THE MISSING INGREDIENT: RETHINKING THE DROUGHT DISASTER RISK REDUCTION AND CLIMATE CHANGE ADAPTATION NEXUS IN CHIRUMHANZU DISTRICT, ZIMBABWE

MASHOKO STEPHEN GREY

A THESIS SUBMITTED IN FULFILMENT OF THE REQUIREMENTS OF A DOCTOR OF PHILOSOPHY IN ENVIRONMENTAL SCIENCE

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ABSTRACT

Two of the main challenges facing communities and governments in developing countries are the reduction of risks of hydro-meteorological hazards and adaptation to climate change. As climate variability and change impacts are becoming more visible in the form of disasters, and are negatively affecting climate sensitive livelihoods and eroding communities’ ability to fully recover, leading to increased vulnerability to subsequent climate risks. The unpredictability of current weather systems, therefore, makes it very difficult for poor governments and households to deal with adverse impacts of climate change. Furthermore, the fragmented approach to DRR and CCA with regards to practice, policy and organisational frameworks for dealing with climate risks is resulting in coordination challenges for the government departments. This study aimed to explore how local households and communities perceive and are experiencing and coping with climate change and drought, and what that means for integrating hydro-meteorological disaster risk reduction and climate change adaptation. The study was carried out in Chirumhanzu district and the methods used for data collection included: 217 household surveys; six focus group discussions; participatory learning actions methods; key informant’s interviews and document review.

The majority of households owned low value material assets and had low levels of livelihood capitals and this exposed them to the impacts of climate variability and successive droughts. This low adaptive capacity largely affected their ability to engage effective drought risk reduction and adaptation strategies for their livelihood activities in small-scale farming and livestock rearing. Vulnerability to climate risks was exacerbated by seasonal weather forecasts, which were deemed by some households to be unreliable, inaccurate and not easily understood, while others used of indigenous knowledge. Successive droughts affected households’ access to food and cash income for other household demands. Other non-climatic factors that contributed to adverse drought impacts at the household level were an emphasis on reactive humanitarian aid approach and the poor economy in Zimbabwe. Additionally, the policy framework for dealing with climate change and drought hazards is fragmented and weak; and is housed in different government departments making it difficult to coordinate and implement.

To improve climate risk management, there is need for the government to appreciate that drought risk reduction and climate change adaptation are all about reducing vulnerability. Understanding this, might assist in improving government focus on addressing the underlying causes of vulnerability and mainstreaming DRR and CCA into development processes through addressing specific and generic adaptive capacities. The thesis argues that as long as rural households are involved in climate sensitive livelihood activities and not getting meaningful intervention to diversity and/or better intensify their livelihood activities, they will continue to be vulnerable to successive climate risks. This fragmented approach to dealing with climate risks, is not yielding any successful results with regards to building resilience, risk reduction or adaptation of rural households.
DECLARATION

I, Mashoko Stephen Grey hereby declare that this thesis is my own original work. It has not been submitted for any degree or examination at any other University, and the sources I have used have been fully acknowledged and referenced. This thesis is submitted for the Degree of Doctor of Philosophy (PhD) at Rhodes University, South Africa.

Signature: _____________________________________________

Date: ________________________________________________
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List of Acronyms

AFN: Asian Forestry Network
AGRITEX: Agricultural Technical and Extension
AIDS: Acquired Immune Deficiency Syndrome
AN: Ammonium Nitrate
CBA: Community-Based Adaptation
CBDRR: Community-Based Disaster Risk Reduction
CBNRM: Community-Based Natural Resources Management
CCA: Climate Change Adaptation
CLA: Crop and Livestock Assessment
COP: Conference of Parties
CPA: Civil Protection Act
CCMD: Climate Change Management Department
CSO: Civil Society Organisation
DA: District Administrator
DAO: District Agritex Officer
DCP: Department of Civil Protection
DCPC: District Civil Protection Committee
DFID: Department for International Development
DLVS: Department of Livestock and Veterinary Services
DRR: Disaster Risk Reduction
DRRSDA: Disaster Risk Reduction and Sustainable Development Association
DSW: Department of Social Welfare
ECD: Early Childhood Development
EMA: Environmental Management Agency
EWS: Early Warning System
FAO: Food and Agriculture Organisation
FGD: Focus Group Discussion
FNC: Food and Nutrition Council
GAR: Global Assessment Report
GIS: Government Input Scheme
GIZ: Gesellschaft für Internationale Zusammenarbeit
GMB: Grain Marketing Board
GNU: Government of National Unity
GoZ: Government of Zimbabwe
HFA: Hyogo Framework for Action
HIV: Human Immuno Virus
IATF: Inter-Agency Task Force
IKS: Indigenous Knowledge System
IPCC: Intergovernmental Panel on Climate Change
IISD: International Institute for Sustainable Development
IOs: International Organisations
INC: International Communications
KII: Key Informant Interviews
LRP: Land Redistribution Programme
OCHA: Office for the Coordination of Humanitarian Affairs (United Nations)
MSD: Meteorological Services Department
MEWC: Ministry of Environment, Water and Climate
MAIM: Ministry of Agriculture, Irrigation and Mechanisation
MLGNH: Ministry of Local Government, Public Works and National Housing
MPSLSW: Ministry of Public Service, Labour and Social Welfare
NCCO: National Climate Change Office
NCCRS: National Climate Change Response Strategy
NEWU: National Early Warning Unit
NEP: National Environmental Policy
NCCTF: National Climate Change Task Force
NCP: National Contingency Plan
NGO: Non-Governmental Organisations
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<tr>
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<tbody>
<tr>
<td>NPCP:</td>
<td>National Policy on Civil Protection</td>
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<tr>
<td>NPDM:</td>
<td>National Policy on Drought Management</td>
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<tr>
<td>NTFP:</td>
<td>Non-Timber Forest Products</td>
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<td>OPC:</td>
<td>Office of the President and Cabinet</td>
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<td>PA:</td>
<td>Provincial Administrator</td>
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<td>Pressure and Release Model</td>
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<td>PCPC:</td>
<td>Provincial Civil Protection Plan</td>
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<td>PDL:</td>
<td>Poverty Datum Line</td>
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<td>PLAM:</td>
<td>Participatory Learning and Action Methods</td>
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<td>RDC:</td>
<td>Rural District Council</td>
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<td>Rural Livelihoods Assessments</td>
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<td>Statistical Package for Social Sciences</td>
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<td>SREX:</td>
<td>Special Report on Managing the Risks of Extreme Events</td>
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<td>United Nations International Strategy for Disaster Reduction</td>
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<td>VIDCO:</td>
<td>Village Development Committee</td>
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<td>WADCO:</td>
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WFP: World Food Programme
WHO: World Health Organisation
WMO: World Meteorological Organisation
ZANU PF: Zimbabwe African National Union Patriotic Front
ZFU: Zimbabwe Farmers Union
ZHDS: Zimbabwe Household Demographic Survey
ZimVAC: Zimbabwe Vulnerability Assessment Committee
PART ONE: SETTING THE SCENE

CHAPTER 1:
INTRODUCTION

1.1 Background to the Study
1.1.1 Overview and Purpose of the Chapter
This chapter outlines the current trends on climate change and hydro-meteorological disasters. It further provides insights into the climate change adaptation (CCA) and disaster risk reduction (DRR) interface, with regards to how these two approaches are viewed from a global and national perspective based on institutional and policy set-ups. In this chapter, the problem statement is outlined together with the objectives of the study. Aspects on the ethical considerations during the fieldwork and the outline of the thesis are also discussed.

1.1.2 Climate Change and Hydro-Meteorological Disasters: A Global Perspective
Two of the main challenges facing communities and governments in developing countries are the reduction of risks of hydro-meteorological hazards (Disaster Risk Reduction, DRR) and adaptation to climate change (Climate Change Adaptation, CCA) (England et al. 2016; Peek 2016). CCA can be defined as “the adjustment in natural or human systems in response to actual or expected climatic stimuli or their effects, which moderates harm or exploits beneficial opportunities” (Intergovernmental Panel on Climate Change, IPCC, 2007). In some natural systems, human intervention may facilitate adjustment to expected climate variability and change, and its impacts (IPCC, 2014). For example, smallholder farmers in semi-arid regions can grow drought tolerant crops in anticipation of reduced rainfall or droughts. The IPCC (2014) concludes that climate change is unequivocal and already happening. The ten warmest years on record have all been recorded since 1990 to date (WMO 2004; Berman et al. 2015; England et al. 2016). Future projections suggest that the global average temperatures will increase by 1.4°C from 1990 levels by the end of the 21st century (VARG 2005; IPCC 2014).
The report further predicts that under medium emissions scenarios, the mean annual temperatures over large areas of Africa will be $2^\circ C$ higher in the mid-21st century compared to the late 20th century (IPCC 2012; IPCC 2014). This average increase in temperature is associated with local and regional changes in climatic conditions (IPCC 2007; IPCC 2014), with variations across the world (Africa included), but with overall adverse impacts on agriculture and food security (UNISDR 2012; IPCC 2014; Peek 2016).

In addition, the increasing frequency of extreme weather occurrences throughout the world in recent years, associated with climate change, has increased sensitivity to the potentially dramatic social and economic impacts of climate change (Mubaya & Yanda 2010; UNISDR 2012; UNISDR 2015). This trend is expected to continue and increase significantly, with attendant negative effects on livelihoods and natural systems (Mubaya & Yanda, 2010). Although climate change negatively affects the continent of Africa, its impacts are not uniform, mainly because of prevailing differences in geographical, environmental and socio-economic characteristics (Mubaya & Yanda 2010; Mubaya et al. 2012; Shackleton et al. 2014). De Souza et al. (2015) argue that differences in vulnerability and exposure might arise as much from non-climate stressors and multi-dimensional societal inequalities, as from changes in the climate itself. Many scholars further state that climate variability and change is threatening biological, environmental and socio-economic systems in both unprecedented and often unpredictable ways (Walker et al. 2004; Root et al. 2005; Parmesan 2006; Lavell et al. 2012; IPCC 2012; IPCC 2014; De Souza et al. 2015). The unpredictability of the current weather systems therefore makes it very difficult for poor communities and governments, especially those in developing countries, to deal with the adverse impacts of climate change (Parmesan 2006; Dube 2008, IPCC 2012; IPCC 2014; Nagonda 2015; Peek 2016).

Climate change impacts are becoming more visible and extreme weather events are becoming more frequent (Shaw et al. 2010a; Gaillard & Mercer 2012; Mercer et al. 2014; Schipper et al. 2015). These recurrent hydro-meteorological hazards negatively affect highly sensitive livelihood strategies and economies in southern Africa (that are agricultural driven) and
elsewhere, and erode communities’ ability to fully recover, leading to increased fragility and vulnerability to subsequent disasters (FAO, 2014a). Disaster risk reduction (DRR) is a key strategy for agriculture since the majority of the rural households who are vulnerable to climate-related hazards and disasters are food insecure and in abject poverty (ibid.).

As used in this study, DRR is defined as “the framework of strategies, policies and practical elements required for the purposes of reducing human vulnerability and minimising disaster risk in a society, in order to avoid (prevent), limit (mitigate) and prepare for the adverse impacts of hazardous events” (UNISDR 2009a). Therefore, emergency response and recovery measures for rural households should aim to rapidly rebuild agricultural capacities while adhering to the principle of ‘Building Back Better’, and assuming that natural hazards in prone areas will occur again (DFID 2011; FAO 2014a; Kelman et al. 2015). As defined by UNISDR (2009b), a natural hazard is “a dangerous phenomenon, human activity or condition that may cause harm, loss of life, injury or other health impacts, property damage, loss of livelihoods and services, social and economic disruption, or economic damage”. IPCC (2014) also defines hazard as “the potential occurrence of a natural or human-induced physical event or trends or physical impact that may cause loss of life, injury or other health impacts as well as damage to and loss of property, infrastructure, livelihoods, service provision, ecosystems and environmental resources”. A hazard only becomes a disaster if it adversely impacts on the life or livelihoods of people (Blaikie et al. 1994; Turner et al. 2003; Winser et al. 2004; Cutter et al. 2008). Hence, the promotion of resilience of rural livelihoods calls for synergies between technical good practices for DRR and CCA (Shaw et al. 2010a; Kelman 2015). Kelman et al. (2015) argue that CCA should become one of the many processes within DRR. Despite this recognition, O’Brien et al. (2008) point out that the main challenge lies in building a conduit between current DRR practices aimed at reducing human vulnerability to extreme events, and efforts to promote CCA to respond to multiple changes in climatic factors. The above authors further comment that DRR should also take into account development and sustainability issues, to avoid seclusion from topics wider than disaster risk (IPCC, 2014).
Moreover, recent approaches to DRR have begun to recognise the socio-political and economic aspects of poverty as the underlying factors for disaster risk, and that strengthening livelihoods is an important strategy for preventing disasters (Practical Action 2009; UNISDR 2012; Moore et al. 2014). Failing to take into account the interplay of issues within sustainable development, will result in DRR and CCA constituting an isolated evolution of practices (Shaw et al. 2010a; Kelman 2015; Serrao-Neuman et al. 2015). The response strategies, policy frameworks and organisations for DRR and CCA continue to be applied in a disjointed manner and are thus likely to exacerbate the impacts of drought disasters on rural communities (Shaw et al. 2010b). Furthermore, poor coordination amongst the organisations dealing with hydro-meteorological DRR and CCA has resulted in the duplication of activities and misdirection of resources and efforts (Kelman et al. 2015). Moreover, intervention by organisations, when a disaster occurs, have been focused on short-term solutions for the affected communities; hence the need for a paradigm shift towards sustainable drought risk reduction and climate risk management (Shaw et al. 2010a; Shaw et al. 2010b; Kelman et al. 2015). This is nowhere more needed than in Zimbabwe, which is prone to frequent drought disasters, and where DRR and CCA are dealt with in a fragmented manner (Section 1.1.3).

1.1.3 DRR and CCA Interface

As alluded to above, climate change has implications with regards to hydro-meteorological DRR as it increases as well as modulates underlying risk factors such as droughts (UNISDR, 2015). Furthermore, the changing climate leads to changes in the frequency, intensity, spatial extension, duration and timing of extreme weather events and climate-related hazards (IPCC 2012; IPCC 2014). This increase in the frequency of hazardous episodes creates a new and exacerbating environment for potential disasters. Poor households and communities are therefore more exposed to droughts and other hydro-meteorological hazards (Ostrom 2007; Shamano 2010; Nangombe 2013). Drought hazards are extreme weather events of concern, the frequency and intensity of which has been significantly increasing due to the influence of climate change (Chagutah 2010; IPCC 2012; Mubaya et al. 2012; IPCC 2014; Mubaya and Mafongoya 2016). Droughts are particularly significant hazards in Africa, accounting for
approximately 25% of all natural hazards on the continent for the period starting from the 1970s to date (UNISDR 2004; Serrao-Nueman et al. 2015).

Since developing countries are likely hardest hit by the impacts of climate variability and change (as mentioned earlier), their capacity to respond to drought hazards is low, with the adverse impacts being worst among the poorest households in a community (Chagutah 2010; Ribot 2009; IPCC 2014; Shackleton et al. 2014). Nhemachena et al. (2014a) argue that extreme weather events, poverty and over-exploitation of natural resources, amongst many other stressors, often congregate to most affect those who have the fewest livelihood options and resources for dealing with these stressors. It seems clear that vulnerability to extreme weather events is closely related to poverty levels, as the poor are the least prepared to respond to climate change (InfoResources 2009; IPCC 2014; Nhemachena et al. 2014a; Rurinda et al. 2014; Shackleton et al. 2014). Africa is the only continent where the regional share of reported disasters has increased over the past decade (DRRSDA 2004). From 2000 to 2001, about 35 million people (13% of the total population in Africa), were affected by disasters (UNISDR, 2004). In addition, the majority of disasters in Africa are hydro-meteorological in nature, with droughts affecting the largest number of people on the continent (DRRSDA 2004; UNISDR 2004; Mubaya et al. 2012; Bongo et al. 2013). Therefore, failure to address climate risks threatens developmental gains across various sectors of both the micro-and-macro economies, making Africa more vulnerable to future climate hazards (Nhemachena et al. 2014a).

Hydro-meteorological DRR and CCA approaches to deal with climate change need to be linked (Schipper and Pelling 2006; Thomalla et al. 2006; O’Brien et al. 2008; Mitchell and van Aalst 2008; UNISDR 2008; Practical Action 2009; Mercer 2010; Turnbull et al. 2013). This emanates from the fact that the negative impacts of climate change on communities increases their disaster risk and erodes adaptive capacity, thereby creating a platform for future disasters (Pelling & Schipper, 2009). Adaptive capacity is “generically the use of available skills, resources and opportunities to manage adverse conditions with the aim of achieving basic
functioning in the short to medium term” (Lavell et al. 2012; pg 33). The vulnerability analysis approach, initially developed for poverty and food security studies, has become a unifying framework for the CCA and DRR communities (Turner et al. 2003; InfoResources 2009). Rivera et al. (2015) further argues that the need to address DRR and CCA simultaneously for achievement of coordinated actions has been emphasized by both UNISDR and IPCC-SREX (2014) reports. The 2014 SREX report not only identified the link between climate change and extreme weather events, but also considered what it meant for DRR and CCA in the context of sustainable development (IPCC, 2014). Given this scenario, the disaster risk community encourages the use of tools, methods and policies of DRR as the basis for the reduction of vulnerability to climate variability and change (O’Brien et al. 2008; Birkmann & Teichman 2010; Gaillard & Mercer 2012; Schipper et al. 2015).

Despite the close linkages between hydro-meteorological DRR and CCA, and the suggestions for convergence in their policies and strategies, in practice they continue to be treated separately from one another through the different conceptual, organisational and policy frameworks that exist (Chapter 7: Section 7.2). This has been evident even at the global level where DRR is dealt with in the United Nations World Conferences on Disaster Risk Reduction (Sendai Framework for Action 2015-2030) and CCA dealt with under the United Nations Framework Convention for Climate Change-UNFCCC (UNISDR, 2012). In Africa, at the regional level, there is the Africa Regional Strategy for Disaster Risk Reduction 2006-2015 (DRR) and the Bali Action Plan established in 2007 under the UNFCCC. The two concepts (DRR and CCA) have thus tended to occupy separate policy spheres at the global, regional and national levels despite their overlap. However, at a local level households are not aware of the differences between DRR and CCA, but rather they are concerned with reducing climate risk impact on their livelihood activities. Instead of recognising this, and merging efforts and strategies on common approaches, DRR and CCA practitioners often try to “re-invent the wheel” by coming up with separate frameworks (Mercer, 2010). Consequently, it is now evident that DRR (mainly focused on coping strategies) and CCA (community adaptation) should not be dealing with unique and separate aspects but rather with the common goal of reducing communities’
vulnerability and enhancing their resilience (Pelling & Schipper, 2009; UNISDR 2012; UNISDR 2015; Rivera et al. 2015). Neither DRR nor CCA is about addressing disasters or climate change in isolation, but about confronting the societal context in which these changes are occurring (O’Brien et al. 2008; Ribot 2013; Ribot 2014). The societal vulnerability to climate change impacts, including extreme events, has become the common ground for dealing with climate-related DRR and CCA. In that regard, Cutter et al. (2008) states that the factors behind climate-related hazards and disasters have always been social. The author further points out that vulnerability to climate-related hazards is the outcome of social precariousness found at grassroots level when a hazard arrives. Mercer (2010) argues that if DRR is implemented efficiently, it would in turn directly enhance the building of resilience and adaptation to climate change impacts. It is against this background that it is argued that the first stage in dealing with climate change is DRR, and hence CCA should be part of DRR (Kelman 2015; Kelman et al. 2015).

Nevertheless, the main challenge being faced by both DRR and CCA practitioners is bridging the gap between current hydro-meteorological DRR policies and approaches and CCA, so as to reduce vulnerabilities to climate risks (O’Brien et al. 2008). For climate-related DRR to be effective, there is a need to consider the changing climate patterns and trends, and since drought hazards are climate change extreme weather events, consequently DRR is the natural entry point for adaptation (DFID 2002; Tearfund 2008; Mitchel & Aalst 2008; Kelman et al. 2015). Practical Action (2006) reiterated that the complexity of interactions between CCA and DRR, as well as the highly context-dependent impacts of climate variability and change, would create a high degree of unpredictability. The significance of DRR-CCA synergy cannot, however, be felt by vulnerable local households, who do not feel the impacts of climate variability or risk-reduction strategies sectorally or separately (Shaw et al. 2010b). Climate change will also prove to be a major challenge to DRR strategies especially when CCA and hydro-meteorological DRR (drought-focused) efforts are dis-jointed (UNISDR, 2008).

Adaptation to climate change in Africa is possible, with strategies ranging from autonomous adaptation to deeper transformational changes, which may also include improved
technologies in agriculture, diversification of livelihood strategies, better trade policies and stronger social protection programs (Blair et al. 2014; Dinesh et al. 2015). However, the effectiveness of such strategies in fostering hydro-meteorological DRR and CCA depends on the underlying cultural or traditional fabric of local institutions within communities, through which the incentives for individual and collective actions are structured (Adger et al. 2009). Birkman & Teichman (2010) advocate community-based approaches as the entry point for both DRR and CCA. Mearns et al. (2010) further argue that historical experiences and knowledge about community-based adaptation and risk reduction are important for future policy formulation regarding vulnerability to the impacts of climate change (Chapter 6: Section 6.4). To that end, the capacity to cope with and/or adapt to climate change depends to a significant degree on the ways local institutions regulate and structure their interactions, between themselves and with external organisations (Pelling, 2015).

One of the major factors behind the slow progress in development and the reduction of vulnerabilities to the impacts of climate change and extreme events, despite interventions by external organisations (Chapter 7: Section 7.4), is the imposition of top-down alien ideas and practices that fail to take into account local contexts (Dodman & Mitlin, 2015). The little work done on climate change issues so far has undertaken limited analysis of the different types of organisations that are relevant to different forms of hydro-meteorological hazards. This has resulted in lack of understanding of the roles played by local organisations in the context of adaptation as well as risk reduction in rural areas (Mearns et al. 2010). The differential location of DRR and CCA organisations as well as those coordinating the processes often result in disharmony in their efforts (Pelling 2015).

Such lack of coordination and attention to local context can result in communities and their livelihoods being destroyed by the disaster caused by droughts or other extreme events. The end result of such a situation is often a focus on short-term benefits (food aid) for communities, ignoring sustainable long-term efforts (preparedness, early warning systems, sustainable livelihoods and an integrated approach to DRR and CCA) to mitigate, recover from
and prevent susceptibility to future risks (Mubaya et al. 2012; Peters 2015). Wilhite et al. (2014) also note that responses to drought by governments in many developing nations are mostly reactive, poorly coordinated and untimely, and typically characterised as crisis management. However, a few countries (in Asia and the Pacific) are now beginning to recognise the slow progress made by these individualistic and uncoordinated approaches to solve the same aspect of reducing vulnerability, and hence, greater efforts are being made to link DRR and CCA (UNISDR, 2012). It is increasingly being recognised that short-term and uncoordinated approaches to climate variability and extreme events puts households in dire situations, where adverse impacts are exacerbated, and they become more vulnerable to climate risks (Shaw et al. 2010a; Dodman & Mitlin 2015; Kelman et al. 2015).

In Zimbabwe, which is the focus country for this study, humanitarian assistance and disaster management are still the largely dominant responses to disasters, once they have already occurred (Tearfund 2008; Practical Action 2009; Chagutah 2010; Shamano 2010; Mutasa 2015). DRR in this context plays more of a mitigatory role of trying to reduce loss of life and livelihood. However, this approach to DRR does not address the underlying causes of the disaster occurrence as discussed above (Thomalla et al. 2006). This is because the relief and DRR agencies often focus on relieving immediate needs, with more emphasis on food aid distribution and little on reviving livelihoods. Consequently, in many cases the hydro-meteorological disaster responses may even exacerbate the underlying causes of vulnerability in the affected communities and create further vulnerability to climate risks and uncertainties (Shaw et al. 2010b). This combined with the usually prompt international response to disaster situations, for example the provision of short-term humanitarian assistance and the opportunity, especially for the already weak governments, to build political mileage out of a disaster situation, further enhances disaster management as opposed to a disaster risk reduction (DRR) approach. This situation of exacerbated vulnerability is a result of short-term solutions that create a dependency on external assistance among communities (Mubaya et al. 2012). One of the factors creating this situation is that funding for development is processed
very slowly in developing countries, as opposed to that of humanitarian funding, which can only be granted after a crisis (disaster) has occurred (Africa INFORMS 2012; Pelling 2015).

At the national level, the organisations dealing with DRR and CCA are often housed in different ministries and government departments, as is the case in Zimbabwe. DRR and CCA institutions are found in distinct structures that fall under the Ministries of Environment; Local Government; and Agriculture and Public Service. These Ministries are involved in different and sometimes overlapping responsibilities including environmental management and meteorological services, civil protection, agriculture and food security, and social welfare. Each institution through its own inter-sectoral coordination has its own source of funding and different intervention entry points, as shown by the international agreements signed by the Government of Zimbabwe (United Nations Framework Convention on Climate Change-UNFCCC and Conference of Parties COP-21, Hyogo Framework for Action – HFA 2005-2015 and the Sendai Framework for Action 2015-2030).

In Chirumhanzu district in Zimbabwe, where this study is focused, different organisations including government departments are involved in DRR and CCA at the district level. To make matters worse, many of these organisations sometimes perform tasks that overlap resulting in wasted efforts and resources, as well as missed opportunities to build resilient communities to future drought disasters and extreme weather events (Pelling & Schipper 2009; Mercer 2010; Lavell et al. 2012; Moore et al. 2014). Thus, DRR and CCA provide a range of complementary approaches for managing the risks associated with climate extremes and disasters (IPCC, 2012). Organisations working in Chirumhanzu district continue to miss the existing link between DRR and CCA that could be explored in an effort to reduce the community vulnerability to climate change variability and extremes. A further result, of communities dealing with climate change trends and weather extremes as separate issues, ensues. These current approaches might produce unintended negative results in the communities and at household levels.
It can be argued therefore that, for viable coping and adaptive strategies to drought hazards, there must be a shift from the mitigation of an immediate disaster (reactive) to more focus on long-term community livelihoods (proactive). This shift would trigger development, DRR and CCA at a local level and the building of a more resilient community to the impacts of future hazardous events and other aspects of climate change. However, integrating DRR and CCA approaches for climate risk reduction will face challenges that range from aligning funding opportunities and developing a policy framework that will address vulnerability, while including DRR, CCA and poverty issues. Therefore, there is a need to explore the opportunity of consolidating climate-related DRR and CCA efforts and effectively reduce vulnerability to climate risk while saving resources.

1.2 Problem Statement
A significant number of studies have been undertaken on the impacts of climate change, climate change adaptation, drought disaster and coping strategies in rural communities in Zimbabwe (Chigwada 2005; Nhemachena et al. 2014a; Unganai 2009; Chagutah 2010, Brown et al. 2013; Rurinda et al. 2014; Dube 2015; Mutasa 2015; Sango & Godwell 2015). While the two are clearly linked, many studies have only focused on one – either disaster risk reduction or climate change adaptation in rural communities. However, limited studies have tried to explore the possibility of an integrated approach to DRR and CCA in the rural communities. This means that there is little knowledge on how different approaches to hydro-meteorological DRR and CCA can contribute to reducing community vulnerability especially in rural areas of developing countries and particularly in Zimbabwe.

The increased frequency in climate extremes (drought included), especially in the Chirumhanzu district beginning in 1980 to date, has been attributed to climate change impacts and have resulted in vulnerability, with catastrophic losses socially, environmentally and economically (DCP Report 2015). The heavy reliance on rain-fed agriculture by the rural population has exposed the communities in the district to drought hazards. The livelihoods of the communities are being, with increasing frequency, affected by drought, and in highly
adverse ways, giving rise to tenuous resilience and coping strategies. At the same time, development efforts that could have been pivotal to building resilience and reducing community vulnerabilities are not mainstreamed to DRR and CCA (Pelling 2015; Schipper et al. 2015). This means that communities are therefore more vulnerable to future drought hazards, which may increase, year by year, the risks of poverty traps and chronic food insecurity in households and communities, due to failure of the harvests needed to meet food requirements and generate income from produce. In other instances, some households may fail to recover at all from the negative impacts of climate variability and extreme weather events. Sallu et al. (2010) note that some communities in Botswana, as a result of climate change, were exposed to multiple shocks (including drought and degradation), and that many of the poorer households failed to recover from the impacts, even after 15-20 years.

This study seeks to fill the knowledge gap in how communities respond to climate change and drought and how DRR and CCA strategies can be mutually supportive in reducing vulnerability. The work presented in this thesis seeks ways to integrate CCA and DRR in the rural Zimbabwe context based on the experiences of affected households and communities. Therefore, what makes this thesis novel and significant to the literature is its focus on bridging and integrating DRR and CCA (the missing ingredient) to reduce community vulnerability in rural areas.

1.3 Research Objectives
The main aim of this study is to explore how local households and communities are experiencing and coping with climate change and drought, and how, if addressed, the integration of hydro-meteorological disaster risk reduction and climate change adaptation could reduce vulnerability, build adaptive capacity and result in more effective long term responses.

The specific objectives of the study include:

1. To explore the existing household vulnerability context in relation to assets and livelihoods and local socio-economic conditions.
2. To investigate household and community perceptions and experiences of climate variability and change and drought, and the impacts of drought events on local livelihoods.

3. To understand local household and community responses to drought impacts.

4. To examine policy frameworks and the roles played at the local level by national and district organisations involved in hydro-meteorological DRR and CCA, and households’ perceptions of external interventions in response to drought events.

5. To explore whether DRR and CCA can be merged to build a community more resilient to future uncertainties and extreme weather events.

1.4 Ethical Considerations

This study gave due consideration to the following ethical research issues:

**Research permission:** Permission was obtained from the relevant Ministries (Environment, Local Government) and Departments (Department of Civil Protection, National Climate Change Office, Agritex) at national level, and local level (District Administrator, Ward Councilor, Headman and Village Heads). Introductions and courtesy calls were done at all levels and the purpose and objectives of the research were explained to those concerned. This helped rule out any elements of suspicion and provided a clear understanding of the study. The Ward Councilors were the key reference point as advised by the Chirumhanzu Rural District Council Office. They then introduced the research team to the Headman of each ward and the Village heads to be interviewed. In addition, other public platforms were used by Ward Councilors to advise residents on the individuals carrying out research in the villages and to emphasize their primary goal.

**Information to respondents:** Before the beginning of the administration of each questionnaire and key informant interview, the respondents were given an explanation on the objectives and purpose of the study to assist in obtaining factual responses. The respondents were also given an opportunity to ask questions on any issues they did not understand concerning the
purpose of study. It was explained that there were no financial benefits from their participation in the study; this lack of financial incentive ensured there would be no bias in the findings.

**Verbal informed consent of respondents:** After explaining the purpose of the study, the interviewers asked for the respondents’ verbal consent before the data gathering process. All those interviewed gave their verbal consent at the different levels of the research.

**Anonymity of respondents and confidentiality of data:** The respondents were assured that their names were not going to be mentioned in the report and a copy of the final thesis would be provided to appropriate stakeholders involved and interested in the study.

### 1.5 Thesis Outline

This thesis is divided into three main parts and into eight chapters as follows:

**Part one (Setting the Scene)** comprises the first three chapters covering the introduction, theoretical and conceptual context and the methodology for this study. Chapter 1 provides relevant background information on issues regarding drought, climate change and disaster risk reduction and climate change adaptation. It outlines the conceptual framing that is pivotal to focusing this study. Chapter 2 presents the theoretical and conceptual context including the frameworks that guided the study. These frameworks, namely the Pressure and Release Model and Resilience Theory, are examined in relation to the study objectives. This chapter further presents some academic views on climate change, drought disaster and vulnerability issues in Africa. Chapter 3 provides the methodology and methods used in the research investigations for this study. This chapter provides additional information regarding the geography of the study area as well as the socio-economic situation prevailing in Zimbabwe in general and Chirumhanzu district in particular.
Part two (Results) comprises four chapters covering different thematic areas. Chapter 4 presents information on the demographic characteristics of the respondents and information on household livelihood assets and strategies, providing a basic understanding of the vulnerability context of the area. Chapter 5 presents findings on the observed weather data, sources of weather information, and perceptions of drought and impacts of drought on households and community livelihoods. Chapter 6 concentrates on providing insight into local autonomous and planned responses for DRR and CCA employed by households and communities for past climate risks. Chapter 7 focuses on the presentation of findings on policy and institutional frameworks for DRR and CCA and the roles of external organisations, household awareness on CCA and DRR, and local perceptions of external interventions.

Part three (Synthesis) comprises Chapter 8 and presents a synthesis of the DRR and CCA interface and the implications of the findings with regards to the possibility of combining DRR and CCA approaches for an improved climate risk management. The chapter further provides a conclusion and a set of actionable recommendations for better management of climate risks in the future.
CHAPTER 2:
CONCEPTUAL FRAMEWORK AND THEORETICAL CONTEXT

2.1. Introduction
2.1.1 Overview and Purpose of the Chapter

This chapter outlines the theory, concepts and frameworks used to conceptualize this study. These aspects provide a foundation for the study and further understanding of the sequence of events that result in the occurrence of a drought disaster. The concepts and frameworks suggest how government departments and development organisations can be positioned to realise how and when to intervene, and reduce the adverse impacts of hazards.

Firstly, this chapter presents the conceptual framework as it is important for the overall framing of this study. The conceptual framework, which was developed specifically for this study by utilising the PAR model, is discussed in Section 2.2. The Pressure and Release (PAR)\(^1\) Model, which assists in the framing of how households are exposed to specific hazards that might manifest into disasters, is also discussed. Section 2.3 and Section 2.4 presents the key concepts and the theoretical context for DRR and CCA as applied in this study. Specifically, the section presents an understanding of vulnerability, CCA, DRR and droughts (including its typologies) as these factors form the basis of this study.

Central to the framing for this study, is the conception that vulnerability is the underlying factor in the manifestation of disasters, and that understanding the vulnerability context of households (Chapter 4: Section 4.2), is the basis for reducing the impacts of hazardous events of differing severity and magnitude (Ribot, 2014). It is therefore important that the impacts of climate variability and change, especially for hydro-meteorological hazards, on human lives and livelihood strategies be contextualised, with comprehensive and integrated measures taken to minimize their severity (Doldman & Mitlin, 2015). Other scholars argue that

\(^1\) The Pressure and Release (PAR) Model can also be referred to as the Disaster Crunch Model.
contextuality is essential to efforts that try to link DRR and CCA in order to address the underlying vulnerability of households and communities (O’Brien et al. 2008; UNISDR 2008; Solecki et al. 2011). Gerulis-Darcy (2013) argue that in order to understand natural disasters it is necessary to appreciate the interaction between livelihood activities and their environment, and the ways the natural system interacts with social, political and economic factors.

2.2 Conceptual Framework Developed for the Study

Figure 2.1 illustrates a potential route to a more integrated approach to dealing with DRR and CCA that might help foster climate resilience in rural households in Chirumhanzu district. It shows how the currently disjointed, but linked practices for DRR (C) and CCA (B) are both aimed at reducing vulnerability to climate change (A). This locates household and community vulnerability (A) at the centre of dealing with climate risk (K) (i.e. both climate variability and trends) and (J) extreme weather events. Ribot (2014) argues that the underlying causes of vulnerability in a given place must be traced from that place through the social relations of production, governance and subjectivity.

Starting at the top of Figure 2.1, the conceptual framework shows that climate change risk is the main aspect under discussion. Climate change risk is currently dealt with in two separate approaches, where climate variability and change tends to be dealt with in CCA (B), while extreme weather events are dealt with in DRR (C). CCA is deemed to be more proactive (D) based on the tools and strategies for adaptation, while DRR is deemed to be more reactive (E) mainly through coping and humanitarian assistance with a focus on extreme events only (Mercer, 2010). However, as already mentioned in theory, current DRR practices have gone beyond coping and humanitarian assistance (Chapter 7: Section 7.4), and are attempting to be more proactive in nature with components such as early warning systems, preparedness, response measures and even recovery based on the 3Bs (Bounce Back Better) (UNISDR, 2012). Nevertheless, in practice the situation is still often reactive, despite the two approaches by the two different communities of practice. It is clear that climate change in the context of climate
variability and extreme events is the main trigger factor for disaster events (Schipper & Pelling, 2006).

Figure 2.1: An Integrated Approach for Climate Risk Management (Researcher, 2016)
The relationship between CCA and DRR in Figure 2.1 is illustrated as broken and divergent indicating the current situation of institutional separation (Chapter 6: Section 6.4) and lack of effective coordination and linkages in policy frameworks and practice.

The framework suggests that an integrated approach can be housed under climate risk management (G) that will deal with both climate variability and extreme events. An integrated approach is therefore likely to be more effective in reducing household vulnerability and building a community more resilient to climate change (H). There is need for a marriage of convenience between DRR and CCA in dealing with climate risk. UNISDR (2012) supports this view and points out that as experience with both DRR and CCA continues to grow, there is increasing recognition that these two share a common focus of reducing vulnerability of households and contributing to sustainable development. Kelman et al. (2015) suggest that since climate change drives hazards and vulnerabilities, and since recent DRR efforts provide more comprehensive views of vulnerability and resilience, a prudent location for CCA would be within DRR. The key concepts highlighted in the conceptual framework (Figure 2.1) are discussed in detail in the sections that follow.

2.3 Concepts and Theoretical Context for CCA and DRR

2.3.1 Vulnerability to Climate Change Impacts

The IPCC (2014) defines vulnerability as “a concept that alludes to sensitivity or susceptibility of a system to harm and lack of capacity to adapt to this harm”. Exposure, sensitivity and adaptive capacity are central concepts to understanding vulnerability as they provide a framework that links biophysical and social climate sensitivity to socio-economic factors that are important to the consequences of environmental change (IPCC 2001; IPCC 2007; Dodman & Mitlin 2013). Exposure is defined “as the presence of people, livelihoods, environmental services and resources, infrastructure, or economic, social or cultural assets in places that could be adversely affected” (IPCC, 2012). Sensitivity is defined “as the degree to which a system or species is affected, either adversely or beneficially, by climate variability or change and adaptive capacity as the ability of systems, institutions, humans, and other organisms to
adjust to potential damage, to take advantage of opportunities, or to respond to consequences’ (IPCC, 2014). Adger (2008) argue that the disparity and similarities in exposure, sensitivity and adaptive capacity defines the scope of vulnerability to social and environmental change. This is the same position as Cutter et al. (1996) whose understanding of vulnerability is divided into three themes: vulnerability of hazard exposure, vulnerability of social response and vulnerability of places. The IPCC (2014) declares that the prevailing social, economic, political and environmental factors expose rural households and negatively affect their adaptive capacity to climate variability and extreme weather events (IPCC, 2014).

Understanding vulnerability to climate change provides a guide for governments and practitioners on where to direct resources to either build on existing strengths or provide new areas of support that will result in long-term climate resilience (Fabinyi et al. 2014). However, addressing vulnerability has proven difficult especially for those households in developing countries whose livelihood strategies are based on natural resources (Adger 2008; Mercer 2010; IPCC 2012; IPCC 2014; Hoppe & Wesselink 2014; Nagonda 2015). Vulnerability, like resilience (see Section 2.2), is generally viewed as being specific to perturbations that impinge on a system (Cutter et al. 2003; GIZ 2014), thus a system can be vulnerable to certain disturbances but not to others (Adger 2006; Adger 2008). Geographical location, social context, livelihood strategies and environmental and economic status all play an important role in shaping the disturbances that can adversely affect a specific household or community (Turner at al. 2003; Cutter et al. 2003; Cutter et al. 2008; Oxfam 2012). Essentially, the most vulnerable households in a community are those with limited access to assets and resources, finding it hard to reconstruct their livelihoods after a devastating disaster (Cutter et al. 2003; IPCC 2014). Asset ownership and access to resources therefore become key elements of vulnerability and for DRR and CCA, as suggested in the PAR model (Section 2.3.3.1).

It is imperative to understand the causes of household and community social vulnerability to climate change in order to support an analysis of policy options that can address the causes and not the symptoms (Malone 2009; Fabinyi et al. 2014; Hinkel et al. 2014). Social
vulnerability emanates from limited access to resources and political power, low social capital, particular norms, beliefs and customs, physical limitations of the population and characteristics of the built environment (Turner et al. 2003; Barnett et al. 2008; Ribot 2013; Hoppe & Wesselink 2014; Ribot 2014). Social vulnerability can therefore be regarded as a complex set of features that includes the wellbeing of an individual, livelihoods and resilience, self-preservation, social protection, socio-political networks and institutions (Cannon et al. 2003; Cutter et al. 2003; Adger 2008; Cutter et al. 2008).

There is need to understand that climate variability and extreme events themselves can alter the context for economic and social development, which in turn reduces the capacity of households to respond to future events (Smit & Wandel 2006; Fussel 2007). It is also necessary to analyse whether DRR and CCA provide innovative capable approaches of addressing the drivers of local vulnerability including extreme weather events (Nagonda, 2015). In this regard, the ability of households and communities to reduce vulnerability is predicated on several capacities that typically overlap with indicators of development (education, heath) (Denton et al. 2014). Essentially, reducing vulnerability is central to both sustainable development, DRR and CCA; therefore, reducing vulnerability will trigger positive DRR and CCA and sustainable development at all levels (Kelman et al. 2015). The next section provides further insight into CCA.

2.3.2 Climate Change Adaptation (CCA)

Adaptation to climate change impacts is an unavoidable choice for human society (Wise et al. 2014). The concept of adaptation has been used both explicitly and implicitly in the social sciences, as well as in natural hazards, political ecology, entitlements and food security scholarship (Sen 1984; Walker 2005; Barnett et al. 2008; Thompson et al. 2010; Lee & Krasny 2015). Adaptation to climate change involves building adaptive capacity through increasing the ability of households to adapt to changes and implement adaptation decisions, and transforming that capacity into action (IPCC 2012; IPCC 2014). Therefore, adaptation occurs in the context of demographic, cultural, environmental and economic changes as well as rapid
transformations in technologies and global pricing processes (O’Brien & Leichenko 2000; Wise et al. 2014). Effective adaptation could reduce the risks associated with changes in climate in a similar way to DRR measures for present day extreme weather events (Mitchell & Tanner, 2006). The major motivation and justification for adaptation is based on the articulated need to protect lives and livelihood strategies and reduce vulnerability to the impacts of a changing climate (Adger 2005; Adger 2008; Adger et al. 2013; Wise et al. 2014; Noble et al. 2014). Therefore, adaptation cannot be treated as an isolated event separate from other policy and institutional frameworks (Kelman et al. 2015).

