they had been taught by an NGO how to create silage during the rainy season, when local natural resources and materials were most abundant for use during the dry season.

Some livelihood organisations, such as those producing vegetables and rearing animals for traction, collected and used the information supplied by NGOs in a relatively effective manner by providing members with space to share, test and experiment with new ideas. In these situations, a 'learn-by-doing' approach was observed, in which temporary setbacks and failures were generally tolerated by both the group and the intervening NGO. For example, discussions with a group that had been taught how to start a new bakery business revealed how the enterprise had eventually stalled due to local competition and poor business practices. However, group members also explained how they had learned from this experience. They described changes that they were going to implement as part of a business re-launch in response to what they saw as new growth in demand for locally sourced, freshly baked bread. In this example, the group was attempting to collectively adjust its management practices in order to take advantage of new opportunities.

In other cases, the activities and budgets of livelihood organisations were closely controlled by the intervening NGO. This was due to agency fears that members might sell the assets they were provided, including seeds and fertiliser, in order to meet short-term priorities. According to the NGO in question, such short-sightedness risked undermining the group's objective of becoming financially self-sufficient over the longer-term by eroding its resource base. In practice, however, such control over the functioning of livelihood organisations meant that the information was not effectively processed into locally relevant knowledge by group members. A dependent relationship between the NGO and organisation appeared to form, with the group's local leaders stating that they had not attempted to create links with other livelihood projects or seek external investment, because the NGO had been doing "everything for them" and providing "everything they needed".

The main challenge in facilitating a more adaptive system with respect to livelihood groups lay in the dissemination of knowledge to the wider population. In Chibuto and Caia, programme beneficiaries were reluctant to pass on externally provided information unless they derived clear benefits in return, such as payment. This is because the translation of external information into forms of knowledge that are locally usable is not a risk-free business (Blaikie et al., 1997); it requires resources and effort, and project beneficiaries were keen to see a return on their 'investments'. In addition, the fact that local leaders tended to cluster around such groups indicates that local knowledge was not just beneficial economically, but also politically. In general, these factors were not taken into account by the intervening NGOs, which tended to view information as plentiful and freely available, and therefore highly amenable to distribution.

In these circumstances, the transfer of knowledge in the case study communities appeared to remain confined to what people observed each other doing, which was only possible for highly visible activities such as vegetable-growing and cattle-rearing. This problem may be rooted in the fact that the community-based groups were often viewed as beneficiaries, rather than as partners-in-development and potential agents for spreading the benefits of knowledge. The only significant exceptions occurred when an existing livelihood group 'splintered' due to an internal division or to fulfil demand elsewhere, as was observed on a number of occasions with NGO-facilitated savings and credit groups. In these cases, a member would break away from the original group to form a new organisation within the community, thus passing on their knowledge and skills to a new set of people. In the Chibuto case study community, for example, the original savings and credit organisation was reported to have split three times.

Where information provision was more passive, for example via demonstrations or instruction booklets, its adoption was more variable, because people did not always engage with the information as the interveneing NGO had expected. For example, local key informants described how farming committees had been provided with drought management manuals that described what crops to cultivate under particular circumstances. However, it was later revealed that many committees had never read the manuals due to 'lack of time'. Instead, the groups appeared to value the manuals, not as sources of information on drought-resistant agriculture, but as symbols of their status as a group that had been 'chosen' for assistance by the NGO. This further underlines the political nature of information provision to communities.

In other cases, people were able to access information, but were limited in their ability to make use of it. This was observed in relation to district meteorological services, which provided seasonal forecasts, and flood and drought warnings via local radio. The messages in these broadcasts were regularly reinforced by community-based disaster risk management groups, many of which had been set up by the government following the floods of 2000 and 2001. However, according to respondents, the advice provided by these groups mainly concerned the optimum locations for agriculture between the high and low agro-ecological zones. This, in theory, would allow farmers to make more informed decisions about where to plant their crops at certain times of the year. It was of limited use, however, in communities facing land use restrictions.

In essence, most NGOs' efforts were focussed on delivering information to groups. However, this did not mean that recipients used it in ways that were intended by the outside agencies, nor that people had the ability to act upon it. External agencies' failure to recognise that information must be transformed into

relevant local knowledge by local individuals meant that they underestimated its political significance. Therefore, in order to facilitate the improvement of adaptive capacity, agencies and the government should pay attention to how people make prescriptive forms of external information meaningful in the contexts of their day-to-day lives, and the impacts of such processes.