Households have always adapted to climate variability and change through a variety of strategies over the decades (De Souza et al. 2015). However, climate change is now pushing at-risk communities beyond their capacity to cope with and adapt to the changes that they had previously dealt with, as well as making more households vulnerable due to their increased sensitivity and exposure (Smit et al. 2000; Turnbull et al. 2013). There is need to understand that inasmuch as communities have been adapting to climate change for years, extremes in climate have now become more frequent, more severe and more intense thus making it very difficult to prepare for or respond (De Souza et al. 2015). As an approach, CCA is a dynamic process and not an end state (Turnbull et al. 2013). This is required as the result of the uncertainty of the impacts of climate change and the need to support at-risk communities in building their adaptive capacity (IPCC 2014). Furthermore, it must be noted that the adaptation process is part of the dynamics of society rather than simply being technical changes to biophysical change (Hoppe & Wesselink, 2014).

Chishakwe et al. (2012) posit that CCA could be divided into ex ante (anticipatory) and ex post (reactive), as well as planned and autonomous adaptation. Planned adaptation is a result of deliberate policy decisions, based on awareness that conditions have changed or are about to change and that action is required to return to, maintain, or achieve a desired state (Chishakwe et al. 2012; IPCC 2012; Li et al. 2015). Eakin et al. (2014) state that adaptation, especially at the government level, provides much attention to infrastructure improvements, improving early
warning systems (EWS), public awareness campaigns and technological solutions. This disregards the context and socio-economic solutions that may already exist within the population (Li et al. 2015). Planned adaptation methods, especially those brought through external intervention, might have limited appreciation of the local context thus risking failure and rendering communities vulnerable to future hazards (Cooper et al. 2008). Adger (2005) also argue that most adaptation processes and activities by rural farmers in the developing world have been reactive. In many cases in rural areas, smallholder farmers rely on local knowledge for hazard prediction (especially hydro-meteorological hazards) and the adverse impacts of drought, being a creeping hazard, are usually realized when it is too late (Chishakwe et al. 2012).

Adaptation processes need to be location and context-specific depending on the nature of the hazard (Eakin et al. 2014). This knowledge resulted in the introduction of community-based adaptation (CBA) to climate change based on a combination of both scientific and local indigenous knowledge (ibid.). This is due to the fact that those smallholder farmers’ perception of climate trends and their responses tend to be localised (Li et al. 2015). While context and place-specificity is imperative, in order for specificity to add value to policy, it must be mapped on two dimensions of adaptive capacity, generic and specific capacity (Eakin et al. 2014). Generic capacity deals with insufficiencies in basic human development needs (health education, livelihood security) while specific capacity deals with tools and skills needed to anticipate and effectively respond to specific hazards (Eakin et al. 2014). In that regard, Wise et al. (2014) note that diverse areas, regardless of development conditions, have different levels and types of adaptive capacity, i.e. the preconditions that enable and foster the adaptation process.

Adaptation is a continuum requiring an over-arching approach that incorporates interventions ranging from those that address the underlying drivers of vulnerability to those designed exclusively to respond to the impact of climate change (VENRO, 2009). This understanding is based on an expansion of the three cornerstones of adaptation namely: (a) reduction of the
sensitivity of the livelihoods system to climate change; (b) alteration of the exposure of the system to climate change; and (c) increased resilience of the system to cope with changes (Adger et al. 2003; Adger et al. 2013). However, the ability of a household or community to be appropriately prepared to cope with and respond to climate change and adapt or transform requires livelihood assets (resources) to enable the process (DFID 2009; DFID 2011; Nangombe 2013; Lee & Krasny 2015). Even though there is no single appropriate approach to adaptation due to the complex, diverse and context-dependent factors, it is imperative to note that the success of the adaptation process needs to be transformational in nature (Noble et al. 2014; Denton et al. 2014; Mimura et al. 2014). Mimura et al. (2014) argue that the most preferable adaptation options offer development benefits and in the process reduce vulnerability in the long-term. The next section presents an understanding of the DRR approach for appreciation of the linkages with CCA and development approaches.

2.3.3 Disaster Risk Reduction (DRR) and Drought

The presence of a hazard does not automatically translate into a disaster (Blaikie et al. 1994; Cutter et al. 2003; Winser et al. 2004; Cannon 2008). There has to be a convergence of the hazard and vulnerability for a disaster to occur (Cutter et al. 2003; Oxfam 2012). The level of disaster risk therefore depends on the magnitude of the hazard and degree of vulnerability of the households and communities (Section 2.2.1) (Oxfam, 2012). Many communities around the world seek ways to reduce risks associated with climate change by diversifying their livelihood strategies to off-farm activities and thus lessening their vulnerability to losses in one area (Chapter 4: Section 4.3) (Arouri et al. 2015). The ability of households or communities to successfully reduce risk associated with hydro-meteorological hazards is based on the ability to access early warning information (Chapter 5: Section 5.5), preparedness and the capacity and capability to take the necessary action, to respond to and even recover from the adverse effects of hydro-meteorological disasters (Chapter 4) (Pandey & Bardsley, 2015). However, poverty and marginalization restrict access to early warning information, livelihood options, income sources, risk reduction strategies and ability to transform into resilient communities (Noble et al. 2014).
A disaster is defined as a serious disruption of the functions of a community that causes widespread human, material, economic or environmental losses, which exceed the ability of the affected households or community to cope using own resources (UNISDR 2009b). IPCC (2012) also defines a disaster as severe alterations in the normal functions of a household or society due to hazardous physical events interacting with vulnerable social conditions, leading to widespread adverse human, material, economic or environmental effects that require an immediate emergency response to satisfy human needs. This indicates that there is no difference in the concept of disaster from both practitioners of DRR and CCA as per the definitions provided above (UNISDR 2009b; IPCC 2012).

Like community-based adaptation (CBA) for CCA, DRR has community-based disaster risk reduction (CBDRR) based on the same principles related to use of local resources supported by scientific advancement to solve local problems. The identification of risk based on a combination of local and scientific knowledge might provide a complete picture, not only of the risk but also of the vulnerability of the community (IATF, 2011). Tapping of local knowledge on risks and vulnerabilities is key to successful risk reduction and safer communities (Tearfund, 2005). However, the current trends on extreme climate change events in relation to magnitude and frequency might be beyond local knowledge if not accompanied by science and adequate resources. DRR experts also need to learn from the community in order to enhance a two-way flow of information and produce comprehensive strategies acceptable to both parties (Thomalla et al. 2006). Risk reduction is likely more effective if it is based on local knowledge and the respect of local cultures, while an imposition of external practices might undermine local knowledge and practices, including cultural factors (Tearfund 2005; Shaw et al. 2010a). The latter approach risks rejection of proposed strategies by local communities as they might consider the actions irrelevant to their cause (Tearfund, 2005). The use of local knowledge is important in understanding social vulnerability at a community level.

The DRR framework is mostly concerned with the readiness or preparedness of communities to face hydro-meteorological hazards (UNISDR, 2012). The communities must be well aware
of the nature of the hazard and the potential impact, as well as how they will respond to the hazard (UNISDR 2005; 2009c; Shaw et al. 2010b, UNISDR 2012). The preparedness or lack thereof, will partly determine whether the hazard will escalate into a disaster or not (UNISDR, 2012). Thus, one aspect of responses is concerned with what should be done after the disaster, hence an emphasis on the availability of supplies to the affected households to kick-start the recovery process (ibid.). The Pressure and Release (PAR) model provides further insight into the factors behind the occurrence of a disaster (Blaikie et al. 1994; Winser et al. 2004).

The DRR framework recognizes that country policy frameworks, legislation, and capacities and capabilities of international and local institutions play a significant role in shaping the local vulnerability context (UNISDR 2005; UNISDR 2012; Noble et al. 2014). The methodologies for DRR follow the same consultative process as the existing tools for CCA (Wilhite 2000; Wilhite et al. 2014) and go further to underpin household vulnerability factors (Tearfund 2005). In addition, DRR tools engage officials from relevant authorities, including meteorological services, which are the main providers of weather and climate data, forecasts and modeling for expected future climatic change. As a priority for risk reduction, communities must be provided with adequate information on the nature and associated adverse impacts of expected hazards (Mimura et al. 2014). This information will therefore be imperative in helping households prepare for risks, identify appropriate options to reduce risk, cope with risk, and finally transform themselves into resilient communities (ibid.).

2.3.3.1. The Concept of Drought

Several definitions for drought have been put forward by many scholars. As will be used in this study, Wilhite (2005) define drought as “an insidious natural hazard (creeping phenomenon) resulting from a deficiency of precipitation from the expected or norm, that when extended over a season or longer, is insufficient to meet the demands of human activities and the environment”. Peters (2015) also defines drought as “a long period of continuous dry weather or insufficient rainfall causing deficiency in soil moisture, depleted groundwater supply and reduced surface water flow”. These two definitions and many others on drought, all have
common ground: that drought results from decrease in water availability caused by decreased rainfall over a period of time. However, droughts are generally classified into four types, which are meteorological, hydrological, agricultural and socio-economical drought (Wilhite & Glantz 1985; Wilhite 2000; Wilhite 2005; Unganai 2009; Wilhite et al. 2014). These types of droughts can best be illustrated in Figure 2.3.

**Meteorological drought** is defined as lack of rainfall for a long period of time over an area (Wilhite 2000; Wilhite 2005). Essentially, this drought type is mainly considered as rainfall deficit with respect to average amounts received in a specific area or the number of days with rainfall of specific threshold. This shows the complexity of setting parameters for defining drought even within the types of droughts. The second drought type is **agricultural drought**, which is also referred to as a period with insufficient soil moisture and consequent crop failure without any reference to surface water resources (Mishra & Singh 2010; Sivakumar et al. 2010). Wilhite & Glantz (1985) further posit that agricultural drought links several characteristics of meteorological drought to agricultural impacts, focusing on precipitation shortages, differences between actual and potential evapotranspiration, soil water deficits, reduced groundwater or reservoir levels, and so forth. Plant water demand depends on prevailing weather conditions, biological characteristics of the specific plant, its stage of growth, and the physical and biological properties of the soil (ibid.).
Thirdly, hydrological drought refers to a situation in which there is inadequate surface and sub-surface water resources for established water use of a given water resources management system (Wilhite 2000; Wilhite 2005). This inadequacy of surface water supply is linked to meteorological drought. In this regard, drought will be defined within specific areas or at a watershed or river basin scale (Sivakumar et al. 2010). Considering the focus of hydrological drought, it is clear that the focus of hydrologists is entirely on how meteorological droughts interlink with the hydrological system (Wilhite & Glantz, 1985). Socio-economic drought is associated with the supply and demand of some economic goods with elements of meteorological, hydrological, and agricultural drought (Wilhite 2005, Sivakumar et al. 2010). Socio-economic drought occurs when the demand for an economic product exceeds supply as
a result of a weather-related shortfall in water supply. It differs from the aforementioned types of drought because its occurrence depends on the time and space processes of supply and demand of economic goods (i.e. water, forage, food grains, fish, and hydroelectric power), which are dependent on the weather (ibid.).

2.3.4. Pressure and Release (PAR) Model
First published by Blaikie et al. (1994) and then again in 2004 (by Winser et al. 2004), the Pressure and Release Model (PAR) has become the internationally accepted model for the explanation of progression of vulnerability and progression of safety (risk reduction). This model (Figure 2.2) was the first attempt to bring the ‘human factor’ into natural disaster management (Blaikie et al. 1994) by shifting vulnerability from the physical hazard to a function of society. The model recognizes the physical hazard only as a trigger factor and the convergence of a hazard and vulnerability resulting in the occurrence of a disaster (Cutter et al. 2003; Winser et al 2004; Twigg 2005; Cutter et al. 2008). This model therefore puts societies at the centre of disaster occurrence and DRR as well (Oxfam 2012). Essentially, there are natural hazards and disasters are man-made. Overall, the model directs attention to the conditions that make exposure unsafe (C), leading to vulnerability and to the causes creating these conditions (Turner et al. 2003). In this study, households are the main focus, and how they relate to root causes, dynamic pressures and unsafe conditions, plays an important role in the success or failure of DRR and CCA strategies. As mentioned earlier, the foundation of the PAR is the recognition that a disaster is the intersection of two opposing forces i.e. a process generating vulnerability on one side and the hazard risk on the other (Turner et al. 2003; Cutter et al. 2008).

As has been discussed, the PAR model illustrates that vulnerability (pressure), which is rooted in socio-economic and political processes (A - Root Causes), has to be addressed (released) to reduce the risk of disaster (Section 2.2; 2.3.) (Cutter et al. 2003). The outcomes will be ‘safe conditions’ as opposed to unsafe conditions, resilient communities as opposed to vulnerable communities and sustainable livelihoods, thus reversing all components of the model (Oxfam
Hazards (E) should be mitigated to reduce their intensity, thereby having less impact on vulnerable populations. In this regard, DRR activities aim to achieve a controlled situation and a resilient community, with no loss of life, few casualties, limited damage, food security and a capacity to recover quickly from any impact of a hazard (Oxfam, 2012).

The PAR model provides a framework for disaster practitioners to understand and analyse the complexity of community vulnerabilities to hazards (Turner et al. 2003). The model illustrates how disasters are perceived within the broader patterns of society and how their analysis may provide a better way of building resilient communities and consequently reduce the adverse effects of hazards (drought for this study) (Turner et al. 2003). In the general context, the model seeks to trace the root causes (A) of disasters within the political and socio-economic context that shape society (human and organizational actions) and their responses to hazards (Blaikie et al. 1994; Cutter 1996). In doing so, there is a possibility that the social vulnerability factors can be identified and support directed towards those specific areas (Turner et al. 2003). The PAR model posits that there are three layers of social processes that cause vulnerability.
and these are unsafe conditions (C), dynamic pressures (B) and root causes (A), and are briefly described in the sections below:

**Unsafe Conditions (C):** Twigg (2001) defines unsafe conditions as the specific forms in which the vulnerability of a population is expressed in time and space in conjunction with a hazard. These unsafe conditions include: fragile physical environment (dangerous locations, unprotected buildings and infrastructure); fragile local economy (livelihoods at risk, low income levels, poverty); vulnerable society (special groups at risk, lack of local institutions); and public actions (lack of disaster preparedness, prevalence of endemic diseases). These unsafe conditions form part of the vulnerability context where people and assets are exposed to the risk of a disaster as explained in Section 2.3.1 (Tearfund, 2007).

**Dynamic Pressures (B):** The dynamic pressures in this model include lack of the following: local institutions, training, appropriate skills, local investment, local market, press freedom, and ethical standards in public life; and macro-forces (rapid population growth, rapid urbanization, debt repayment, schedules, deforestation, and declines in soil productivity) (Section 2.3.1) (Cutter et al. 2003; Oxfam 2012).

**Root Causes (C):** Root causes are a set of well established, widespread economic, demographic and political processes within a society that give rise to vulnerability and affect the allocation and distribution of resources amongst groups of people (Section 2.2) (Winser et al. 2004; Schilderinck 2008; Ribot 2009; Ribot 2013; Ribot 2014). The root or underlying causes of vulnerability include: limited access to power, structures, and resources; and ideologies (political systems, economic systems) (Cutter et al. 2003; Turner et al. 2003; Winser et al. 2004; Oxfam 2012).

### 2.3.5. Resilience to Climate Risks

Resilience theory is linked to the social-ecological systems paradigm (Lavell et al. 2012). As originally introduced by Holling (1973), resilience is a concept that aids in understanding the capacity of ecosystems to persist in their original state after being subject to perturbations.
Resilience can be defined as the ability of a system and its component parts to anticipate, absorb, accommodate or recover from the effects of a potentially hazardous event in a timely and efficient manner, whilst at the same time ensuring the preservation, restoration or improvement of its essential basic structures and functions (Lavell et al. 2012, IPCC 2014). DFID (2011) defines resilience as the ability of countries, communities and households to manage global environmental change, by maintaining or transforming living standards in the face of shocks or stresses without compromising their long-term development prospects. In this regard, humanitarian practitioners and natural resource managers now agree that hydro-meteorological shocks can mainly be dealt with by building resilience (appropriate engineering) to reduce vulnerability, among other measures, as depicted in the PAR model (Section 2.3.1; Section 2.3.4) (Townsend & Masters, 2015). Resilience has played a significant role in advocating practices that help communities understand their vulnerability in relation to hydro-meteorological shocks and trends and how to deal with them (Section 2.3.1; Section 2.3.3.1) (Turner et al. 2003).

**Elements of the Resilience Framework**

The adopted resilience framework (Figure 2.4) provides an understanding of the resilience framing for which resilient households are the expected outcome (DFID 2011; Audouin et al. 2013). Even though they are many definitions put forward in trying to show an understanding of this concept (Holling 1973; IPCC 2007; DFID 2011), they all have commonalities on four elements, namely context, disturbance, capacity, and reaction, as depicted in the PAR model (Section 2.3.4). An integration of these components in the four elements framework is key to unpacking the resilience process that exists in a particular household or community to climate change impacts (DFID, 2011). The resilience framework seems very simple and straightforward but in reality is complicated in that the response curve could be slow and uneven due to, for example, the political context, secondary shocks or lack of appropriate information (DFID, 2011). External stresses can be cumulative, building slowly to become a shock, and both shocks and stresses may result in a number of different reactions (ibid.). The elements of the framework are explained below.
**Context:** Resilience like vulnerability or adaptation must always be contextualised thereby providing an opportunity to fully understand the processes at the household or community level (see Figure 2.4). Contextualisation provides an opportunity to respond to the question, “resilience of what?” (DFID, 2011). Resilience can be identified and strengthened in a social group, socio-economic or political system, environmental context or institution. Each of these systems will display greater or lesser resilience to natural or man-made disasters (UNDP, 2014). More work is needed to differentiate between the significance of resilience for different social groups, resources and institutions across a range of different contexts (DFID 2011; UNDP 2014). The context element enables specific local knowledge (including local resources) to be utilised in the building of practical resilience.

![Figure 2.3: The Four Elements of a Resilience Framework (DFID, 2011)](image-url)
Disturbance: The next important step in the resilience framework is to understand the type of disturbance encountered by specific systems, households or communities. In appreciating the role of this component in the framework, the question to ask is “resilience to what?” (DFID, 2011). The disturbances come in two forms i.e. shocks and stresses (DFID, 1999; DFID 2009). Shocks are sudden events that pose a risk to households or communities and these shocks can strike at different levels within the context (DFID, 2009). Shocks include disease outbreaks, wars/conflicts, and geophysical events like earthquakes and climate-related hazards like floods, cyclones or hurricanes (DFID 1999; DFID 2009; DFID 2011). On the other hand, stresses are long-term trends that undermine the potential of a given system or process and increase the vulnerability of actors within it (DFID 2011, UNDP 2014). These stresses include environmental degradation, climate change, drought and loss of agricultural production or economic decline (ibid.).

Another important element of the framework is the capacity to deal with the disturbance, whether shock or stress. The ability of a system, household or community to deal with the disturbance is entirely dependent on the levels of exposure, sensitivity and adaptive capacity, which are all elements of vulnerability as discussed previously in Section 2.3.1 (Nelson et al. 2007; DFID 2011; IPCC 2012). The issue of transformation focuses on the creation of a fundamentally new system when ecological, economic or social structures make the existing system untenable (Chapin et al. 2009; Folke et al. 2010). Central to the adjustment of the community to the weather events, are the issues on culture, economic status of individuals, and knowledge of environmental change as discussed in Section 2.3.3.1 (Nelson et al. 2007; Stokols et al. 2013).

Reaction: The appropriate reaction to disturbance is to bounce back better (3Bs) which ensures sustainable actions for livelihoods (Rakib et al. 2014). Bouncing back better enhances adaptive capacities of systems while reducing sensitivity and exposure to current and future disturbances (Section 2.3.1) (DFID, 2011). The other option of just bouncing back restores the system to its status quo, that of vulnerability to a disaster, an undesirable option considering
future events (UNDP, 2014). The worst-case scenarios are when a system recovers but is less functional than before, or else collapses completely, which reflect that the system has no capacity, is exposed and sensitive to disturbances, and is even more vulnerable to future shocks and stresses (DFID, 2011).
CHAPTER 3:
STUDY AREA AND RESEARCH METHODOLOGY

3.1. Introduction
3.1.1 Overview and Purpose of the Chapter
This chapter provides a general description of the study area and a detailed explanation of the research design, methods, sampling design, data collection instruments and approach to analyses used in this study. The description of the study area centres on geographical location, biophysical environment, administrative layout and governance, and the socio-economic context. The other sections focus on sampling procedures and specific data collection instruments that were used under both quantitative and qualitative approaches including participatory learning and action methods. The last section presents the analytical approaches for both quantitative and qualitative data that were used to analyse data collected in this study.

3.2. Contextual Setting and Study Area
The location of the study was Chirumhanzu Rural District (Midlands Province) in Zimbabwe as shown in Figure 3.1.

3.2.1 Selection of the Study Area
Zimbabwe is a country that frequently faces drought hazards, and their adverse effects (Chagutah 2010; Mutasa 2010; Shamano 2010). It is also one of the many African countries that continue to deal with CCA and hydro-meteorological DRR separately, from a policy and institutional standpoint. A rural setting that continues to be battered by climate variability and extreme events, especially droughts, presents an opportunity for study. The district was therefore purposively selected, as it is one of those areas frequently affected by hydro-meteorological disasters, and specifically droughts, over the years. Additionally, its geographical location in agro-ecological regions 3 and 4, presents the risk that it is becoming more drought-prone, as is happening in regions 3, 4 and 5 (Mugandani et al. 2012).
3.2.2. Geographical Location

Zimbabwe is a landlocked country in the southern African region, with an area of 390 760 square kilometers (Mano & Nhachena, 2007). It lies within the tropics between 15° 30” S and 22° 30” E and 33°E. Running from north to south along the eastern border with Mozambique is a narrow belt of mountains called the Eastern Highlands (ibid.). The deep cleft of the Zambezi River Valley forms the boundary with Zambia in the north-west (Mano & Nhachena, 2007). The climate is mostly semi-arid (Mubaya & Mafongoya, 2016). The country lies in a region with limited and unreliable rainfall patterns, and has a national mean rainfall of 655 mm (Chagutah, 2010). Chirumhanzu district is in the Midlands Province and borders with Mashonaland West to the north, Mashonaland East to the east, Masvingo to the south, and Shurugwi and Gweru districts to the west (Figure 3.1).

![Figure 3.1: Map of Zimbabwe Showing Chirumhanzu District (Researcher, 2016)](image-url)
3.2.3 Bio-Physical Information

The country is divided into five agro-ecological regions (Region 1-5 as illustrated in Figure 3.2), based on the amount of annual rainfall received (Mugandani et al. 2012). Chirumhanzu district lies in agro-ecological region 3 where semi-intensive mixed farming is suitable and recommended. Agro-ecological region 3 is located mainly in the mid-altitude areas of the country and is characterized by an annual rainfall of 500-750 mm, mid-season dry spells and high temperatures (Figure 3.3; FAO 2006; Mugandani et al. 2012). The severe dry spells in both Mushandirapamwe and Maware wards make them very vulnerable to the impacts of climate variability and extreme weather events particularly drought hazards (Mugandani et al. 2012). Rainfall for the cropping season is received between mid-October and April (ibid.). Frequent mid-season dry spells and other unusual variations such as droughts are characteristic of the marginal areas in regions 4 and 5, and parts of region 3 (Zvigadza et al. 2010).
The mean annual temperature is 16° C with mean minimum and maximum temperatures of 11° C and 24° C respectively (Mupaso et al. 2014). The temperature in Zimbabwe has risen by about 1° C over the last 40 years, while rainfall and runoff has decreased by approximately 20% and 30%, respectively (GoZ, 1998). The worst affected parts of the country are agro-ecological regions 4 and 5, which now receive a below average rainfall of less than 450 mm (Zvigadza et al. 2010). The vegetation in Mushandirapamwe and Maware wards is sparse with thorny bushes and shrubs, and Mopani trees that are mainly dominant in dry areas, while the vegetation in Mapiravana ward is characterised by savanna grasslands and *Brachystegia spiciformis* (msasa) trees (Mupaso et al. 2014).

Drainage networks are dominated by permanent rivers such as Ngezi (Mapiravana ward), Shashe (Maware ward), and Siyawakuya and Mhende rivers (Mushandirapamwe ward) (Krueter & Workman 1996; Mupaso et al. 2014). The households in the study area engage in small-scale gardening activities sustained by digging their own wells along streams, which are also affected by dry periods (Mupaso et al. 2014). Most of the wards in Chirumhanzu have small dams that can support small-scale irrigation activities. However, most of these small dams dry up during the dry season and more so during drought years. The dams have also been negatively affected by agricultural activities in nearby areas resulting in siltation, reduction in water-holding capacity and drying up of the water sources (Mupaso et al. 2014). The soil types in Chirumhanzu district are mostly grayish brown sands and sandy loams derived from granitic rocks especially in Mapiravana and Mushandirapamwe wards (Krueter & Workman 1996). The soils are inherently of low fertility and subject to rapid depletion of fertility (Mupaso et al. 2014). Regular applications of organic and inorganic fertilizers are necessary to obtain reasonable and sustainable yields (*ibid*.). However, Maware ward is largely dominated by reddish clay soils with fine particles that limit the fast vertical water movement into the ground (Mupaso et al. 2014). The reddish clays take longer to absorb water but are also quick to dry up. The occurrence of droughts in this district year-in and year-out has become a norm.
3.2.4 Administrative and Governance Information

Zimbabwe comprises 10 provinces, which are Manicaland, Mashonaland East, Mashonaland Central, Mashonaland West, Harare, Masvingo, Matebeleland South, Matebeleland North, Bulawayo and Midlands. These provinces are divided into 60 districts throughout the country. The Midlands province is further divided into eight (8) districts. Chirumhanzu district is divided into 25 administrative wards (Figure 3.3). Chirumhanzu district has a total of 19,736 households and a total population of 81,087 with 47% males and 53% females (ZimStat, 2012).

Figure 3.3: Selected Wards of Chirumhanzu District
Each ward comprises approximately 50-80 villages with an average of 20 households per village, each with an average of four (4.1) people per household (ZimStat, 2012). Three wards were randomly selected (using the RANDBETWEEN function in Microsoft Excel) for the study and these were: Mapiravana (Ward 1), Maware (Ward 10) and Mushandirapamwe (Ward 25) (see Figure 3.3). The total number of households are 1042, 1170 and 881 for Mapiravana, Mushandirapamwe and Maware wards respectively (ZimStat, 2012). A headman is the traditional leader for each ward. The traditional leadership in each ward falls under a Chief who is the traditional overseer of the whole district. The appointment of village heads, headmen and Chiefs is guided by the Traditional Leaders Act of 1998, which defines their functions including village registration certificates and settlement permits. Local administrative leadership exists at the ward level; Ward Councilors are elected through the guidance of the Rural District Councils Act (RDCA) of 2002, which also defines their functions; these include administration and provision for matters connected to their jurisdiction (RDCA, 2002). Ward Councilors are political positions for which the individuals are voted into power by the political party members and then endorsed by the Rural District Council (RDC). At the district level, there is a Chief Executive Officer (CEO) for the RDC supported by the District Administrator (DA). These officers oversee development and disaster activities in the district respectively.

### 3.2.5 Socio-Economic and Livelihood Information

The main livelihood activity of the households in the district is rain-fed agriculture (subsistence farming and small-scale animal husbandry) (Kapungu, 2013). The predominant farming system is smallholder agriculture with relatively intensive cropping systems (Mupaso et al. 2014). Production systems are based on cereal crops and semi-intensive livestock production that rely on fodder crops and natural rangelands (Kapungu, 2013). The main crops grown are maize (the staple food grain), groundnuts, sorghum, cowpeas, pumpkins, roundnuts and finger millet (*rapoko*) that are local cash crops in the district, especially in Mapiravana and...
Mushandirapamwe wards. Sorghum and finger millet\(^2\) (*Eleusine africana*) crops are now beginning to gain prominence especially in Maware ward. Irrigation schemes play an important role in sustaining small-scale horticulture (vegetable production consists mainly of cabbage, tomatoes, spinach and rape) and sugar beans from the Mashamba Irrigation Scheme in Maware ward (Chapter 4: Section 4.3.2.4) (Kapungu, 2013). Some households plant small portions of maize crop, for green mealies, in their gardens, which they can irrigate on a small scale for a better harvest. The economic activities are mainly agro-based, but the continued soil deterioration and erratic rains are reducing crop yields, thus likely reducing incomes from the sale of surplus grain (Kapungu, 2013). Other economic activities include casual labour exchange through working in fields for other individuals for monetary gains. In addition to the poor rainfall conditions, the unstable macro-economic situation characterised by hyperinflation prevailing in Zimbabwe since 2000 to date and the resultant economic hardships being experienced, create a stage for current and future hazards (Mugandani et al. 2012; Chirau et al. 2014).

### 3.3. Methods

#### 3.3.1. Mixed Methods Approach

This study used data collection methods that collect both qualitative and quantitative data (Figure 3.4). Use of this approach was premised on the basis that all methods have inherent biases and strengths; using a mixed methods approach spreads the prospect that data collected will be of greater quality (Creswell & Clark 2007; Denscombe 2008; Johnson et al. 2007). This integration of approaches generated deeper and broader insights and a full understanding of the complex social processes required for DRR (particularly droughts) and CCA in relation to climate variability and change (Johnson et al. 2007). Further, this approach broadened the sample size, as some household heads not included in the survey administration, were likely involved in focus group discussions and participatory learning and action methods (PLAMs) (Denscombe, 2008).

\(^2\) Also known as *rapoko*
Because of the different data collected, verification of data and different methods of analysis were required, as shown in Table 3.1.

Table 3.1: Methodology Matrix

<table>
<thead>
<tr>
<th>Research Objectives</th>
<th>Data Collection Method</th>
<th>Method of Data Analysis</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. To explore the local household vulnerability context to drought hazards and local socio-economic conditions.</td>
<td>-Household survey -FGDs -Transect walks -Historical timelines -Seasonal calendar</td>
<td>-SPSS (frequency distribution, cross-tabulation)</td>
</tr>
<tr>
<td>2. To investigate households’ perceptions and experiences of climate variability and change, and the impacts of drought events on local livelihoods.</td>
<td>-Household survey -FGDs -Transect walks -Historical timelines</td>
<td>-Thematic analysis -SPSS (frequency distribution, cross-tabulation)</td>
</tr>
<tr>
<td>3. To understand past and present local household and community responses to drought impacts.</td>
<td>-Key informant interviews -Household survey -FGDs</td>
<td>-Thematic analysis -SPSS (frequency distribution, cross-tabulation)</td>
</tr>
</tbody>
</table>
4. To examine the roles played at the local level by national and district organisations involved in hydro-meteorological DRR and CCA and households’ perceptions of planned external interventions in response to drought events.

- Household survey
- Key informant interviews
- Document analysis
- Institutional mapping
- Thematic analysis
- SPSS (frequency distribution, cross-tabulation)

5. To explore how autonomous and planned approaches to DRR and CCA can be merged to build a more resilient community to future uncertainties and extreme weather events.

3.4. Sources of Data
3.4.1. Secondary Data

Document review was employed in this study to facilitate the understanding of the context of climate variability and extreme weather events (drought) and DRR. The review was aimed at answering specific questions linked to the study objectives. Secondary data was obtained from the Ministries of Environment, Local Government and Agriculture, the Meteorological Services Department (MSD), census reports and the Zimbabwe Vulnerability and Assessment Committee (ZimVAC) reports. The data collected through secondary sources included: temperatures (minimum and maximum) and rainfall amounts for Chirumhanzu district, total number of people and households in wards and district, approaches and strategies undertaken for CCA and DRR, and policy and organisational frameworks for the Government of Zimbabwe. With regards to temperature and rainfall information\(^3\) for the district, only data from 1980 to 2014 was collected mainly because data recorded before 1980\(^4\) was not available.

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\(^3\) The temperature and rainfall data obtained from the Meteorological Services Department were monthly averages and total annual amounts including other statistics were calculated by the researcher.

\(^4\) 1980 is the year in which Zimbabwe obtained its independence and data recorded after independence is easier to find.
3.4.2. Primary Data

3.4.2.1. Household Survey Questionnaires

During the study, survey questionnaires were administered to 217 respondents\(^5\) across the randomly selected wards (Table 3.2; Box 1). The questionnaire focused on obtaining information on households’ perceptions and experiences of climate change and variability and drought, and their views on external interventions on addressing drought disasters. The survey questionnaire was divided into thematic sections related to: demographic information, household livelihood assets, impact of drought disasters, early warning systems and drought DRR strategies and role of external organisations, with specific detailed aspects on each theme. The sampling selection for the households is explained in the next section (Box 1).

**Box 1: Sampling Procedure**

| Stage 1: Selection of the District - The researcher focused on the single district of Chirumhanzu. |
| Stage 2: Selection of Wards - The list of wards selected was obtained from the 2012 ZimStat Census Report. A random sample of wards was obtained using random numbers generated by the RANDBETWEEN function in Microsoft Excel. The 3 wards selected constitute 12% of the wards in the district. |
| Stage 3: Selection of Households - The sample size selection for the households was based on the assumption that 25% of the rural population has been affected by drought, with a desired 95% confidence interval and precision of 0.05% as indicated in the formula below. |

\[
n = \frac{t^2 \times p (1 - p)}{m^2} = \frac{1.645^2 \times 0.25 (1 - 0.25)}{0.05^2} = 203
\]

Where:

- \(n\) = sample size
- \(t\) = confidence level at 95% level of significance (1.96)
- \(p\) = proportion of population affected by drought (0.25)
- \(m\) = precision (0.05)

\(^5\) The respondents for this study were the adult of each of the households, either the household head or the spouse. Considering the sampling approach was such that the households with no respondents were replaced with the nearest households, hence reaching the targeted sample size.
\( p \) = estimate of the proportion of people falling within the group affected by drought (0.25)  
\( m \) = margin of error (0.05%).

To correct for the design difference, the sample size was multiplied by the design effect (D) that the researcher proposed as 1.5%. The sample was further increased by 0.05% to account for contingencies such as non-responses or recording errors. Based on the above calculation, the resultant sample size for the total households to be interviewed for the 3 wards was therefore: 203*1.5*0.05 = 218 households. In selecting the actual households, the sampling units (households) were assigned consecutive numbers from 1 to the total number of households in each ward. The generation of random numbers was achieved using the Random Number Generator (mobile application on my mobile phone) and ranged from: 1-1042, 1-299 and 1-881 from Mapiravana, Mushandirapamwe and Maware wards respectively. The generated random numbers tallied with the numbers assigned to the provided household list, and each generated random number represented a household from which data was collected. In the event that members of a targeted household were absent or refused to participate in the survey and/or for any other reason, the next nearest household was approached.

The total number of households in each ward under study was established using the Census report (ZimStat, 2012). A three-stage cluster sampling approach was used through a combination of random and non-random sampling methods. The households were selected from the ward level. A household is the basic sampling unit of this study. A list of villages and households were obtained from the Ward Councillor. Table 3.2 shows the three wards identified for the study.

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6 In this study, a household refers to a homestead with a family or two related families living at the same homestead and sharing their meals.
Table 3.2: Target Households in Selected Wards (Zimstat, 2012)

<table>
<thead>
<tr>
<th>Ward Name</th>
<th>Total Population</th>
<th>Total No. of Households</th>
<th>Sample Size</th>
<th>Design Effect (1.5%)</th>
<th>Final Sample Size with Contingency (0.05%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mapiravana</td>
<td>4,030</td>
<td>1,042</td>
<td>95</td>
<td>2</td>
<td>102</td>
</tr>
<tr>
<td>Maware</td>
<td>1,170</td>
<td>299</td>
<td>27</td>
<td>0.5</td>
<td>30</td>
</tr>
<tr>
<td>Mushandirapamwe</td>
<td>3,636</td>
<td>881</td>
<td>81</td>
<td>1</td>
<td>86</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>8,836</strong></td>
<td><strong>2,222</strong></td>
<td><strong>203</strong></td>
<td><strong>206</strong></td>
<td><strong>218</strong></td>
</tr>
</tbody>
</table>

The sampling procedure used in this study is shown in Box 1, which also explains the selection procedures for wards and households. The sample procedure involved three steps or stages, with the final selection of households being random and related to the size of the wards.

**3.4.2.2. Focus Group Discussions (FGDs)**

A total of six FGDs were held to elicit ideas, insights and experiences in a social context, where people were stimulated to give their own views (Mubaya & Yanda, 2010). Groups composed of 6-18 participants. With larger groups, it becomes difficult to ensure that all participants can contribute freely and meaningfully. With fewer than six people on the other hand, one or two individuals might tend to dominate (Mubaya et al. 2012). Three FGDs had only males participating and three FGDs had only females participating, that is two FGDs per ward across three wards. The discussions were held separately to encourage women to respond freely as men usually dominate discussions in this rural setting. These discussions were based on a set of questions used as a guide (Burton, 1997). Participants were asked to reflect on the questions under discussion and provide their own comments and opinions while listening to what the rest of the group had to say (Goebel, 1998). Efforts were made by the facilitator to avoid conflicts on views and dominance during the discussions by the participants.

The issues discussed included the following: perceived climate change indicators, indigenous early warning systems on drought, vulnerability context to drought, coping strategies and perceptions of the households on climate change, and drought hazards. It was also necessary to understand how the community perceived the role of institutions in drought disaster risk.
reduction and what they expected from their assistance in reducing vulnerability to climate change and drought disasters.

Each Ward Councilor and the researcher played the role of selecting individuals for the discussions based on age, position in society and period of residence in the village or ward. They also acted as the link between the researcher and the respondents especially with regards clarification of issues and maintaining order during the proceedings.

**Participatory Learning and Action Methods (PLAMs)**
Adoption of the PLAM enabled diverse groups and individuals within a community to express their views, perceptions and experiences in a co-operative manner, identify challenges and generate positive responses in a collaborative and fair manner (Chambers, 1997). PLAM are interactive and organic processes, which encourage stakeholders to engage in cycles of research, co-analysis, reflection and evaluation together over time (Kane & O’Reilly, 2001). The community members, who had attended the six FGDs, were also the groups that were involved in the PLAM methods. Below are the specific methods used in this study are described.

**3.4.2.3. Key Informant Interviews (KIIs)**
A total of ten (10) KIIs were conducted at the district and national levels mainly to get policy views and technical information not attainable at household level. Respondents in different positions in government agencies and development organisations were interviewed for their perceptions on drought risk reduction and CCA\(^7\). Information was obtained on the weaknesses and strengths of coping strategies used during drought disasters, perceptions on policy and organisational frameworks for DRR and CCA, views on integration of DRR and CCA, strategies to adapt to climate change and any possible solutions. In addition, information was gathered

\(^7\) The researcher failed to secure an interview with the Chief Executive Officer of Chirumhanzu Rural District Council (CRDC) after many attempts to set up appointments.
on DRR and CCA national governance structures and the implementation of policies. The following key personnel were interviewed:

- Research & Publication Personnel (Department of Civil Protection Department – Ministry of Local Government, Public Works and National Housing)
- Climate Change Research Officer (National Climate Change Office - Ministry of Environment, Water and Climate)
- National Agritex Director (Agritex Department - Ministry of Agriculture, Irrigation and Mechanisation)
- Agro-Meteorologist (Meteorological Services Department - Ministry of Environment, Water and Climate)
- Assistant District Administrator (Chirumhanzu - Ministry of Local Government, Public Works and National Housing)
- Climate Information Officer (Oxfam - NGO)
- District Agricultural Extension Officer (Agritex, Ministry of Agriculture, Irrigation and Mechanisation)
- Agritex Officers (Agritex - 3 Selected Wards – Ministry of Agriculture, irrigation and Mechanisation)

A voice recorder was used with the permission of the interviewee to capture the discussions. The recording was also done to improve the flow of the discussions and to ensure that the key informants expressed their views without being disrupted by the researcher taking notes.

### 3.4.2.4. Institutional Mapping

Institutional maps or Venn diagrams are visual representations of the different groups and organizations within a community (World Bank, 1998). Institutional mapping takes into account the institutions and stakeholders operating in the district (Sanginga & Chitsike, 2005). Brainstorming was used to generate ideas in a non-judgmental way by allowing participants to freely express their ideas on a specific issue (Mubaya & Yanda, 2010). Information was sought on the kind of support each formal institution provided to the communities. Participants then presented the lists of institutions together with diagrams showing their
relationships with them in areas of food security, livelihood support, early warning systems, awareness campaigns and drought disaster coping strategies. This provided an understanding of the involvement of the institutions under the different themes of the study. In addition, participants were asked to indicate if and how support has changed in the past 10-20 years.

3.4.2.5. **Historical Timelines**
Timelines were drawn to help record changes in the life of community members over time. They were used to help identify the important past climate-related events (drought, floods, frost, El Nino) using memories, experiences and opinions of the participants (AFN, 2002). The timeline drawn in the study tracked these climate-related events from 1980 to 2014. The participants were asked to remember the most devastating climate-related events that negatively affected their lives or livelihoods. It is important to note that consensus was reached regarding mentioned climate-related disaster events. All the years together with the climate-related events were recorded on the drawn diagram.

3.4.2.6. **Transect Walks**
Transect walks were done to collect data informally and in a participatory way. The study used this method for familiarizing the researcher with the resilience and/or vulnerability context, natural and physical capitals, land-use, outstanding assets and adaptation and coping strategies used in households to deal with climate change and drought risk. Transect walks provided an opportunity to capture the current agricultural practices and other livelihood strategies for different households and communities. These transect walks were also used for triangulation and validation of information given during FGDs and household surveys. One transect walk was done in each of the 3 wards in the company of an individual from the local leadership selected by the Ward Councilor. A few individuals (not more than four) from the PLAM and FGDs were willing to assist the researcher in moving around different parts of the wards. The researcher asked questions on livelihood activities, natural resources important in the livelihood activities, water sources and the general environmental outlook.
3.5. Validity and Reliability of Data Instruments
Data survey measurements require an assessment of ‘overall’ suitability and accuracy. Churchill & Gilbert (2007) suggest that the quality of a measure can be assessed for validity, (including content and design, and whether predictive), as well as for reliability. For this study, a pilot study was conducted to pre-test the household survey questionnaire in one selected village. Five household survey questionnaires and one FGD were administered in this village; thereafter some adjustments were made to questions before embarking on the full-scale data collection process.

The triangulation of the data collection instruments then sought to address the research questions while focusing on maintaining reliability and validity, not only of the collected data, but the overall inferences and conclusions drawn from it. This involved cross-examining the consistency in the questionnaire interviews, documentary sources, focus group discussions, key interviews, seasonal calendars, institutional mapping and historical timelines.

3.6. Data Analysis and Presentation
Since the study collected both qualitative and quantitative data, the data analysis methods used matched the nature of the data as indicated below.

3.6.1 Qualitative Data
Qualitative data were collected as interview scripts and observational notes, from key informant interviews, transect walks, FGDs and institutional analysis sessions. The researcher listened to the recordings numerous times while transcribing the interview and discussions, and gained a sense of the whole data through reading the transcripts several times (Vaismoradi et al. 2013). The transcribed data were generated from the KIIs and FGDS that were typically 45 minutes to one and half hours long, resulting in 3-10 pages of qualitative data. Essentially, analysis of qualitative data was conducted following this procedure:
- transcribing data, reading and noting down key findings;
- aligning key findings of the study to generate a thematic map;
analyzing the specifics of each theme to generate key and essential findings; and lastly

- selecting vivid and compelling extract examples and final analysis of selected extracts relating to the study objectives (Creswell & Clark, 2007).

A thematic content analysis was used, which focused on identifying, describing and analysing the qualitative data. Thematic analysis as used in this study is defined as a method for identifying, analysing and reporting patterns (themes) within the collected qualitative data (Vaismoradi et al. 2013). The above authors further posit that thematic analysis is a flexible and useful research tool, and provides a rich and detailed, yet complex account of data. Thematic analysis involves the search for and identification of common threads that extend across the entire set of data (Vaismoradi et al. 2013). Themes identified were based on the set objectives of the study, for example, household vulnerability to drought hazards and perceptions on climate variability and change and how these have impacted on livelihood activities.

For this study, thematic qualitative data analysis was employed in the rigorous ordering and structuring of the qualitative data. This was largely based on continuous and repetitive reading of the interview transcripts against the set themes of the study objectives. The themes were then linked together into chains or patterns of evidence to enable the drawing up of contrasts and comparisons in the experiences of the community.

### 3.6.2 Quantitative Data

The Social Package for Social Sciences Software (SPSS Version 20) was used to analyze quantitative data collected from household surveys. Responses to the household survey questions were checked for errors and consistency, and coded for entry into the SPSS software after the data collection process. The CODEBOOK was then used for entry of data into the SPSS software and for creating an SPSS file that was used to generate frequency tables, percentages of responses and cross-tabulations. With reference to cross-tabulations of some variables, Chi-square tests were performed to ascertain statistically the significance of the difference between the wards and groups at 5% significance level. Chi-square tests were performed in
SPSS software using the previously coded data. Overall, the analysed data were presented using tables, graphs and charts.

For the purpose of analysing rainfall and temperature (minimum and maximum) data, trend analysis tests were performed using Stata13 software. These trend analysis tests were also performed on a decadal basis to ascertain trends in temperature and rainfall across decades from 1980 to 2014. Performing the tests included formulating a hypothesis; the null hypothesis was that there was no trend in rainfall, minimum and maximum temperature data; and it would be rejected depending if the computed P value is less than or more than the critical value at 5% significance level (Kampata et al. 2008). In particular, the tests were useful in determining whether rainfall and temperature data exhibited an increasing or decreasing trend, which could be statistically distinguished from random behaviour. Rainfall and temperature data were treated as a time series, and trend estimation was used to make and justify statements about tendencies in the data, by relating the measurements to the times at which they occurred (Kampata et al. 2008).
CHAPTER 4: HOUSEHOLD VULNERABILITY TO DROUGHT HAZARDS: DEMOGRAPHIC AND LIVELIHOODS CHARACTERISTICS

4.1. Introduction
4.1.1 Overview and Purpose of the Chapter

This chapter addresses Objective 1, namely to explore the existing household vulnerability context in relation to household assets and livelihoods, and local socio-economic conditions. Information presented in this chapter was obtained through various methods that included household surveys, transect walks and focus group discussions (FGDs) with community members (Chapter 3: Section 3.3). This chapter presents findings on stocks of livelihood capitals and assets at the household level, namely human capital, natural, social and financial capital. These five livelihood capitals, as defined by DFID (2009), are key in achieving positive livelihood outcomes in the face of imminent hazards. The appreciation of livelihood assets provides a departure point for understanding the vulnerability context in the study area. The vulnerability context refers to unpredictable events that can undermine livelihoods and cause households to fall into poverty (Krantz, 2001).

In addition, several household demographic characteristics were measured including age and gender distribution, household composition, educational attainment of household heads, and duration of residence in the village. Several of these also relate to human capital in the household, while the latter can affect social capital. This chapter also presents findings on primary livelihood activities and primary sources of cash income for households, as this can offer further understanding of vulnerability, especially in relation to the sensitivity of livelihood activities to climate risk (Chapter 2: Section 2.3.1). Using the above-mentioned data, this chapter provides insights into the relationships between selected demographic variables, household assets, livelihood activities and vulnerability to climate change risk (specifically...
drought). This contextual background thus provides a platform from which conclusions can be drawn on household vulnerability based on asset accumulation and usage, and livelihood activities, and what this means for DRR and CCA (Chapter 2: Section 2.3.1; Section 2.3.4; Section 2.3.5).

4.1.2 Conceptual Framing: Livelihoods, Assets and Linkages with Vulnerability to Climate Risk

This study used the livelihood definition by IISD (2003) that defines it as comprising the capabilities, assets and activities required for a means of living. Similarly, Connolly-Boutin & Smit (2016) assert that livelihoods are composed of a combination of assets (or capitals) that allow households to follow a combination of strategies to attain positive livelihood outcomes. The above notions of livelihood illustrate the centrality of assets in livelihood strategies as well as their potential for determining positive livelihood outcomes for households or communities. Therefore, livelihood assets are defined as a means of production available to a given household that can be used to generate material resources sufficient for household functionality (DFID 1999; DFID 2009; Gwibi 2009). In that regard, household resilience (Chapter 2: Section 2.3.5) has to be built across multiple livelihood capitals as explained in Section 4.2, which in turn has the potential to reduce vulnerability to drought risk (Chapter 2: Section 2.3.1) (DFID 1999; DFID 2009; DFID 2012; Shah & Dulal 2015). Access to livelihood assets is shaped by characteristics of the household and the community, and by multiple and interacting biophysical and socio-economic drivers that interact to affect local context (DFID 1999; Connolly-Boutin & Smit, 2016). Thus, livelihood assets and activities (including small-scale farming) affect both a household’s susceptibility to stress (exposure and sensitivity) and the ability of a household to respond positively or to recover from the stress (adaptive capacity) (Connolly-Boutin & Smit, 2016). Therefore, livelihood assets assist in determining what resources, to aid in adapting or coping with drought, are available and accessible (InfoResources 2009; Mubaya & Mafongoya 2016).
Gwibi (2009) note that the stronger a household’s asset base is, the wider the range of livelihood options, and the more resilient to climate risk the household is likely to be. In turn, households that have more livelihood options can diversify their livelihood portfolio. For example, Paavola (2008) indicates that diversification of livelihoods is triggered by the need to create a portfolio of livelihoods with different risk attributes, so that risks can be managed and recovery becomes easier. In this study, livelihood diversification is defined as the process by which rural families construct a diverse portfolio of activities and social support capabilities in order to survive and improve their standard of living (Baird & Gray, 2014). While assets can support livelihood diversification, lack of viable alternatives, particularly for some households, can also result in the erosion of the household asset base, undermining the potential for risk reduction (Eakin et al. 2012). Thus, when a household has a diversified livelihood, they are also likely to be sustainable (DFID 1999; Rakodi 1999; DFID 2009; Krantz 2001; Richard et al. 2015) and resilient. Chambers and Conway (1992) argue that a livelihood is sustainable only when it can cope with and recover from stress and shocks, and maintain or enhance its capabilities and assets both now and in the future. Overall, livelihood assets and livelihood activities are strongly related and an important consideration for understanding household vulnerability to climate risks, especially drought – the focus of this study (Chapter 2: Section 2.3.1).

There are five main types of livelihoods assets or capitals as included by DFID (1999) in the sustainable livelihoods framework, namely human, social, financial, natural and physical capital. Each of these capitals, as used in this study, are briefly discussed below.

Human capital is determined by household size, gender of household head, levels of education, skills level and health status of household members, and has the ability to reduce the impacts of drought at household level (Luiz & Striessing, 2015). Human capital varies at household level and can be decisive in the utilisation of any other types of livelihood capital (Kollmair & Gamper, 2002). Both the quantity and quality of labour resources available to each household are subsumed under human capital (Carney, 1998). Although evidence on the relevance and value of education level to farm incomes varies, rural households are often
excluded from well-paid wage or profitable self-employment opportunities in the non-farm sectors by their low educational levels and lack of skills (Rakodi, 1999). The options for off-farm activities for households with low levels of education are therefore limited and this is likely to expose and render them vulnerable to shocks, especially the effect of drought on farming activities (Lutz & Striessing, 2015). Davies et al. (2008) argue that the response strategies for households with low education levels are then characterised by intensifying their dependence on natural resources, while these natural resources are also adversely affected by drought; this effectively places these rural households in a worse state of vulnerability during drought events. In this study, measures such as gender of household heads, age of household heads, level of education, marital status and size of the household provide information on human capital (Section 4.2.1).

Social capital is defined as being a function of trust, social norms, participation and networks, and can play an important role in building resilience to climate risks (Nakagawa & Shaw, 2004). Chen et al. (2014) also define social capital as “an aggregate of actual or potential resources, which are linked to the possession of a durable network of more or less institutionalised relationships of mutual acquaintances”. These definitions of social capital point to aspects of societal cohesion and association linkages, which are considered valuable and provide huge potential for risk reduction and coping strategies during droughts (DFID, 2012). Evidence from Wossen et al. (2015) shows that social capital is crucial, as the cash outlays needed to make investment in land management practices may make adaptation unaffordable to poor smallholder farmers and therefore they depend on each other. In their study in Ethiopia, the above authors indicated that a lack of social capital in rural households might hinder adoption of DRR and CCA technologies and actions when households have limited access to capital, information, markets and formal labour (human capital). In this study, social capital was assessed through perceptions of social cohesion during drought periods, position in the community and length of residence in the community (Section 4.2.2).
Financial capital is the financial resources that are available to households and that provide them with different livelihood options (DFID, 1999). These include finances (including credit) for investments in new productive assets, for inputs into production and for responding to the climate variability impacts including recovering and reconstructing livelihoods (Krantz, 2001). Krantz (2001) maintain that there are two main questions that underpin household financial capital and these are: what are the income earnings of the household from different sources (crop and livestock sales, off-farm activities, forest products, fishing, remittances, gifts), and what other sources of finance are available to the household (savings, bank credit and informal credit institutions) (Serrat, 2008). In this study financial capital was measured through an assessment of access to formal credit, amount of cash borrowed, household income adequacy, value of inputs used per annum in farming, and household livestock as liquid savings (Section 4.2.4).

Natural capital constitutes natural resource stocks from which resource flows useful to livelihood activities are derived, including land, water and other natural resources (Serrat, 2008). Natural capital can therefore be thought of as ecosystem services (ibid.). Hence, land, security of tenure, health of ecosystems and access to natural resources are major issues with specific regards to natural capital for reduction of drought impacts (Carney, 1998). The rural poor, because of their lack of access to private assets, mostly depend on common pool natural resources, which in most cases are under heavy pressure (because of competition for resources) and often over-utilised, exposing rural households to climate risks (Serrat, 2008). Interestingly, some of these natural resources are directly and indirectly affected by climate variability and this might impact negatively on resilience and coping of the households and rural communities (Thiede, 2014). For example, some natural resources are directly affected by climate variability through extreme weather events like drought on water sources and indirectly in that wild fruit trees require adequate rainfall to bear fruits, which people also depend on during drought episodes. Therefore, in this study, natural capital was assessed through access to water resources for domestic activities, farming, gardening and livestock...
(excluding the infrastructure), access to wild fruits and vegetables and land for agricultural activities (crop production, gardening and grazing for livestock) (Section 4.2.3).

Physical capital can be explained with response to the following questions: what infrastructure do household members have access to and use (transport, marketing facilities, health services, water supply); what are the terms of access to and maintenance of different types of infrastructure (payment, open access, individual or "pooled", etc.), and what tools or equipment do household members use during different livelihood activities and what are the terms of access to them (ownership, hire, sharing, etc.) (Serrat, 2008). Improved access to physical capital, especially basic infrastructure and production equipment, is an essential element of drought risk reduction strategies and adaptation to climate change (Krantz, 2001). Such physical capital provides households with opportunities for diversification of livelihood activities (ibid.). Without physical capital that allows diversification into off-farm activities locally, residents will move elsewhere and to urban centres to find opportunities there. Thus, physical infrastructure development (e.g. roads and electrification) is necessary for the development of non-farm economic activities in rural areas and can provide important options for households during drought disasters or as a way of diversifying income sources (Serrat, 2008). Indeed, the absence of investment in physical capital often constrains smallholder farmers from using appropriate inputs, accessing market opportunities and diversifying their livelihood strategies (Kollmair & Gamper, 2002). In this study, physical capital was assessed through household material assets for example, ownership of a radio, television and motor vehicle (Section 4.2.5).

It was argued in the introduction of this chapter that people require a range of capitals to achieve positive livelihood outcomes, as no single category of capital on its own is sufficient to yield all the many and varied livelihood outcomes that people seek, especially within the context of an increasingly uncertain and riskier future, that likely holds increased climate variability and extreme weather events (IPCC 2012; 2014). This is based on the understanding that poor households’ access to any given category of capital tends to be very limited. As a
result, they have to seek ways of nurturing and combining what capitals they do have in innovative ways to ensure risk reduction and adaptation to climate change (Arouri et al. 2015; Richard et al. 2015; Mubaya & Mafongoya 2016).

4.2. Livelihood Assets
4.2.1. Demographic Characteristics and Human Capital

With regards to household size, fifty-one percent of respondents8 headed households with 4 to 6 members, followed by 34% for households with 1 to 3 members and 15% with 7 to 10 members, while there were no households with more than 10 members (Figure 4.1). Results indicated few large households of seven and above members, while most households were of the average size (4 to 6 members). Larger households of 10+ members are now rare in the rural communities.

Figure 4.1: Household Size (n=217)

In terms of age, a large proportion (58%) of household heads fell within the 36–65 years (58%) age group (Table 4.1). There were fewer respondents on both ends; that is the young age

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8 Respondents in this study are primarily household heads, and the terms will be used interchangeably throughout this thesis.
group (18-35 years, 23%) and the elderly age group (66+ years, 19%). With regards to gender, there were marginally more male household heads (52%) than their female counterparts (48%) (Table 4.1).

<table>
<thead>
<tr>
<th>Age Group</th>
<th>Specification</th>
<th>Male</th>
<th>Female</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>18-35 Years</td>
<td>% within Age Group</td>
<td>57</td>
<td>43</td>
<td>100</td>
</tr>
<tr>
<td></td>
<td>% of Total</td>
<td>13</td>
<td>10</td>
<td>23</td>
</tr>
<tr>
<td>36-65 Years</td>
<td>% within Age Group</td>
<td>53</td>
<td>47</td>
<td>100</td>
</tr>
<tr>
<td></td>
<td>% of Total</td>
<td>31</td>
<td>27</td>
<td>58</td>
</tr>
<tr>
<td>66+Years</td>
<td>% within Age Group</td>
<td>44</td>
<td>56</td>
<td>100</td>
</tr>
<tr>
<td></td>
<td>% of Total</td>
<td>8</td>
<td>11</td>
<td>19</td>
</tr>
<tr>
<td><strong>Total %</strong></td>
<td></td>
<td><strong>52</strong></td>
<td><strong>48</strong></td>
<td><strong>100</strong></td>
</tr>
</tbody>
</table>

Results further show that within the 18-35 years’ age group (young respondents), there were more households headed by young men (57%) compared to those headed by young women (43%) in all three wards (Table 4.1). Results were similar for the mid-range age group of 36-65 years, which showed an almost equal gender distribution of 53% male-headed households and 47% female-headed households (Table 4.1). However, amongst the elderly age group of 66+ years, the pattern was reversed and there were slightly more female-headed households (56%) than male-headed households (44%) (Table 4.1). Thus, there seems to be an increase in female-headed households with age, for example, the young age group had 43% female-headed households, the mid-range age group had 47% and the elderly age group had 56% (Table 4.1). A Chi-square test used to ascertain difference between age group and gender, showed no statistical difference between these groups ($x^2 = 4.97; df= 6; p>0.55$).

With respect to the marital status, many of the respondents (62%) were married household heads 23% were widows or widowers, while 12% were single and 4% were divorced (Figure 4.2a). Another important element of demographic characteristics considered for the study related to whether, amongst the married households, the head stayed with their spouse or not. Almost half of married respondents (55%) indicated that they were currently staying with
their spouses, while 45% were not at the time of the study (Figure 4.2c). Overall, some two thirds of households had *de jure or de facto* single household heads.

Results on employment and occupational status of household heads indicated that 92% were in the informal or self-employment category, against 8% who were employed in the formal sector (Figure 4.2b). Formal employment is related to the education status of household heads. Regarding educational attainment, half of respondents had attained secondary education (50%), followed by 40% with primary education and 4% had never been enrolled for formal education (Figure 4.2d). Regarding higher levels of education, 3% of respondents had attained college education, and 1% each for advanced level (A’ Level), and vocational and university education (Figure 4.2d). Such a low higher education profile affects employability in the formal sector. The combined percentage for primary and secondary education commanded 90% of the sample against only 6% who had attained tertiary skills and 4% with no education at all (Figure 4.2d).
Further analysis of household heads’ educational attainment indicated that in the young age group (18-35 years), the majority had secondary education (82%); this was a higher percentage than in any other group (Table 4.2). Eighteen percent only had primary education, while no one had tertiary education (Table 4.2). With regards to the mid-range age group (36-65 years), approximately half of respondents had attained secondary education (49%), while 41% had primary education. Only 8% of respondents had post-secondary education and 3% had never attained formal education (Table 4.2). This group is the only age group with respondents who had attained university education. The elderly age group (66+ years) had the highest number of respondents who only had primary education (66%) and never enrolled in formal education (10%) (Table 4.2). This age group had the least proportion of respondents with secondary education (20%) (Table 4.2).

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9 In this context, formal employment is considered a formal job with a fixed monthly salary while informal employment is any other activities carried out for income with no fixed remuneration, such as casual labour.
Further, analysis of education by gender revealed that more female heads had attained primary education (24%) than their male counterparts (16%), and at secondary level male respondents had increased to 31% while female heads had decreased to 19% (Table 4.3). There was a decrease in numbers for the female respondents with the rise in the level of education. Male heads had more education beyond secondary level (4%), while fewer female counterparts had education beyond secondary level (2%) (Table 4.3). Interestingly, the 4% respondents who had no formal education were all female household heads (Table 4.3).

Chi-square tests were used to ascertain significant difference in educational attainment between male and female respondents. Results show there is a significant difference in educational attainment between males and females ($\chi^2 = 73.97; df= 36; p<0$).

Writings regarding demographic characteristics and human capital in Zimbabwe indicate rural to urban migration by the young male population (Chirau et al. 2014), contrasting findings from this study. The higher proportion of young male-headed households also contrasts with the position of Mabogunje (2010) and Baird & Gray (2014) who link the rural-urban migration...
mainly to the younger male population. Rural-urban migration has long been an attribute of rural livelihoods in Zimbabwe and was mostly triggered by perceptions of opportunities and economic benefits in urban areas (Mabogunje, 2010). However, with the increasingly poor performance of the economy in Zimbabwe (Chirau et al. 2014), not many young men are now willing to migrate to urban centres. This is because of difficulties faced by young men in securing formal employment and regular income to support their families in the urban centres. There is a trend of decreasing migration. However, households headed by young males, have scant labour assets and can therefore be considered vulnerable. These households, with labour lacking, may not be able to diversify into off-farm activities; this lack of diversification of livelihood activities can further increase their vulnerability.

Only 8% of household heads were employed in the formal sector. These households are guaranteed a fixed salary on a monthly basis. Formal employment is therefore likely associated with resilient households in a rural setting as their income is primarily from off-farm activities that are less likely affected by drought (Thiede, 2014). Even in drought years, these households are guaranteed their salary, providing cash to satisfy household demands including food supply. In addition, households employed in the formal sector in rural areas also often venture into smallholder farming activities to supplement food supply and thus diversify their livelihood activities in the process. This diversity of livelihood activities brings with it various options for sources of food and income for households (Baird & Gray, 2014). The manifestation of diversified livelihoods indicates a high level of responsiveness that may significantly increase capacity to cope with and respond to drought (Shah & Dulal, 2015). However, the ability to venture into diversified livelihood activities requires a household to have adequate and regular financial resources to finance both on and off-farm activities. This is not the case for the majority of households in the study area (Section 4.2.4). These households are reliant on informal and self-employment, which is primarily linked to farming and natural resource collection, both of which are climate sensitive. Thus, while the small proportion of wealthy families are able to diversify their livelihood activities, the poorer majority in the study area...
may be driven further into the vicious cycle of poverty, and more so, vulnerability (Baird & Gray 2014; Thiede 2014; Shah & Dulal 2015).

However, the pathways for successful climate resilience become very narrow for those 40% of household heads with primary education (24% being females) and the 4% (all females) with no education at all. Therefore, female-headed households are likely to be more vulnerable, as they have lower levels of educational attainment than their male counterparts. In their study in South Africa, Flato et al. (2016) revealed that female-headed households, because of their many responsibilities at household level and marginalised access to social capital, are indeed vulnerable to climate variability. It can be argued that such households have limited ability to be innovative and to diversify their livelihood strategies, especially when hit by drought (Bird & Shepherd 2003; Lutz & Striessing 2015; Flato et al. 2016). The 40% with primary education only have limited skills and limited chances of securing blue or white-collar employment and limited chances of diversifying their livelihood activities. However, there may be situations where the household head is poorly educated but has managed to ensure that his/her children attain good education, and consequently secure formal employment and send remittances home to their parents.

Several studies find strong evidence, both at the micro-and macro-level, of the risk-reducing potential of education, which enables individuals to acquire knowledge and skills and competencies that can influence their adaptive capacity (Chapter 2: Section 2.3.1.) (Frankenburg et al. 2013; Muttarak & Pothisiri 2013; Baird & Gray 2014; Shah & Dulal 2015). However, the results from this study indicate that only 6% of respondents have acquired tertiary education. The 50% of respondents who had secondary education have the advantage of having studied some practical subjects (e.g. agriculture, carpentry, fashion and fabrics). These might provide useful skills especially for livelihood diversification, placing household heads with secondary education in a better position to build resilience to climate risks than those with primary education or no education at all (Bird & Shepherd 2003; Lutz & Striessing 2015). In this regard, education is considered an investment in human capital and is important
for innovation and diversification of livelihood strategies, especially to off-farm opportunities (Dejene et al. 2011). In their study in Lesotho, Dejene et al. (2011) showed how people place a high priority on higher levels of education, because they believe this will increase their chances of employment and salaried jobs, and ability to diversify from small-scale agriculture and generally broaden their livelihood options. Lutz & Striessing (2015) emphasized that an investment in secondary education offers a huge potential for saving lives and household livelihoods from the adverse impacts of climate variability and extreme weather events. Conclusively, higher education levels need to be coupled with enabling policy frameworks (Chapter 7: Section 7.2) and material resources for successful implementation of drought risk reduction and adaptation strategies at all levels (Chapter 6: Section 6.2).

The marital status of household heads reflects the possibility of household members getting financial (Figure 4.2a) or material support through combined efforts and/or from the other spouse, whether formally employed or not, including during drought episodes. It was found that about half of married household heads had their spouses residential and the other half not (Figure 4.2c). There are various positives and negatives associated with having a residential or absent spouse. Having both spouses living together in the rural area may limit the diversity of livelihood activities and sources of income (cash or kind), as this arrangement aptly pins both spouses to agro-based and/or natural resource-based livelihoods that can expose them to more climate risk (Dejene et al. 2011). However, a positive outcome from both spouses staying together in a rural setting is that they can intensify and combine their efforts in small-scale farming due to labour availability and this could result in improved harvests. Contrastingly, households with one of the spouses in an urban setting might have a better chance of diversifying their livelihood strategies into the off-farm sector, thereby putting their households in a more favourable position to reduce the adverse impacts of droughts, and to cope with, respond to and recover from drought disasters (Shah & Dulal, 2015). Interestingly, migration is conceptualized both as a cause and as a response to vulnerability because beyond the positive effects of migration, for example, reduced consumption and remittances, household production capacity is reduced due to the loss of its labour force and human capital.
in general as educated household members leave (Shah & Dulal 2015; Gautier et al. 2016). The benefits outlined above are, of course, not generally available to single-headed households, especially those without other adult members. This makes this category of household particularly vulnerable to climate risk (Flato et al. 2016), and these households formed more than one third of the sample in the three wards in this study. Therefore, migration of household members to urban areas is beneficial only if they can send remittances back to their rural counterparts to purchase food and support their livelihood activities.

4.2.2. Social Capital (Social Cohesion)

Perceptions of social cohesion during past droughts were sought and linked to respondents’ years of residence in their respective villages and their position in their community. In this study, social capital was assessed based on respondents’ perception of social cohesion/community unity during drought periods, which in Shona terminology is referred to as ‘kubatana’. This provided a proxy as to whether households assisted each other or not during drought years.

Regarding length of residency in the community, the majority of the respondents have resided in their respective wards and villages for a period greater than 20 years (69%) followed by those who have stayed for 16-20 years, 11-15 years and 6-10 years (7% each) and finally 0-5 years (9%) (Figure 4.3). Thus, most respondents have resided in the study site for most of their lives, suggesting there might be high levels of social connectedness to members of the community and surrounding areas.
Considering the overall strength of ‘kubatana’ (social cohesion) in the study area, a third of respondents (31%) perceived social cohesion in their communities to be fair during drought periods, while a combined 26% perceived the social cohesion to be strong or extremely strong (Table 4.4). At the opposite end of the scale, 43% of respondents believed social cohesion to be poor or very poor (Table 4.4).

Considering perceptions of social cohesion by period of residence for shorter periods of residence (0-10 years), half of respondents (50%) perceived social cohesion in their villages as poor or very poor, 19% saw it as fair, while 31% alluded to it as strong or very strong (Table 4.4). In this case, the proportion of short-term residents (21%) who believed social capital to be weak, was higher than that of long-term residents. The findings for mid-term residents (11-19 years) were intermediate between the above two in that 40% of respondents reported social cohesion to be poor or very poor, while 34% felt it was fair, and 26% believed it to be strong or very strong (Table 4.4). With regards to long-term residents, a collective 29% of respondents with more than 20 years residence in their villages felt that social cohesion and support during drought periods was very poor or poor, compared to a combined 17% of respondents who indicated it to be strong or extremely strong (Table 4.4). The remaining 23% saw it as fair (Table 4.4). This leaning towards poor or fair is contrary to the expectation that
long-term residents would have strong social capital as a result of social networks, trust and bonds built over the years.

The results showed that, in all cases, responses were disposed across the very poor to strong continuum illustrating very mixed perceptions across different households and no clear trend in relation to length of residency and social cohesion. However, that said, for all residency periods a relatively smaller proportion of respondents believed social cohesion to be strong or very strong compared to other categories, and interestingly the percentage of residents reporting this was lowest (17%) for the long-term residence group. In addition, Chi-square tests to ascertain whether perceptions of social cohesion were different for different periods of residency showed no significance ($x^2 = 13.89; \text{df}= 16; p>0.61$).

<table>
<thead>
<tr>
<th>Period of Residence</th>
<th>Very Poor</th>
<th>% per Group</th>
<th>Poor</th>
<th>% per Group</th>
<th>Fair</th>
<th>% per Group</th>
<th>Strong</th>
<th>% per Group</th>
<th>Extremely Strong</th>
<th>% per Group</th>
<th>Total (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-10 Years</td>
<td>3</td>
<td>19</td>
<td>5</td>
<td>31</td>
<td>3</td>
<td>19</td>
<td>3</td>
<td>19</td>
<td>2</td>
<td>12</td>
<td>16</td>
</tr>
<tr>
<td>11-19 Years</td>
<td>3</td>
<td>20</td>
<td>3</td>
<td>20</td>
<td>5</td>
<td>34</td>
<td>2</td>
<td>13</td>
<td>2</td>
<td>13</td>
<td>15</td>
</tr>
<tr>
<td>20 + Years</td>
<td>11</td>
<td>16</td>
<td>18</td>
<td>26</td>
<td>23</td>
<td>33</td>
<td>8</td>
<td>12</td>
<td>9</td>
<td>13</td>
<td>69</td>
</tr>
<tr>
<td>Total (%)</td>
<td>17</td>
<td>26</td>
<td>31</td>
<td>13</td>
<td>13</td>
<td>13</td>
<td>13</td>
<td>13</td>
<td>13</td>
<td>69</td>
<td>100</td>
</tr>
</tbody>
</table>

Regarding the relationship between social cohesion and the leadership position of the respondents in the community, it was found that 39% of ordinary villagers perceived social cohesion as very poor or poor, while 30% alluded it to be fair and a combined 21% believed it to be strong or very strong (Table 4.5). On the other hand, for respondents holding leadership positions, almost double the number (40%) believed social cohesion to be strong or very strong, and 30% perceived it to be fair, while another third (30%) felt it was poor or very poor (Table 4.5). This could reflect on their own positions, as they are likely to have stronger social networks, both vertically and horizontally. However, qualitative data gathered during FGDs on perceptions of external interventions also highlighted that the support received during droughts was causing a rift among community members as there were conflicts arising as a result of the criteria used to distribute aid to beneficiaries. This has eroded the social capital.
in the communities; as droughts occur more frequently (Chapter 5: Section 5.2), more assistance is received and more conflicts arise (Chapter 7: Section 7.4.3).

Table 4.5: Respondents’ Perceptions of Social Cohesion During Droughts by Village Position (n=217)

<table>
<thead>
<tr>
<th>Position</th>
<th>Very Poor % per Position</th>
<th>Poor % per Position</th>
<th>Fair % per Position</th>
<th>Strong % per Position</th>
<th>Extremely Strong % per Position</th>
<th>Total (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ordinary Villager</td>
<td>15</td>
<td>24</td>
<td>24</td>
<td>10</td>
<td>7</td>
<td>80</td>
</tr>
<tr>
<td>Village Head</td>
<td>1</td>
<td>1</td>
<td>3</td>
<td>1</td>
<td>2</td>
<td>8</td>
</tr>
<tr>
<td>Village Secretary</td>
<td>1</td>
<td>25</td>
<td>1</td>
<td>0</td>
<td>1</td>
<td>4</td>
</tr>
<tr>
<td>Vidco Member</td>
<td>1</td>
<td>25</td>
<td>1</td>
<td>25</td>
<td>1</td>
<td>4</td>
</tr>
<tr>
<td>Village Police</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>33</td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td>Village Treasurer</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Combined respondents in positions</td>
<td>3</td>
<td>15</td>
<td>3</td>
<td>15</td>
<td>6</td>
<td>30</td>
</tr>
<tr>
<td><strong>Total (%)</strong></td>
<td><strong>21</strong></td>
<td><strong>30</strong></td>
<td><strong>36</strong></td>
<td><strong>16</strong></td>
<td><strong>17</strong></td>
<td></td>
</tr>
</tbody>
</table>

Overall, the findings suggest that social capital in the study area is not strong, with residents who have been living there the longest having the lowest percentage of responses in the strong to very strong category. This is contrary to Baird & Gray (2014), who argue that a long period of residence should be instrumental in fostering social cohesion in rural areas and its emergence during drought years. The contrasting result in this study could be a result of a comparison to the past amongst the longer-term residents when social cohesion may have been stronger (Chigodora, 2001). There is evidence in the literature to support the view that social cohesion in rural areas in Zimbabwe and elsewhere in the region is declining, becoming unreliable and exposing households to the adverse impacts of recurrent drought (Scoones 1996; Campbell et al. 2001). With declining social capital, the chances of households assisting each other in drought years are reduced and this might push households to depend mainly on their own livelihood capital and material assets. This particularly applies to poorer households because of their inability to reciprocate, making wealthier households reluctant to help them (Gautier et al. 2016). Thus, the trust built by the community members over the years (Baird & Gray, 2014) may no longer be key to enhancing the willingness of households to assist each
other, as all households are exposed to more co-variate risks as a result of climate variability, increased drought events and other stressors (Campbell et al. 2001; Rurinda et al. 2014; Mubaya & Mafongoya 2016). Given this situation, and as Rurinda et al. (2014) in their study in Makoni and Hwedza districts (Zimbabwe) suggest, the perceived limited success of social capital, as a livelihood capital with the potential to foster positive livelihood outcomes, may contribute to increasing the negative impacts of drought on human lives and household livelihood activities in the study sites.

4.2.3. Natural Capital
Household survey respondents were asked to comment on their access to natural capital assets that included arable landholding, water sources for domestic usage and small-scale irrigations activities and non-timber forest products (NTFPs).

4.2.3.1. Arable Landholdings
Household survey respondents were asked to report on the size of their landholdings and some respondents reported arable land under use while others reported on their total arable landholdings. Findings revealed that 14% of households had less than 0.4 hectares of arable land, 36% had access to 0.4–0.99 hectares, and the remaining 50% had more than a hectare of arable land (Figure 4.4). Thus a collective 50% of the respondents had access to land that is less than one hectare in size, while the other half had access to one hectare or more (Figure 4.4). Transect walks in the study area revealed that households held numerous pieces of land (fields) with different sizes and soil type. Additional findings indicated that, regardless of the size of landholdings, only 9% of respondents mentioned that they had increased their arable landholdings in recent years compared to 90% that had no desire to do so (1% non-response). The predominant narrative from the FGD participants in all wards suggested that most participants were not interested in increasing the size of their arable landholdings since this would translate into an increase in farming inputs and labour requirements. One FGD participant from Mapiravana ward pointed out, “farming inputs are costly to acquire and we
are already struggling to acquire inputs for the current small arable land in use... we need adequate financial resources to purchase adequate farming inputs for our farming activities”.

Figure 4.4: Household Arable Landholdings by Size (Hectares; n=217)

Regarding the productivity of the land, FGD participants from Mapiravana and Mushandirapamwe wards stated that the soils in their fields were no longer fertile and were exhausted from years of continuous monoculture farming practices. This meant that there was need for continuous application of fertilisers (chemical and/or organic) to realise a decent harvest. Hence, 92% of respondents from the household survey reported applying chemical fertilisers in their crop production activities, while only 8% did not. Furthermore, FGD participants acknowledged that the application of appropriate farming inputs could increase yields, thus fostering food security and generating income from the surplus produce, but that these were costly to acquire personally and what was supplied through government initiatives was inadequate. This perspective was supported by one of the Agritex officers who said, “...most of the fertiliser used by respondents was received through the government agricultural input scheme. Under this scheme one smallholder farmer would receive 10-20 kilograms of Compound D and 10-20 kilograms of Ammonium Nitrate (AN) fertilizers, which is inadequate...”. FGD participants in all wards also stated that they did not receive these fertilisers every season and this negatively affected their crop productivity from year to year.
The District Agritex officer further stated, “... the average harvest (for maize) in the study area is 0.4 to 0.6 tonnes per hectare in recent years (from 2009 to date) and farming on less than one hectare of land (50% of respondents) might not be adequate to support households throughout the season ...”.

The perceived low fertility of soils and the lack of access to sufficient fertilisers could thus be some of the factors leading to the abandonment of large pieces of arable land as was observed during transect walks in all wards. Transect walks further showed that some smallholder farmers were using animal manure (cattle) as organic fertiliser for their crop production activities. The amount of animal manure a household could harvest was determined by the size of their cattle herd, but with the small herds owned in the study only small quantities of animal manure could be used (Section 4.2.4.3; also see Chapter 6: Section 6.2.1). Households without livestock but with very strong social capital could have access to animal manure but generally, without owning livestock, there was no access (Chapter 6: 6.2.1). The other perceived factors for abandonment or reduction in the utilisation of arable land that were shared by participants during transect walks included: limited labour, soil exhaustion and limited access to other appropriate farming inputs (e.g. hybrid seeds).

Overall discussions on arable land indicate that, land in rural areas is considered an important livelihood asset that could determine the scale of agricultural activities undertaken by each household and their food security (Gandure et al. 2013), but only if the land is fertile and households have the capacity to cultivate it, which includes access to labour and inputs. Results from this study indicated the latter was not the case for many households and that these households were abandoning large pieces of arable land to focus on smaller areas, which often do not provide enough yield to see households through the year. Fifty percent of respondents currently cultivate less than one hectare of land on which they try to apply appropriate and adequate farming inputs. Few households have the required financial resources to purchase additional farming inputs over and above those provided by government; indeed, this is typical of rural areas of Zimbabwe considering the limited sources
of cash income households have (Section 4.4.2) (Mawere et al. 2013; Nyamwanza 2014). This is why the majority of households in the study area had no desire to increase their arable land and why the trend is towards cultivation of small pieces of land. With such a strategy, it can be argued that it can also help to reduce loss of financial resources through the purchase of farming inputs only to experience crop failure under the current unpredictable climate patterns and frequent droughts (Chapter 5: Section 5.2).

However, the reduction of arable land into smaller portions and the application of adequate inputs, may not necessarily translate into higher yields or adequate food for the household, as rainfall still plays a pivotal role in crop production, considering the main farming practice is dryland cultivation. For this reason, Baird & Gray (2014) argue against arable land reduction suggesting that even with inadequate application of inputs and reduction in per unit crop yield, households with the biggest and most diverse landholdings should still realize the largest outright levels of production. This is largely because the arable land available to households is often not one large piece of land, but rather numerous fields of different sizes located in different parts of the landscape within their community. These areas have different field characteristics (soil type, moisture content, dambo, slope etc.), which help to ‘spread the load’ of drought risk. Growing crops across a diversity of fields in different locations could therefore be considered a resilience mechanism. This suggests that any support for cultivation and food security in the region should take these various perspectives into account, especially considering that labour for cultivation of large areas of land is a recognised constraint for many households. It is only the wealthier households that are able to cultivate large areas as they can afford to purchase the required inputs and employ labour (which also becomes a source of casual labour and income - Sections 4.3.1 and 4.3.2).

4.2.3.2. **Water for Crop Production, Gardening and Livestock**

Respondents were asked about their main source of water for crop production activities. Ninety-five percent of respondents indicated that they depended on natural rainfall for crop production activities in their open fields, while 5% indicated that they used small-scale
irrigation systems. Households that used small-scale irrigation systems were those households that primarily focused on production in their gardens (using buckets to water crops or vegetables) and households from Maware ward who were under the Mashamba Irrigation Scheme (under government). Three Agritex officers in the ward supervised the irrigation scheme activities. During a transect walk in Maware ward, it was learnt that the irrigation scheme was established in 1992 and has 98 hectares of land with a current membership of 108 farmers. Each farmer is provided with half a hectare to a hectare of arable land for crop production. It was also learnt that the Mashamba Irrigation Scheme has an overhead irrigation system with water supply from nearby Mashamba Dam, and farmers mainly grow sugar beans, maize and wheat crops. Some of the reasons that limited the membership of this government irrigation scheme as indicated by the Agritex officer was the size of the allocated land and monthly costs paid by members, which were highlighted as costs for water (US$11-00/month) and electricity ($30-00/month). The Agritex officer further indicated that talks were underway with the government authorities regarding the expansion of the scheme to accommodate more farmers willing to join.

Overall, observations through transect walks in all the wards highlighted a limited capacity by government and rural households to establish meaningful irrigation infrastructure for open fields in most areas of the study site. Further transect walk observations showed that household gardens were primarily located near a water source; i.e. wetland, stream or river to enable access to water (Figure 4.5). With this close proximity to the water source, household members would use buckets for watering vegetables or crops in their small individual gardens. Discussions during a transect walk in Mushandirapamwe ward revealed that in drought years the weir in their area, shown in Figure 4.5, would dry out and the little water left would be reserved for livestock. Thus, many of the natural sources of water have become unreliable during drought years, rendering households, and their livestock, vulnerable to drought impacts (Chapter 5: Section 5.6.2).
Livestock in the study area largely depend on rivers, dams and streams during non-drought periods and on these and other domestic water sources during drought periods for drinking water (see Figure 4.4). With regards to distance to livestock water sources, forty-seven percent of respondents said they had to travel less than a kilometre, 41% travelled between 1 to 2 kilometers, while 12% travelled between 3 to 5 kilometers. Only 1% of respondents travelled between 5 to 10 kilometres to water their livestock (Figure 4.6).
Generally, a combined 88% of respondents, who were the majority of households that own livestock (Section 4.2.4.3), have relatively fair access to water sources for their livestock considering that they travel less than two kilometres to water their livestock during non-drought periods. However, the distance they travel increases during drought periods as many of the natural sources dry up. This might result in the physical deterioration of the livestock due to the long distances travelled, as discussed later in Section 4.2.4.3 and Chapter 5: Section 5.6.

### 4.2.3.3. **Domestic Water Sources**

Concerning domestic water, 68% of respondents used communal sources from either a communal borehole (39%), a communal protected well (18%) or a communal unprotected well (11%) (Figure 4.7). Only 18% of households had access to their own protected wells for domestic water, while 14% received piped water (Figure 4.7). Overall, 89% of the respondents had access to improved water sources (communal borehole, own protected well, communal protected well and piped water) against 11% accessing water only from communal unprotected wells for domestic use (Figure 4.8; Figure 4.9).
Figure 4.6: Domestic Water Sources (n=217)

Results showed that the households are largely reliant on communal supplies, which may run low/dry, due to the increased demand for water during drought periods and low top-up through rainfall. Utilisation of these communal water resources is not controlled and there is bound to be competition amongst community members during droughts. This increases the rate of depletion of the water and exposes households to water scarcity (Figure 4.8). Eighteen percent of respondents with their own water source had the ability to meet costs associated with the digging and construction of a deep well (Figure 4.8), but most households cannot afford to do this.
Access to domestic water is uneven across the wards making up the study site. The representative from the DA’s office indicated that the Rural District Council (RDC) and other development partners have been assisting communities by drilling new boreholes and repairing the existing ones across some parts of the district. Observations during transect walks showed that the greatest numbers of households with access to piped water and other improved water sources (own protected well, communal protected well and communal borehole) were from Maware and Mushandirapamwe wards, with Mapiravana ward having limited access to improved water sources. However, FGD participants in all wards also revealed that most of these improved water sources dry up during drought, forcing the communities to use unsafe water sources such as ‘mufuku’ for domestic purposes (see Figures 4.8 and 4.9). Transect walk participants in Mushandirapamwe ward spoke about how households would fetch drinking water from ‘mufuku’ (unprotected water sources in river beds) during droughts, including the fieldwork period during the 2014/15 drought (Figure 4.9). This demonstrates the severe impact of drought on water sources in the study site. With that background, the DA representative pointed out that in a drought in 1992, Mapiravana ward recorded a high number of deaths from both cholera and typhoid diseases.
With regards to distance travelled to fetch water from communal domestic water sources, the majority of respondents (72%) travelled for less than one kilometre to fetch water (Figure 4.10). One percent of respondents walked for distances of 10+ kilometres, while 21% and 6% of respondents travelled for distances of 1-2 kilometres and 2-5 kilometres respectively (Figure 4.10). This indicates that while most households had a relatively close source of water supply (within recommended distance of 400 to 1000 metres stipulated by the World Health Organisation (WHO) and United Nations Children Fund (UNICEF) (WHO & UNICEF, 2012), some had to travel some distance and this would take up much of the time of the women in these households. Moreover, discussions during transect walks indicated that the distance travelled in search of water increased during drought, as some of the water sources dried up.
Overall, the distance to which potable water is accessed plays an important role in determining how people allocate their time resource to livelihood activities (Richard et al. 2015). Since women in rural areas are at the centre of household and livelihood activities, fetching water from distant sources might consume productive time for gardening or other livelihood activities \textit{(ibid.)}. Considering that drought negatively affects household livelihoods (see Chapter 5: Section 5.6), losing time travelling long distances to fetch water is counterproductive as households need to engage in other activities of risk reduction.