3.3.2 Innovation

An enabling environment that allows innovation to occur is a central component of adaptive capacity. In both case study communities, there was a widespread perception that the weather was becoming increasingly unpredictable. ACCRA's research found many innovations occurring relating to non-agricultural forms of income generation as a result of this, particularly in Chibuto, where limited rainfall and soil fertility posed considerable constraints. However, relatively few agricultural innovations resulting from flooding or drought were observed, despite the presence of a range of NGO-led initiatives designed to assist farmers cope with climate and development pressures. These included lending and savings groups; new technology, such as 'improved' seeds; and methods and tools for irrigated agriculture.

Farmers' difficulties in adopting new practices were attributed by some interviewees from the government and NGOs to de-motivation, dependency on external handouts, or a 'culture of risk aversion'. However, other key informants pointed out that, due to the inherently hazardous nature of agriculture in Mozambique, particularly in the Zambezi valley where flood recession agriculture is practised, many farmers are highly attuned to risk. Rather than being risk adverse, farmers' have learned to prioritise the minimisation and control of risks within existing activities instead of adopting new and unfamiliar practices that might bring new risks. This helps to explain why some NGO initiatives, such as credit services that involved taking on relatively large amounts of debt, were mostly unused by large sections of the local population, which preferred to avoid being held to formal loan agreements. These contrasted with interventions building on more socially embedded practices, such as social funds designed to promote income smoothing during times of crisis, which were interest-free and came with an indeterminate repayment period. These latter arrangements are similar to the informal trust-based system of 'Xtique' (Marsh, 2002), and far more popular as a result. This misunderstanding over risk management between NGOs and communities, and the role that risk played in stimulating innovation amongst small-scale farmers, can be further illustrated with regard to seed distribution (see Figure 12).

In one case study community, maize and groundnut seeds had been distributed at the start of growing season in October between 2005 and 2008. These interventions were designed to boost production due to the shorter growing cycle of externally sourced seeds relative to local varieties, even though external varieties were less drought-tolerant. Although the external seeds were considered to be superior to local varieties by the NGO staff, farmers expressed preference for the local type. The farmers were most concerned with using seeds they knew would perform reliably under the area's unpredictable climatic conditions, even if their yield was sometimes small. The NGO, however, believed that farmers should aim for maximum yield, even thought this was only possible under rather narrow parameters, including a relatively stable climate. As a result, recipients often chose to eat seeds rather than plant them alongside their local varieties, even though they accepted them from the NGO without question. Eventually the NGO became frustrated with this behaviour and ended the programme, stating concerns about 'dependency' developing among the local population. In this situation, however, citing dependency appeared to be used merely as a convenient escape for the NGO, referring to a characteristic of the local community rather than acknowledging a deficiency in their own planning and implementation.

Figure 12: Differing attitudes towards crop production, risk and drought between an NGO and a community

Teacher with pupils at Meboi Primary School

Even though most NGO interventions aimed to assist the poorest and most vulnerable, in practice most livelihood groups centred on better-off community members, including established local leaders. Research from both study sites suggests that these beneficiaries tended to have more assets, and were better able to access external sources of information and knowledge from development agencies and local government, and were therefore most likely and willing to innovate. Interviews with livelihood groups revealed that the experience gained from collectively working in financial management organisations led to greater self-confidence and the creation of a vision for community development. For example, the saving and credit organisation in Chibuto reported that it was planning to broaden its remit to include future investments in cattle, a new irrigated farm, and an office from which to manage accounts. Because adaptive capacity refers to the 'potential of individuals, communities, and societies to be actively involved in the processes of change', developing a level of self-belief amongst populations trying to respond to a changing physical and social environment is vital. These changes witnessed in the livelihood groups could be the first step towards the development of a more adaptive local environment in the case study communities.