The drying up or reduced water levels of domestic water sources during drought has a negative effect on potable water by affecting quality (see Figures 4.7 and 4.8), especially when people turn to unprotected natural sources such as ‘	extit{mufuku}’. These sources in the riverbeds were said to provide critical water during drought, but are extremely risky in terms of safety as wild and domestic animals also have access to ‘	extit{mufuku}’. This could increase competition for water and trigger water-borne diseases due to animal waste being in or close to these water sources. This finding regarding the safety of such water sources contrasts with findings by Mutasa (2010) in Buhera (Zimbabwe) where he argues that water holes dug in the riverbeds (‘	extit{mufuku}’) provided clean and safe water to drink since it was filtered with sand and therefore required no treatment.
Overall, the findings show that most households in the study area are relatively water secure regarding domestic supplies during non-drought periods, but that water becomes increasingly scarce during droughts in relation to their intensity. In such situations, households may be forced to use unsafe supplies increasing the risk of exposure to water-borne diseases (Chapter 6: Section 5.6.2). Therefore, there is need for further improvement of water infrastructure and supplies, especially in some wards in the study area. Without these, households will continue to be vulnerable. Sustained access to clean and potable water through reliable protected sources is key to reducing household risk and vulnerability to drought, which this study shows clearly affects the quantity and quality of water from existing sources.

4.2.3.4. Non-Timber Forest Products (NTFPs)

The study area, particularly Mapiravana and Mushandirapamwe wards, is endowed with a variety of non-timber forest products (NTFPs), as large dry forests surround the communities. Households had access to many wild products (Box 2)

Box 2: Wild Fruits, Vegetables and Mushrooms with Scientific and Shona names (Gomez, 1988)

<table>
<thead>
<tr>
<th>Scientific Name</th>
<th>Shona Name</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Wild Fruits</strong></td>
<td></td>
</tr>
<tr>
<td>Vitex payos</td>
<td>Tsvubvu</td>
</tr>
<tr>
<td>Stychnos spinosa</td>
<td>Matamba</td>
</tr>
<tr>
<td>Parinari curatellifolia</td>
<td>Chakata</td>
</tr>
<tr>
<td>Lannea edulis</td>
<td>Tsambatsi</td>
</tr>
<tr>
<td>Azanza garckeana</td>
<td>Matohwe</td>
</tr>
<tr>
<td>Uapaca kirkiana</td>
<td>Mazhanje</td>
</tr>
<tr>
<td>Anona senegalensis</td>
<td>Maroro</td>
</tr>
<tr>
<td>Syzygium guineense</td>
<td>Hute</td>
</tr>
<tr>
<td>Dovyyaliscaffra</td>
<td>Nhunguru</td>
</tr>
<tr>
<td>Dovyaliscaffra</td>
<td>Tsvoritsvoto</td>
</tr>
<tr>
<td>Ximeniacaffra</td>
<td>Nhengeni</td>
</tr>
<tr>
<td><strong>Wild Vegetables</strong></td>
<td></td>
</tr>
<tr>
<td>Gynandrospis gynadra</td>
<td>Nyevhe</td>
</tr>
<tr>
<td>Corchorus oditoris</td>
<td>Derere</td>
</tr>
<tr>
<td><strong>Wild Mushrooms</strong></td>
<td></td>
</tr>
<tr>
<td>Amanita zambiana</td>
<td>Nhedzi</td>
</tr>
<tr>
<td>Cantharellus densifolius</td>
<td>Nzveve</td>
</tr>
<tr>
<td>Cantharellus</td>
<td>Chihombiro</td>
</tr>
</tbody>
</table>
These NTFPs are harvested in non-drought years, but also play an important role in supplementing household food demands during drought periods, as discussed in Chapter 5: Section 5.4. Some of these products are affected by droughts, but some of them are also in abundance during the drought period (Chapter 5: Section 5.4), as a natural mechanism to cushion people from acute food insecurity during severe drought years (Chapter 5: Section 5.2). Household members also harvest small quantities of fish, but during droughts, these water sources could dry up depending on the severity of the drought as explained earlier. Additionally, households with young boys or men can also hunt or set traps for small game like common duiker, cape hare, mice, birds, wild guinea fowl and steenboks.

Results of this section of the study suggest that crop production for the most part is becoming less extensive, and more difficult and uncertain, and that large numbers of households are cultivating smaller areas and therefore not producing enough food to see them through to the next harvest season. This increases the risk of food security and household vulnerability, especially during drought (Gwimbi 2009; Chagutah 2010, Mutasa 2010, Mubaya et al. 2012; Mugabe et al. 2010; Nhemachena et al. 2014a; Rurinda et al. 2014; Dube 2015). Clearly, any external support for cultivation that forms part of a combined CCA and DRR approach needs to take this situation and the changing dynamics (demographic changes) of rural areas into account (Chapter 7: Section 7.4.1). That said, the households in the study area still had fair access to water supply for domestic use and for livestock during non-drought years, but during drought years there was strain on households and livestock as water sources dried up. Additionally, the heavy reliance on rain-fed crop production and very little small-scale irrigation exposes the farming activities to climate variability and drought. This further increases household vulnerability during drought periods, as there is a scarcity of rainfall for crop production, water for livestock and households’ domestic activities.
4.2.4. Financial Capital

4.2.4.1. Household Income Adequacy
With regards to income adequacy at the household level, the majority of respondents indicated that their income was not enough (80%) and 15% indicated that income was fair while a mere 5% of respondents stated that income was adequate for household needs even during drought periods (Figure 4.11). Study findings therefore suggest that the majority of households did not have adequate financial resources to meet their daily requirements and during drought periods their financial situation was likely to get worse. This inadequacy of financial resources in these rural households is likely linked to their main livelihood activities and main sources of cash income, as will be discussed later in Section 4.4.1 and Section 4.4.2 respectively.

Figure 4.9: Household Income Adequacy (n=217)

For further understanding of household finances, an additional question on the value of farming inputs used on an annual basis for farming activities was asked and the majority of respondents (73%) said a few dollars to US$200 while 3% used between $401 and $600 (Figure 4.12). Interestingly, 3% of respondents revealed that they do not purchase farming inputs for crop production activities (Figure 4.12). The District Agritex Officer for inputs requirements indicated that to cultivate one hectare of maize crop, a farmer requires 25 kilograms of seed (priced at an average of US$85.00); 300 kilograms of Compound D fertiliser (priced at US$32.00

| P a g e 85 |
per 50 kilograms) and 250 kilograms of Compound AN (priced at US$38.00 per 50 kilograms) with a total value of US$467.00, and this is without labour or any other additional costs. These were indicated to be standard requirements for maize crop production in the area. The District Agritex officer further indicated that growing maize crops per hectare without such an investment (US$467.00) would result in reduced harvests, and these could trigger food insecurity at household level.

Figure 4.10: Value of Farming Inputs per Household per Year

With the majority of households in this study indicating that they have inadequate household income, it suggests that they are unlikely to meet household demands, from food through to inputs, for livelihood activities. As a result of limited financial resources, households might even fail to implement recommended strategies for drought risk-reduction and adaptation (Chapter 5: Section 5.3), which would require purchase of inputs (e.g. drought tolerant seed varieties), rendering them vulnerable to drought. Similarly, Cao & Limnirankul (2014) and IPCC (2014) argue that farmers’ risk reduction and adaptation have close ties with household economic welfare (household income), with wealthier farmers showing better adaptation. However, these wealthier farmers were in the minority in this study (Section 4.2.4.1). With inadequate household income, the chances of satisfying other facets of livelihood capitals (e.g. access to education and health) that are essential for effective drought risk-reduction and
adaptation are limited, further exposing households to drought impacts (Chapter 5: Section 5.6).

4.2.4.2. Access to Credit

Respondents were asked whether they had access to formal credit in their localities. The majority (87%) indicated that they had no access to formal credit, while 13% mentioned that they did.

Respondents mentioned several factors they perceived were behind the limited access to credit. These factors included, among others, lack of collateral (36%), high interest rates (5%) and no access to credit institutions (29%) (Figure 4.13). Additionally, 18% of respondents were not interested in credit, while 8% had never tried to acquire loan and 2% did not respond (Figure 4.13). In relation to collateral, a pensioner during a FGD indicated, “... I am currently earning a pension salary of less than $100 per month and it is not even enough to support my children let alone get a loan. Who would give me a loan with such a salary and how would I repay it ...?” Related to the ability to repay a loan, a teacher during a FGD in Mapiravana ward indicated, “... at one point around 2009 and 2010, when the country started using United States Dollars, all civil servants were not paid salaries; rather they were given allowances of $100 worth of vouchers per month for a few months, ... and before 2009, we were being paid in bearer cheques, which were swept away by hyper-inflation on payday.... in most cases one could buy US$5 from the black market ...”.

All these above-mentioned factors acted as major barriers to accessing credit at individual level (Figure 4.13). The 5% of respondents that indicated knowledge of high bank interest rates on loans suggests that some households might have made efforts to secure formal credit at some point or they were well informed on credit issues (Figure 4.13). In support of high interest rates, an Agritex officer from Mushandirapamwe ward also stated that, “... naturally the majority of people would compare their incomes against the principal amount to be...”
borrowed plus the interest, so when realising that they might repay almost double for the loan, they decide not to secure the loan ...”.

Figure 4.11: Perceived Challenges in Accessing Credit (n=217)

The 13% of respondents with access to loans had borrowed amounts ranging from a few dollars to US$2000 (Figure 4.14). Most respondents (61%) had borrowed amounts less than US$500, 23% had borrowed between $501-$1000, while 8% each had borrowed between $1001-$1500 and $1501-$2000 (Figure 4.14).

Figure 4.12: Amounts Borrowed by Respondents
With regards to the presence of women’s saving groups, 59% of respondents indicated that they did not have such groups in their village or ward, while 30% confirmed that they had a women’s savings group and 11% did not know whether there was a women’s savings group or not (Figure 4.15). Essentially, two-thirds of respondents confirmed that they did not have women’s saving groups in their community, and the 11% that did not know of an existence of or not, might be an indication that there is no women’s saving group in their communities.

Figure 4.13: Existence of Women’s Saving Groups

Financial capital is low amongst most households in the study site and there is little opportunity to access loans. The borrowed amounts were mostly deemed meager considering that they are below the poverty datum line (PDL)\(^\text{10}\) of $484.00 per month in Zimbabwe (ZimStat, 2016). Such loans are likely to have little impact on fostering meaningful household development, livelihood diversification (to off-farm activities), farming activities and building resilient livelihoods to future climate risks. In the end, households are likely to use borrowed money for daily consumption. This will leave the households in more debt, since with these loans, households are unlikely to generate more capital while servicing the loan at the same

\(^\text{10}\) Poverty Datum Line is defined as the threshold below which families or individuals are considered to be lacking the resources to meet the basic needs for healthy living (Zimstat, 2016).
time. Additionally, the small amounts borrowed by households can be attributed to a lack of high-value assets to use as collateral against borrowing large sums of money (Section 4.2.5.1).

The low access to credit in the study site demonstrates that there is still limited progress by the government and financial institutions with regards to establishing themselves in rural areas for assisting rural households financially (Chapter 2: Section 2.3.4 - Pressure and Release Model). Without support institutions like these, rural smallholder farmers and households continue to be marginalized and excluded from opportunities to improve and develop their financial status through access to credit (Mubaya et al. 2012; Nhemannchena & Hassan 2008; Nhemanchna et al. 2014a). Financial institutions seem to be reluctant to establish offices in rural areas, perhaps because they consider it not viable due to perceived low business and income flows (Chirau et al. 2014). Moreover, alternative forms of micro-finance offered are limited.

Although there were low levels of access to formal credit, the establishment of women’s savings groups (informal micro-finance institutions) in some communities might help other households to secure financial resources in times of need. In their study in Zimbabwe, Bote et al. (2014) argue that such informal financial institutions at the community level, especially in rural settings, can potentially alleviate financial constraints and consequently improve rural livelihoods. Similarly, in their study in Lushoto (Tanzania), Nyasimi et al. (2016) showed that savings groups in rural areas are important with regards to pooling resources together; being in savings groups also presented other opportunities of securing loans at affordable interest rates. The women’s savings groups that were revealed in this study were said to be an initiative of external interventions as a way of improving livelihood activities. Some of the organisations that were involved in the establishment of women’s savings groups included Oxfam and Care International (Chapter 7: Section 7.4.1). However, there are constraints in joining savings groups, as informal savings are said to be costly for poor households whose limited income is used primarily for food consumption, making them vulnerable during drought periods when

With regards to vulnerability, it is well established that households with no access to credit, such as the majority in this study, are, particularly during droughts, more exposed to risks and hazards, and less able to cope or adapt, than those with this option (Chapter 2: Section 2.3.1) (Nhemachena & Hassan 2007; Chirau et al. 2014). In their study in rural Uganda, Okonya et al. (2013) argue that financial resources accessed through credit during drought periods could assist those households to improve accessibility to food resources and facilitate coping and recovery strategies. Similarly, Nhemachena et al. (2014b) in their study in South Africa, Zambia and Zimbabwe, conclude that access to credit by smallholder farmers increases their financial resources and ability to meet the costs associated with adaptation options they might consider undertaking. In addition, access to credit could foster arable land development through investments in farming inputs, irrigation infrastructure, appropriate farming practices and other off-farm investments that are key to long-term DRR and CCA strategies (Nhemachena & Hassan 2007; Nhemachena et al. 2014b, Nagonda 2015). Unfortunately, many rural households in this study live in abject poverty and lack information on credit and the non-accessibility to loans could even exacerbate their poverty (Chapter 2: Section 2.3.1; Section 2.3.4). Furthermore, because of the current successive droughts (Chapter 5: Section 5.2), even those households with access to loans might be left in more debt and increased poverty, as they continue to borrow and perhaps fail to pay back.

4.2.4.3. Household Livestock Ownership
Some two-thirds of respondents’ households owned livestock (69%), against 31% who did not (Table 4.7). Considering livestock ownership in relation to age of household heads, it was found that 43% of households with heads between the ages of 36 and 65 years had livestock, while this decreased to 13% for those household heads older than 66 years (Table 4.7). Thirteen percent of households in the age group 18-35 years owned livestock (Table 4.7). A
Chi-square test to ascertain differences in livestock ownership based on age showed no statistical difference between age groups ($x^2=11.18; df=6; p>0.08$).

Table 4.7: Household Livestock Ownership by Age Group (n=217)

<table>
<thead>
<tr>
<th>Livestock Ownership</th>
<th>Specification</th>
<th>18-35 Years</th>
<th>36-65 Years</th>
<th>66+Years</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>% of Total</td>
<td>13</td>
<td>43</td>
<td>13</td>
<td>69</td>
</tr>
<tr>
<td>No</td>
<td>% of Total</td>
<td>10</td>
<td>16</td>
<td>6</td>
<td>31</td>
</tr>
<tr>
<td><strong>Total %</strong></td>
<td>% within Livestock</td>
<td>23</td>
<td>59</td>
<td>19</td>
<td>100</td>
</tr>
</tbody>
</table>

Analysis of livestock ownership by gender revealed that more male-headed households owned livestock (38%) than their female counterparts (31%). There was no statistical difference in livestock ownership based on gender, as indicated by a Chi-square test ($x^2= 1.67; df= 1; p>0.196$).

Table 4.8: Household Livestock Ownership by Gender (n=217)

<table>
<thead>
<tr>
<th>Livestock Ownership</th>
<th>Specification</th>
<th>Male</th>
<th>Female</th>
<th>Total %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>% of Total</td>
<td>38</td>
<td>31</td>
<td>69</td>
</tr>
<tr>
<td>No</td>
<td>% of Total</td>
<td>14</td>
<td>17</td>
<td>31</td>
</tr>
<tr>
<td><strong>Total %</strong></td>
<td></td>
<td>52</td>
<td>48</td>
<td>100</td>
</tr>
</tbody>
</table>

Several different types of livestock were owned, with cattle and goats being the most common (59% cattle and 45% goats) (Figure 4.16). Ownership of pigs and donkeys[^11] was much lower, with only 4% of households owning pigs and 1% donkeys (Figure 4.16). Regarding numbers of livestock, herd sizes of between 1-5 beasts were most common, applicable to 35% for cattle owners and 37% for goat owners, followed by herd sizes of 6-10 beasts (18% and 5% of households for cattle and goats respectively) (Figure 4.16). The number of households with livestock in the range of 11+ beasts was a mere 6% for cattle and 3% for goats (Figure 4.16). Discussions during transect walks with some study participants in all wards suggested that this

[^11]: Donkeys are primarily used for draught power (ploughing and donkey carts) and are not consumed for meat in the study area.
predominance of small numbers of livestock per household could be because they cannot afford to purchase cattle, as they are high-value livestock.

![Figure 4.14: Livestock Ownership by Quantity and Type](image)

Discussions on livestock in rural areas suggest that livestock provide an important form of financial capital as well as having other benefits. Essentially, livestock, especially cattle, provide liquid savings (cash income when sold) and draught power, and contribute to soil fertility and ensure protein (meat and milk) in household diets (Berman et al. 2015; Connolly-Boutin & Smit 2016; Karim & Noy 2016). However, for cattle and donkeys to be used for draught power, they need to be strong and healthy otherwise farming activities at the household level might be compromised (Chapter 5: Section 5.4), as is often the case in drought when fodder is scarce (Nkondze, 2014). Households that own cattle and donkeys are therefore likely to engage more effectively in agricultural activities without major setbacks in terms of draught power and animal manure (Arouri et al. 2015). The quantity of animal manure, especially from cattle, that can be collected is largely dependent on the number of cattle one possesses (see Section 4.3.2.1; Chapter 6: Section 6.2.1). Usage of organic manure in gardens and open fields might increase the potential for high yields and reduce exposure to climate variability (Richard et al. 2015). However, in this study, the number of cattle per household
amongst livestock owners is generally low (with 35% of cattle owners having 1 to 5 beasts) and therefore, animal manure might not be adequate for application on cultivated fields. The low numbers of livestock ownership in the study area can be attributed to impacts of successive droughts in the areas, as evident in Chapter 5: Section 5.2, where droughts are said to be occurring almost every two years. Moreover, the 31% of households without livestock might have limited access to animal manure, as they will be used by livestock owners, and therefore risk lower harvests (Richard et al. 2015). Given the soils types in the study area, non-application of organic and/or chemical fertilizers will probably result in low yields, rendering these households vulnerable to adverse impacts of drought (Chapter 3: Section 3.2.4; Section 4.2.3.1) (Connolly-Boutin & Smit, 2016).

Livestock are an important safety net for households in that they can be sold in times of financial need (Smucker & Winser 2007; Ahmed et al. 2014; Berman et al. 2015; Connolly-Boutin & Smit 2016; Karim & Noy 2016). In their study in Zimbabwe, Bote et al. (2014) showed how some parts of Zimbabwe were benefitting from a livestock based banking model, in which communal households used their livestock as collateral for getting credit from Steward Bank. Cattle becomes a tradable asset that can be used to secure cash when the need arises (ibid.). During drought in particular, the sale of livestock usually happens too late when the animals are already in poor condition or the market is flooded (as everyone is now trying to lay off their livestock) and therefore does not provide much financial gain as they do not fetch the best prices.

Cash income realised during drought will be inadequate for savings or rebuilding the livestock herd, and will likely be used to purchase grain for household consumption (Karim & Noy, 2016). Moreover, the low numbers of high-value livestock like cattle in this study (as mentioned earlier), suggests that households cannot rely on liquidating their cattle to cushion themselves against stresses in the long-term. However, livestock are also at great risk as they are adversely affected by drought, resulting in an increased livestock mortality rate (Chapter 5: Section 5.4), physical deterioration, or low rates of reproduction (Chapter 5: Section 5.6).
(Tirivarombo & Hughes, 2011). This scenario can put the same households at higher risk and vulnerability to future droughts than they were before (Baird & Gray, 2014).

4.2.5. Physical Capital

4.2.5.1. Household Material Assets

Regarding household material assets, the majority of the respondents owned mobile phones (85%) while 3% owned motor vehicles and 1% owned motorcycles (Figure 4.17). Almost half of respondents (51%) owned radios while 57% owned solar panels and 30% owned bicycles (Figure 4.17). There was low ownership of high value assets (e.g. motor vehicles and motorcycles). The ownership of television sets was also low (17%) and this could be a result of their high cost to purchase and the need to access energy for powering them (Figure 4.17).

![Figure 4.15: Household Material Asset Ownership](image)

Generally, households owned different types of assets that would be used for various household activities including communication and productive equipment for livelihood activities. Ownership of mobile phones is likely to improve the ability of households to communicate effectively with friends, relatives and other family members in different geographical locations, especially in times of need such as drought periods. Improved communication has positive effects on social capital that might increase chances of rural
families receiving support from urban or better-off relatives during drought (Wossen et al. 2015). Currently remittances can be received as cash through mobile phones (mobile banking), thus the usage of mobile phones now spans the range from communication to banking at a small scale. In addition, mobile banking enables rural households to have savings in their account, which was previously made difficult by the documentation required by banks when opening a bank account in Zimbabwe. Mobile phones are now seen as ‘mobile banks’ as people can send and receive money in Zimbabwe through mobile services like Ecocash, One Wallet and Telecash, including in rural areas. Additionally, ownership of mobile phones in rural areas might increase one’s chances of having access to seasonal weather forecasts and prediction information, for example, in Zimbabwe through the EcoFarmer service or being notified by friends and family through their mobile phones (Chapter 5: Section 5.5.1).

Essentially, the households with solar panels also owned radios, mainly because they use solar energy as a power source for this electronic gadget. The limited accessibility and connection to electricity in rural areas has encouraged installation and usage of solar power for many uses, including charging mobile phones, energy source for radios, and energy for televisions and lighting. Possessing a radio or television set is an indication that the household can access information on seasonal weather forecasts and predictions, climate risk and innovative advice on coping strategies through the various radio and television programmes offered. Government departments and/or NGOs (e.g. MSD, Agritex, Department of Livestock Veterinary Services (DLVS), Oxfam) with interest in reaching out to the mass population, largely use radios to convey key messages especially to rural households (Chapter 5: Section 5.5.1). However, low ownership levels, particularly of television sets (17%), shows that only a

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12 The EcoFarmer facility through Econet notifies its subscribers of weather information and prices for produce and the specific markets. Eco-farmer is a facility offered by Econet Wireless, a mobile phone service provider in Zimbabwe. EcoFarmer is a revolutionary way of farming using mobile technology. It is Zimbabwe’s first Micro Insurance product designed to insure inputs and crops against drought or excessive rainfall. In addition, the insured farmer can receive daily weather information, farming tips and information on when and where to sell, and the best prices for their produce (www.econet.co.zw/ecofarmer).
few rural households receive any climate information via this medium (Figure 4.17). Limited access to climate information for rural households makes them vulnerable to drought impacts, as they will not be informed on the severity of the drought and potential impacts, and to initiate drought risk reduction and adaptation strategies (Chapter 6: Section 6.2) (Lemos et al. 2013).

Motorcycles and motor vehicles mean greater access to other areas. Thus owning some mode of transportation and the ability to travel long distances during drought for provisions, water and forage can be considered a good coping strategy. Therefore, households that owned modes of transportation (4%, see Figure 4.17) were in a better position to quickly react and travel to purchase food and other household requirements, giving them an advantage over those that did not. Those households having transport could travel to fetch clean and potable water (see Section 4.3.2.3) and water for livestock. Chambers & Conway (1992) posit that ownership of modes of transportation also increases accessibility to external institutions that are not in the local area. However, the majority of households in all wards did not have this option and household members were required to travel long distances on foot, with donkey carts or by public transport in search of provisions during droughts (Chapter 5: Section 5.3). In addition, in some cases, by the time they reached places selling grain or still having water, supplies were low, exposing them to hunger and other health risks.

DFID (2009) argue that households require a range of material assets to assist them achieve positive livelihood outcomes when experiencing external shocks and stresses. However, in this study, the majority of respondents owned only a range of low value material assets (mobile phone, radio, television, solar, bicycle), which limited their options. In some parts of Chirumhanzu district, especially around Chaka ward, some households had invested in high-value assets like sewing machines and knitting machines, which they used to produce garments for sale (Kapungu, 2013).
4.3. Livelihood Activities
4.3.1. Primary Livelihood Activity and Sources of Cash Income for Households

The majority of households were involved in smallholder farming (71%), followed by mixed agriculture (farming and livestock rearing) (21%) (Figure 4.18). Only 6% had a household member in formal employment, while 1% were involved in intensive small-scale livestock rearing (chickens, pigs, rabbits etc.) and casual labour as their primary livelihood activities (Figure 4.18). Some respondents who owned livestock (69%, Section 4.2.4.3) did not consider small-scale livestock rearing (chickens, pigs, rabbits etc.) as their primary livelihood activity even though they owned animals. Respondents in the formal employment sector (6%) were largely teachers (Early Childhood Development (ECD), primary and secondary school teachers), pensioners and nurses. However, those in the formal employment sector also engaged in subsistence farming mainly to supplement food supplies as mentioned earlier in Section 4.2.1.

Figure 4.16: Household Primary Livelihood Activity (Responses to Question: What is your primary livelihood activity?)

Regarding the main source of food for the household, 90% of respondents were dependent on own production, whereas 10% of respondents relied primarily on buying or working in the community for food. Results showed that the majority of households were still involved in
smallholder farming for food production, although on differing scales. Those households that could not afford to purchase food for themselves, often worked for other families and in return were given an agreed amount of food (grain or mealie meal).

An additional question was asked on where households usually sourced food during drought periods; 32% of respondents sourced food within the district (Figure 4.19). Twenty-five percent of respondents sourced food from towns/cities, while 18% indicated humanitarian food aid and 17% sourced food within their ward (Figure 4.19). Only 7% of respondents sourced food from other nearby districts (Figure 4.19). Overall, a third of respondents sourced their food outside the district boundary while two-thirds sourced food outside the ward boundary. This suggests that households in the study site had to travel long distances in search of food or grain during drought periods, supporting the importance of ownership of modes of transportation as a coping strategy, as explained earlier in Section 4.2.5.1.

![Figure 4.17: Sourcing Food during Drought Events (n=217)](image)

The primary sources of cash income in households were casual labour (41%), followed by food crop sales (28%) and salaries (11%) (Figure 4.20). Another 9% of respondents depended on petty trade for cash income, 5% on remittances, 5% on vegetable sales and 2% on livestock
sales (Figure 4.20). Discussions with Agritex officers and the District Administrator (DA) representative pointed out that casual labour has been on the rise mainly because of the decreasing levels of wealth in rural communities. Hence, some households are surviving primarily on labour exchange in fields and homesteads to earn income, with a secondary range of other activities. FGD participants who generated income from the sale of food crops said they mostly sold their maize and other grains during the period of high food demand from December to May before the next harvest. One FGD participant from Mushandirapamwe ward indicated, “... maize prices usually start as low as US $5/bucket during the harvest period (April – May) rising to about US $10/bucket around December. The price can rise as high as US $15/bucket during recurrent drought periods ...”. Furthermore, regarding cash income, FDG participants in all wards stated that many households receive food or money from their children, relatives or parents who have migrated to urban areas.

![Primary Source of Cash Income for the Household](image)

Figure 4.18: Primary Source of Cash Income for the Household (Response to the Question: What is the primary source of cash income for your household?) (n=217)

Regarding livelihood activities, the study results confirm findings by Gwimbi (2009) that livelihoods of 70% of households in rural Zimbabwe are dependent on rain-fed agriculture, making them vulnerable to a variety of shocks, including those associated with climate change
(Section: 4.3.2.2; Chapter 5: Section 5.6). As envisaged by Mawere et al. (2013) in their study in Chivi and Zvishavane districts, a significant proportion of the population in rural Zimbabwe is still largely dependent on exploitation of environmental provisions for their livelihoods and subsistence farming. Due to dependence on rain-fed farming and limited government support, small-scale farming activities have been greatly affected by climate variability and this has resulted in continuous acute food shortages on a yearly basis and heavy reliance on food aid (Mubaya et al. 2012; Bola et al. 2013; Mawere et al. 2013; Murungweni et al. 2014; Nyamwanza 2014).

While 1% of respondents had diversified their livelihood to include casual labour, results revealed that the contribution of cash income from casual labour seems to be gaining prominence over recent years. This is contrary to the widely accepted view that the main source of cash income for smallholder farmers in rural areas is gained through the selling of grain (Akter & Mallick 2013). With agriculture performing poorly, many households are left with few options, one being to sell their labour for income. For casual labourers, labour exchange is not only limited to fields, but extends to homesteads and even herding cattle. Even in the face of imminent drought, smallholder farmers with the means do not down their tools, they still plough and cultivate their fields in the hope that they will get something; hence there is opportunity for casual labourers. In times of good rains, casual labour might be abundant, but when drought strikes households might hold on to their resources and assets thus affecting those dependent primarily on casual labour. However, Smucker & Winser (2007) in their study in Tharaka (Kenya) showed that poor households were faced with the difficult decision of diverting labour from their own crop production, thereby endangering productivity on their own landholding, and selling labour as a means of earning livelihood income. Largely, activities that required labour were seasonal and included: ploughing at the onset of the rain season; weeding as crops grow; harvesting, husking and shelling during the harvest period; digging anthills and manure from kraals in preparation for the cropping season; and thatching houses during the dry period and laying bricks.
Murungweni et al. (2014), in their empirical study in south-eastern Zimbabwe, showed that some of the rural households were beginning to diversify their livelihoods to include: brickmaking, petty trading, fishing for sale, beer brewing, *Gonimbrasia belina* (mopane) worm harvesting for trade and handicrafts. Other optional activities were also climate sensitive, and petty trade (i.e. manufactured products, vegetables such as rape, tomatoes, cabbage, sweet cabbage, and wild fruits) was another source of income for the households. The wild fruits that are mostly sold for cash income include “*mazhanje*” (*Uapaka kirkiana*), “*matamba*” (*Strychnos spinosa*), “*tsvubu*” (*Vitex payos*), “*matohwe*” (*Azanza garckeana*) and ‘*hute*’ (*Syzygium cordatum*) (see Section 4.3.2.4) (Gomez, 1988). In another study in South Africa, Shackleton & Shackleton (2004) showed that non-timber forest products (NTFPs) were harvested both for subsistence and for selling, either regularly or during stresses and shocks, in this case drought. In that respect, the household’s dependence on wild fruits during drought is highly dependent on the severity of the droughts, and when it is more severe these households are at risk and vulnerable to drought impacts (Section 4.3.2.4) (Shameem et al. 2014). In their study in Zimbabwe, Rurinda et al. (2014) maintain that households that are dependent on wild fruits or other natural products during drought are vulnerable and under serious threat since droughts might negatively affect the natural ecosystem.

In this study, only a small proportion (6%) of households were employed in the off-farm (formal) sector, and generally these opportunities were limited, especially where educational levels were low, as was the case for most respondents in this study (Section 4.2.1). If not based on education, livelihood diversification should be backed by adequate financial resources to support off-farm activities, but only if the households have extra financial resources to set aside as capital into these ventures. This is not the case in this study as explained in the next Section 4.3.

Livestock sales were rated as the lowest source of cash income. One reason for this could be the decreasing numbers of livestock per household, attributed to adverse impacts of recurrent droughts (Chapter 5: Section 5.2). Further, those with livestock try as hard as possible to hold
on to their livestock, considering that they do not fetch good prices during drought periods (Section 4.2.3.3) (Scoones 1996; Mugabe et al. 2010). Similarly, Murungweni et al. (2014) showed that livestock (especially cattle) selling is important for households in getting cash income during drought, but households with fewer cattle would rarely sell their livestock. Households with livestock will only sell them if the situation becomes sufficiently dire to require financial resources to meet other household demands.

The receipt of remittance from urban areas was considered an important source of cash income for some households. The remittances were in the form of either food packs or money sent by family, friends and relatives. Thus, households that relied on sourcing food or grain from towns or cities were likely to get assistance from family members or relatives residing in those cities. Remittances have helped rural families survive acute food shortages due to recurrent drought disasters (Berman et al. 2015). Thus, the remittances were an important risk-reduction and/or coping strategy during drought years in the rural areas, as well as providing an insurance mechanism that could, to a limited extent, cover losses (Nivaran 2009; Berman et al. 2015). This means that families not receiving remittances were likely less able to respond to risks as they might have limited options for cash income.

4.4. Conclusion
Access to stocks of the five livelihood capitals and associated assets are key to cushioning households from the adverse effects of drought hazards (Moore et al. 2014). However, with the successive droughts experienced in Zimbabwe, their impacts are likely to reduce the rural household asset base, potentially lowering their adaptive capacity and exposing them to future climate risks (Carter et al. 2007; Bola et al. 2013). The severity of a drought determines how much a household draws from its livelihood assets base to meet household demands (Carter et al. 2007). In some cases, droughts have been severe and have greatly reduced the livelihood asset base, especially for assets like livestock. For example, in Zimbabwe more than one million cattle died in the 1992 drought across the whole country in communal areas (Mubaya et al. 2012; Bola et al. 2013; Rurinda et al. 2014). However, households that are
strong in all five livelihood capitals and have considerable wealth are likely to be less vulnerable to drought in comparison to those with a small asset base (Connolly-Boutin & Smit 2016). To reduce vulnerability and build resilience there is need for adequate access to all types of livelihood capitals as these support one another in helping households cope and adapt.

An interesting observation on household social capital was the perceived weak social cohesion within communities that in many previous studies in the country had been indicated as strong (Chimhowu & Hulme 2006; Chirau et al. 2014; Murungweni et al. 2014). With weak social capital, the dissemination and sharing of information becomes limited if not impossible, slowing down the spread of appropriate drought risk-reduction strategies, knowledge and practices (Eakin et al. 2014; Baird & Gray 2014; Murungweni et al. 2014). While, social capital has long been championed to reduce vulnerability and improve resilience to climate variability and change, it is clear from the findings in this study that aid programs and cultural shifts are eroding this asset. In addition, rural households have limited access to formal credit and this has affected their ability to diversify livelihoods and/or to invest in their livelihood activities. In this regard, some households have abandoned their larger arable lands to focus on small pieces of land and/or gardens as they cannot afford the inputs and the government supplies are often inadequate. Further, such a strategy reduces loss of financial resources associated with risk of crop failure under an uncertain climate. Overall, this has affected the capacity of the rural households to invest in their smallholder farming activities, for example, setting up small-scale irrigation systems (physical capital). Limited financial resources might also be one of the many factors that have led to the low levels of attainment of tertiary education across all age groups – affecting the human capital development.

As a result of low education levels, there is a high reliance on farming and the limited diversification of livelihoods activities, linked to a lack of off-farm options. This increases their vulnerability, and reduces their capacity to cope with and/or recover from adverse impacts of climate change and extreme weather events (Bird & Shepherd, 2003). However, some
households have tried to diversify their livelihood activities by for example, working as casual labourers, selling wild fruits and other activities. Smucker & Winser (2007) argue that this diversification of livelihood activities in rural areas might not necessarily indicate a wide range of options, but it could be an indication of a struggle to replace coping mechanisms. While, some of these could be built on, many are still climate sensitive. By and large, households in the study need to diversify their livelihood strategies to off-farm activities if they are to avoid the impacts of climate change. With limited livelihood diversification options, households may be heading down a slippery slope of mounting reliance on measures that threaten long-term livelihood security (Smucker & Winser, 2007). This may require new types of support and investment in rural areas, especially through external intervention, by building on both local activities and value chain management for impact and sustainability (Brown et al. 2013). Households could also improve their ways of continuing with their current livelihood activities, for example, by using conservation farming for crop production, as this has proved beneficial in some parts of the study site.
CHAPTER 5:
HOUSEHOLD PERCEPTIONS OF CLIMATE VARIABILITY AND
CHANGE, ACCESS TO CLIMATE INFORMATION AND DROUGHT
IMPACTS

5.1. Introduction
5.1.1. Overview and Purpose of this Chapter
This chapter focuses on household and community perceptions of climate variability and change, including drought events, in relation to the meteorological data from the study area. The chapter specifically addresses Objective 2, which seeks to investigate household perceptions and experiences of climate variability and change, particularly droughts and their impacts on local livelihoods. The methods used to gather the data presented in this chapter included: household surveys, focus group discussions (FGDs), transect walks, participatory learning actions and methods (PLAM), key informant interviews (KIIs), transect walks and document review of rainfall and temperature data from the Meteorological Services Department (Zimbabwe) (Chapter 3: Section 3.4).

This chapter presents and discusses changes in different weather elements using the recorded meteorological data (rainfall and temperature from 1980 to 2014) from Chirumhanzu district, and considers the implications for smallholder farming activities. This chapter further presents findings on household perceptions of climate variability and change, as these might play a role in shaping livelihood activities, and adaptation and risk reduction strategies at household level. Insight into past household experiences and their perceptions of drought disasters are also provided. An appreciation of the sources of seasonal weather forecasts and drought prediction, including conventional media sources and indigenous knowledge, help to provide an understanding of early warning systems in the community and the source of weather information preferred by rural households. Lastly, the perceived impacts of drought on livelihood activities are discussed.
5.1.2. Conceptual Framing: Perceptions of Climate Variability and Change, Access to Weather Information and Drought Impacts

Qualification of climate variability and change, through discussions with local people, is necessary in order to detect any changes that have already occurred and can be helpful in making predictions and forecasts for future climate risks (Swain et al. 2015). Perceptions of climate variability and change, and associated risks, are a key component of the understanding of climate change (Janicot et al. 2015). These perceived views of local people on climate change are key to assessing their levels of understanding, and how this understanding is assisting them in initiating measures of preparedness, and strategies for coping and livelihood adaptation. Simba et al. (2012) maintain that appreciating community perceptions is the initial step towards addressing climate change related challenges, as it gives insight into societal understanding of the challenges. The above authors further point out that any adaptation and risk-reduction interventions crafted after due consideration of communities’ perceptions of changes and risks, are likely to succeed as they command public support. Bryan et al. (2013) similarly argue that smallholder farmers’ behaviour is shaped more by their perceptions of climate variability and climate risk, than by actual climate patterns as measured by scientific methods. The above authors further maintain that while farmers’ perceptions are based in part on past observations, several studies have suggested that farmers place greater emphasis on recent climate events in forming their perceptions of climate risk and in making decisions about risk reduction and adaptive strategies. Perceptions of climate signals and the ability to anticipate a change in the season is thus a determinant stage in the management of a farming system for smallholder farmers (Simba et al. 2012; Janicot et al. 2015). While smallholder farmers and rural households may perceive changes in weather patterns, these will be taking them into unfamiliar experiences and situations and therefore weather information needs to be accessed by all households.

However, being informed on the weather patterns might depend on, among other factors, access to sources of weather information and the interest of individuals to know and learn about local seasonal weather trends over the years. Informed households are presented with
a greater opportunity to make informed farming decisions and implement the necessary risk reduction and coping strategies (Peters, 2015). In this study, an early warning system (EWS) is defined as a series of organized surveillance mechanisms or actions that collect information on potential hazards in a given location, in order to trigger timely, coordinated responses (FAO, 2014d). Wealthy households with access to electronic and/or print media have better access to seasonal weather forecasts and drought predictions than poorer households (Peters, 2015). As a result of low wealth levels (Chapter 4: Section 4.3) in rural areas, most households have no access to weather information and therefore no capacity to implement preparatory strategies. These households are consequently likely to suffer from the adverse impacts of climate hazards (Chirau et al. 2014; IPCC 2014; Doldman & Mitlin 2015; Peters 2015).

Nevertheless, even with full access to seasonal weather forecasts and drought predictions, there will always be shortcomings on the part of households to translate climate information into risk reduction and adaptation action (Nhemačena et al. 2014b). Taking appropriate action requires available information, accurate information, understanding of this information, and more importantly the capacity to implement the desired strategies (Dejene et al. 2011; Noble et al. 2014; Heltberg et al. 2015). Disseminated weather information is therefore vital for the rural households to be adequately prepared to protect their livelihood strategies in the event of a hazardous episode (Chapter 6: Section 6.2), but climate information also needs to come with other knowledge and forms of support (Peters, 2015). The timing and form of climate information, access to trusted guidance, and ability to interpret and implement the information in decision-making processes, are important to rural households for building resilient livelihoods (Wilhite et al. 2014). Similarly, Ziervogel et al. (2016) maintain that it is important to have access to usable climate information that is considered alongside the socio-economic and governance context. In addition to the above, Gautier et al. (2016) argue that there is a need to take local knowledge and information into account when dealing with climate hazards, as its abandonment may increase the vulnerability of the local households and communities. Therefore, in this context, failure to access, understand and/or
translate climate information (local or scientific) into appropriate action by poor households might result in adverse drought impacts (Gautier et al. 2016; Heltberg et al. 2015; Peters 2015).

Drought disasters in Zimbabwe are now becoming complex and successive in nature, undermining hard-won development gains both at national and local levels (FAO 2014a; IPCC 2014; Nhemachena et al. 2014a). These droughts have differential impacts across communities, households and social groupings depending largely on their contexts, livelihood activities and capacities (see Chapter 4: Section 4.3) (Ribot 2009; Habiba et al. 2012; Shackleton et al. 2014). FAO (2014a) further state that the impacts of drought disasters especially in the agriculture, food and nutrition sector, affect crop production, increasing the vulnerability of rural households, exacerbating persistent high poverty levels and leading to inequalities and socio-economic tensions. These adverse impacts of successive droughts in rural Zimbabwe have not only entrenched rural poverty, “... but have seen the introduction of new coping strategies such as conservation farming and food aid, all of which have failed to usher in a comprehensive remedy, primarily because of the palliative nature of the solutions...” (Nangombe, 2013). Therefore, drought hazards not only impact adversely on agriculture but also reduce smallholder farmers’ income, labour opportunities and inputs, and investment in the agricultural sector (Arouri et al. 2015; Habiba et al. 2012; Udmale et al. 2014).

5.2. Temperature and Rainfall Data for Chirumhanzu District Between 1980 and 2013/2014
An analysis of temperature records over the period 1980 to 2013 for Chirumhanzu district was undertaken. The lowest recorded average annual minimum temperature was 10.1°C in 1971 and the highest average minimum of 12°C was recorded in 1992 (Figure 5.1a). Results show that there were 17 years in which the minimum temperature was above 11°C (the average minimum temperature for the 34-year period). Of these 17 years, six were in the

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13 The temperature records were acquired from MSD and were recorded at a weather station in Mvuma, which is local for Chirumhanzu District.
1980s; another nine were in the 1990s, and two between 2000 and 2009. Almost every year in the 1990s, temperatures were recorded as above the average minimum temperature of 11 °C (Figure 5.1a). A trend analysis was done to determine whether there had been an increase or decrease in the minimum temperature from 1980 to 2013. The result was insignificant (p=0.168), suggesting that there is no trend in the temperature differences seen in Figure 5.1a.

Regarding maximum temperature, the highest average annual maximum temperature was 26.6 °C, recorded in 2012 and the lowest was 24.4 °C, recorded in 1981, while the average maximum temperature for the 34 years was 25.5 °C (Figure 5.1b). Results revealed that the last 20 years had recorded maximum temperatures above the average maximum temperature of 25.5 °C. The distribution for these years is five years in the 1980s, five in the 1990s, six between 2000 and 2009, and four between 2010 and 2013 (Figure 5.1b). Thus, between 2000 and 2009 there were more years with above average maximum temperature. A trend analysis was also done to determine whether there had been an increase in maximum temperature over the recorded period. This was significant (p=0.026,) suggesting a trend of gradual increase in maximum temperature from 1980 to 2014. It is also evident from the trend line in Figure 5.1b, showing a slight increase above the average temperature of 25.5 °C.
A decadal analysis of minimum temperatures indicated that the highest mean temperature of 10.7 °C was recorded in 1980-89 (Table 5.1). Again, trend analysis at decade intervals was performed and results were insignificant (p=0.150), suggesting that there is no trend in the minimum temperature differences observed in Figure 5.1a. Regarding maximum temperatures, decadal analysis indicated that the highest recorded mean temperature of 26.6°C occurred in the 2010-13 period (Table 5.1). The highest variation between maximum temperatures was observed in the 1980-89 period where there was a 2.1 °C difference (Table
5.1). A trend analysis test at 10-year intervals was performed for maximum temperatures. Results were also significant (p=0.033), again suggesting that temperatures have been increasing since 1980. This confirms the overall increase in maximum temperature as shown in Figure 5.1b.

Table 5.1: Decade Analysis of Minimum and Maximum Temperature

<table>
<thead>
<tr>
<th>Grouping</th>
<th>Variable</th>
<th>No. of Observations</th>
<th>Mean</th>
<th>Std. Dev</th>
<th>Minimum Temp</th>
<th>Max Temp</th>
<th>Range</th>
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<tbody>
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<td></td>
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<td></td>
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<tr>
<td>1980-89</td>
<td>AA Temp</td>
<td>9</td>
<td>11.1</td>
<td>0.3563</td>
<td>10.7</td>
<td>11.7</td>
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<td>AA Temp</td>
<td>9</td>
<td>11.4</td>
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<td>10.3</td>
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<td>1.6</td>
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<td>2000-09</td>
<td>AA Temp</td>
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<td>10.3</td>
<td>11.7</td>
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<td>2010-13</td>
<td>AA Temp</td>
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<td>10.2</td>
<td>10.8</td>
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<td></td>
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<td>1980-89</td>
<td>AA Temp</td>
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<td>1990-99</td>
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<td>2010-13</td>
<td>AA Temp</td>
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<td>26.3</td>
<td>0.1873</td>
<td>26.4</td>
<td>26.6</td>
<td>0.4</td>
</tr>
</tbody>
</table>

(AA Temp- Average Annual Temperature)

With regards to rainfall, there has been notable rainfall fluctuations in the study area over the 34-year period for which data are available, i.e. 1980 to 2013 (Figure 5.2). For example, the 1980-81 season received 996.9 mm of rainfall, while in the following 1981-82 season rainfall plummeted to 387.3 mm. Thus, it is usual for rainfall levels to change dramatically across consecutive rainy seasons (Figure 5.2). While there were acute fluctuations in average annual rainfall in the 1980s, such fluctuations were observed to be occurring on a frequent basis from 1990. Over the entire 34-year period, the highest annual rainfall of 1006.6 mm fell in the 1984-85 season, while the lowest was 321.8 mm in the 1991-92 season (Figure 5.2). Results on rainfall data showed that 13 years received rainfall above the 34-year period average of 587.8 mm per year: four years in the 1980s, three years each in the 1990s and 2000-09, and three years between 2010 and 2014. On the other hand, 21 years received rainfall below average.
and the distribution was as follows: five years in the 1980s, seven years each in the 1990s and 2000-09, and two years between 2010 and 2014.

A decadal analysis of rainfall indicated that Chirumhanzu district received an average of 643.1 mm in the 1980s, 547.7 mm in the 1990s and 561.9 mm in 2000-2010. Results further showed that the 1991/92 season experienced the lowest amount of rainfall (321.8 mm) and the worst meteorological drought (1992) nationwide, while the 1984/85 season received the highest maximum amount of rainfall at 1006.6 mm (Table 5.2). A trend analysis on a decadal basis showed an insignificant result (p= 0.987), suggesting that there is no linear decrease in rainfall.

Table 5.2: Decade Analysis of Rainfall from 1980 – 2013

<table>
<thead>
<tr>
<th>Period Grouping</th>
<th>Variable</th>
<th>No. of Observations</th>
<th>Mean</th>
<th>Std. Dev</th>
<th>Min Rainfall (mm)</th>
<th>Max Rainfall (mm)</th>
<th>Range (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1980/81-89</td>
<td>AA Rainfall</td>
<td>10</td>
<td>53.0</td>
<td>18.9</td>
<td>387.3</td>
<td>1006.6</td>
<td>619.3</td>
</tr>
<tr>
<td>1990/91-99</td>
<td>AA Rainfall</td>
<td>10</td>
<td>45.0</td>
<td>13.4</td>
<td>321.8</td>
<td>853.3</td>
<td>531.5</td>
</tr>
<tr>
<td>2000/01-09</td>
<td>AA Rainfall</td>
<td>10</td>
<td>49.9</td>
<td>16.8</td>
<td>376.3</td>
<td>924.9</td>
<td>548.6</td>
</tr>
<tr>
<td>2010/11-13</td>
<td>AA Rainfall</td>
<td>4</td>
<td>49.1</td>
<td>9.05</td>
<td>481.9</td>
<td>739.3</td>
<td>257.4</td>
</tr>
</tbody>
</table>

Table 5.2: Decade Analysis of Rainfall from 1980 – 2013

(AA Rainfall - Annual Average Rainfall)

Overall, not all drought years were a result of low rainfall, since some drought years mentioned in this study received above normal rainfall for their agro-ecological region as discussed in Chapter 3: Section 3.2.4. In this regard, while the amount of rainfall received may be adequate, what is critical was the distribution of the rainfall throughout the season. Therefore, this could have been linked more to the distribution of rainfall throughout the rainy season (see Figure 5.3). Rainfall distribution can affect crop growth processes at critical stages producing poor harvests; this is termed agricultural drought (Chapter 2: Section 2.3.4). Figure 5.3 below shows a comparison of the two rain seasons 1984-85 and 2007-08, which both received high rainfall, yet the former was perceived as the worst in the study area (see Section 5.4; Figure 5.3b). The district received its highest rainfalls in 1984-85, 1999-2000, 2001-02 and 2007-08 with 1006.6 mm, 853.3 mm, 924.9 mm and 839.4 mm respectively. Yet, 2001-02 and 2007-08 were mentioned as drought years (Section 5.4). A closer look at the 2007-08 season reveals an uneven distribution of rainfall with 104.5 mm in November, 508.2 mm in December, 202.2 mm in January and almost zero (9.5 mm) in February (Figure 5.3a). This indicates that December received 62% of the total rainfall, while February received only 1.1%. For the 1984-85 season,
rainfall started in early September with 31 mm, November 86.3 mm, January 509.5 mm, February 111.3 mm and March 35 mm (Figure 5.3b). This indicates that January received 50.6% and February received 11.1% of the rainfall, although these months are usually characterised by dry spells of three to four weeks in some cases. During the 1984-85 season the amount of rainfall received was adequate and was distributed evenly which could be why the 1984-85 season was not a drought year, compared to 2007-08 and 2001-02 with similar rainfall amounts.

Figure 5.3: Rainfall Distribution in (a) 2007-08 Season (b) 1984-85 Season
Effects of fluctuations and variations in temperature and rainfall indicated above can have devastating effects including on livelihood activities and the natural systems. Rising temperatures and decreasing rainfall and, unpredictable weather events are making livelihood activities more difficult for many households in the semi-arid regions (Ziervegol, 2016), and Chirumhanzu district is no different. The above findings coincide with respondents’ perceptions of weather unpredictability and variability (see Section 5.3), and the impacts on livelihoods are discussed (Section 5.6). While changes are already happening, the future is even more concerning. The IPCC Third Assessment Report and Zimbabwe INC (2007) suggests that by 2050, temperatures and rainfall over the country will be 2-4 °C higher and 20-30% less respectively than the 1961-1990 baseline. Regional model simulations show that annual rainfall is expected to decline by 5% from the 1961-1990 average by 2080 in all the country’s major river basins (ibid.).

5.3. Households’ Perceptions of Climate Variability and Change

Regarding changes in climate, a third of respondents believed there had been a reduction in rainfall, with one indicator of this being the abundance of wild fruits (31%) (Figure 5.5). Another local indicator of changes in climate mentioned by respondents was the drying up of perennial water sources (25%) (Figure 5.5). Other respondents had observed shifts in the rainy season (23%). With respect to a shifting rainy season, one Agritex officer stated, “... last season the rains came late, and when they came, they were very heavy and then they would disappear (dry spell). In most parts they (rains) disappeared around January or beginning of February. This is when the maize crop was at tasseling stage or even before tasseling ... Generally, we found that crop failure was estimated at 90% owing to the inconsistent rainfall ...”. Other indicators perceived by respondents were extreme temperatures (12%) and long mid-season dry spells (9%) in their respective localities (Figure 5.5). The rainy season was perceived to be starting later and ending earlier and consequently was seen as shorter than previously, while mid-season dry spells were now said to be longer and more frequent within the season. Further, one FGD participant from Mapiravana ward mentioned, “… mid-season dry spells have been there in the past and were usually experienced for approximately two weeks in the
month of February but currently they are now more pronounced within a season and of a longer duration, even up to four weeks or more in some cases ...”.

Perceptions of mid-season dry spells were also supported by evidence from rainfall records for the February months across the data. All February months in the 1980s received a total cumulative amount of 1293.8 mm, 954.3 mm in 1990s, 839.4 mm between 2000 and 2009 and 386.8 mm between 2010 and 2014 (Table 5.3). Average rainfall for the month of February from 1980-2014 was 104.8 mm. In the 1980s, there were six years with above average rainfall, three each for 1990s and 2000-2009 and only once between 2010 and 2014 (Table 5.3). There seemed to be a decline in total amount of rainfall received in the month of February from 1980-2014.
Table 5.3: Rainfall Received in the month of February from 1980-2014

<table>
<thead>
<tr>
<th>Year in 1980s</th>
<th>Rainfall in February</th>
<th>Year in 1990s</th>
<th>Rainfall in February</th>
<th>Year in 2000s</th>
<th>Rainfall in February</th>
<th>Year in 2010s</th>
<th>Rainfall in February</th>
</tr>
</thead>
<tbody>
<tr>
<td>1980/81</td>
<td>262.7</td>
<td>1990/91</td>
<td>157.6</td>
<td>2000/2001</td>
<td>301.2</td>
<td>2010/2011</td>
<td>0.0</td>
</tr>
<tr>
<td>1981/82</td>
<td>57.5</td>
<td>1991/92</td>
<td>16.8</td>
<td>2001/2002</td>
<td>0.0</td>
<td>2011/2012</td>
<td>73.5</td>
</tr>
<tr>
<td>1982/83</td>
<td>169.0</td>
<td>1992/93</td>
<td>183.0</td>
<td>2002/2003</td>
<td>86.5</td>
<td>2012/2013</td>
<td>96.5</td>
</tr>
<tr>
<td>1983/84</td>
<td>86.5</td>
<td>1993/94</td>
<td>41.5</td>
<td>2003/2004</td>
<td>106.0</td>
<td>2013/2014</td>
<td>216.8</td>
</tr>
<tr>
<td>1984/85</td>
<td>111.3</td>
<td>1994/95</td>
<td>30.0</td>
<td>2004/2005</td>
<td>31.4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1985/86</td>
<td>44.5</td>
<td>1995/96</td>
<td>97.0</td>
<td>2005/2006</td>
<td>53.0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1986/87</td>
<td>20.8</td>
<td>1996/97</td>
<td>55.0</td>
<td>2006/2007</td>
<td>131.5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1989/90</td>
<td>122.9</td>
<td>99/2000</td>
<td>311.0</td>
<td>2009/2010</td>
<td>95.3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Total Rainfall: 1293.8  954.3  839.4  386.8

FDG participants in Mushandirapamwe and Maware wards revealed that in the 1970s and 1980s, they would experience the first rains of the new cropping season by mid-October, and that is when they actually started planting their first crops. This was further supported by evidence from rainfall records which indicated: in the 1980s, all months of October received rainfall with a cumulative total of 469.3 mm of rainfall for the 10 years, in the 1990s only one October did not receive rainfall, but the cumulative total of rainfall decreased to 236.8 mm for the decade, while for the period of 2000-2009 five of the months of October did not receive rainfall at all and a cumulative total of 229.1 mm of rainfall was received (Table 5.4). During the period of 2010-2014 three of the months of October did receive rainfall and over these four years, a cumulative total of 50.1 mm of rainfall was received (Table 5.4). There is thus an increase, for each decade from 1980 to 2014, in the number of October months not receiving rainfall (Table 5.4). Further, for those months of October that did receive rainfall, in most of the recent years the rainfall was just too little for the households to carry out any meaningful planting activities. For example, 5.5 mm in October of 1990/1991; 3.0 mm for 1991/1992; 8.1 mm for 1997/1998; 2.0 mm for 2001/2002; 0.2 mm for 2006/2007 and 0.6 mm for 2013/2014 (Table 5.4). Hence, evidence from all FGDs indicated that the first rains now arrive mainly in
December (as was the case in the 2014-15 and 2015-16 seasons) and, in some parts of the study site, rains heavy enough to allow commencement of planting only arrive in early January.

Table 5.4: Rainfall Received in the month of October from 1980 to 2014

<table>
<thead>
<tr>
<th>Year in 1980s</th>
<th>Rainfall in October</th>
<th>Year in 1990s</th>
<th>Rainfall in October</th>
<th>Year in 2000s</th>
<th>Rainfall in October</th>
<th>Year in 2010s</th>
<th>Rainfall in October</th>
</tr>
</thead>
<tbody>
<tr>
<td>1980/81</td>
<td>31.1</td>
<td>1990/91</td>
<td>5.5</td>
<td>2000/2001</td>
<td>32.0</td>
<td>2010/2011</td>
<td>0</td>
</tr>
<tr>
<td>1983/84</td>
<td>29.0</td>
<td>1993/94</td>
<td>0.0</td>
<td>2003/2004</td>
<td>110.4</td>
<td>2013/2014</td>
<td>0.6</td>
</tr>
<tr>
<td>1984/85</td>
<td>47.0</td>
<td>1994/95</td>
<td>36.7</td>
<td>2004/2005</td>
<td>66.9</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1985/86</td>
<td>18.5</td>
<td>1995/96</td>
<td>37.5</td>
<td>2005/2006</td>
<td>0.0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1986/87</td>
<td>73.0</td>
<td>1996/97</td>
<td>71.0</td>
<td>2006/2007</td>
<td>0.2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1987/88</td>
<td>12.3</td>
<td>1997/98</td>
<td>8.1</td>
<td>2007/2008</td>
<td>0.0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1988/89</td>
<td>30.0</td>
<td>1998/99</td>
<td>12.0</td>
<td>2008/2009</td>
<td>0.0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1989/90</td>
<td>111.6</td>
<td>1999/2000</td>
<td>13.0</td>
<td>2008/2010</td>
<td>1.0</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>469.3</strong></td>
<td></td>
<td><strong>236.8</strong></td>
<td></td>
<td><strong>229.1</strong></td>
<td></td>
<td><strong>50.1</strong></td>
</tr>
</tbody>
</table>

As far as extreme temperatures are concerned, participatory learning and action methods (PLAMs) participants in Mushandirapamwe and Maware wards revealed that the 2012 winter season was the worst in the 2000s, as the resultant frost affected large sections of the forests and other plants including vegetables in their gardens (Figure 5.6). PLAMs participants in Mushandirapamwe and Mapiravana wards revealed that colder days were now being experienced even in summer (Figure 5.6). They argued that, in the past (before and during the 1980s) winter was experienced from May to July, but currently extremely cold days, largely characterised by very low temperatures and ground frost in the morning, are experienced further into September and early October. Further evidence from all wards indicated that high temperatures (including heat waves) were now being experienced more frequently since 2006, between October and January, which resulted in wilting of crops, especially at the early stages of crop growth.
Erratic rainfall might also have contributed to a worsened water availability situation. Drying of water sources in all wards was observed during transect walks, including previously known perennial sources during droughts (Chapter 4: Section 4.2.3.2; Section 4.2.3.3). This was supported by rainfall data (Section 5.2). Further, FGD participants in all wards observed that they no longer receive the ‘landmark’ rainfall that marked their calendar for livelihood activities throughout the year. FGD participants mentioned that locally identified specific types of rain (Table 5.5) are now inconsistent and/or some are no longer being received as they used to be in the past.

Table 5.5: Landmark Rainfall Types (in Vernacular Language) No Longer Consistent

<table>
<thead>
<tr>
<th>Rainfall in Shona</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Odzamashanga</strong></td>
<td>This rainfall was received soon after the crop harvest at the beginning of May. It is perceived that the rainfall facilitated the rotting of crop stalks for manure in the fields.</td>
</tr>
<tr>
<td><strong>Mavhurachando</strong></td>
<td>This rain marked the beginning of the winter season and came at the end of May.</td>
</tr>
<tr>
<td><strong>Bumharutsa</strong></td>
<td>This rainfall would be experienced after the winter season around early August and marked the end of the burning of the dry vegetation in anticipation of spring.</td>
</tr>
</tbody>
</table>
These rains were usually light showers, which fell in September, meant to add moisture to the dry soil and marked by the growth of shoots.

These rains marked the beginning of the rainy season, but not adequate for planting crops. The rainfall was experienced at the beginning of October, usually after burning veldt/rangelands in preparation for the rainy season.

These rains, which began in mid-October, marked the beginning of the rainy season and the respondents said that they could start planting their crops.

With specific reference to changing climate, the Meteorological Services Department (MSD) representative revealed, “… The MSD has done some studies and we have seen that in other parameters such as temperature, there is some change. But when you look at rainfall in Zimbabwe, the change is not very noticeable. We have seen some areas having slight increase, some areas a slight decrease, if you do a month-on-month kind of study. We are working with many stakeholders on climate change …”. On the other hand, one Agritex officer clearly stated, “… The farmers are not yet aware of climate change. The farmers are used to their usual calendars and cycles. They still want to plant at the same time as in the past. This creates problems when we try to convince the farmers to wait for the onset of the rainy season. They are definitely not aware of what is happening in the grand scheme of things …”.

Discussion on perceptions of mid-season dry spells suggest a change in the duration of the multiple mid-season dry spells, especially when they occur at the critical stages of crop growth cycle. The extension of the mid-season dry spells has implications for crop production. In a similar empirical study in Zimbabwe, Rurinda et al. (2014) showed that the adverse impacts of the mid-season dry spells on crop production are likely devastating, given that they affect the total crop harvest. This concurs with conclusions drawn from a study in Zimbabwe by Nhachachena et al. (2014a), that the overall negative impacts of the long mid-season dry spells are that crops will experience moisture stress that affects the overall crop productivity and harvest, likely resulting in poor harvests. Nhachachena et al. (2014a) further maintain that Zimbabwe has recently been experiencing frequent long mid-season dry spells, and these experiences are expected to continue in the future. Therefore, there is need to understand the trends for mid-season dry spells to reduce the risk of adverse impacts on livelihood.
strategies in rural settings. However, even if smallholder farmers are aware of climate variability and change, some may still fail to reduce risk and adapt optimally, because of limited access to information (Section 5.5), coping or adaptation technology options, or markets and financial resources (Nhemachena et al. 2014b).

Findings from this study on occurrence of unexpected cold days into the summer season, counter findings from Mubaya et al. (2012) and Habiba et al. (2012), who cite the shortening of winter periods as one of the impacts of climate change in Zimbabwe. In a similar study in South Africa, Gandure et al. (2013) indicate that farmers perceived that summer temperatures were getting warmer while winter temperatures were much colder. This study further found that the occurrence of more unexpected cold days during summer could delay the commencement of gardening activities, posing a threat to food supplies and income during the off-season period.

The late onset of rains resulting in a shorter rainy season means that some crops may not complete the full growth cycle, thereby causing poor harvests (FAO Newsletter, Issue 03-1st Trimester 2015). Shorter rainy seasons have become more prominent since the late 2000s. Late rainfall onset, as mentioned earlier in this section, might prompt some smallholder farmers to shift planting dates to December or January, instead of the usual October or November. In contrast, the Agritex officer, as quoted earlier in this section, mentioned that some households were continuing to plant crops based on past experiences rather than current trends, thereby risking their crops. Smallholder farmers often expressed concern about greater variability and seasonal changes, which hindered their ability to predict rainfall patterns and plan for their farming activities accordingly (Gandure et al. 2013). The IPCC (2014) therefore concludes that the implication of the changing rainfall trends is that it is becoming increasingly important to practice risk reduction and adaptation measures in agricultural activities.
5.4. Drought Perceptions and Experiences

The question on most remembered drought years in the district as perceived and experienced by household respondents, allowed for multiple responses in order to try to capture all the years that were considered drought disasters. The majority of respondents concurred that 2008 (88%) and 1992 (46%) were drought years (Figure 5.7). This was followed by 1982 mentioned by 7% and 2002 by 6% (Figure 5.7). Other years mentioned by a smaller proportion of respondents were 2012 (5%), 2000 (3%) and 2011 (3%) (Figure 5.7). When respondents mentioned these drought years, they might have also focused on momentous drought years that affected the livelihood activities of the whole community rather than their own households. Results indicate that most drought years mentioned by respondents were from the 2000s (five out of seven years) with one each in the 1980s and 1990s (Figure 5.7). Based on household perceptions, there was an increase in the frequency of droughts from the 1980s to the 2000s. Other drought years not mentioned in the household surveys, but rather during the PLAMs, included 1983, 1987, 1998, 2005 and 2014 (Section 5.3: Figure 5.6). In this study, the finding was that if rural households in the study site do not harvest well due to little rainfall, mid-season dry spells or poor rainfall distribution, they call the season a drought. Households’ perceptions\textsuperscript{14} of droughts and those articulated by the MSD often therefore differ, as households mostly based their definition on their harvests and livelihood while the MSD definition is based on the total amount of rainfall received. Drought definitions that have close meaning to that of the community’s perception of drought are meteorological and agricultural drought (Section 2.3.3.1). However, it can also be a combination of meteorological, agricultural and hydrological drought since households in rural communities rely on rainfall for smallholder farming (which is the main livelihood activity), surface water sources for other livelihood activities (for example gardening) and water for their livestock which are an important financial asset to them.

\textsuperscript{14} Households do not totally disregard the amount of rainfall received but are guided by their field harvest. To them drought is largely food insecurity which might be induced by rainfall shortage (drought).
While on the same topic, respondents were also asked to identify the worst drought years in their localities. The majority of respondents (74%) stated that 2008 drought was the worst, followed by the 1992 drought (15%) and 1982 (7%), while only a small number of respondents mentioned 2002 (9%), 2011 (1%) and 2012 (1%) (Table 5.5).

Further analysis of reasons why particular years were labelled as the worst droughts, shows that almost half of respondents based their perceptions on extreme hunger experiences (47%), of which 35% were the same respondents who had indicated 2008 as the worst drought year (Table 5.5). This is supported by one FGD participant in Mushandirapamwe ward who stated, “... the 2008 and 1992 droughts were associated with acute food shortage to the extent that it was very difficult to find anyone/anywhere selling grain...”. While another FGD participant from Mapiravana ward indicated, “...most people in 2008 survived on only eating ordinary vegetables (rape) from their gardens and fields since it was the only food they had in their gardens...”. Another major contributing factor that might have pushed the 2008 drought into a severe disaster was the overwhelming hyper-inflationary conditions mentioned by 9% of respondents (Table 5.5). In addition, 13% of respondents cited little rainfall as an indicator, while 17% expressed their dependence on wild fruits as the main contributing factor for their
perception of 2008 as the worst drought year (Table 5.5). Households tended to remember the recent years when they suffered the most from drought disaster impacts. Seven percent of respondents travelled long distances to buy food, while 4% were forced by drought circumstances to sell their livestock for either cash or grain (Table 5.5). Supporting the sale of livestock as an indicator of severe drought, one FGD participant from Mushandirapamwe ward pointed out, “...prices for livestock especially in 2008 were very low and this forced households to sell as many livestock as possible in order to secure more money, largely to purchase grain and other food requirements for the household ...”. Additionally, another FGD participant from Mushandirapamwe ward stated, “... the value of a cow during drought was so low that in 2008 some households exchanged a cow for three 50 kg bags of maize grain ...”.

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Extreme hunger &amp; nowhere to buy food</td>
<td>6</td>
<td>4</td>
<td>35</td>
<td>1</td>
<td>1</td>
<td>47</td>
</tr>
<tr>
<td>Travelling long distances to buy food</td>
<td>1</td>
<td>2</td>
<td>4</td>
<td>0</td>
<td>0</td>
<td>7</td>
</tr>
<tr>
<td>Selling livestock to buy food</td>
<td>1</td>
<td>0</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>4</td>
</tr>
<tr>
<td>Dependence on wild fruits</td>
<td>2</td>
<td>2</td>
<td>12</td>
<td>0</td>
<td>1</td>
<td>17</td>
</tr>
<tr>
<td>Little rains - crop wilting and livestock dying</td>
<td>2</td>
<td>1</td>
<td>8</td>
<td>1</td>
<td>1</td>
<td>13</td>
</tr>
<tr>
<td>Drought worsened by inflationary conditions</td>
<td>3</td>
<td>0</td>
<td>9</td>
<td>0</td>
<td>0</td>
<td>12</td>
</tr>
<tr>
<td>Total (%)</td>
<td>15</td>
<td>9</td>
<td>74</td>
<td>1</td>
<td>1</td>
<td>100</td>
</tr>
</tbody>
</table>

On wild fruits dependence, one FGD participant in Mapiravana ward revealed that, “…people actually survived on Parinanri curatellifolia (chakata) fruits especially in 1992 and 2008. Parinanri curatellifolia fruits were used for making many different types of food products including porridge, bread, and beer but were largely consumed in their fresh natural state. In many cases after consuming the fleshy part of the Parinanri curatellifolia fruit, children dried

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15 Parinanri curatellifolia fruits contain the following nutrients: protein, vitamin C, fat and ash; and the following minerals (calcium, iron, magnesium and zinc). The protein content is 3.42%; fat content is 4.51%; vitamin C content is very high with 66.06 mg/g; calcium content is 0.15%; magnesium content is 0.02%; zinc is 0.02% and iron is 0.05% (pulp) (Muchuweti et al. 2013).
the seeds and would later crush them to extract the nuts (shomhwe\textsuperscript{16}) which are rich in protein ...”. Evidence from other FGD participants from Mapiravana ward indicated that inasmuch as the wild fruits provided much needed food for the households, the continuous consumption of these wild fruits also resulted in health and dietary consequences (stomach pains, diarrhoea) depending on the quantity consumed and frequency of consumption. Transect walks in Mapiravana and Mushandirapamwe wards showed that there was an abundance of \textit{Parinari curatellifolia} trees, as these trees are protected by the prevailing traditional laws in the study site. Wild fruits provided food and cash options to the rural households and not only during drought years (Chapter 4: Section 4.2.3.4).

While study respondents viewed the 2008 drought as the worst drought for the reasons mentioned above, meteorologically the year 1992 was considered the worst drought not only in Zimbabwe, but in the entire southern African region (Chapter 2: Section 2.3.4) (Scoones 1996; Dude 2008; Shamano 2010; Mubaya et al. 2012; Rurinda et al. 2014; Mutasa 2015). This is because in the 1992 season, the southern African countries received very little rainfall, with Zimbabwe receiving a mere 321.8 mm in that season (see Figure 5.2). Comparing household perceptions to the rainfall records in 2008, the season showed above normal rainfall with 924.9 mm in the 2007/08 cropping season (see Figure 5.2). This might then suggest that rainfall distribution patterns in 2008 might have resulted in reduced crop productivity and consequently drought (see Section 5.2; see Figure 5.3). Additionally, it is key to also consider the prevailing economic environment for off-farm activities and livelihood options, (e.g. unsafe conditions, dynamic pressures and root causes) when understanding households’ perceptions of drought (see Pressure and Release (PAR) model in Chapter 2: Section 2.3.5) (Shamano, 2010).

The perception that the 2011 drought was the mildest drought could be due to the fact that there was political and economic stability during that period as a result of the coalition

\textsuperscript{16} \textit{Shomhwe} refers to the nuts inside the \textit{Parinari curatellifolia} seeds.
government (Government of National Unity) that spanned the years from 2009 to 2013 (Dodo et al. 2012; Hltywayo & Mukono 2012). The coalition government introduced the usage of the multi-currency system including the United States Dollar (USD), South African Rand, Botswana Pula and European Euro, which automatically dealt with the inflationary situation (Nota & Sakupwanya, 2013). In a relatively short time, inflation was reduced from eleven digits to a single digit (ibid.). This adoption of foreign currency improved access to currency and ability to purchase various household needs including food products (Nota & Sakupwanya, 2013).

Overall, the 2000s droughts were most severe since the government did not have the enabling financial resources for any meaningful assistance or intervention, especially in 2008 (see Chapter 6: Section: 6.7) (Shamano, 2010). In 2008, the economy of Zimbabwe was performing poorly which left the government with no money for public expenditure (Nota & Sakupwanya 2013; Chirau et al. 2014). This was characterised by loss of jobs, critical shortage of farming inputs in 2008, shortage of basic commodities in the formal market and the inflationary conditions in 2008 (pegged at 79,600,000,000%) which made it difficult to cope with changing inflation rates (Dodo et al. 2012; Mugabe et al. 2010, Chitongo 2013; Nota & Sakupwanya 2013). Therefore, the 2000s droughts were made worse by other compounding conditions such as poor performing economy and policy frameworks (Chapter 7). This further exposed rural and marginalized households to ever greater vulnerability (Chapter 2: Section 2.3.1) (Mutasa, 2015). Rural households were therefore left to fend for themselves in a very unstable macro-and micro-economic environment, making drought coping difficult if not impossible (Mutasa, 2015).

5.5. Households’ Sources of Seasonal Weather Forecasts and Drought Prediction
5.5.1. Conventional Sources (EWS) for Seasonal Weather Forecasts

Given the shift in seasons alluded to above, it is important to understand the role of access to weather forecasts and drought prediction information in helping households and smallholder farmers to make decisions regarding their farming activities. On primary sources of seasonal
weather forecasts and prediction information, almost half (54%) of respondents mentioned radios, 19% stated village meetings and 8% mentioned getting this information from other villagers (Figure 5.8). The finding that almost half of respondents received weather information through the radio is aligned to household asset ownership which indicated that 51% of respondents owned radios (Section 4.2.5.1). Regarding the latter, this would have been from villagers who attended the village/ward meetings or those with access to media sources. Since only 3% owned televisions, others mentioned getting the information from religious meetings (2%), newspapers (1%) and EcoFarmer (see Footnote 8, Section 4.2.4.3) (1%), while 13% did not have any access to seasonal weather forecasts (Figure 5.8).

![Bar Chart: Conventional Sources of Weather Forecasts (n=217)](chart)

**Figure 5.8: Conventional Sources of Weather Forecasts (n=217)**

Agritex officers in Mapiravana and Mushandirapamwe wards mentioned that elderly populations were severely affected by being too old to walk long distances to attend meetings by Agritex officers. This is reaffirmed in the results, which revealed that a significant proportion of the elderly in the study lacked accessibility to vital seasonal weather forecasts in preparation for the new cropping season.

Although the majority of respondents (87%) had access to seasonal weather forecasting and drought prediction through various sources, this did not automatically translate into
adaptation or risk-reduction actions. There were several factors mentioned by respondents that could influence whether households took action or not. These included understanding of the weather forecasts, perceived accuracy of the information, timeous receipt of the weather information, and the ability to translate the information into farming decisions.

Regarding understanding of weather forecast information, 54% of respondents who received seasonal weather forecasts did not understand these, while 46% understood the weather forecasts. In support of the fact that households often struggled to understand seasonal weather forecasts, a MSD representative revealed, “… the major challenge is understanding of the terms we use when disseminating weather information. But, in some places where we have had workshops there is now better understanding of our risk warnings and forecasts. For example, in Zvishavane, Gutu and Chirumhanzu districts where we had workshops there is a very good understanding of these terms and seasonal weather forecasts in general…”.

Further evidence from the MSD representative indicated that inasmuch as they wanted to go to grassroots level and simplify the seasonal weather forecasts for improved understanding by rural households, the resources required for such activities are immense and might not be sustainable in the long run for the department. Therefore, MSD continue disseminating the seasonal weather forecasts through Agritex, which already has structures and personnel in place at the grassroots level across the country. However, Agritex officers are not able to fully understand weather data trends and simplify it for smallholder farmers’ consumption, nor to make weather projections meaningful for farming activities considering that they do not have training on climate variability or climate modeling (Chapter 7: Section 7.4.2).

Secondly, household perceptions of accuracy of seasonal weather forecast information played an important role on whether households took action or not. Households that received weather information through media sources were asked for their perception of accuracy and reliability of the information. Forty percent of respondents believed weather information to be fair, while 24% believed it was accurate (Figure 5.9). Thirty-six percent of respondents perceived seasonal weather forecasts as inaccurate (Figure 5.9). With respect to accuracy of
disseminated weather information, the MSD representative stated, “… we are prepared in dealing with these hazards but the main problem is the Meteorological Services Department forecasts are not 100% accurate. They are usually 50-75% accurate. We also experience changes in phenomena and we have no updates, for example we had a hailstorm two years ago in Zvishavane and we never had a forecast on that …”.

Additionally, one Agritex officer revealed that weather information provided by MSD has a huge geographical coverage and is not pinned down to specific area locations. Therefore, they do not have the high resolution data needed to improve the accuracy of the information disseminated. The MSD representative further supported this view and mentioned, “… specification of the weather forecast is quite a concern. When you look at Zimbabwe, take for instance the westerly cloud band when it comes in over Matabeleland and sweeps over Harare and Mash West, you tend to generalize because it will be one big system that will be approaching. So you cannot really split to say this area will be receiving more rainfall than the other but of course there are local effects where some areas are warmer than others so precipitation will be more in those areas. That is the dynamics of the atmosphere. We would like to pinpoint areas but your time allocation on TVs and radio is also restrictive. We would otherwise have 2 minutes to cover 57 districts, which is difficult. So people do not trust the
weather forecast because they do not understand the trends. The small projects that we have worked with so far like ICRISAT, successes were recorded when forecasts were sent via SMS every 10 days. ...... When we go into the season, the 10-day forecasts are provided, we have the models, which we tend to generalize. They cannot be specific. If you want to try and downscale the models to some small areas, it is quite difficult...”.

Thirdly, action or non-action on weather information was attributed to timeous receipt of information. Forty-four percent of respondents said they received seasonal weather forecast information less than one month before the start of the rainy season, while 27% received seasonal weather predictions 1-2 months before the start of the planting season (Figure 5.10). Lastly, 29% of respondents received information more than three months prior to the cropping season (Figure 5.10). Regarding timely dissemination of weather information, an Agritex officer from Mushandirapamwe ward pointed out, “... the timely dissemination of weather information to the farmers is likely to equip them with a decision-making tool for the new cropping season ...”. Additionally, the MSD representative indicated that they start issuing seasonal forecasts for the upcoming cropping season in August, which were sent through to Agritex officers who then disseminated the information to smallholder farmers around October or November in their respective areas. One Agritex officer indicated that there was often a delay in final dissemination of seasonal weather forecasts to the smallholder farmers, and this was partly attributed to bureaucratic processes and limited coordination on information flow between inter-and intra-Ministry departments (Chapter 7: Section 7.2.4).
Despite high ownership of mobile phones (Chapter 4: Section 4.2.5.1), there was very little usage of the EcoFarmer facility (1%). This limited utilisation of the EcoFarmer facility to receive weather information could be attributed to the cost factor to the users (USD$1.50 per month or $0.08 per day to receive messages only without the insurance aspect) and the lack of high quality resolution (too general) for smallholder farmers to understand and take any meaningful action. Therefore, households indicated that they were not in a position to pay daily or monthly subscriptions for services from the EcoFarmer facility specifically to receive weather information in the form of a Short Message Service (SMS). However, making farming decisions without using weather forecast information (scientific or traditional) is risky and could result in crop failure or reduced productivity as farming activities are not aligned to rainfall patterns (Chapter 8: Section 8.2.2).

The mass media through which households receive weather information (radio, televisions and newspapers) is expensive for rural households considering their high poverty levels (ZimVAC Report, 2013). Evidence from the ZimVAC Report (2013) supports this view as it pegged the rural poverty rate at 76% and 23% within the poor and extremely poor categories respectively in Zimbabwe. In fact, some of the respondents who indicated that they rely on
radio for weather information were reliant on radios from shopping centres and next-door
neighbours. Indeed, in some parts of Chirumhanzu district (the study site), one cannot receive
a radio signal or a mobile network service making it difficult for those in the remote and
marginalised areas to access vital seasonal weather forecasts to engage in risk reduction and
adaptation strategies.

There were differences in language and terminologies used for forecasts by MSD, which if
simplified might result in improved understanding of weather forecast information at
grassroots level. In a similar study in Zimbabwe (Tsholotsho, Murehwa and Chiredzi districts),
Soropa et al. (2015) showed that most smallholder farmers could not access, interpret and use
scientific meteorological predictions due to their limited ability to translate weather
information to action at household level. It is important to disseminate weather information
in a format and language that can be easily understood (Soropa et al. 2015). Gandure et al.
(2013) note that lack of access to early seasonal weather forecasts and unreliability of seasonal
forecasts is a barrier to promoting risk reduction and adaptation action in South Africa.
Therefore, with limited access to simplified seasonal weather forecast information, rural
households cannot position themselves strategically against drought hazards and this creates
a platform for disaster occurrences (Wilhite et al. 2014).

Accuracy of seasonal weather forecast is crucial in making farming decisions such as type and
variety of crop to plant, when to plant and application of fertilizers (organic or artificial). The
MSD limited airtime on media mentioned earlier, might suggest a compromised quality of
weather forecast information, affecting the decisions on risk reduction and adaptation. In this
regard, Wilhite et al. (2014) argue that the ability of a smallholder farmer to make an informed
decision is dependent on the accuracy of available information and the manner in which it is
processed at the household level. Seasonal weather forecasts need to be of high quality and
context specific, and must deal with current and expected weather trends and their impacts
(Gandure et al. 2013). Smallholder farmers who perceived seasonal weather forecasts as not
accurate are more likely not to use the forecasts for planning their farming activities. Such
sceptism by smallholder farmers might lead to non-action, even when facing imminent
drought, exposing them to climate risk (Wilhite et al. 2014). Finally, Peters (2015) and Ziervogel
(2016) note that seasonal weather forecasts can only be useful when accurate, simplified and
timeous in reaching the smallholder farmers and households. Yet, Agritex officers are often
late in receiving seasonal weather forecasts from their line Ministry to disseminate to
smallholder farmers, and by then some farmers would have already purchased inputs in
preparation for the new cropping season. In some cases, these farming inputs were
inappropriate for the forthcoming cropping season and this resulted in crop failure and/or low
crop yields increasing chances of food insecurity at the household level.

5.5.2. Indigenous Indicators for Seasonal Weather Forecasting, Drought
Prediction
Respondents were asked if they used local indigenous knowledge for seasonal weather
forecasting and hazard prediction. Half of the respondents (53%) confirmed using indigenous
knowledge\textsuperscript{17} against 47% who did not. These households used indigenous knowledge
observed based on local indicators from the natural ecosystem to predict the outlook of the
new cropping season or drought hazards.

The most common local indicator for drought prediction was the bearing of large quantities of
wild fruits by specific trees, especially \textit{Parinari curatellifolia}, \textit{Lannea discolor} and \textit{Lannea edulis}
(71%), while observing the skies and the sun (4%) was the least mentioned indicator (Figure
5.11). Other indigenous indicators used by households included observation of colour of new
shoots (11%), wind direction towards the rainy season (8%), and late onset of the rains (5%).
Following up on bearing of wild fruits, FGD participants in Mapiravana and Mushandirapamwe
ward expressed that in each year there was drought, there was an abundance of \textit{Parinari}

\textsuperscript{17} Indigenous knowledge for this study is defined as local knowledge generated over a period of time through a
people’s close interaction with nature. Thus, it is indigenous to a selected geographical location and its
inhabitants (Theodory, 2014).
curatellifolia (chakata) fruits (see Chaper 4: Section 4.2.3.4; Section 5.4). However, respondents in Maware ward mentioned that *Lannea discolor* (gan’acha) fruits were more pronounced in their area during dry environmental conditions. Evidence from FGDs illustrated there was a difference between specific geographical locations in terms of indicators.