These developments were undoubtedly positive, but their potential to 'deliver' innovation was limited by a number of actual and perceived exclusions within the communities. Credit and savings schemes tended to be run by relatively select groups of more powerful women, and some respondents felt barred from participating. This was particularly the case for female youths, who were unable to join such groups due to prohibitive fees or restrictions on the number of members allowed. Many respondents, especially male youths, were unable to differentiate between different types of organisation operating in their district, and had limited understanding of the goals and activities of NGOs operating in their communities. Some respondents pointed out that all development was directed via community leaders, and that if people were detached from the leadership then they would not benefit from external interventions. In other cases, there appeared to be exclusions within groups themselves. A number of instances were reported in which group leaders, who tended to be those with the most knowledge in the organisation's area of activity, were retaining economic benefits for themselves at the expense of the wider group. Equitable entitlements are essential to build adaptive capacity, but these shortcomings demonstrated how it can be undermined if institutions are not adopted by the wider community, and local elites are not fully supportive (Platteau and Gaspart, 2003, Platteau and Abraham, 2002).

Section 4: Relevance for development practice

Relevance for development practice

In both case studies, a variety of development interventions were examined, some of which were specifically aimed at helping people adapt to climate variability and change. All interventions, from those providing financial capital to those delivering agricultural training, had the potential to enhance adaptive capacity. These programmes had some success in the assimilation and use of information among groups to create locally appropriate knowledge, as well as in increasing confidence and vision. However, a number of limitations were also observed. Most significantly, many beneficiaries did not engage with information provided in ways anticipated by development organisations, or were unable to act upon it due to various constraints. These shortcomings meant that, in general, projects were falling short of successfully facilitating an adaptive local environment.

4.1 Shortcomings of external inventions

Many of these challenges arose due to an under-appreciation of the important role of people's agency in development interventions. 'Agency' can be defined as 'the ways in which people approach certain constraints and opportunities in their lives in an effort to engage each other in their endeavours, and encompasses both decision-making and action' (Johnston et al., 2000). Within development interventions, acknowledging agency requires that people's capabilities are fully recognised and taken seriously, which in turn promotes adaptive capacity.

An appreciation of agency also means that attention should be paid to what people are already doing. ACCRA's research in both study sites found many autonomous responses and adaptations to climate uncertainty and development pressures, which varied in their likely sustainability. However, these actions and responses were rarely taken into account by development organisations. Rather, the starting point for interventions seemed to reflect more what agencies' capabilities were, and what they could do for people, rather than a concern with what people could actually do for themselves. The overriding assumption was that the means through which people would be enabled to respond and adapt primarily came into communities from outside: 'risk adverse' and 'un-motivated' populations were considered development problems that could be resolved by well-trained development professionals via the implementation of policy. Different projects reflected these assumptions to varying extents, and some interventions did make genuine attempts to gather people's own ideas and build on them through the injection of financial resources. However, even in such cases, beneficiaries' projects were still selected for funding according to external criteria, and community-based groups were expected to adapt their activities and aspirations accordingly. Such approaches led to assumptions about what people responding to environmental and developmental change required. This often resulted in mismatches over local priorities.

4.2 Barriers to the fulfilment of adaptive potential

Instead of focusing on 'working out' what is 'best' for communities, development organisations and the government could pay more attention to recognising the numerous structural, social, economic, cultural and political barriers that people face in their day-to-day lives. They could help people to remove or overcome these obstacles, allowing individuals and communities to make meaningful choices and reach their adaptive potential. Many of the interventions observed were already making important contributions to the removal of barriers encountered by beneficiaries, for example through the provision of financial assets to overcome economic constraints to investment, boosting beneficiaries' organisational capacities to surmount social barriers to collective action, and the promotion of management skills to help tackle financial illiteracy. However, interventions can also unwittingly (or even deliberately) act to entrench barriers to agency. ACCRA's research suggests three areas in which this potentially occurred in the case study areas:

- socioeconomic heterogeneity;
- intra-community power; and
- the wider political economy in which the communities and project interventions were located.

Working towards the identification and removal of these barriers in a more unequivocal fashion would help beneficiaries to make the most of their agency and hence adaptive potential.

4.2.1 Socioeconomic heterogeneity

The importance of variations in socioeconomic status within a community has long been studied by development academics, but has yet to be fully incorporated in practice (Agrawal and Gibson, 1999). ACCRA's research in Mozambique suggests that adaptive capacity varied according to people's assets, and their access to knowledge and institutions. These differences were rarely taken into account by NGOs, however, and projects often operated at the level of the 'community' as a whole. Field research shows that better-off people were benefiting more from interventions than poorer groups; this could have hardened existing socioeconomic stratifications. In response, agencies and government need to identify the major social and economic strata that exist within communities and target different parts of projects to relevant groups. The evidence from the case studies suggests that, in some instances, it might be preferable to target more capable individuals within better-off groups to 'kick-start' innovative processes, although this risks resulting in a faulty 'trickle down' approach to development in which disadvantaged groups are unable to access benefits due to institutional barriers. In other cases, it will be more desirable to specifically target poorer groups, perhaps through the provision of 'safety net' schemes to help people avoid turning to unsustainable coping strategies during periods of hardship. As adaptive capacity is context-specific, the particular mix of strategies to remove socioeconomic barriers and thus facilitate different groups' agency will likely vary from situation to situation. Investigations to determine local stratifications can include – but must go beyond – consultations with local leaders, who cannot be assumed to represent all sections of the 'community'. Pre-intervention baseline studies can be relatively effective for identifying socioeconomic groupings and measuring impact.

4.2.2 Intra-community power relations

ACCRA's research shows how interventions should be considered political processes due to the translation of information into locally relevant knowledge by different groups. This raises the possibility that NGOs might reduce people's ability to adapt to future change via the entrenchment of existing inequitable institutions. The research findings suggest that this process might already have occurred to some extent in the case study communities, as established leaders tended to dominate NGO-initiated livelihood groups ,and there was limited knowledge transfer into the wider populations. Development organisations should therefore pay more attention to the constellation of power relationships in communities, and consider how their interventions might interact with these. There is a need to distinguish between the pursuit of rapid improvement in beneficiaries' living standards, which might deepen existing power structures, and exercises that seek to empower members over a longer timeframe, which might eventually lead to challenges to the established political order. According to Hulme (1994), many organisations have historically been reluctant to examine this problem, instead choosing to pursue a strategy of ambiguity that permits the presentation of different images to different audiences. These considerations are particularly important in rural Mozambique, where three decades of transitions – characterised by socialist policies, a protracted and low intensity civil war, and the privatisation of state assets – mean that the identification of 'legitimate' local authorities and institutions is not a simple task. These additional considerations suggest that, when designing development interventions intended to increase local adaptive capacity, agencies and the government should invest in slightly more extended periods of qualitative research that aim to explore local power relations, and how the community fits within broader contexts (Markowitz, 2001).

4.2.3 Political economy

While adaptive capacity is context-specific, the broader political economy in which communities are located is also relevant. ACCRA's research found that wider political and economic forces were rarely taken into account by development organisations, which tended to focus on the micro- and community-level. This risks projects accidentally deepening the marginalisation and disadvantage faced by beneficiaries. For

example, many development organisations are engaging in government-run resettlement programmes as 'climate change adaptation' or 'humanitarian' projects, with little consideration of their effectiveness in promoting adaptive capacity (cf. Patt and Schroter, 2008) or how they interact with national and international economic interests and pressures in the Zambezi area (cf. Thá and Deager, 2008).

ACCRA's research highlights the critical role that land access can play in facilitating adaptive capacity in and around river valleys in Mozambique. As a first step, NGOs should raise community awareness of land rights and relevant laws, and how traditional land management methods interact with these. The role of community leaders in land rights negotiations, and their relationships and responsibilities with respect to other stakeholders, can also be reinforced. District government capacity to implement existing laws needs developing. This requires the provision of extra personnel, resources and training on conflict resolution, as well as the establishment and use of monitoring and reporting systems. All these elements need to be fully integrated into a National Resettlement Policy for Mozambique. Secondly, NGOs should advocate improved information flows between all those involved in land management, and facilitate consultation by decision-makers with district- and community-level stakeholders on how to interact with the private sector. Interviews with representatives of local government revealed that the greatest challenges lie in coordinating across different administrative levels of government when making decisions about land use. More generally, Political Economy Analysis (Bjuremalm, 2006) might help development partners overcome existing social constraints and understand the complex context in which their activities take place.

Ultimately, building local adaptive capacity requires acting on an understanding of the effects of interventions upon people's agency. This is not to suggest that increasing preliminary qualitative and quantitative research will resolve every problem. However, the recognition that a concern with adaptive capacity requires the identification and removal of socioeconomic and political divisions (at community and higher levels) is itself valuable. Combined with enhanced knowledge of how development interventions work in practice, such recognition may elucidate how populations can be better helped to respond to and take advantage of uncertainty and change.

Group discussion Meboi community, Chibuto district

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