![Figure 5.11: Local Indicators for Seasonal Weather Forecasting and Drought Prediction (n=217)](image)

Dwelling on the ‘bearing of wild fruits’ indicator, study participants held that if they see *Parinari curatellifolia* (muchakata or hacha), *Lannea discolor* (mugan’acha) or *Lannea edulis* (mutsambatsi) fruit trees bearing large quantities of fruits before the rain season, then this is a sign of little rainfall (drought). It is important to note that not all wild fruit trees bear an abundance of fruits during droughts, but these were specific trees identified through local knowledge as indicating drought. The usage of these indicators for weather forecasting was not unilateral, but one could use a combination of indicators in trying to gain greater accuracy. This natural mechanism of ‘bearing large quantities of wild fruits’ helped to provide a cushion to the rural households from acute food shortage and hunger during drought by providing alternative food sources (Chapter 4: Section 4.2.3.4).

Eleven percent of respondents indicated that if the *Brachystegia spiciformis* (msasa) tree shoots were dark maroon in colour, this is an indication of imminent drought and that farmers
should plant small-grain crops (finger millet, millet and sorghum as discussed in Chapter 6: Section 6.2.1) that resembled the colour of the new shoots. Further evidence from FGDs indicated that these shoots appear just before the onset of the rain season around September/October when smallholder farmers are making farming preparations for the coming cropping season. For example, FGD participants in Mapiravana ward indicated that based on the *Brachystegia spiciformis* tree shoots’ colour (Figure 5.12) at the onset of the 2014-15 rain season, a drought was predicted by the communities and it actually occurred, highlighting local belief in the reliability of local indigenous knowledge indicators.

![Figure 5.12: Colour of *Brachystegia spiciformis* Tree Shoots in Mapiravana Ward for the 2014-15 Season](image)

Further consultations during FGDs, and information from the household surveys, indicated that 8% of respondents believed that when the winds blow in a south to north direction towards the rain season, this indicates little rainfall. If the winds are strong and blowing from the north to the southeast, it is a sign of good rains in that particular community. It was further revealed during the FGDs that the winds could be strong and shift the clouds that should bring good rains to their area.

In support of the importance of the local indigenous knowledge in weather and hazard prediction, the Department of Civil Protection (DCP) representative cited “... we also rely on...”
the communities for early warnings as each community has its own way of weather forecasting using their understanding of nature. In fact, we have to improve on the documentation of the locals’ knowledge systems as they have proved to be quite accurate over the years ...

The use of indigenous knowledge by the local smallholder farmers in making farming decisions was largely dependent on their perception of its accuracy. However, the perception of accuracy of indigenous knowledge varied among different households, with 57% indicating that it was accurate (Figure 5.13). Thirty percent of respondents mentioned that indigenous knowledge’s accuracy was fair (Figure 5.13). Only 13% of respondents declared the accuracy of indigenous knowledge to be poor (Figure 5.13).

![Pie chart showing household's perception of accuracy of indigenous indicators for seasonal weather forecasting](image)

**Figure 5.13: Household's Perception of Accuracy of Indigenous Indicators for Seasonal Weather Forecasting**

Additionally, respondents were asked about their preferred source of seasonal weather forecasts and drought prediction. Respondents’ preferences were slightly biased towards using conventional sources (46%) (Figure 5.14). A smaller portion of respondents (38%) preferred using indigenous knowledge, while 16% preferred using both (Figure 5.14).
With regards to seasonal weather forecasting and drought prediction, households relied on both scientific sources and indigenous knowledge. Households were likely to use local indigenous indicators with which they are familiar with and able to decode. Households that used indigenous knowledge believed in their local indicator interpretations. In their study in northwestern Zimbabwe, Mugabe et al. (2010) showed that accuracy of using indigenous knowledge depends on the ability of households to interpret the signs correctly. However, UNDP (2009d) concluded that indigenous indicators such as physiological behaviour of trees and wild animals are related to the response of certain animals and plants to already prevailing weather stimuli, rather than the forthcoming cropping season. Theodory (2014) argue that it is such assumptions that result in disappearance of indigenous knowledge as it is not sufficiently acknowledged and integrated into formal risk-reduction strategies. Although communities are equipped with traditional knowledge and wisdom, there is need to link indigenous knowledge and new scientific practices and policies to enable smallholder farmers to cope with climate risks, thereby providing them with the means to sustain their livelihood activities (Shaw et al. 2010a).

However, the elderly in the community are the ones who mainly possess local indigenous knowledge (Peters, 2015). Indigenous knowledge is passed on from generation to generation
and the modernisation of rural areas is not supportive of this exchange of knowledge (Theodory, 2014). Indeed, in this study, some study participants indicated there was limited passing on of indigenous knowledge to the youth, as the youth were not interested. Theodory (2014) further supports this, and indicates that indigenous knowledge is under threat of disappearance due to the increasing passing on of the elderly population who are crucial custodians of it.

Almost half the respondents preferred scientific weather information, while others used indigenous knowledge that has been in use from time immemorial. Preference by households for the scientific sources might be a product of the perceived reliability or accessibility of seasonal weather forecasts and drought prediction. Preference for both sources could be an appreciation of the fact that either of the sources has advantages and shortcomings, hence, combined use enhances complementarity. Though scientific weather information is important, indigenous knowledge is recognised as providing economical and effective solutions that are likely sustainable, as well as bearing ethical and heritage values (Janicot et al. 2015). In conclusion, Theodory (2014) argue that indigenous knowledge is valuable to climate science as it enhances observations and interpretations on a larger spatial scale with considerable temporal depth by highlighting elements that are measured by climate science.

5.6. Perceived Drought Disaster Impacts
Respondents were asked to report on the main livelihood activity affected by droughts, and 71% mentioned farming activities, 13% cited livestock rearing while 16% stated both of these livelihood activities.

5.6.1. Perceived Primary Drought Impacts on Smallholder Crop Production
Respondents were asked about the primary impacts of drought18 on smallholder crop production. A wide range of possible impacts were mentioned. Sixty percent of respondents

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18 When the majority of the population does not have a good harvest, it would be considered a drought.
mentioned wilting of crops, while 39% stated reduced yields and 1% cited insect infestations (Figure 5.15).

![Perceived Drought Impacts on Crop Production (n=217)](image)

Figure 5.15: Perceived Drought Impacts on Crop Production (n=217)

Crop production by smallholder farmers in the study area was heavily dependent on natural rainfall, with limited options for irrigation, especially for the open fields (Chapter 3: Section 3.2.4). Thus, a decrease in the amount of rainfall received in each locality in each cropping season might result in wilting of crops, reduced crop productivity and yields. This is against the background that almost a third (28%) of respondents were dependent on crop sales for cash income in their households (Chapter 4: Section 4.3.2). Furthermore, in the study site, the manifestation of insects in 2012 during droughts affected harvests as some of the insects, such as worms and grasshoppers destroyed crops. Wild animals such as baboons, hyenas and wild pigs were also mentioned during FGD to be destroying crops and eating small livestock during drought periods. This was corroborated by FGD participants from Mushandirapamwe ward who indicated that the invasion of fields and homesteads by different animals in search of food due to severe droughts were affecting their crop harvests, granary stocks and small livestock
assets\(^1^9\). This deepened food insecurity for households that were already facing severe
droughts.

### 5.6.2. Perceived Primary Drought Impacts on Livestock Rearing

Regarding the primary impacts of drought on livestock rearing, 49% of respondents cited high livestock mortality, while 39% indicated selling livestock for various reasons, 9% mentioned that their animals lost weight and 3% spoke about reduced rangeland productivity (Figure 5.16). FGD participants across all wards revealed that most of the households had lost some of their livestock during previous droughts especially in 1992, when it was indicated that large numbers of cattle died across the district (1992 received the lowest rains compared to other drought years in the country (Chapter 5: Section 5.2)); Chapter 4: Section 4.2.4.3). Agritex officers in all wards expressed that livestock, especially cattle, during past droughts would lose weight and show physical deterioration resulting from the search for water and fodder. Furthermore, transect walks in the study area showed that all the livestock were largely reliant on natural rangelands for fodder, and harvested maize stalk during the dry season as well as during drought episodes.

![Figure 5.16: Perceived Drought Impacts on Small-Scale Livestock Rearing](image)

\(^1^9\) Wild animals (baboons, hyenas, wild pigs) were now turning to their field crops (maize, pumpkins, groundnuts and millet) and domestic livestock (chickens, turkeys and rabbits) for food.
In their study in semi-arid regions of Zimbabwe, Sango & Godwell (2015) showed that drought results in poor regeneration of grasslands and increased water shortages, and induced heat stress, and consequently a high mortality, in livestock. Poor quantity and quality rangelands can also contribute to poor quality livestock (Ramirez-Villegas & Thornton, 2015). Thornton et al. (2015) point out that drought might lead to increased livestock mortality, vulnerability of livestock to diseases and physical deterioration due to the long distances travelled in search of greener pastures and water sources. All of these impacts were identified in this study. With poor pastures and stress on livestock, breeding was negatively affected and in many cases, the offspring born in drought do not usually survive due to hunger and malnutrition (Nkondze 2014). Ramirez-Villegas & Thornton (2015) argue that for each 1 °C or more increase in temperature, all livestock species reduce their intake by 2-5% and this has far-reaching effects on the quality and quantity of livestock.

With livestock dying in large numbers as indicated by 49% of respondents, Scoones (1996) recommend the sale of cattle as soon as a drought hazard is predicted and restocking in more favourable conditions. Scoones (1996) based his advice on the fact that the price of livestock, especially cattle in Zimbabwe, would fall during drought (Chapter 4: Section 4.2.4.3). Selling of livestock by households (39%) was perceived as a main impact as this was largely done for cash income to purchase food (see Chapter 4: Section 4.2.4.3). Therefore, selling some livestock before drought would reduce the chances of households experiencing a total loss of their livestock asset (Chapter 4: Section 4.2.4.3) (Scoones, 1996). However, those households with low numbers of livestock are reluctant to sell their livestock in times of food deficit unless the impacts on food availability have reached alarming levels (Murungweni et al. 2014; Sango & Godwell 2015). Continuous sale of few livestock by the rural poor could lead to long-term adverse impacts on livelihood strategies and induce exposure and vulnerability to future drought events (Chapter 4: Section 4.3.1) (Murungweni et al. 2014; Rurinda et al. 2014).
5.6.3. Perceived Drought Impacts on Society

The adverse impacts of a drought can spread to the whole community and more widely to society and these can be considered secondary impacts to some extent. The study revealed that 43% of respondents mentioned conflicts among community members that arose as a result of the distribution of humanitarian aid from government and other external organisations (Figure 5.17). A large number of respondents (39%) reported that the major impact of drought was increased poverty levels (Figure 5.17). Other respondents mentioned an increased prevalence of human diseases (7%) and increased human mortality rates (7%), while 4% mentioned water conflicts (Figure 5.17).

With respect to conflicts on aid, FGD participants mentioned, “... the selection of relief beneficiaries was sometimes based on social groupings and/or political affiliations, which created social tension within communities because other deserving households or groups were excluded...”. The FGD participants stated that some of the criteria used to distribute drought relief, which triggered conflicts, included the number of household members and the identification and selection of needy households. All KIIIs pointed out that it is not government policy to distribute drought relief on a political partisan basis; however, local individuals in local authorities are appointed through elections and some of these individuals exploit the situation to their benefit and that of fellow party members.
Overall, food availability was low in the study site, especially during drought events, and in some areas, food aid was the only source of food for the households. Therefore, they could not afford to miss an opportunity to get their share. Hence, the eruption of conflicts among community members as households try to secure their portion of drought relief. Once the NGOs have left after the drought, the households would try to rebuild their relations and then be struck by another drought hazard (see Section 5.4). Therefore, the process of rebuilding relations in the community to uphold the social capital that once existed is never a complete process and/or can take a very long time (Chapter 2: Section 2.3.5; Chapter 4: Section 4.3.1) (Shah & Dulal, 2015). These resultant conflicts on aid erode the existing social capital in the community and reduce the possibility to assist each other in the future as mentioned earlier in Chapter 4: Section 4.2. The eroded social capital is also significant in the poverty eradication processes in rural areas.

Poverty and vulnerability levels are exacerbated by successive drought impacts on rural households, illustrating the link between the two aspects (Richard et al. 2015). Given that poor households are successively hardest hit by drought hazards, all their wealth and assets are depleted in the attempts to reduce the impacts on their livelihoods (Akter & Mallick 2013;
Shah & Dulal 2015; Richard et al. 2015). Consequently, some households are likely to fall deeper into poverty (Carpenter & Brooks 2008; Shameem et al. 2014; Arouri et al. 2015). This consequence of drought was noted by 39% of respondents as the main impact. The most increased poverty levels are predicted in the rural areas because of their location in marginal areas, reliance on climate sensitive livelihood activities, low incomes and weak adaptive capacity (Heltberg et al. 2009). In this respect, IPCC (2014) maintains that the impact of climate change slows down economic growth, makes poverty reduction more difficult, erodes food security, and creates new poverty traps and the emergence of new hunger hotspots. Therefore, more drought impacts under climate changes exacerbate poverty in most developing countries and create new poverty pockets in countries with increasing inequalities (Richard et al. 2015). As poverty deepens due to drought impacts, so does the households’ quality of life and this might trigger human diseases and deaths. However, it is very difficult to attribute deaths to drought.

Considering that drought induces shortage and scarcity of water, demand and competition for access to water increases (Chapter 4: Section 4.2.3.2) (Rijsberman, 2006). Water resources especially in drought will be used for many activities including for domestic purposes, small-scale irrigation of gardens and for livestock. Water being a common good, there is no control on the access to and utilisation of the resource by households and this exerts a tremendous amount of pressure on the little water resources available during drought episodes, and can also create social conflicts (Rijsberman, 2006).

5.7. Conclusion
An important conclusion drawn from this chapter is that smallholder farmers were aware of climate variability and change mainly from either access to conventional media sources, experience or their observations of local environment over the years (Section 5.3). Only a minority of households had not yet realised any changes in climate, as they continued with the business-as-usual approach. Information on climate change disseminated through the radio and newspapers was not sufficiently simplified to be understood by ordinary smallholder
farmers (Section 5.5.1). In addition, some households do not trust the seasonal weather forecasts disseminated through media, as they have proved to be inaccurate in the past. Lack of trust on weather information might result in non-action. Moreover, translation of information into action is somewhat limited as smallholder farmers face difficulties in making informed decisions for livelihood activities and lack the means to adapt accordingly (Chapter 2: Section 2.3.3.2). FAO (2014d) note that early warning information only lessens the impact of a drought on household livelihood activities, if appropriate action is taken.

However, some households were not receiving seasonal weather forecasts timeously for them to assess the implications of the forecasts, and make informed decisions to protect livelihood strategies and assets (Section 5.5.1). This has in many cases left households uncertain on what to prepare for, creating a platform for drought disaster occurrence. The key to reducing risk is having timeous access to weather information on the nature of the impending hazard and being prepared for it, and this might be the missing ingredient amongst many rural smallholder farmers (Simba et al. 2012; Twigg 2015).

Worth noting was the observation that the use of indigenous knowledge was based on the ability to read the signs and decode the information for consideration by smallholder farmers. It was encouraging to learn that Agritex officers collect and use traditional crop and weather knowledge and that they are encouraged to do by the government. Theodore (2014) argue that if value is put on indigenous knowledge by government and development organisations, and used effectively, households will be in a position to make their own seasonal weather forecast and prediction without wasting time waiting for scientific weather forecasts. Perhaps more widespread appreciation of this activity would encourage and empower local communities to preserve this knowledge even more especially as correct interpretation of signs is an important aspect of household decision making for farming in rural areas.

Hiwasaki et al. (2014) maintain that the resilience of communities facing climate risks can increase when scientific and indigenous knowledge are combined. Research and development
organisations including the DCP have acknowledged the existence and importance of indigenous knowledge and strategies related to DRR and CCA, yet in practice, little documentation of its application through official channels exists (Mercer et al. 2009). Acknowledging the existence of indigenous knowledge is within the fundamentals of Hyogo Framework for Action 2005-2015, which views ‘traditional and indigenous knowledge and cultural heritage’ as that of ‘knowledge innovation and education needed to build a culture of safety and resilience at all levels’. In conclusion, no single knowledge can be a panacea for DRR and CCA, but indigenous knowledge has the potential of contributing far more than is usually permitted (Hawasaki et al. 2014).
CHAPTER 6: 
HOUSEHOLDS’ DROUGHT RISK REDUCTION AND ADAPTATION STRATEGIES

6.1. Introduction
6.1.1. Overview of the Chapter

Building on Chapter 5, this chapter focuses on households’ and communities’ drought risk-reduction and climate change adaptation strategies. Specifically, the study’s third objective (Objective 3) is addressed in this chapter. This objective sought to understand local household and community responses to the occurrence of drought, as well as other changes in climate. Like other results chapters, the data presented in this chapter were collected using a variety of methods that included household surveys, focus groups discussions (FGDs), key informant interviews (KIs) and transect walks in the study area (Chapter 3: Section 3.4).

This chapter presents data on local drought risk-reduction and adaptation strategies used by smallholder farmers in both crop production and small-scale livestock rearing, as these are important livelihood activities in the study site (see Chapter 4: Section 4.3). In this chapter, drought risk-reduction and adaptation strategies that were recommended by external organisations in periods when households and communities were facing an imminent drought hazard are explored. Households’ perceptions of their recovery, specifically regarding whether they managed to recover before another hazard, are also discussed. Findings on drought risk-reduction and adaptation strategies that were used by community forebears in the past and whether they can be adopted as viable strategies in the current context and environment are also provided. Another important section of findings in this chapter is on households’ perceptions of combining external interventions and local practices for effective risk reduction and adaptation. This chapter therefore provides a snapshot of risk-reduction and adaptation strategies preferred by households, which could form the basis for future recommendations. Lastly, this chapter presents findings on perceived barriers for drought risk reduction and adaptation mentioned by households and smallholder farmers in the study site.
6.1.2. Conceptual Framing: Drought Risk Reduction and Adaptation Strategies

Use of local practices and knowledge can improve risk reduction and adaptation to drought and climate variability respectively (Hiwasaki et al. 2014). Therefore, understanding local practices is pivotal to assessing how households utilise local knowledge and resources to reduce risk and cope with frequent drought episodes (Theodory, 2014). Similarly, Hiwasaki et al. (2014) argue that local and indigenous knowledge can give smallholder farmers a platform from which to engage in local farming practices that might reduce impacts of drought and climate variability. Investigating such local and indigenous knowledge, and the strong social interrelations associated with it, helps to reveal the functional flexibility of local farming strategies, and can provide a gauge of local adaptive capacity (Chapter 2: Section 2.3.5) and ability to cope with climate risks. Hiwasaki et al. (2014) further maintain that local practices are recognised as providing economical and effective solutions that promote livelihood resilience and that bear the heritage values of the community. DRR and CCA therefore, should include building on local practices, something that is often poorly addressed or even ignored by practitioners supporting risk reduction and adaptation (Janicot et al. 2015). Yet, complementarities need to be sought between local and external interventions to enhance communities’ adaptive and coping capacity to climate risks (FAO 2014d).

Risk reduction and adaptation practices advocated by external organisations can potentially reduce vulnerability by changing the context in which shocks and stressors occur, or they can directly address outcomes (O’Brien et al. 2009). However, some recommended practices may negatively affect livelihood activities existent in the community, thereby increasing vulnerability to climate variability and extreme weather events (O’Brien et al. 2009). With the current trends of climate variability and successive droughts, some argue that integrated technological and scientific interventions offer the best option for strengthening livelihoods through improved agricultural productivity and building the capacity of households to diversify incomes (Shiferaw et al. 2014). However, FAO (2014e), following the line of thinking in the previous paragraph, posit that it is important to pay due respect to existing traditional and
cultural systems and structures, especially at the community level, when offering recommendations for agricultural production. An integrated approach to drought risk reduction and adaptation is thus most likely to see households build resilient livelihoods and recover when hard-hit by drought disasters.

The recovery process for rural households, including livelihood activities and assets, is influenced by the interface between climate risk policies, institutions and dynamic pressures in that area, as explained in the Pressure and Release (PAR) Model (see Chapter 2: Section 2.2; Section 2.3.3.1) (Blaikie et al. 1994; Cutter et al. 2003; Turner et al. 2003; Winser et al. 2004; Twigg 2015; Heltberg et al. 2009; Audouin et al. 2013). In an empirical study in Zimbabwe, Nyamwanza (2014) show that policy frameworks need to be formulated and, most importantly, interpreted and implemented within an understanding and acceptance of local realities, if rural households are to build resilience or recover from drought disasters (Chapter 2: Section 2.4). In this regard, the recovery process requires adequate time, but also depends on the extent of adverse impacts of the previous disaster, referred to as unsafe conditions in the PAR Model (Chapter 2: Section 2.3.3.1), and accessibility to available local resources and assets. Heltberg et al. (2009) and Sallu et al. (2010) point out how many climate-induced disasters (including drought) can destroy or damage the natural resource base and climate-sensitive activities of a community. This also adversely affects future livelihood prospects over both the short- and long-term. In such cases, household recovery becomes difficult, if not impossible, as the households encounter barriers to risk reduction and adaptation.

As rural households rely on different livelihood strategies and sources of income (see Chapter 4: Section 4.3), they encounter different barriers in reducing drought risk and adapting to climate variability and change. This is because each household in a community has different capacities of preparing for, responding to and recovering from drought hazards (UNISDR, 2009d). The perceived barriers provide a platform for discussing the possible pathways towards climate-resilient household livelihoods by overcoming these barriers. Shackleton et al. (2015) argue that barriers that hinder adaptation are a function of the people involved, the
nature of the specific systems involved and/or the larger context in which the people and systems interact. Therefore, barriers to drought risk reduction and adaptation at household level might be reflective of the status of livelihood activities and the asset base (Chapter 4: Section 4.3) and sources of income (cash or kind) of the household (Chapter 4: Section 4.3.2) (Shackleton et al. 2015). Essentially, households with more diverse livelihood strategies and assets are less likely to encounter barriers for risk reduction or drought resilience and adaptation, as they have the ability to shift or switch between different livelihood strategies and assets/capitals (Wilhite et al. 2014).

6.2. Current Local Drought Risk Reduction and Adaptation Strategies
6.2.1. Local Strategies for Crop Production
Regarding arable cropping, several strategies or practices, both endogenous and introduced, were used by the interviewed households and smallholder farmers to deal with drought or expected drought. Household respondents were asked if they knew of actions to adopt in the face of imminent drought. Seventy percent of respondents knew what actions to adopt while 30% did not.

From the proportion of respondents who knew of drought risk reduction and adaptation strategies, 56% mentioned that they would stock grain until the next harvest season (see Section 6.3; Figure 6.1). FGD participants in all wards supported this and mentioned that stocking of grain until the next harvest was primarily the initial step to ensure continued food availability during lean periods at household level. To ensure that grain lasted longer, one FGD participant from Mapiravana ward indicated, “... we even reduced the size and number of meals taken per day to one meal per day in the evening, porridge in the morning to save on mealie meal and in the afternoon everyone would fend for themselves with fruits or food from neighbours and friends...”.

One-third of respondents stated that they planted early with the first rains of the new cropping season, in selected areas (even with knowledge of pending drought), another one-third
engaged in traditional and cultural practices to influence the weather (rituals), while 27% used conservation farming/agriculture (Figure 6.1). The main traditional practice performed was a rainmaking ritual known as ‘mutoro’ or summoning the rains. With respect to early planting, one FGD participant from Mapiravana ward revealed, “... the practice of early planting of crops was largely applied in wet fields (dambo\textsuperscript{20} fields), which are now less prevalent because of the change in the amount of rainfall received annually. This practice would give an early start to those households with dambo fields and ensure that crops receive most of the moisture even before the new cropping season ...”. Smallholder farmers with dambo fields planted their maize crops as early as September and harvested in December, often planting another crop from December until April. With this strategy, households increased the chances of their crops receiving as much moisture as possible and consequently increased their chances of a decent harvest. However, some households using the early planting strategy indicated some difficulties due to: (a) the limited rains received annually that now largely affect these dambo fields and adversely affect their water-holding capacity and functionality, and (b) the unpredictability of the current rains made it difficult for households to prepare properly for the early season. On other occasions, some households would plant maize early in portions of their small gardens, and irrigate by using buckets as seen during transect walks.

Another proportion of respondents applied animal manure to improve soil fertility (23%), 16% used appropriate seed varieties, 14% grew small-grain crops while 2% used seed banking (Figure 6.1). Only 1% of respondents used dry planting\textsuperscript{21} (Figure 6.1). In relation to seed banking, study participants revealed that the selected maize cobs were smoked in a traditional rural kitchen mainly as treatment against pests and insects (weevils and borers). Smallholder

\textsuperscript{20} Dambos are seasonally waterlogged areas found in the headwater zones of drainage systems or alongside streams or rivers (Turner 1986). Their importance spans from providing grazing in the dry season as well as being moist enough to grow dry season crops without irrigation (ibid.).

\textsuperscript{21} Dry planting is the practice whereby farmers plant the seeds a week or even 10 days before the onset of the rains. This practice ensures that as soon as the rains commence, the planted seeds will begin to germinate. The seeds must be planted in dry soil and the rains must come within that period or farmers risk their seeds rotting underground.
farmers were advised by Agritex officers on when to harvest the crop to ensure that grain had appropriate moisture content and received the required treatment to preserve it for a long time. However, in other cases, households used harvested grain for planting without special selection from the grain.

Amongst households that did not know what actions to take, 86% did not have adequate income, while 10% of households had fair income and 4% had adequate income (Table 6.1). On the other hand, of those households who knew what actions to take, 76% did not have adequate income, while 18% had fair income and 6% had adequate income (Table 6.1).

Table 6.1: Cross-tabulation of Income and Action for Drought Risk Reduction

<table>
<thead>
<tr>
<th>Action</th>
<th>Not Enough</th>
<th>Fair</th>
<th>Adequate</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>% of Yes/No</td>
<td>% of</td>
<td>% of Yes/No</td>
</tr>
<tr>
<td></td>
<td>total hhs</td>
<td></td>
<td>total hhs</td>
</tr>
<tr>
<td>Take Yes</td>
<td>76</td>
<td>55</td>
<td>18</td>
</tr>
<tr>
<td>Action No</td>
<td>86</td>
<td>25</td>
<td>10</td>
</tr>
</tbody>
</table>

Note: hhs stands for households

Additional information during household surveys indicated that rainmaking ceremonies were performed in early October to ensure that rains were received on time for the cropping
season. Some respondents believed that performing the traditional rituals ensured good rains and consequently a good harvest and food security. In support of the above view, some FGD participants also mentioned that rainmaking ceremonies were effective in the past to the extent that it would start raining immediately after the ritual. One FGD participant from Mushandirapamwe ward revealed, “... in the past, upon completion of ‘mutoro’ ritual, the rain would come indeed. Nowadays the rain seems to even go into hiding when we perform the rituals. Some among us attend churches and we go to the fields with the priests to pray for the rain. Either way, the rains are asked for in October. No rituals or ceremonies are performed in November. Anything performed after October is futile because the rains have started already. The effectiveness of ‘mutoro’ is arguable because the processes are not being done correctly. Some of the information on conduct of traditional rituals seems to be lost in translation. The knowledge is still there with the elders and not passed on to the younger generation. There is also desecration of sacred areas, which could be leading to erratic rains ...”. Regarding the manner in which the rainmaking rituals were conducted, another FGD participant from Mushandirapamwe ward claimed, “... the main traditional and cultural activity we engage in is ‘mutoro’, a traditional rainmaking ritual. When it is done right, it rains. We believe that it works sometimes. What is baffling is that at times even when done right we still encounter drought episodes. Some of us who do not believe in the traditional and cultural activities simply pray for the rain and it comes...”.

Other FGD participants also stated that traditional rainmaking rituals were currently not working at all mainly because the rituals were not conducted in the appropriate manner. FGD participants went on to describe what constituted the appropriate manner: beer for the rain-making ceremony was brewed by young girls who were still virgins or elderly women who had reached menopause; this beer must be brewed in sacred places in traditional beer-brewing clay pots and the water for brewing must be fetched using clay pots. The millet for brewing the beer should be placed in sacred ponds with still water for a week for the fermentation process (kunyika mumera in Shona terms) before being processed into powder in the traditional way. One FGD participant from Mushandirapamwe ward disclosed, “... we had
'mutoro’ last week in one of our villages but unfortunately it did not even rain after the ceremony. It seems misleading these days. In some cases, it seems to scare the rains away. It may be due to the fact that the elders are not passing on the information accurately or the young are not interested. We try to instruct the youth on culture, but the young ones who are recently married are arrogant and adamant, saying that the water is from God. Only God can make it rain...”.

With regards to conservation farming, FGD participants expressed different views on its introduction in their communities. Some FGD participants indicated that conservation farming was introduced to help households without draught power for ploughing and cultivation activities, while other FGD participants, specifically from Mapiravana ward, argued that conservation farming was introduced by external organisations with the provision of farming inputs to incentivise smallholder farmers to embrace the practice, given the occurrence of successive droughts. Overall, FGD participants in all wards pointed out that conservation farming required intensive labour, which was too much for the elderly and small households and hence was used mainly on small pieces of arable land. One transect walk participant in Mushandirapamwe ward articulated, “... I am happy with the introduction of conservation farming in my area as I am guaranteed good harvests every season. I know it is labour intensive, that is why I use it for my homestead field only, and this is the only portion I cultivate. As you can see, I am going to have a bumper harvest this season 2014/15 when the majority of the population in my area will be suffering from poor harvest. The problem with many people in my area is that they do not want to work hard, they are just lazy and they do not want to use conservation farming. Conservation farming works and it works for me...”. All participants who used conservation farming commented that it had helped them to realise good harvests throughout drought years, when some of their community compatriots were struggling to harvest enough to feed themselves. However, most of the smallholder farmers especially in Mapiravana ward had stopped using conservation farming when the organisations that had introduced it departed, as there was no longer any input benefit.
All interviewed Agritex officers provided advice to smallholder farmers on the type of seed varieties suitable for each season depending on seasonal weather forecasts. Overall, Agritex officers recommended that in the face of drought, smallholder farmers should use drought resistant crops and seed varieties, and early-maturity maize seed varieties to stand a better chance of attaining high yields. In this regard, early-maturity varieties\textsuperscript{22} were recommended as they fit into the shortened rain season (see Chapter 5: Section 5.2). Agricultural seed companies in Zimbabwe like Pioneer, Pannar and SeedCo, have been developing hybrid varieties that are drought-resistant and disease-tolerant, and produce high yields. In turn, observations in hardware shops in the study site showed that different types of hybrid seed varieties were now being sold to surrounding communities. Agritex officers in the study site mostly recommended the following maize seed varieties: SeedCo (SC403, SC407, SC411 and SC513) and Pannar (PAN6227, PAN6777 and PAN61). However, some FGD participants could not afford to buy treated hybrid seeds every cropping season because of limited financial resources. In those cases, households used traditional untreated seeds from previous harvests or seeds facilitated by seed banking. However, one FGD participant from Mushandirapamwe ward pointed out, "... the yield from untreated seed would not be impressive even with adequate rains in comparison to hybrid seeds ...".

This study found that several drought risk-reduction and adaptation strategies were used for crop production. These are discussed below.

One-third of households believed in and practiced traditional and cultural rituals as a means to avert drought; however, households are currently being negatively affected by droughts that are more frequent. Evidence from FGDs mentioned earlier in this section, showed that households are now questioning not only the effectiveness but also the relevance of

\textsuperscript{22} An early-maturity variety can either be planted early and harvested before the end of season, or be planted late and harvested by the end of season. It is recommended in areas where the rain season is short, rainfall patterns are irregular or in situations of chronic drought (FAO 2014c).
traditional and cultural rituals. This study found that the younger generation in the rural areas are resisting total acceptance of the traditional and cultural practices, indicating their belief in God and Christianity. In their study in Zimbabwe, Mawere & Mubaya (2015) came to a similar conclusion and showed that the decrease in appreciation of traditional rituals could be attributed to the spread of Christianity and modernisation of rural societies due to rural-urban interaction. This risks the demise of traditional rituals, and the value and knowledge accompanying them. Additionally, other community members are of the position that non-belief in these rainmaking rituals is actually part of the cause of the droughts.

In this study, conservation farming was largely introduced through NGOs (e.g. Christian Care and Oxfam) and Agritex, to assist smallholder farmers during dry seasons (Chapter 7: Section 7.4.1). Conservation farming is a farming practice based on three principles: minimum soil disturbances, permanent soil covers and crop rotation. These are known to improve soil quality, conserve moisture and most of all improve yields during moisture stress periods (FAO 2008). Almost one-third of respondents used conservation farming for their crop production in this study (Figure 6.2). Households using the practice clearly indicated their satisfaction that conservation farming helped them to realise good harvests from their small fields (homestead fields) during drought episodes. Sietz & van Dijk (2015) argue that larger families with a large proportion of active members are more likely to use conservation farming on a large scale, while small families will reduce the size of their fields to reduce labour requirements. That said, if all households in rural areas were each to set aside a small piece of land for conservation farming, it would go a long way to fostering food security, especially in drought periods.
Households that could afford to purchase farming inputs largely used appropriate seed varieties. This included those households that benefitted from the government input scheme (seed and fertiliser). However, even for those households that benefitted from the government input scheme, the inputs received were inadequate and inappropriate. This left smallholder farmer’s with no option other than to top-up with traditional seeds. Hybrid seed varieties are drought- and disease-resistant, and have a high probability of producing high yields during drought. With high yields, rural households would be food secure and some households would sell surplus grain for cash income. Despite clear advantages of hybrid seeds, especially with regards to yield, they require costly inputs, such as fertilizers and pesticides that may not be available or accessible to smallholder farmers, to obtain their maximum potential yield, which may not be available or accessible to smallholder farmers (FAO 2014c; FAO 2014e). For this reason, it is argued that using such seeds will not promote resilience (McGuire & Sperling, 2016).

Thus, with limited access to hybrid seed varieties, smallholder farmers plant traditional seed varieties. Seed banking practices were promoted in the study site by Agritex officers to maintain preservation of traditional seed. However, in this study a mere 2% of respondents
used seed banking practices. There were two arguments concerning traditional seeds as revealed in the study. Firstly, traditional seeds have limitations that include lower yield potential and substandard quality (irregular viability and reduced physical and varietal purity), leading to weaker yields over time (see Chapter 2: Section 2.3.3.1; Chapter 4: Section 4.2.3) (FAO 2014e). Secondly, smallholder farmers prefer traditional seed varieties because they are cheap and accessible, require limited inputs, and are better adapted to withstand stresses such as droughts (FAO 2014e). Therefore, the inability of the majority of smallholder farmers to move to treated hybrid seeds or treat their own traditional seeds could result in poor harvests becoming imminent and food aid continuing to be regularly needed (Chapter 7: Section 7.4.1) (Bola et al. 2013).

To ensure high yields, households owning livestock engaged in soil enrichment practices through application of animal manure (Figure 6.3; Chapter 4: Section 4.2.4.3). These soil enrichment practices need to be coupled with the use of drought-resistant crops like finger millet, sorghum and millet, to ensure high crop yields during drought (Section 6.3) (Bola et al. 2013). However, this study’s findings indicated that the assimilation of small-grain crops by households has been slow, which contradicts findings by Mawere & Mubaya (2015) who indicate that small-grain crops are increasingly becoming dominant crops because of their drought-resistance characteristics (see Section 6.3). Smallholder farmers’ resistance to adopt drought-tolerant crops can only result in unsafe conditions (Chapter 2: Section 2.3.3.1) that favor drought disaster occurrence, as explained earlier in the Pressure and Release Model in Chapter 2: Section 2.3.5 (Turner et al. 2003; Winser et al. 2004; Cutter et al. 2008; Sietz & van Dijk, 2015).
Another strategy used in this study was dry planting as mentioned earlier, and timing for planting is crucial for this method. However, the unpredictability of the current rainfall patterns due to climate variability and frequent droughts was making it difficult for the households to make rainfall predictions (Chapter 5: Section 5.3). Hence, only 1% of respondents were using the strategy in the study area. Overall, for resilience, the best option would be a combination of strategies rather than only one strategy that might not give the desired results.

6.2.2. Local Strategies for Livestock Rearing

Essentially, livestock owners used local knowledge and practices to ensure the survival of their herds during drought. Results indicated that the main concerns for livestock when struck by a drought disaster were water and fodder. Three major local practices for reducing drought impacts on livestock rearing were identified. The majority of respondents (87%) kept cattle feed (maize stalks) to ensure survival of livestock during droughts (Figure 6.4). Other options were to fetch water for livestock (9%) and to travel long distances in search of water and pasture (4%). The latter were important considering that many water sources in the study site
dried up during droughts (see Chapter 4: Section 4.3.2; Figure 6.4). With regards to feeding livestock, FGD participants from all wards also indicated that during drought, livestock were herded along the river banks that usually remained green and provided a source of fodder.

Harvested maize stalks were one of the most important sources of cattle feed during the dry season and during drought periods when pastures were dry with insufficient fodder. For those households that could afford it, salt blocks were purchased to add to the maize stalks. The maize stalks were then distributed to livestock in small portions until the beginning of the rainy season, when new growth of grazing appear in the rangelands. However, keeping such feed for the livestock is dependent on the availability of maize stalks, which were also affected by drought disasters (Bola et al. 2013; Thornton et al. 2015). Further, maize stalks kept as livestock feed are unlikely to last the full length of the drought period, especially when hit by successive droughts (Figure 6.5). During severe droughts, the supply of maize stalks for livestock would be at best limited. This was confirmed by observations during transect walks, where it was observed that in some of the fields seriously affected by drought, the owners had not even bothered to cut maize stalks for livestock, and they had been left to dry up in the fields.
With inadequate maize stalks for the entire drought period, smallholder farmers were forced to seek greener pastures and water sources for their livestock. Fetching water for livestock was considered the last option after all other water sources had dried up in the community. This was done largely at boreholes constructed with small ponds for livestock. Depending on the severity of the drought, some households had to travel as far as 10 kilometres (see Chapter 4: Section 4.3.2). This meant that households with young and able-bodied members were prepared to travel long distances. With regards to pasture, the main concern was that the small pieces of green pasture along rivers were overwhelmed by livestock during drought periods.

6.3. Drought Risk Reduction and Adaptation Strategies Recommended by External Organisations; Integration into Current Practices

There were several external organisations in the study site providing support for CCA and drought. Forty-seven percent of respondents admitted to having received advice from government departments (Chapter 7: Section 7.4.1) and external organisations on how to
reduce drought impacts on their livelihood activities, while 42% had not received any information and 11% were unclear. Relevant government departments and external organisations issue advice using local structures and mass media (radio, television and newspapers) to try and reach out to the majority of rural households (Chapter 5: Section 5.5.1). The relatively high proportion of respondents who had not received information on risk-reduction and adaptation strategies might be a reflection of their non-access to media sources or agricultural extension officers (see Chapter 7: Section 7.4.2). However, in the event of an imminent drought hazard, it was clear that some government departments and NGOs working on local development projects seemed to be extending their advice to smallholder farmers (see Chapter 7: Section 7.4.1).

Of the respondents that received advice, 24% received advice to plant drought tolerant crops/small-grain crops (see Section 6.2.1), 22% received advice on early-maturity varieties (Section 6.2.1.), 20% on keeping grain stocks (Section 6.3), and 18% on early planting (Section 6.2.1), while 14% were advised on conservation farming (Section 6.2.1.) (Figure 6.6). A mere 2% were advised to sell their livestock so that they could realise financial gain and restock later after drought (Figure 6.6).

![Figure 6.5: Drought Risk-Reduction and Adaptation Strategies Recommended by External Organisations (n=102)](image)

Figure 6.5: Drought Risk-Reduction and Adaptation Strategies Recommended by External Organisations (n=102)
Results show that the foremost recommendation received by households from external organisations (Agritex and NGOs) was to shift to drought-tolerant crops in order to increase productivity and be food secure during drought (Section 6.2.1). This study found that a few smallholder farmers were starting to plant drought-tolerant crops despite the increased frequency in droughts (see Section 6.2.1). Planting drought tolerant crops is a long-term adaptation to climate risks that include drought. In contrast, in Mapiravana ward, a few households grew finger millet (in some cases for brewing traditional beer) as an additional crop to maize (Chapter 3: Section 3.2.4; Chapter 5: Section 5.2; Section 6.2.1). The slow uptake of drought-tolerant crops could perhaps be attributed to several factors that included: maize is the nation’s staple crop and a shift from this crop might result in a change in household diet, which rural households are likely not prepared to do; and limited information on the impact of drought on current crop production systems, and the benefits of drought-tolerant crops (Section 6.7).

As already mentioned in Section 6.2, Agritex officers in all wards provided training on post-harvest grain storage methods, which included application of chemicals, natural storage and construction of appropriate grain storage facilities at household level to uphold grain stocking as a drought risk-reduction strategy. One Agritex officer in Mapiravana ward made the following remarks with regards to stocking of grain, “... we engage in pre-and post-harvest training to assist the farmers in preventing their grain from infestation by weevils and other pests. We teach them about the chemicals to use and the right doses for maximum results. We also educate the farmers about the optimum storage conditions for longevity. Some farmers leave their maize in the field until it is very dry and already affected by weevils and we try to avoid this. Quality is compromised if this happens. We try to minimize crop damage on harvesting....” However, transect walk participants in all wards revealed that some household granaries did not portray features that guarantee security and proper grain storage conditions (see Section 6.2.1), since households could not afford to purchase building materials for construction of the recommended granaries. Besides, households were discouraged from keeping grain in granaries due to an increase in the number of grain theft cases in recent years.
in their communities (see Section 6.7). This could be attributed to frequent droughts and economic hardships.

Additionally, respondents were asked whether there was a need to combine current local practices and recommended external interventions. A combined 48% expressed the need to combine strategies, with 34% mentioning the need for complementarity of practices and 14% indicating that practices be combined to increase production (Figure 6.11). A combined 45% perceived no need to combine the practices (Figure 6.11). The undecided respondents (7%) indicated that the only difference between the two approaches was that some of the indigenous practices had been adopted by NGOs with slight improvements on the approach (e.g. planting and storage of small grain).

![Figure 6.6: Reasons for combining Local Practices and External Interventions for Drought Risk Reduction and Adaptation (EI in the figure means External Intervention) (n=217)](image)

Regarding respondents’ preferences in relation to practices to reduce drought risk and display adaptation, 53% preferred external interventions, while 35% preferred indigenous practices and 12% of respondents mention both as being options.
Regarding CCA and DRR strategies, the belief of half the respondents that current and external intervention strategies should be combined, was likely based on the finding that some of the recommended strategies (drought-tolerant crops, grain stocking, early-maturity varieties, conservation farming, and early planting) were already being used by households in the study site (Section 6.2). The main perception of the households was that external intervention practices, being based on scientific research, were better placed for enhanced results (see Section 6.2.1).

Since food insecurity is one of the greatest impacts of drought, conserving grain stocks until the next harvest was an important strategy (Bola et al. 2013; Nhemachena et al. 2014b; Connolly-Boutin & Smit 2016; Rankoana 2016). Households in this study considered it an initial step towards reducing drought impacts (Section 6.2.1). An important economic benefit of safe grain storage is that smallholder farmers affected by drought are not put under pressure to sell their produce (FAO, 2014e). This would increase their bargaining power, as they have an option to delay selling grain while seeking better prices (FAO, 2014e). FAO (2014e) posit that failure to stock grain might undermine the capacity of rural households to overcome these crises and impede an early recovery after drought disaster. In an empirical study in Zimbabwe, Mawere et al. (2013) showed that lack of grain reserves during drought years is already pushing households into the one meal per day bracket. However, storing grain for a long period without damage requires quality storage structures yet granaries built by some households – (see Figure 6.8, Mushandirapamwe ward) – were not in accordance with the standards as advised by Agritex officers in order to keep out pests and insects, and maintain dry conditions. This limited the ability of households to stock and sell grain during drought periods, when they could get higher returns because of high grain prices. This resulted in limited income to meet other household demands (see Chapter 4: Section 4.3).
6.4. Indigenous Drought Coping Strategies Used by Forebears and Integration into Current Practices

Regarding knowledge of drought-coping strategies that had been used by forebears in their localities, 33% of respondents mentioned growing small-grain crops (see Section 6.2.1) and contributing part of their harvest to the chief’s granary (31%), while 15% mentioned traditional and cultural practices such as rainmaking rituals (Figure 6.9). Thirteen percent of respondents mentioned storage of small grains (see Section 6.2.1 and Section 6.4) and only 8% stated extensive mixed cropping (Figure 6.9). The growing of small grain crops as a coping strategy was mainly advised by the government through the Agritex officers and some development agencies working in the communities. With respect to traditional and cultural practices, one Agritex officer revealed, “... there are always traditional ways of doing things and they cannot be disregarded. It is not surprising to find half of the community using indigenous practices. These practices work for them and we are encouraged to glean from these experiences. ...”.
Additionally, households were asked whether indigenous practices used by forebears could be adopted into the current context for drought risk reduction. Two-thirds of respondents believed that indigenous strategies could not be adopted, as smallholder farmers were now using modern strategies (Figure 6.10). One-third of respondents mentioned that indigenous practices could be adopted into current farming practices while 4% of respondents mentioned that indigenous practices could be adopted but lacked support from government and external organisations (Figure 6.10).
Household’s perceptions that some indigenous strategies could be adopted into the current context, might be based on this study’s finding that some indigenous practices were currently used and remained relevant irrespective of changes in context (Theodory 2014; Mawere & Mubaya 2015; Tibesigwa et al. 2016). Strategies that included growing small-grain crops, stocking small grains, using local indicators of drought as early warning signs, and practicing traditional and cultural rituals as discussed in detail in Section 6.2.1 and Section 6.4 and Chapter 5: Section 5.3, were currently used. While some indigenous strategies were already being used, government departments (Agritex) were not offering adequate support to encourage assimilation into current practices to build resilient livelihoods (Chapter 7: Section 7.4.2). Along similar lines, Theodory (2014) in a study in Tanzania, posit that local households and communities need to be empowered to recognise the relevance of their indigenous knowledge, and how it could contribute to reducing drought disaster threats and adapting to climate variability.

Strengthening indigenous coping strategies such as planting small-grain crops and improving storage could provide benefits to smallholder farmers. Small-grain crops help households reduce risk and assist in coping with drought, due to their drought tolerance as discussed earlier in Section 6.2.1 and Section 6.3. Growing small grain is favourable for long-term grain
storage that could cushion households during successive droughts, as discussed earlier (Chapter 5: Section 5.2). Additionally, an indigenous way of storing small grains for long shelf life in the granary was to stock the cobs without removing chaff or to use ashes from the burnt maize cobs as treatment and a preventative substance against insects and pests. Building on these approaches might be less costly than the modern methods which many households cannot afford (Section 6.3).

The use of the chief’s common granary (zunderamambo) is a traditional practice whereby the chief keeps a strategic grain reserve to support the needy and vulnerable within the community such as orphans, the elderly, widows, the disabled, and any other community member during disasters such as drought (Mawere & Mubaya, 2015). Community members contribute grain to the chief’s granary or provide labour in the fields set aside by the chief to produce grain for the strategic grain reserve (Rurinda et al. 2014). This approach was primarily facilitated by the influence of traditional leaders and the strong social fabric existent in their communities in the past (root cause in the PAR Model) (Chapter 2: Section 2.3.5; Chapter 4: Section 4.3.1).

Some households believed that indigenous strategies could not be adopted into the current context and this was probably a reflection of socio-economic, political, environmental and demographic changes that had occurred over the years (Wise et al. 2014). For example, the chief’s common granary (zunderamambo) coping strategy might no longer be applicable to the current context due to the following perceptions: (a) weakened social cohesion in communities (Chapter 4: Section 4.3.1); (b) the introduction of formal administrative offices representing local government might be undermining the power of traditional leaders and other lower power structures (Section 6.4); (c) modern ideologies and religion have turned most people from believing in traditional rituals and practices (Section 6.4); and (d) continuous poor harvests due to successive droughts (Chapter 5: Section 5.6). The powers and influence of the current chiefs have been diluted by administrative structures set up by Rural District Councils (RDCs) through the appointment of District Administrators and Ward Councilors, as
well as Ward Development Committees (WADCO) and Village Development Committees (VIDCO). These structures compete with the traditional ones, making it difficult for the chiefs to enforce the traditional and cultural practices (Chapter 3: Section 3.4.2.3).

Few respondents (8%) mentioned mixed cropping as a past practice, but this was contributed to the fact that households were still using the practice. Mixed cropping could help to ensure a harvest from either of the planted crops in times of limited rains and makes it possible to harvest different crops at the same time (Mawere & Mubaya, 2015). For example, a cereal such as maize and a non-cereal crop such as pumpkins, roundnuts, groundnuts or cowpeas were usually grown together. The essence of the practice was planting more than one type of crop at the same time and in the same field to ensure that in the case of one crop failure, the smallholder farmer would at least realise a harvest from the other crop(s). FAO (2014e) maintain that increasing the diversity of crops in a smallholder farmers’ field improves the chances of crops coping with insects, diseases and environmental stresses such as drought. Mixed cropping can also play a role in supplementing dietary requirement at the household level through producing crops with different nutritional characteristics.

Droughts are not a recent phenomenon but their frequency of occurrence has recently increased, as elaborated in Chapter 5: Section 5.2. This suggests that since droughts have been in existence from time immemorial, forebears used methods that were relevant to their context to protect their livelihood activities (Tibesigwa et al. 2016). Some of these strategies are still applicable and are currently used by some households for reducing risk and adapting to drought and climate variability (see Section 6.2), while some indigenous strategies might be difficult to implement in the current context. Therefore, government departments and NGOs must take cognisance of such perceptions before recommending practices that might not be applicable contextually and might exacerbate household vulnerability to drought (Cao & Limnirankul 2014; Wise et al. 2014; Tibesigwa et al. 2016).
6.5. Households’ Perceptions on Recovery after Drought Disaster

In this study, recovering on time from drought disaster was based on households’ perceptions of retaining their status quo or better before the next drought.

With regards to households’ recovery after drought, 38% of respondents mentioned that they were able to recover, 34% said they did not recover timeously before the next drought, and 28% mentioned that they never recovered at all (Figure 6.11). Thus, a combined two-thirds of respondents struggled to recover from droughts, which increased vulnerability and resulted in drought disasters (see Chapter 2: Section 2.3.3.1).

Households falling into the category ‘able to recover’ were likely endowed with a wide livelihood asset base, diversified livelihood strategies and various sources of off-farm based income as explained by DFID (2011) in the resilience framework and also in Chapter 2: Section 2.3.3.2. Inversely, respondents in the category ‘never recovered at all’ were likely to have a shallow livelihood asset base and be heavily reliant on rain-fed subsistence farming for livelihood activities and cash income (Chapter 4: Section 4.3).
With droughts now occurring frequently, almost every two years or even annually in some cases, many households will not be able to recover considering their low adaptive capacity (Chapter 5: Section 5.2). Recovery from drought disasters requires the rebuilding of livelihood assets, which depends on favourable structures and processes, as explained earlier in the PAR model in Chapter 2: Section 2.3.5, and the resilience framework in Chapter 2: Section 2.3.5 (Blaikie et al. 1994; Turner et al. 2003; Heltberg et al. 2009; DFID 2011; Bryan et al. 2013; Sango & Godwell, 2015). Poor households are likely to build similar conditions during the recovery process to those existing before the drought, and this creates another vulnerable platform for future climate risks (Brown et al. 2013). Therefore, they are likely to fall deeper into poverty as they face more frequent droughts with limited livelihood assets and livelihood options (Chapter 2: Section 2.3.1) (Kollmair & Gamper 2002; Turner et al. 2003; Carpenter & Brooks 2008; Serrat et al. 2008; Connolly-Boutin & Smit 2016). In a similar study in Zimbabwe, Rurinda et al. (2014) showed that many smallholder farmers who experienced the 1991-92 drought and lost cattle have not yet recovered and will not be able to do so without sustained external support. This failure or delay to recover was because of, amongst other factors, the successive droughts (Section 5.2), the ailing economy prevailing limiting households’ opportunities for income and the importance of livestock as a source of cash savings (Section 4.2.4.3). In this regard, the government will have to improve their social protection of the vulnerable groups and their drought relief programmes (Chapter 7: Section 7.4).

6.6. Perceived Barriers to Drought Risk Reduction and Adaptation
Household survey respondents revealed a wide range of challenges they encountered when facing an imminent drought or when hit by frequent drought episodes. One-third of respondents mentioned having inadequate capital to purchase appropriate farming inputs (Chapter 4: Section 4.3.3.1) and 25% had limited access to food stocks, while 15% experienced water shortages and associated diseases (Chapter 4: Section 4.2.3.2) (Figure 6.12). With regards to other resources needed for coping and adaptation, the Agritex officer stated, “... Even if the farmers are equipped with the information, there is lack of some of the resources that can help farmers realize high yields. Firstly, there is need of provision of inputs that suit
the region, even if the farmers have money to buy their own inputs. The varieties needed are out of reach. For effective dissemination of information there is need of transport and proper accommodation, which is also nearer to the farmers, and literature, which is current to the extension officer ...”. Twelve percent of respondents indicated lack of access to drought coping information (for example drought tolerant crops and climate change adaptive farming methods) as a major setback for drought risk reduction and adaptation, 9% mentioned a lack of unity of purpose (social cohesion) (Chapter 4: Section 4.2.2), 6% indicated increased criminal activities in the communities as a problem, while 3% were confronted with the challenge of household heads migrating to urban areas (Figure 6.12). Regarding access to information, another Agritex officer stated, “... We try our best at Agritex to pass on whatever information we have to the best of our ability. We cannot guarantee that the information will be accurately used. Back to the issue of transport, it is also very hard to be in several places at once and the mileage is high without a vehicle or motorbikes .... Now it is a lot more challenging to carry on with this on foot, as there are more homesteads.

![Figure 6.11: Perceived Barriers to Drought Risk Reduction and Adaptation (n=217)](image-url)
For the sake of a systematic discussion on barriers to drought risk reduction and adaptation in this study, the barriers were categorised into financial, governance and external approaches, cross-scale, informational and knowledge, and cultural (Shackleton et al. 2015).

With regards to the financial category of barriers, heavy reliance on rain-fed agriculture and natural resource-based livelihood activities resulted in rural households not realising adequate financial resources with which to meet household demands and cushion themselves during drought episodes (Chapter 4: Section 4.2.4). This financial barrier limited their capacity to purchase appropriate seed varieties that could withstand drought impacts and early-maturity seed varieties with a growth period that could fit within the shortened rain season. Limited financial resources were also the cause of rural households’ difficulties in accessing grain and more so, constructing granaries that ensured safety and favourable storage conditions, as advised by the Agritex officer (see Section 6.3). In some cases, even those households that had had money to purchase grain could not find outlets supplying grain and were left stranded with their cash. Food insecurity was made even worse by the fact that the few households with excess food supplies withheld their grain stocks during drought until they were assured of a decent harvest. In their study in Zimbabwe, Brown et al. (2013) show that as the food situation deteriorates the price of grain increases, beyond the reach of many rural households. Therefore, household members would have had to travel long distances, mainly out of their districts and even to major cities, to purchase grain or other food necessities depending on the severity of the drought disaster.

Failure to stock grain was being faced at the national level, as highlighted by all key informants, who stated that failure by the government to raise adequate financial resources to support various facets of the economy, including poverty alleviation, and to secure the national strategic reserve of grain during droughts, had exposed rural households in particular to drought impacts. Almost every year since 2000, the Government of Zimbabwe has been importing maize grain from South Africa and Zambia, but it is inadequate in terms of needs (Chitongo 2013; OCHA 2015). In support of this view, Chitongo (2013) argues that stocking
grain has been grossly undervalued by the Government of Zimbabwe, which has failed to raise financial resources to import adequate grain supplies or increase producer prices to incentivize farmers (i.e. increase producer prices and timeous payment of farmers) to sell grain to the Grain Marketing Board (GMB). Furthermore, with the current policy of indefinite ownership of land in Zimbabwe, it is difficult for farmers (especially commercial farmers) to invest in land; this in turn hinders long-term planning and productivity (Fewsnet, 2014). Therefore, limited financial resources are a barrier to DRR and CCA at the national level.

The continued heavy reliance on rainfall related livelihood activities was classified under physical barriers to risk reduction and adaptation. Water shortages were affecting alternative livelihood activities, presenting drought DRR as a daunting task for rural households (Chapter 4: Section 4.2.3.2). For example, livelihood activities like gardening were adversely affected by water shortages during droughts due to increased water demand and low rainfall amounts (Chapter 4: Section 4.2.3.2; Chapter 5: Section 5.2) (Mimura et al. 2014; Noble et al. 2014; Nagonda 2015). Eventually, households would abandon their gardening activities in search of grain or off-farm activities for cash income with which to purchase grain (Mimura et al. 2014).

Lack of access to drought-coping information was identified as a barrier in this study and categorised under informational and knowledge barriers. This included: poor prediction of duration of the mid-season dry spells from the beginning of the rainy season to inform planting of crops; and lack of rainfall forecasts based on specific geographical locations, especially districts, as this would also inform type of crop and crop variety and timeous recommendations for rural households after predictions of climate risks. Shackleton et al. (2015) posit that informational barriers tend to be commonly elicited to explain lack of response to impending climate risks. In this study there were several factors that could have resulted in lack of access to information, which included the following: weakening social cohesion impeding the sharing of information amongst community members as explained earlier; lack of access to sources of information especially the mass media, households ill-informed on the current trends in weather conditions and the strategies that are
recommended by various organisations including government departments; inefficiency of the responsible authorities in conducting awareness campaigns in the rural areas to inform the communities of climate variability and potential impacts on their livelihood activities. For example, the Environmental Management Agency (EMA) was known for policing villagers who cut down trees, yet doing nothing to foster climate change awareness. Further, some households indicated that some NGOs did not consult them on implementing development projects, and households were left with limited information on the objectives and intended outcomes of the projects. In the end, the projects intended to facilitate risk reduction and adaptation, did not help the intended beneficiaries and were eventually abandoned. Such approaches of not recognising the importance of community engagement therefore acted as a barrier to long-term risk reduction and development in general.

Weakened social cohesion was considered a social and cultural barrier to risk reduction and adaptation in this study (Chapter 4: Section 4.2.2). Weak social cohesion might have created and sustained social exclusion, and served as a barrier to enhancing sustainable livelihood strategies, as it maintained structural inequities especially when it came to receiving donor assistance. Humanitarian aid provided through external interventions by NGOs, government and international organisations triggered and exacerbated conflicts amongst households in the communities and created a dependency syndrome (Chapter 7: Section 7.4.1). This made drought risk reduction and adaptation processes very difficult and exposed communities to drought impacts (Section: 6.5). As a result of weakened social cohesion, households were now focusing on survival of the immediate family rather than the community as a whole. The deteriorating social cohesion limited the sharing of information on drought-coping strategies as well as on seasonal weather forecasts. With limited information sharing, households in rural areas have limited information on risk reduction and adaptation options, which could otherwise assist in establishing sustainable livelihoods and improve on income through various shared income-generating activities.
Weakened social capital might also have contributed to the increase in criminal activities in the rural communities (Chapter 4: Section 4.2.2). In Zimbabwe, since the early 2000s, the country had been experiencing a collapsing economy with increases in unemployment rates causing them to peak at 85%-90% (Chirau et al. 2014). Therefore, limited options with regards to off-farm livelihood activities, and successive droughts, had resulted in increased criminal activities, especially stealing grain in the rural areas.

6.7. Conclusion
The implementation of various types of drought risk-reduction and adaptation practices for crop production and small-scale livestock rearing were a common reaction in the event of a drought episode. Some households adopted local knowledge for farming activities. Indigenous and traditional knowledge systems and practices, including local people’s holistic view of the community and environment, were a major resource for adapting to climate change and drought risk reduction, yet these had not been used consistently in existing adaptation and risk-reduction efforts (Sietz & van Dijk, 2015). There was need to contextually analyse these practices on a broader scale considering the current natural ecosystem and community characteristics, and assess what might continue to be relevant and be fostered by science for improved results (Nhemachena et al. 2014b). The following factors were behind households adopting local practices: (a) they were realistic and affordable solutions, and (b) their forebears had been using them. The success of these practices was also dependent on the severity and intensity of the drought, and the nature of external support extended to households and farmers. With successive droughts, local practices used by smallholder farmers were often overwhelmed and there was need for meaningful proactive external support to save lives and livelihoods, and to trigger resilience and/or recovery after drought disasters. External support that should be provided to rural households in dealing with climate variability and extreme weather events should essentially address the root cause of vulnerability, which in this study was poverty, and enhance generic capacities (Eakin et al. 2014). Only when poverty and development issues are addressed could the rural households be in a position to build resilient livelihood activities (Lemos et al. 2013).
Current trends in DRR and CCA required innovation and complementarity of practices in order to improve on risk reduction and adaptation to climate risks now and in the future (Cao & Limnirankul 2014; Eakin et al. 2014; Theodory 2014; Mawere & Mubaya 2015). Indeed, Theodory (2014) posit that despite a rich heritage of experiences, indigenous knowledge is often not sufficiently acknowledged and integrated into formal adaptation strategies and approaches, which might result in limited success for external interventions.

Barriers impeded the ability of rural households to engage in risk-reduction strategies, to respond to, to cope with, and finally to transform their communities into ones resilient to future droughts. Households indicated that these barriers were actually paralyzing them as a system. The most prominent barriers that were revealed in this study are entirely based on poverty, while most governments and NGOs projects were not seriously addressing poverty and livelihood issues. These short-term approaches to assisting rural communities during drought periods had weakened other sectors of livelihood capitals (e.g. social cohesion as discussed in Chapter 4: Section 4.2.2) and thus households would remain vulnerable to future climate risks. In conclusion, as long as these barriers were not addressed the transformation of households, and risk reduction, that were key to protecting community livelihoods, will remain a pursuit and never be attained. Barriers faced at the local level could only be dealt with through poverty reduction, sustainable development projects, a favourable policy framework and effective institutions, as these would address the root causes of vulnerability to climate variability and extreme weather events, from the local to the national level (Kelman et al. 2015).
CHAPTER 7: ORGANISATIONAL AND POLICY FRAMEWORK FOR DRR AND CCA, AND ROLE OF EXTERNAL ORGANISATIONS IN PROVIDING SUPPORTING INTERVENTIONS

7.1. Introduction
7.1.1 Overview of the Chapter

This chapter provides an understanding of the complexity of managing CCA and drought DRR including how government and other stakeholders have been responding to climate change and extreme events and more importantly, how policies and strategies can exacerbate or ameliorate vulnerability to hazards (Wilhite, 2005). The influence of policy on government departments’ and development agencies’ activities when dealing with climate risks should not be underestimated. Chapter Seven thus addresses Objective 4, which seeks to examine: (a) the role played by various organisations involved in hydro-meteorological DRR and CCA, (b) the policy frameworks that shape these roles, strategies and actions, and lastly (c) households’ perceptions of external actions/interventions in response to drought episodes. Data presented in this chapter were collected through different methods that included document review, key informant interviews (KIIs), participatory learning action methods (PLAM) and household surveys (Chapter 3: Section 3.4).

This chapter initially presents findings on the policy and organisational frameworks that guide how DRR and CCA strategies are implemented in Zimbabwe. The organisational structure of government departments involved in both CCA and drought DRR are discussed and household respondents’ awareness of national CCA and DRR policies and strategies are explored. The role played by external organisations including government departments in assisting smallholder farmers to reduce risk and cope with climate variability and drought are then presented. More importantly, households’ perceptions of such external interventions are proffered, particularly regarding whether they actually assist households and communities to cope with and adapt to or heighten their vulnerability. Lastly, this chapter discusses the government proposed
transformations of the policy and organisational framework for disaster risk management in Zimbabwe.

7.1.2. Conceptual Framing: Importance of Enabling Policy and Organisational Frameworks, and Workable External Interventions in Drought Periods

Regarding climate change and hazards, understanding policy and organisational frameworks is important in unveiling the structural context of enabling or hindering environment regarding vulnerability to droughts and other climate events and changes at both national and local levels. Policies on drought DRR or CCA should be focused towards reducing risk by developing improved awareness and understanding of climate risks, and the underlying causes of societal vulnerability (Chapter 2: Section 2.2) (Wilhite 2002; Cutter et al. 2003; Cutter et al. 2008). Similarly, Wilhite (2005) posit that drought policies that are proactive rather than reactive, and aim at reducing risk rather than responding to disasters, are cost effective and promote sustainable livelihoods and reduced humanitarian interventions by government and its stakeholders. Peters (2015) note that managing drought, which includes reducing risks associated with it as well as developing coping responses, is a complex process that should be backed by sound policy frameworks and active and continuous participation of all stakeholders (central and local governments, CSOs, NGOs, international humanitarian organisations), including the affected local communities. More so, climate risk policies that uphold self-reliance and sustainable use of natural resources will be more effective in the long-term and will reduce the reliance on external intervention (Wilhite, 2002). It is therefore crucial that livelihoods development activities are coordinated effectively, with numerous organisations working together towards achievement of common goals, including reducing vulnerability to drought hazards (Cannon et al. 2003).

The policy framework for drought should contain provisions for improvement of coordination within government departments, local authorities and the donor community (Wilhite, 2002). However, the uncoordinated approach amongst government departments and/or donor
agencies weakens the ability to develop a common vision of reducing community vulnerability when dealing with droughts (UNISDR, 2012). Poor coordination of organisations would likely result in duplication of development activities and wastage of scarce resources that could otherwise be used in building climate resilient households and livelihoods (Cannon et al. 2003; Kelman et al. 2015; Peters 2015). It is argued that the root failure of many drought DRR strategies and plans is mostly associated with this limited or ineffective coordination amongst key stakeholders (UNISDR, 2012). This illustrates the complexity of the phenomena and the overall fragmented approach of many governments (ibid.). Improved and effective coordination of stakeholders in drought risk management will not only reduce duplication of activities, but will also improve resource allocation for risk-reduction activities and improve community resilience.

Understanding households’ perceptions on external interventions and strategies is important in assessing the impact and sustainability of interventions, as well as how they might trigger the recovery process and promote resilience to future climate risks (Peters, 2015). Sustainability of external interventions depends on the involvement of communities in risk-reduction projects from the planning phase right through to the implementation phase and post-intervention stage, and requires building on and incorporating local knowledge and practices (Wilhite 2002; FAO 2004; Wilhite 2005; Ndlovu 2011). However, external intervention in most developing countries has been dominated by food aid, on the assumption that affected communities have lost their access to food and need consumption support at least until the next harvest season (O’Brien et al. 2009). This crisis management approach decreases self-reliance and increases dependence on external interventions, and consequently households might end up having negative perceptions of the interventions (Wilhite, 2002). Essentially, external interventions by NGOs and government departments should instill an aspect of risk-sharing between external organisations and smallholder farmers, while building capacity of communities to plan and undertake activities that utilise household resources efficiently and effectively (Ndlovu, 2011).
7.2. National Policy and Organisational Frameworks
7.2.1 Drought Risk Reduction at the National Level

At national level is the Department of Civil Protection (DCP), which was established through an Act of Parliament known as the Civil Protection Act Chapter (CPA 10:06 of 1989 and amended in 2001) and is housed in the Ministry of Local Government, Public Works and National Housing (Table 7.1). DCP’s main functions include: preparation for and where possible, prevention of disasters; dissemination of disaster management related information, and mitigation of effects of disasters once they occur (CPA, 2001). Further, DCP’s mandate is primarily to carry out the overall co-ordination of disaster activities of all relevant disaster management stakeholders from the national to local level as articulated in the Civil Protection Act (CPA) of 2001 and the National Policy on Civil Protection (NPCP) of 2001 (Table 7.1). The functions of the DCP are guided by the NPCP, which focuses on disasters (man-made and natural) in Zimbabwe (Table 7.1). Additionally, the DCP chairs the Civil Protection Committee with the assistance of relevant stakeholders through its structures at various levels, which are: National Civil Protection Coordinating Committee (NCPCC\(^\text{23}\)) chaired by the Director-DCP, the Provincial Civil Protection Committee (PCPC) chaired by the Provincial Administrator (PA), and the District Civil Protection Committee (DCPC) chaired by the District Administrator (DA) (CPA, 2001). The NCPCC is responsible for the formulation of the National Civil Protection Plan (NCPP) at the national level, which forms the overall plan for coordination and execution of Emergency and Disaster Management in Zimbabwe (Betera, 2011). In coordinating these functions on disaster management, the DCP is also assisted by United Nations Humanitarian Coordinator (UNHC), which also coordinates UN agencies in various development sectors for a coordinated UN response (Zimbabwe National Contingency Plan, December 2012-November 2013).

\(^{23}\) The NCPCC consists of several members, who are ministers from different ministries, the police, the army and the air force, and the UN agencies.
Overall, the NPCP deals with all natural and man-made disasters including those resulting from climate variability and extreme weather events. Besides the NPCP, the government also produces annual National Civil Protection Plans (NCPPs), based on anticipated hazards. The intended objective of the policy is to ensure that government and its stakeholders coordinate their responses in a timely and consistent manner to anticipated hazards in order to minimize potential humanitarian consequences and initiate linkages to early recovery (Zimbabwe National Contingency Plan, December 2012-November 2013).

Table 7.1: DRR Institutions and Policy Frameworks

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<th>Ministry</th>
<th>Government Department</th>
<th>Operational Policy</th>
<th>Function</th>
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Another department dealing with drought disasters is the Department of Social Welfare (DSW) under the Ministry of Public Service, Labour and Social Welfare (MPSLSW), which focuses on welfare of the vulnerable populace (especially children under 5 years old, the disabled, the poor and the elderly above 60 years old). It further deals with and coordinates organisations that have interests in assisting communities (through food aid) during drought disasters. The functions of the DSW with regards to drought disaster management are guided by the National Policy of Drought Management (NPDM) of 1999\(^{24}\) (Table 7.1). The NPDM of 1999 primarily focuses on general drought management issues and reviews government capacities and structures to deal with drought preparedness, mitigation and response. The NPDM highlights that there should be relief assistance to affected communities to ensure recovery, rehabilitation and sustainable development, and that drought mitigation activities get due

\(^{24}\) The NPDM states that drought activities should be integrated with other development programmes and projects and that they should form an integrated part of all district, provincial and national level development policies and planning processes (NPDM, 1999).
attention in the government’s development processes at all levels. In the current NPDM, importance is placed on developing sustainable livelihoods for rural households at risk of drought-induced shocks. With reference to sustainable livelihoods, the NPDM stresses drought-mitigation strategies that can build local adaptive capacity such as: harvesting and efficient utilisation of water, improved agricultural productivity, sustainable utilisation of natural resources and sustainable practices for land management. An important aspect put forward in this policy, is fostering combined efforts from both the government and communities, on drought risk-reduction strategies, but the policy strategies are not supported by financial resources for effective implementation. However, what the policy document is advocating and what is happening on the ground are very different (Section 7.2.4).

The Department of Social Welfare (DSW) is always at the centre of drought disaster planning, as they focus more on humanitarian aid or food aid than proactive strategies that link livelihoods to poverty reduction and sustainable development (Chapter 5: Section 5.6.3; Chapter 7: Section 7.5). The DCP representative stated, “… Drought is managed by the Department of Social Welfare but they are a member of the Civil Protection Committee, so they are the ones who will deal with those projects …”. The DA representative indicated that during drought events the DSW is at the forefront for coordinating organisations for food assistance and ensuring that communities are allocated food assistance or any other assistance required, when availed through different channels that including government, and donations from international organisations. This is because the DSW has offices at the district level.

With regards to policy implementation in Zimbabwe, Ndlovu (2011) showed that district level personnel do not refer to the NPDM of 1999 in drafting their District Civil Protection Plans (DCPPs) for drought management, but are rather guided by resource availability and perceived immediate needs for the communities. These DCPPs for drought management can only be activated when drought occurs, and this is because funds for disaster management are only released by the government and humanitarian agencies upon occurrence of drought disaster and not when drought is predicted. This makes their action reactionary in nature, which
cripples the potential for drought preparedness and risk-reduction strategies that play an important role in reducing drought impacts. Further, limited financial resources for local authorities has resulted in the abandoning of some NPDM principles namely; integrating drought management activities into development programmes and projects, capacity building of communities and fostering sustainable livelihoods. To that end, local authorities have resorted to crisis management at the expense of the rural poor and vulnerable household livelihoods as mentioned earlier (FAO 2004; Mutasa 2015). Thus, drought management plans give little recognition to NPDM long-term solutions that should be deeply embedded in sustainable community development. There is non-alignment of activities between development efforts and drought risk-reduction measures, which should have otherwise provided a comprehensive package for sustainable development while reducing community vulnerability to climate risks (Ndlovu 2011; Dube 2015). Furthermore, there seems to be a mismatch between some of the fundamental principles of the NPDM of 1999 and how the government is currently handling their drought hazards and disasters. This is even in contrast with the recent Sendai Framework for Action (2015-2030) (UNISDR, 2005), which calls for, as one of its focus areas, the integration and mainstreaming of DRR into sustainable development policies and planning.

Despite the fact that the country is battered by successive droughts that are attributed to climate variability and change, there is limited recognition of global climate change and CCA in the NPDM. This shortcoming might present a challenge that will be difficult to address unless there is recognition of climate variability and extreme weather events, and social vulnerability. This situation exists despite the fact that the main concept of dealing with climate variability and change, and climate-induced disasters of any nature, is the same, especially considering aspects like early warning systems (EWS), preparedness, response to and recovery from disaster, and rehabilitation. For example, the housing of the NPDM under the Department of Social Welfare (DSW) might suggest that the government is focusing on humanitarian aspects rather than proactive risk-reduction strategies. This is because the DSW’s mandate is the up-keep of social welfare for the communities affected by drought disasters. Therefore, the DSW
might not be the appropriate government department to oversee and implement activities for NPDM (see Section 7.3.1), especially considering NPDM aspects like fostering sustainable livelihoods as mentioned earlier. This scattering of policy frameworks at the national level might present a challenge with regards to mandate, coordination and resource allocation, and this might see rural populations being deprived of appropriate and sustainable intervention.

### 7.2.2. Drought Risk Reduction at Sub-National Levels

In carrying out its mandate at sub-national level, the DCP is represented by the Provincial Administrator (PA) at provincial level and District Administrator (DA) at district level. Overall, Provincial and District Administrators are tasked with the responsibility of coordinating any emergency-related activities in provinces and districts through assistance of Provincial and District Civil Protection Committees (PCPC/DCPC) respectively as articulated in the CPA of 2001. The PA and DA also chair the Provincial and District Civil Protection Committees (comprised of various departments, international organisations and NGOs) respectively and are accounting officers for the DCP at these levels, as stated by the DA’s representative. The civil protection committees are also responsible for producing the civil protection plans at both the district and provincial levels.

District Civil Protection Plans (DCPPs) are drafted by stakeholders (under committees) each season, and are guided by the first, second and third crop assessments conducted by the Agritex office in each district. The DCPPs feed into the Provincial Civil Protection Plans (PCPPs) that are included into the National Contingency Plan as mentioned earlier (see set-up of provinces in Chapter 3: Section 3.2.3; Figure 7.1). These plans guide the activities and coordination at each level during disasters. As provided by the CPA of 2001, all these levels are required to produce civil protection response plans, which will be activated during disasters. In this regard the DA representative stated, “... we create civil protection plans each and every year for each season for input into the disaster management plan identifying action points which Agritex, EMA and other departments can focus on, depending on expertise...”.
Effective implementation of these Civil Protection Plans is largely dependent on availability of financial resources whether from the national fiscus or through humanitarian organisations that would be availed upon in the event of a disaster. Essentially, these civil protection committees are concerned with mitigating the impacts of the disaster rather than reducing risk and future vulnerability to the drought hazard. Multi-sectoral representation of authorities at national, provincial and district levels is supposed to facilitate coordination (depending on the nature of disaster) and ensure an effective response to spearhead the overall Emergency Management System. However, coordination of a multi-stakeholder approach needs to be backed up by financial resources, which have been limited from the Government of Zimbabwean (Chapter 6: Section 6.7). Additionally, there has been a mismatch between government policy and practice, with the NPDM indicating a risk reduction approach, yet this has not been backed with financial resources. In this regard the government is not fulfilling its obligations to the Sendai Framework for Action (2015-2030). Priority 3 calls for
investment in DRR for resilience. Governments are expected to avail financial resources for implementation of DRR strategies in order to reduce impact of disasters for governments and communities.

7.2.3. Organisational and Policy Framework for Climate Change Adaptation at the National Level

There are several government structures on climate change in Zimbabwe and these include the National Climate Change Task Force, Climate Change Management Department and the Meteorological Services Department (Doldman & Mitlin, 2015). The Climate Change Management Department (CCMD) is under the Ministry of Environment, Water and Climate (MEWC) and has the responsibility of engaging with the United Nations Framework Convention for Climate Change (UNFCCC). The CCMD is a government department whose sole mandate is to climate-proof all socio-economic sectors of Zimbabwe through effective climate change management as indicated in the strategy. This includes the production of National Climate Change Communications for UNFCCC and implementation of the National Climate Change Response Strategy. However, the CCMD is not in a position to implement any awareness activities or adaptation interventions since it does not have structures at local levels, and the Environmental Management Agency with local structures is neglecting its information dissemination mandate as mentioned earlier in Chapter 5: Section 5.5.1.

Since there is no climate change policy in Zimbabwe, CCMD is guided by the 2013 National Climate Change Response Strategy (NCCRS). In this regard, the Climate Research officer from the CCMD stated, “… Climate Policy is being developed. We however have a National Climate Change Response Strategy which has adequately addressed several key issues and we are soliciting for partnerships to start implementing the strategy whilst developing the Policy which will compel sectors and the nation to mainstream Climate Change into their plans...”. However, the overall guide for dealing with climate change was initially the National Environmental Policy (NEP) of 2009, which focuses on management of a broad range of environmental issues. Climate change is not comprehensively articulated in the NEP but is mentioned in passing on
aspects such as air pollution and greenhouse gas emissions (Table 7.2). However, climate change issues are covered in various sectoral policies (environment, agriculture, and disaster management), strategies and action plans in various government departments as illustrated in Table 7.2.

**Table 7.2: Climate Change Organisations and Policy Framework**

<table>
<thead>
<tr>
<th>Ministry</th>
<th>Government Department</th>
<th>Operational Policy</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>Office of the President and Cabinet (OPC)</td>
<td>National Climate Change Task Force (NCCTF)</td>
<td>National Climate Change Response Strategy (NCCRS) (2013)</td>
<td>Climate Change</td>
</tr>
<tr>
<td>Ministry of Environment, Water and Climate</td>
<td>Climate Change Management Department</td>
<td>National Climate Change Response Strategy (NCCRS) (2013)</td>
<td>Climate Change</td>
</tr>
<tr>
<td>Ministry of Environment, Water and Climate</td>
<td>Meteorological Services Department</td>
<td>Comprehensive Agricultural Policy Framework 2012-2032</td>
<td>Early Warning</td>
</tr>
<tr>
<td>Ministry of Agriculture, Irrigation and Mechanization</td>
<td>AGRITEX</td>
<td>Comprehensive Agricultural Policy Framework 2012-2032</td>
<td>Extension Services</td>
</tr>
<tr>
<td>Ministry of Agriculture, Irrigation and Mechanization</td>
<td>National Early Warning Unit (NEWU)</td>
<td>Comprehensive Agricultural Policy Framework 2012-2032</td>
<td></td>
</tr>
</tbody>
</table>

In 2013 the National Climate Change Response Strategy (NCCRS) was adopted and it outlined the mandate for the newly established Climate Change Management Department (CCMD) (Table 7.2). The NCCRS facilitates the formulation and implementation of the Climate Change Policy and ensures the effective implementation of CCA strategies. The main goal as stated in the NCCRS is to mainstream CCA and mitigation strategies into economic and social development at national and sectoral levels through multi-stakeholder engagement (NCCRS

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25 The MSD used to be under the Ministry of Transport and was moved to the MEWC in 2013
2014). To achieve this goal, it is guided by the following pillars: adaptation and disaster risk management; mitigation; capacity building; governance; finance and investment; technology development, transfer, communication and advocacy, as outlined in the strategy document.

Another government structure involved in climate change at the national level is the National Climate Change Task Force (NCCTF), which is under the auspices of the Office of the President and Cabinet (OPC) and reports to the OPC Permanent Secretary. The task force is chaired by the Permanent Secretary of the OPC and its members are Permanent Secretaries from relevant Ministries including Environment, Agriculture and Economic Planning. However, the task force is not legally constituted by an Act of Parliament and therefore does not have the legal mandate to address climate change issues or coordinate institutions or other stakeholders involved in climate change issues.

The MSD and National Early Warning Unit (NEWU) are key proponents of climate and weather information dissemination but are regrettably not decentralised at the local level. In the past, the MSD was under the Ministry of Transport and Communication but around 2013/2014 was put under the Ministry of Environment, Water and Climate (MEWC). The main function of the MSD is the monitoring and production of up to date weather and climate information and dissemination of this information including potential risks to the national population through media (print or electronic). As indicated in the NCCRS, the MSD is also mandated to provide information on greenhouse gas emissions and information on interventions required to react to impacts of climate change. MSD is also a member of the National Civil Protection Committee (NCPC) steered by the Department of Civil Protection. The Agro-meteorologist from MSD, with regards to their role in climate risk management stated, “... Our role includes working with the Department of Civil Protection, which coordinates all disaster management aspects. We are there to look at weather and climate issues, and to issue warnings whenever we see any threatening patterns. We do analysis of droughts and seasonal climate forecasts which will help with planning ...”. However, there is need to put more emphasis on climate risk prediction and to provide a functional early warning system that is accurate, timely and within the context
of the local communities for relevance. However, there is no framework that guides the dissemination of weather and climate information to the end-users, nor to government departments involved in weather, climate or climate change. Except for Pillar 7 in the NCCSR that indicates need for communication and advocacy, information management and dissemination, which largely focuses on awareness campaigns, there is no information on how to improve inter-agency sharing of weather and climate information.

There are other organisations indirectly involved in climate change due to their proximity to environmental or livelihood issues, and these include National Early Warning Unit (NEWU), Zimbabwe Vulnerability Assessments Committee (ZimVAC), and Food and Nutrition Council (FNC).

NEWU was established in 1998 (under the Ministry of Agriculture) as the focal point for early warning information on weather in relation to agricultural activities. It operates in liaison with the MSD and Agricultural Technical and Extension Services (Agritex). The main function of Agritex is to provide technical and advisory services, regulatory services, farmer training, food technology (including post-harvesting processing and product development), dissemination of technologies, and provision of market-oriented extensions for sustainable farming. In this mandate, there is mention of dissemination of weather and climate information, but it does not carry out the function. NEWU is not established at the local level as mentioned earlier. Climate information and hazard warnings produced at the national level by NEWU, MSD and other stakeholders will also be disseminated by the Agritex officers at grassroots levels.

Dissemination of climate information and assessment of food availability are complemented by the Zimbabwe Vulnerability Committee (ZimVAC), which is a conglomerate of government departments, UN agencies, NGOs and international Organisations with foremost interest in the food security sector in Zimbabwe. ZimVAC assesses food and nutrition situations in all districts of the country with focus on expected harvest against demand and deficit. ZimVAC
forms the central pillar around which the Food and Nutrition Council (FNC)\textsuperscript{26} plans and builds its strategy to fulfill food and nutrition requirements to the national population. Essentially, the ZimVAC acts as the convener and coordinator of national food and nutrition security issues in Zimbabwe. ZimVAC provides information on drought impacts from the previous season and the likely situation in the forthcoming cropping season. The ZimVAC reports are built from Crop and Livestock Assessments (CLAs) conducted seasonally by Agritex and the Department of Livestock and Veterinary Services (DLVS) in all districts. These Crop and Livestock Assessments are also used for the drafting of District Civil Protection Plans. The District Agritex Officer (DAO) indicated that the CLAs provide detailed status of the grown crops, hectares grown for different crops, the total area cultivated and the expected harvest for each crop depending on the nature of the season.

\textbf{7.2.4 Coordination of Drought DRR and CCA Organisations}

Regarding coordination of multiple stakeholders for drought risk reduction, the DA representative revealed that involving different government departments increases efficiency because of different expertise required for different hazard situations. In this regard, he stated, “... all departments involved in disaster management were in agreement under the government auspices through a memorandum of understanding in which climate change and variability issues are also covered. So in essence, the involvement of the different departments is actually increasing efficiency because of expertise required for different scenarios. Reforms for combining certain departments in different ministries might be necessary but that also depends on the type of government you are dealing with but for a military system like ours one needs one coordinator like the DA Office ...... as a recommendation we might need a coordinating legislature for civil protection and disaster management ...”.

\textsuperscript{26} The FNC is a department housed in the Office of the President and Cabinet (OPC).
However, the Agro-meteorologist also confirmed the above and stated, “... The coordination and communication is very good. Whenever we see any threats coming, we tell the other organisations timeously. We communicate at all levels from ward level to national level ...”.

The DCP representative also supported this and indicated, “... the majority of institutions are well coordinated, they used to work on their own without the input of the government but most of the donors have instructed their organisations to be members of the Civil Protection Committees. Most organisations are very effective before the disaster and they help us with funding preparedness planning workshops. Even with the responses after a disaster, they help. They help by prevention mitigation, awareness programmes and logistical support in areas affected ...”.

Similarly, the National Contingency Plan (December 2012-November 2013) showed that there is a multi-stakeholder approach ensuring cooperation between the government and its stakeholders. The above Plan further revealed that organisations involved in risk reduction or humanitarian activities are already working in these affected communities and have flexibility structurally, materially and technically to adjust their activities to humanitarian and recovery measures in times of disasters.

Although the DCP is supposed to coordinate disaster management activities including preparedness and risk reduction, it is currently largely involved in mitigation of drought disasters where households are already suffering from the adverse impacts. This is attributed to the finding that the PA’s and DA’s offices rely on financial resources allocated from the national fiscus; these funds have been limited and/or not timeous in recent years, impeding coordination of humanitarian and recovery activities. In support of the above, the DA representative stated, “... Issues to deal with disaster management are mainly handled at management level (national level). For instance, a disaster is declared by the President that would mean we would not have the resources for dealing with a disaster until it has been declared a disaster then resources are mobilized to that respect. We mainly rely on funds from
our national fiscus which are limited and even when we get support from international organisations the funds have to go through the head office ...”.

The DA’s representative reiterated that any financial support from international organisations was channelled through central government; therefore, local level authorities have to wait for resource allocation to commence any disaster management activities. International organisations want to have full control of their resources, including channelling them where they feel assistance is most required, and are opting to implement the various projects themselves with the support of government departments. With different international organisations implementing their projects focusing on different mandates, it might be difficult for the DA’s office to coordinate and ensure that all activities reduce risk or trigger early recovery of affected communities or build resilience to future risk and climate change. Bureaucratic processes on the side of the government on the receipt of and allocation of aid then becomes a barrier to effective implementation of climate risk-reduction plans or strategies. Besides, the lack of readily available funds to trigger proactive or reactive drought risk reduction also becomes a barrier for the DCP to implement and/or coordinate their activities.

There were complexities in coordinating multiple stakeholders with regards to drought risk reduction and recovery of affected communities, as they all had different approaches to intervention. For example, evidence from institutional mapping exercises indicated several strategies used by various organisations in dealing with drought (see Section 7.5). Regarding difficulties in coordination of organisations, the Oxfam representative reiterated, “.... there are always some problems in working with other partners; there will be bureaucracy that will affect our work whereby information has to go through so many people first.... We have also challenges as there used to be a climate-change working group that used to be very active until last year. There is now a coalition of NGOs working in the southern part of the country but the challenge is we are working independently....” The Climate Research Officer at the CCMD had this to say on institutional set and coordination, “... the institutional set-up is not bad as such
as it is largely responsive and is using the business as usual approach.... It is fragmented and ineffective possibly due to lack of clear policies and if the policies are there, it is the sensitisation and implementation needing improvement ...”.

Coordinating all relevant organisations and departments where there is fragmentation of institutions and policy frameworks with limited resources for implementation is difficult. With regards to resources, the Climate Research officer further iterated, “...the department has 10 technical persons including the Director, the Deputy, and 8 Officers (6 Climate Change Scientists and 2 Researchers) and is still being constituted. Interviews for the officers are being done. This will go a long way in dealing with climate change management issues. To effectively deal with the issues in all key sectors and communities, the department will need more human capital and presence at lower levels (provinces and districts). The Department still needs capacity building in terms of financial and other resources such as vehicles and other tools to enable the officers to do the Climate Change management job ...”.

There were currently several organisations promoting hydro-meteorological risk reduction and adaptation in Zimbabwe, yet interventions were not coordinated effectively, and there was possible duplication of roles and responsibilities (NCCRS, 2013). For example, CCMD had a mandate on climate-change adaptation activities, while the MSD, as one of its functions, provided information on interventions required to deal with adverse impacts of climate change. However, there was an entire department (CCMD) that dealt with climate impacts including extreme weather events, that were also dealt with by the Department of Civil Protection, indicating duplication of responsibilities amongst government departments. An example of poor coordination was that NEWU and Agritex were under the same Ministry of Agriculture, yet the flow of information from one department to the other seemed inefficient, as information from NEWU for dissemination to smallholder farmers was received late (around October/November) by the Agritex officers. Considering the limited resources of many government departments, there was need to consider an integration of some departments for efficiency in coordinating activities and allocation of resources. With less government
departments and improved coordination, there was bound to be success in reducing vulnerability to climate risks through long-term strategies for sustainable livelihoods.

7.2.5. The DCP’s Proposed Transformations on Organisational and Policy Framework for Disaster Management in Zimbabwe

The DCP representative mentioned that the DCP has long proposed a restructuring of its department together with a change in disaster policy and strategy to support its functions. The DCP representative revealed that since 2003 there have been plans afoot to change the name of the DCP to Department of Emergency Preparedness and Disaster Management, supported by the proposed Emergency Preparedness and Disaster Management Bill. The National Policy on Civil Protection (2001) was expected to be replaced by the proposed Draft Disaster Risk Management Policy and Draft Disaster Risk Management Strategy. The DCP representative also indicated that the process of making these changes had been dragging on for years and this was mainly attributed to the lack of adequate financial resources with which to fast track the civil protection system overhaul. After approximately nine (9) years, the drafts for both bills and policies are still going through consultative processes. The proposed Draft Disaster Risk Management Policy, and the Strategy, seeks to mainstream climate change as one of the crosscutting issues in all sectors of the economy. The DCP through the proposed draft policy and strategy intends to incorporate a decentralized arrangement for coordination of national, provincial and local level initiatives of disaster risk management.

The proposed structural changes were costly since they included setting up of new and separate institutions. New structures proposed through the Department of Emergency Preparedness and Disaster Management included the National Emergency Services Subcommittee, the National Food and Water Subcommittee, the National Epidemics and Zoonosis Crises Subcommittee and the National Resource Mobilisation Subcommittee.

Moreover, Shamano (2010) concludes that the proposed changes have not yet been effected mainly due to the debates and disagreements in the highly polarised Zimbabwean legislature.
The proposed transformation was taking excessively long, the issues initially identified in 2007 for the Disaster Risk Management Policy might be irrelevant now, and there might be need for updating of sections of these drafts to fit current DRR trends. This was because the proposed changes were largely based on the Hyogo Framework for Action 2005-2015 while the recent Sendai Framework for Action 2015-2030 brought new insight for DRR, which might need to be included in the national strategies and policy documents. Lastly, the proposed DRR policy was still missing the link on climate change and DRR, which was an integral part of dealing with adverse impacts of climate change, including extreme weather events like drought (Dube, 2015).

Proposed changes seemed to continue a legacy of being reactive, for example the suggested name change from Department of Civil Protection to Department of Emergency Preparedness and Disaster Management. The ‘emergency’ and ‘disaster’ parts in the proposed name was possibly still suggestive of managing disasters rather than risks. There was a need for a paradigm shift from managing disasters to managing hazards and in a way that they were prevented from causing serious losses and disruptions to communities. Hazard events must always be prevented from escalating to disasters through proactive approaches that foster specific and generic capacities for risk reduction and CCA, thereby strengthening sustainable livelihood activities.

The proposed policy and strategy call for establishment of more institutions both at national and local levels, is a possible cause for concern considering limited coordination of the already existing institutions and a possible wastage of resources. Adding more institutions might not result in the desired positive outcomes for DRR and CCA. This would only affect resources that would trickle down to the communities. Besides, the proposed new institutions would have the same functions as the current institutions, and therefore the logical proposal would have been to improve efficiency, improve allocation of resources and add functions to the existing institutions rather than form new ones. The proposed transformations institutionally should
have had more focus on the improvement of coordination of the existing organisations rather than the proposed addition of institutions with duplicate roles and functions (Section 7.4.3).

7.3. **Households’ Awareness of Climate Change and DRR Policies and Concepts**

With regards to awareness of government policies on CCA and DRR, the majority of households’ survey respondents (89%) were not aware of any DRR and CCA policies since there had never been any campaigns or awareness meetings in their communities. Only 11% of respondents indicated that they had heard of the terms in some meetings in their communities. Regarding the latter, a FGD participant in Maware ward mentioned “... we have heard the terms (CCA and DRR) mentioned, as there was a workshop here on it last week. Some of us here were invited. We were told about the state of the climate with regards to shifting climate patterns and the rains coming later than anticipated. Rains used to come in October but for this season, we were advised to anticipate rains after the 4\(^{th}\) of November and we were also told to plan for shorter season varieties in line with the rain forecasts ...”. In Maware ward, households were already involved in a project by MSD and Oxfam on climate change and weather information dissemination.

On the other hand, one FGD participant from Mushandirapamwe ward stated, “... We have not come across these terms or words ...”. FGD participants from Mapiravana and Mushandirapamwe wards supported the above observation and indicated that they had never attended or heard of CCA or DRR, or any awareness campaigns for climate change. An interesting finding from the study was that the respondents were not even aware of the CCA and DRR concepts, let alone the difference between them. Additional information from households’ survey respondents indicated that external organisations were not in any way involved in building awareness of climate change, but rather were largely focused on offering humanitarian assistance (food aid) after drought disaster. Reflecting on policy issues, the DA revealed that, “... The policy especially on environment is reflective of the colonial system, because EMA is more about policing the communities. Communities then begin to repel these
“policy actions .....”. EMA is not even concerned about climate change issues but mainly focusing on policing of tree cutting and veld fire issues. EMA is becoming a policing agent rather than a regulatory, training and advisory agent and it is becoming more reactive than proactive, and there are now limited consultations on environmental issues at the local level.

Overall, the study results indicate that rural households had limited information and knowledge on DRR and CCA, as well as policy frameworks and strategy programmes used by government and other stakeholders in dealing with climate variability and extreme weather events. This indicated that the Environmental Management Agency (EMA), as an institution at the local level and mandated to spearhead awareness environmental campaigns, was not effectively undertaking its responsibility (awareness of climate change as an environmental issue) as earlier mentioned. This left rural communities with limited information on policy issues and other environmental concerns that should have been at the centre of their livelihood activities. With limited awareness of prevailing climate risks, rural households were bound to be hard hit by adverse drought impacts and other changes in climate. This limited knowledge on policy frameworks might have been an indication of how little the government and external organisations were doing with regards to potentially reducing risk and impacts of climate variability in a more sustainable manner that would build resilience at local levels. Furthermore, without knowledge, local people would have little understanding of the links between climate variability and change and extreme weather events (in this case drought).

Decision-making for rural households and smallholder farmers depends in part on policy awareness and level of knowledge, and the manner in which information is processed by individuals, households and communities (Wilhite et al. 2014). Therefore, raising awareness about the climate risks that households faced and using past experiences as guiding principles could help both DRR and CCA, and help households to understand why certain risks were prioritised by governments and external organisations (FAO, 2014d). Therefore, it was imperative for rural households and smallholder farmers to understand the policy frameworks
for CCA and DRR in Zimbabwe, considering the sensitivity of the livelihood activities to climate (Chapter 4: Section 4.3.1).

7.4. Organisational Interventions, Strategies on CCA and DRR at the Local Level

7.4.1 Types of External Interventions during Drought

Fifty percent of households’ survey respondents confirmed having received assistance from government departments or external organisations during drought years, while 49% indicated that they had never received any assistance.

Of those 50% of respondents who had received assistance, 34% received assistance in livestock rearing, 30% in establishment of community gardens and 20% in farming inputs (Figure 7.2). Only 12% of respondents received assistance in conservation farming and 2% each in village cash savings and food-for-work programmes (Figure 7.2). Responses from households did not only indicate assistance provided during drought years but went on to indicate information on general development activities, as households could not differentiate between specific DRR and CCA activities. Essentially, some of this assistance was not necessarily aimed at CCA and DRR but at on-going development projects. When the communities experienced droughts, assistance from different organisations largely focused on food aid.

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27 There was a 1% non-response to this question, which accounted for the shortfall in the total (99%).
There were diverse actors involved in providing assistance as named by respondents through institutional mapping exercises in the study site. These were seen as being part of CCA and DRR processes. The external organisations identified included: Christian Care, Oxfam International, Care International, Caritus, FAO and Midlands Aids Service Organisation (MASO), and their approaches to assistance were varied (Figure 7.3). In Mapiravana ward, FAO provided seeds and fertilizers; Christian Care trained households in conservation farming; and MASO embarked on a “livestock pass-on” project (Figure 7.3). In Mushandirapamwe ward, Oxfam provided assistance such as food aid, farming inputs, deep wells and gardens; Christian Care provided food aid, farming inputs and deep wells; and Caritus provided sanitation, farming inputs and gardens (Figure 7.3). Lastly, in Maware ward, MASO embarked on sweet potato farming; Oxfam provided food aid and farming inputs; Christian Care provided training for conservation farming and farming inputs, while Care International provided food aid and farming inputs (Figure 7.3).
Figure 7.3: External Organizations working in Mapiravana Ward (top), Mushandirapamwe Ward (middle) and Maware Ward (bottom)
Transect walks in Mapiravana ward (Chahuwe Village) revealed that Christian Care had established a community garden equipped with a borehole and drip irrigation systems for beneficiaries in the mid-1990s; however, after a few years, beneficiaries had abandoned the project. It was learnt throughout the study site that a number of established gardens had been abandoned within the first few years, and fencing material and equipment had been taken by the beneficiaries for personal use. This brought the sustainability of these development projects into doubt, as a FGD participant from Mapiravana ward revealed, “... the community garden project was imposed by external organisations without due consultations at local level, and with limited information on availability of water resources and what communities actually wanted ...”. Further discussions indicated that the same approach was used to establish a garden by Caritus (Figure 7.4), and it was facing similar challenges on accessibility to water, which was becoming a threat to its existence.

FGD participants in all wards indicated that households’ gardening activities were largely affected by droughts (water scarcity), a significant drop in temperature during winter (frosting), heat waves (drying up) during summer, and a decline in the amount of rainfall, which affected their water sources. Transect walk participants in all wards disclosed that the construction of large dams for irrigation purposes was one idea that community members felt would assist as they would hold large quantities of water to assist communities during droughts. One FGD participant from Mapiravana ward indicated, “... we would like the government to set up an irrigation scheme or build catchment systems to prevent loss of water in the rainy season. The flooding you heard about in Tokwe Mukosi was largely due to the fact that the water they failed to harness went downstream and flooded the lower lying areas. Our water just goes to other people ...”. However, some transect walk participants from Mushandirapamwe and Mapiravana wards pointed out that even if households managed to produce wells in their gardens, the main challenge they were all facing was securing a reliable market for their produce. The discussants even cited that the real assistance they required from external organisations was not the establishing of community gardens, but was the securing of reliable markets for their produce. This was seen as important since the majority
of households involved in gardens established through external intervention, also owned their own individual gardens (Figure 7.4; 7.5). Hence, there was multiple garden ownership producing similar types of vegetables (cabbages, rape, tomatoes, onions), resulting in a saturation of the vegetables market (Chapter 4: Section 4.1).

Figure 7.4: Community Garden (with proper fencing) established by Caritus in Chahuhwe Village (Mapiravana Ward)

Figure 7.5: Individual Household Garden with Live Fencing in Mushandirapamwe Ward
Interestingly, many respondents cited livestock rearing (the livestock pass-on project\(^{28}\)) as the main assistance they received from external organisations. Households’ survey respondents indicated that the goat pass-on project was established by MASO, a local NGO operating in the Midlands province. Households indicated that through MASO they were given goats and when they bred, that household would pass on the breeding goats to the next beneficiary and be left with the offspring. The target result for the project was to ensure that most households in the community owned livestock. The mentioning of the livestock pass-on project by many household respondents might have been indicative of the positive impact it was having in the community.

Results from institutional mapping suggested that external organisations were also interested in providing short-term solutions like food aid and standard farming inputs, which have long-term adverse impacts on the capacity of households to build resilient livelihoods into the future (Ndlovu 2011; Chitongo 2013). Farming inputs provided to smallholder farmers did not show an urgency to shift to long-term strategies, as the NGOs continuously provided maize seeds rather than seeds of drought-tolerant crops like sorghum and millet. Similarly, maize seeds provided under government schemes were not aligned to the seasonal weather predictions, providing the wrong seeds and exposing households to climate risks. With continuous and frequent occurrence of drought episodes, humanitarian organisations (WFP, Oxfam, Christian Care and Care International) had been providing food aid, which could create a dependency syndrome if not implemented in a way that encouraged self-sufficiency amongst households. Overall, there were similarities of assistance provided by external organisations working in the same area. This might suggest that there was limited coordination of the organisations with respect to the types of assistance they were providing to the households (see Section 7.2.5).

\(^{28}\) The livestock pass-on project (introduced by local NGO MASO) was aimed at improving household livestock ownership through provision of goats to a household. After having an offspring, the household was required to give that livestock to another household.
7.4.2. Role of Agricultural Technical and Extension Services (AGRITEX)

Almost half of respondents (42%) said they had received advice on general farming techniques including those that could be used during drought years, particularly conservation farming, from Agritex officers (Figure 7.6). Elaborating on their mandate, one Agritex officer from Mapiravana ward mentioned, “... our main role is imparting knowledge to the communities we serve... we facilitate the sharing of information and ideas. Agritex officers felt that they had become more relevant in recent years as they were helping farmers in conservation farming as dry periods became more prevalent. For example, Agritex officers reiterated that in recent years they had been advising smallholder farmers to use conservation farming as it was efficient during moisture stress periods and drought periods specifically.

The type of information disseminated by Agritex officers to smallholder farmers included advice of fertilizer application and types of seed varieties to plant (16%). In addition, they assisted with the distribution of inputs from government or donors (11%) and provided assistance to households without draught power (2%) (Figure 7.6). On seed varieties, one Agritex officer from Maware ward stated, “... as an extension officer my role is to inform farmers about the different crops to grow in relation to the changing climate. For example, from our records the rains being received cannot sustain several varieties of maize (500 series and above) and to a lesser extent early varieties of maize. However, with this I then take that chance to discuss with farmers the disadvantages of growing maize instead of small grains, which helps them improve on food security...”. With regards to the latter, one Agritex officer from Mapiravana ward revealed, “... We also assist farmers’ groups to access inputs by providing them with the supporting documentation or anything else that will ensure they succeed. For the inputs procurement we normally work with the Zimbabwe Farmers Union (ZFU)...”.

However, some 28% of respondents cited that they had not received any services from Agritex officers despite having three Agritex officers in each of the wards selected for this study (Figure 7.6).
Despite support, Agritex officers’ advice when communities were facing imminent droughts was perceived to be ineffective by almost half of respondents, while 22% of respondents perceived service to be fair and 30% perceived it was adequate. This is based on the evidence from one Agritex officers who stated, “… none of the Agritex officers had received any specific training on climate change, CCA, or DRR for that matter ...”. These differences in perceived satisfaction among smallholder farmers regarding Agritex services might reflect the effectiveness of Agritex officers in dispatching their duties in their respective areas.

Households mentioned several reasons as to why they were either satisfied or not satisfied with the services delivered by Agritex officers in their communities (Figure 7.7). Three mentioned reasons for not being satisfied were that Agritex officers were not mobile and had poor interaction with smallholder farmers (33%), that Agritex officers were selective regarding whom they provided with farming advice (13%), and that some Agritex officers were incompetent (7%) (Figure 7.7). Regarding mobility, Agritex officers agreed to the sentiments on non-mobility and indicated that they had no mode of transportation to reach out to all parts of their sphere of influence (considering the rural landscape,) hence they worked largely
with groups/households able to walk to attend meetings at their offices. One of the Agritex officers from Mapiravana ward indicated, “... we do not have motorbikes as Agritex officers used to, for moving from point A to point B. Now we are forced to walk very long distances to try to reach out to many households, and in this ward, we have close to 900 households. In fact, with that in mind we might not be able to reach out to all people in our wards ...”. Agritex officers expressed that inasmuch as they had limited resources, they had advised smallholder farmers to arrange themselves into groups that they can work with regarding farming advice and/or input acquisition from government departments or other external organisations. FGD participants from Mushandirapamwe ward who were also part of some farmers’ clubs clearly stated that the advice from the Agritex officers was central to their farming activities since they were always working with them throughout all seasons.

Similarly, satisfied survey respondents believed that Agritex officers helped equip them with farming knowledge (17%) and thus allowed them to realise good harvest (19%) (Figure 7.7). For those respondents who were not happy with the services they received, two of the reasons mentioned did not entirely show dissatisfaction with Agritex officers, but rather with the whole smallholder farmer support system. Respondents mentioned that the main problem was not the Agritex officers but rather availability of inputs (6%), and 5% indicated that the farming advice provided by Agritex officers was not coupled with inputs, hence was not useful to them without all the components. Thus, although Agritex officers offered useful advice to smallholder farmers, the unavailability of adequate appropriate inputs remained a barrier to their farming activities. They further indicated that if the availability of inputs was not resolved at all levels, the support from the Agritex officers might not provide much of a difference especially during drought years.
The elderly members of the community (see Chapter 4: Section 4.2.1), who were vulnerable to adverse impacts of climate variability and change, continued to be disadvantaged by the limited capacity of the Agritex officers as they might not be able to walk long distances to attend meetings. While Agritex officers highly recommended the formation of farmers’ clubs in communities, their formulation was also dependent on social capital, which in this study was shown to be weakening (Chapter 4: Section 4.3.1). Therefore, formation of farmers’ clubs might become a problem in such situations. In a similar study in Zimbabwe, Rurinda et al. (2014) showed that collective farming (farmers’ groups) was a potential tactical adaptation option not only for accessing draught power, but also for acquiring farming inputs on time and at a reduced cost. Collective acquisition of farming inputs reduced transaction costs because farmers shared the cost of transport and could purchase inputs at discounted prices (Rurinda et al. 2014). Farming with no advice, especially when smallholder farmers are experiencing profound climate variability and extreme weather events, might be a risk to their livelihood activities. This would expose the livelihood activities and render them vulnerable to climate risks (Chapter 4: Section 4.3.1).
The agricultural extension services are crucial for smallholder farmers in rural areas (Chapter 6: Section 6.3). Agritex had several hundred extension workers all over the country and provided advice on farming to smallholder farmers. The positioning of Agritex officers at grassroots level provided them with an opportunity to advise smallholder farmers fully on the best farming practices, especially when facing successive severe droughts. However, it was difficult for the Agritex officers to share any credible assistance and advice on CCA and DRR considering that they had no training in these areas of expertise; there were other logistical barriers as described earlier. With training on CCA and DRR, Agritex officers could have done a better job in advising smallholder farmers averting drought disasters.

7.4.3. Perceptions of External Interventions in Drought Years

Half of respondents (52%) were not consulted before implementation of projects on CCA and DRR, while the other half (48%) were consulted on projects in their localities. FGD participants in all wards revealed that people with positions in their communities were largely consulted to identify the needy and most vulnerable households in their areas for shortlisting for food assistance, but they were not involved in the project planning process. In many cases, this resulted in societal conflicts. One FGD participant from Maware ward stated, “...they would come into the community after they had already decided on their projects. There was no consultation prior to this. We would be brought together when it was time to discuss how to implement the project in the community and to decide or clarify on the beneficiaries...”. Another FGD participant in Mapiravana ward indicated, “... in some cases the donor organisations would just came and set up gardens without consulting the intended beneficiaries and some of these gardens were placed far from water sources so they died a natural death ...”. Therefore, some organisations would consult but only when they had already decided on a course of action, rather than from the planning phase of the project, and thus still regarded communities as recipients rather than partners in projects.
Regarding households’ perceptions of effectiveness of external interventions during drought events, 64% of respondents perceived them to be effective, 26% perceived them to be fair and 10% perceived them to be ineffective (Figure 7.8).

![Figure 7.8: Households’ Perceptions of External Interventions](image)

The reasoning behind the positive perceptions of external support was: (a) the intervention provided food during difficult times (42%); (b) food aid was often people’s only source of food during drought events (18%), and (c) farmers received training on farming techniques (17%) (Christian Care & Oxfam International) (Figure 7.9). Overall, in the KIIIs and FGDs it was highlighted that droughts could stretch for more than one season and the food situation, especially in the later seasons, could become dire resulting in increased demand for food aid. The support received during past drought years was in the form of food handouts especially maize grain, sugar beans, cooking oil and barley to prevent starvation and malnutrition and these were largely received from the World Food Programme (WFP) and Oxfam International.

Another proportion (9%) of respondents indicated that donor aid was selective and caused conflicts amongst community members. The issue of community conflicts due to donor aid was supported by one FGD participant from Mapiravana ward who stated, “... *we have NGOs that come to assist us in time of drought. The donors seem to want to divide us. They state that*...
they want to help the needy. How do they assess this in times of drought, who is needier than who? They make people hate each other. They always look at widows and orphans and neglect the widowers...”. Another FGD participant from Mushandirapamwe ward distinctly stated, “... we believe the assistance given should be evenly distributed to target communities. Their selection criterion for the most vulnerable households is very biased and creates conflict amongst the community members. In times of drought, everyone is in need including those who are neither widows nor orphans. We would also like to have assistance in the form of dams to be able to irrigate our crops and not beg for food from organisations ...”.

Seven percent of respondents suggested that the external interventions and projects could create dependency, while another 7% indicated that households still suffered from food shortages despite external intervention (Figure 7.9). Regarding dependency syndrome, a FGD participant from Mapiravana ward pointed out, “... we wish to eliminate the donor syndrome hence we would be pleased to receive information and training as opposed to just receiving food handouts. The handouts dissipate but knowledge lasts for a long time. The development organisations also need to talk to the community members and see what their real needs are before implementing their projects ...”. Another FGD participant who was against reliance on donor aid mentioned, “… donor aid creates a dependency syndrome and a reluctance to work in some members of the community, knowing that they would receive assistance particularly during drought periods ...”. Additionally, the DA representative supported this and stated, “… humanitarian aid approach is not sustainable as a strategy against drought disasters as it provides makeshift solutions that treat the symptoms rather than the cause of the disaster...”. With regards to food aid, the DCP representative indicated, “… most of the organisations could improve by being proactive and not wait to react. They should also link up with us on disaster risk reduction to make sure that we prevent disasters and are not just given food aid after a disaster. We normally work with Zimbabwe Red Cross Society, World Vision, Catholic Relief Services, Plan International and UNDP ...”.
Establishing development projects in a rural setting without consultation with the intended beneficiaries or communities, risks rejection and abandonment as there is risk of not addressing community needs (Biagin et al. 2014; FAO, 2014b; Mimura et al. 2014). In this study, results showed that half of the households were not consulted on developments implemented in their localities and some of those consulted were consulted on project implementation and not during the project’s planning phase. This resulted in established gardens being abandoned and communities focusing on their individual gardens. Therefore, it can be argued that these projects have limited positive impact on the livelihood strategies of communities. For external organisations, it is always important to engage with communities in assessing their needs in terms of priorities so as to establish intervention in line with identified needs during drought periods (Biagin et al. 2014). Furthermore, community engagement on drought DRR or CCA projects brings with it a sense of ownership and involvement to community members, thereby increasing the chances of sustainability (Biagin et al. 2014; Mimura et al. 2014). Thus, projects with long-term benefits should foster building of climate resilient households with sustainable livelihood strategies.

Figure 7.9: Reasoning behind Households’ Perceptions of External Intervention (n=217)
Humanitarian assistance especially food aid, though relevant, only provides a short-term solution, reduces self-reliance and promotes limited efforts in rebuilding livelihood strategies, leaving communities vulnerable to future drought hazards (Biagin et al. 2014; Mimura et al. 2014; Wilhite et al. 2014). Poor and vulnerable households often require food handouts from humanitarian organisations as this defers food shortage catastrophes, but this should be accompanied by other interventions to build self-sufficiency and thus reduce dependency (Biagin et al. 2014; Kanwar & Thummarukudy 2014; Wilhite et al. 2014; Nagonda 2015). This is largely because during droughts, humanitarian agencies have to address immediate needs, but this should graduate from short-term to long-term as they address the underlying causes of disaster. Addressing the causes would strengthen livelihood strategies and reduce the chances of a disaster occurring in the future. Additionally, Wilhite et al. (2014) conclude that responses to drought by governments throughout the world are generally reactive, poorly coordinated, untimely and typically characterised by a crisis management approach. This reactive approach has negative feedback on households, their livelihood assets and strategies, as proposed in the PAR model (Winser et al. 2004).

7.5. Conclusion
In Zimbabwe, CCA and DRR functions have been housed under different organisations and policy frameworks (Section 7.2.1; Section 7.2.2), yet the aim remains to reduce vulnerability and build resilience to climate risks. Additionally, DRR is often found in disaster management agencies and CCA in environmental agencies, rather than mainstreaming all forms of hydro-meteorological risk reduction into the development agenda. This has frustrated the cross-sectoral links necessary for work on the multi-dimensions of poverty reduction as these focal point ministries and departments tend to be poorly resourced and relatively weak within the government system. Some external organisations and government departments are still based on reactive strategies, largely characterised by drought relief, which have resultant negative trickle-down effects in the community (Biagin et al. 2014; Mimura et al. 2014; Wilhite et al. 2014). Various organisations operating at the local level were identified (i.e. Oxfam, Christian Care, Care International, Caritus,) with each one focusing on its own mandate ranging from
provision of drought relief, provision of farming inputs, training of smallholder farmers on best practices and other income generating projects for rural households. Many of these organisations had overlapping activities in the same communities in the study site and few were truly community-engaged. While the involvement of external organisations in the development process of rural communities has been very significant over the years, rural households continue to suffer from drought impacts at local levels (Shah & Dulal, 2015). Only DRR and CCA interventions that are inclusive, consultative and serving of the best interests of the communities, are likely to be sustainable (Wilhite et al. 2014; Shah & Dulal 2015).

Assistance provided to rural households through external organisations, although important for coping with and recovery from drought events, could often be counter-productive in the long-term. In an empirical investigation in Zimbabwe, Bola et al. (2013) showed that as soon as some households realise that they receive drought relief every time they experience drought, they become reluctant to embark on sustainable livelihood strategies. In another study in Masvingo province (Zimbabwe), Chitongo (2013) showed that most international organisations used temporary remedies for drought, rectifying the immediate needs of the affected communities instead of finding lasting and sustainable solutions, a deliberation known as ‘crisis management’. Gautier et al. (2016) further argue that assistance by external organisations does not always match the local communities’ priorities and can reduce their adaptive and coping capacity. In conclusion, there is little indication that any current short-term humanitarian responses, while essential to cater for the most acute lifesaving needs, are able to break the cycle of crisis, and reduce vulnerability to future climate risks (FAO, 2014d).
PART THREE: SYNTHESIS

CHAPTER 8:
Synthesis, Conclusion and Recommendations

8.1. Introduction
8.1.1. Overview of the Chapter
This study aimed to examine the experiences of local communities and households in coping with climate change and drought, how their perceptions impact the integration of hydro-meteorological disaster risk reduction (DRR) and climate change adaptation (CCA) in rural, central Zimbabwe. Thus, it explored whether a more integrated approach to dealing with climate risks by combining the policies, strategies and organisations for DRR and CCA could better reduce households’ vulnerability to impacts of climate change. This study sought to understand: (1) the existing households’ vulnerability context in relation to assets and livelihoods, and socio-economic conditions and drought events; (2) household and community perceptions and experiences of climate variability and change, and the impacts of drought on the resilience of local livelihoods; (3) past and present local household and community responses to drought impacts; (4) the policy frameworks and roles played at the local level by different organisations involved in hydro-meteorological DRR and CCA and households’ perceptions of such externally driven interventions in response to drought events; and lastly (5) whether autonomous and planned approaches to DRR and CCA could be merged to build a community more resilient to future uncertainties and extreme weather events, and the barriers that may block this process. In this chapter, the key findings and implications for DRR and CCA are presented for each of these objectives in turn. Suggestions on improving how to deal with hydro-meteorological risks at local and national levels are presented alongside the key findings of the study. The final objective (Objective 5) is presented as a synthesis of the findings from the other objectives (Objective 1-4) as aligned to the results chapters in this study. Lastly, this chapter draws a conclusion to the study.
8.2. Key Findings and Implications for DRR and CCA

8.2.1. Households’ Vulnerability to Climate Risks and Drought

This study shows how household and community vulnerability (based in livelihood practice) and drought hazards combine to produce disaster, as theorized by the PAR model. The PAR model explains that drought hazards alone do not result in disasters, instead it is the convergence of drought hazard and social vulnerability that results in drought disasters (Chapter 2: Section 2.3.3.1; Figure 2.2; Chapter 5: Section 5.4) (Blaikie et al. 1994; Cutter et al. 2003; Turner et al. 2003; Winser et al. 2004; Wilhite 2005; Cutter et al. 2008). This places the vulnerability context at the centre of managing climate risks (Chapter 2: Section 2.2). It also demonstrates the need for recovery time following a disaster, in order to cope with and rebound following further shocks into the future, as explained by the resilience framework. In this study, many households showed low levels of the various livelihood capitals, suggesting that these might not be adequate to cushion them against droughts and future climate risks (Chapter 4: Section 4.2; Chapter 5: Section 5.4). For example, social capital has long been championed to reduce vulnerability and improve resilience, but it is clear from the study findings that aid programs and cultural shifts are destroying this asset. Consequently, resource-poor households in the study site faced a situation where drought hazards were likely to escalate into disasters, resulting in notable adverse impacts (Chapter 5: Section 5.6). The study site was characterised by high vulnerability and low adaptive capacity as households had limited livelihood assets and options, and lived in poor socio-economic conditions (Chapter 4: Section 4.2). In the end, even minor hazards and new risks associated with climate change and variability would pose serious threats to the communities’ livelihood strategies.

Moreover, the continuous battering of rural households by climate variability and extreme weather events would further erode these limited assets and the capacity to respond to drought, and thus ultimately the ability to transform into resilient households (Chapter 4: Section 2; Section 3). The successive occurrence of drought hazards afforded no time to households to recover from previous disasters (Chapter 6: Section 6.5). In this regard, households failed to recover and instead rebuilt to their status quo or a worse-off situation,
creating a vulnerability platform for future drought disaster (Chapter 2: Section 2.3.5; Chapter 6: Section 6.5). The resilience framework explains that households need to rebuild to better conditions (Build Back Better, 3Bs) after drought disasters if they are to cope in the future, but the study findings suggested that this was unlikely in the study site for the majority of households (Chapter 2: Section 2.3.5) (DFID 2011; Akter & Mallick 2013).

Other non-climatic factors have been shown both in this study and other research to play a pivotal role in disaster occurrence in Zimbabwe, in particular the failing economy, which made it difficult for households to cope or adapt (Chirau et al. 2014), or recover and build resilience (DFID, 2011). With constant adverse impacts on rural livelihoods, households would fall deeper into poverty, perpetuating the vicious cycle of poverty (Dejene et al. 2011; Akter & Mallick 2013; Olsson et al. 2014; Richard et al. 2015). With poverty linked to vulnerability, smallholder farmers and rural households needed sustainable, external interventions to re-orient their livelihood activities to become more resilient to climate risks (Shaffer 2014; Thiede 2014). The results of this study suggest recovery is not possible from most households at the study site due to underlying poverty, including the deepening inequality cycle, a lack of social protection and poor access to climate information. Climate sensitive livelihood activities like rainfed agriculture continue to place households at high risk, and that fragmentation across government agencies in addressing DRR and CCA prevents communities from building resilience, adapting and reducing risk. With limited options for livelihood diversification into off-farm activities due to low levels of higher education and skills (Chapter 4: Section 4.2.1), rural households should improve on rain-fed farming techniques (for example, through use of conservation farming as explained in Chapter 6: Section 6.2), introduce drought-tolerant seed varieties and crops, and dispose of livestock when drought is predicted. Other activities based on wild resources, that are more resilient to drought, and other forms of local self-employment, could also be considered. In the worst-case scenario, and for those extremely vulnerable households, forms of productive social protection may be needed if households were to avoid poverty traps. This was because social protection included initiatives that protected, and transferred income or assets to, the poor and vulnerable, against livelihood
shocks and stressors, whilst improving the rights and social status of such marginalised communities (Davies et al. 2009). Social protection could be considered in its three forms: social insurance (protection against risks and events); social inclusion (access to entitlements, legal rights and community systems); and social assistance (cash payments to assist communities) (ERD, 2010). Overall, these approaches to social protection could be instrumental in building households’ and communities’ resilience and in reducing vulnerability to stresses and shocks including climate risks (Davies et al. 2008).

### 8.2.2 Perceptions of Climate Variability and Change, and Droughts

In this study, meteorological data and household perceptions and experiences confirmed shifts and changes in overall climate and weather trends in the district since 1980 (Chapter 5: Section 5.2; Section 5.3). Such changes made it difficult for rural households to predict and protect their livelihood activities against climate risks (Chapter 5: Section 5.2). Further, it became difficult at the local level to be consistent in terms of food production and grain stocks reserves for households (Chapter 4: Section 4.3; Chapter 6: Section 6.2), while at the higher level, accuracy in weather forecasts and support to the communities from the government were also challenging given the uncertainty of the climate (Chapter 5: Section 5.5; Chapter 6: Section 6.2).

Accuracy, geographic resolution (ward or district level), understandability and timing of climate information dissemination, were some of the factors affecting the usefulness of scientific weather forecasts that were considered important by households. Limited understanding of seasonal scientific weather forecasts by almost half of the rural households undermined practical use of this information in livelihood strategies (Chapter 5: Section 5.5). Access to such poorly understood weather information was thus as good as not having access to information at all. Indeed, non-use of seasonal weather information implied both no or inappropriate action by households in the face of adversity, rendering them more vulnerable to climate risks. On the other hand, reliable, understandable and timely seasonal weather forecasts did not automatically translate to risk reduction and adaptation action. Several other
factors like supporting organisations and policy frameworks (Chapter 7), livelihood capitals and activities (Chapter 4) and socio-economic and environmental conditions (Chapter 5) still played an important role in the successful uptake of risk-reduction strategies, as explained by Blaikie et al. (1994) and Turner et al. (2003) in relation to the PAR model. Thus, good early warning and seasonal forecasts on their own were not likely to help without addressing other components of the complex system in which rural livelihoods were located.

Against this background, the following suggestions for improving early warning systems for climate risks could be considered at different levels, bearing in mind the above observation regarding the need to tackle multiple components of the rural livelihoods system simultaneously (Chapter 2: Section 2.2 and Figure 2.1):

- There was a need for an articulate and coherent national framework on climate information production and dissemination aimed at farmers. Such a framework would go a long way to improving seasonal weather information transfer from producers to end users. This framework should indicate the information flow from the national level (MSD) to the district and local level, as well as provide for a better link between climate forecasters and end users, through encouraging active participation of organisations working on livelihoods to assist in the transfer of climate information.

- The MSD could consider establishing offices at the district level to enhance data collection, analysis, processing and modelling for specific forecasts. The MSD office should also be mandated to engage local communities when disseminating seasonal weather forecasts, or improve and better coordinate their partnership with Agritex.

- Newsletters/pamphlets/posters written in both English and the local language for the local context should be made available and dispatched to all rural communities, especially marginalised communities. This should play an important role in improving understanding of seasonal weather forecasts and fostering preparedness to climate risks. Considering the availability of resources, a few of these posters could be placed in strategic places, including schools, community halls, local shopping centres or even churches for easy and wide accessibility.
- Increasing the number of weather stations throughout the country could improve the geographical coverage and the recording of specific and local weather conditions for more areas. This would enable the MSD to make forecasts for specific geographical areas. In fact, the establishment of a weather station in each district and ward would foster contextualised, localised and more precise forecasts.

- Greater use of available community radio stations for location specific seasonal weather dissemination could play an important role in improving access to weather information. Making action-oriented weather information available to all communities would facilitate the sharing of knowledge and expertise, thereby raising awareness and possibly leading to engaging in risk-reduction and adaptation strategies.

The use of indigenous knowledge for weather forecasting by half of the households illustrated the continued importance of local knowledge (Chapter 5: Section 5.5.2). Further, it suggested that there was still relevant local knowledge that was recognised, and this knowledge should be captured and used in combination with scientific knowledge (Chapter 5: Section 5.5.1). Ignoring indigenous knowledge with regards to weather forecasting and drought prediction could risk rejection of scientific information by households and communities, while its inclusion might improve on appeal, context and relevance to local communities (Mawere & Mubaya 2015). The slow death suffered by indigenous knowledge as was found during this research, was a potential cause for concern if indigenous knowledge was to remain relevant for drought risk reduction and CCA. Without it, drought impacts could be more devastating.

An important consideration that could maximize on indigenous knowledge could be to document indigenous knowledge and use it in the prediction of seasonal weather forecasts. This could be done through the Agritex officers, who were stationed in each ward throughout the country. Agritex officers do collect and use traditional crop and weather knowledge and are encouraged to do so by the government. Perhaps more widespread appreciation of this activity would encourage and empower local communities to preserve this knowledge, even more especially as correct interpretation of signs is an important aspect of household decision making. Once documented, it can be availed to NGOs intending to work in those communities.
Drought impacts at household level were heterogeneous and could be attributed to variance in households’ asset bases, sources of income, livelihood activities and access to off-farm income (Chapter 4: Section 4.2, Section 4.3). This was the same conclusion drawn by Shackleton et al. (2014) who noted that households’ sensitivity and ability to respond to shocks (drought hazard) is largely a function of their livelihood strategies, poverty levels and asset holdings, including access to these assets, which may be influenced by local institutions, markets and political processes. Drought impacts were notable in the study site across different aspects of livelihoods from crop production (food security) and small-scale livestock rearing (financial resources, food security and agricultural activities) to society (social cohesion and traditional and cultural values) (Chapter 5: Section 5.6). These drought impacts on primary livelihood activities had implications for household income, and this might have affected households’ other needs such as education and capital for investment in livelihood activities; this indicated the complex linkages between these different components of rural livelihoods, as discussed in Section 8.2.1. For example, improved education might play an important role in increasing agricultural productivity and/or widen off-farm livelihood options which are not affected by climate variability and change. Therefore, in addressing drought impacts, there was need for a comprehensive and integrated approach embedded in building specific and generic adaptive capacities (Chapter 2: Section 2.2; Chapter 8: Section 8.2.5) (Eakin et al. 2014).

### 8.2.3. Drought Risk Reduction and Adaptation Strategies

The resilience framework (Chapter 2: Section 2.3.5) explains that adaptation, like resilience or vulnerability, must always be contextualised, as cognisance should be given to indigenous knowledge while also taking the opportunity to appreciate external interventions (DFID, 2011). In this study, households used both indigenous/autonomous and externally supported strategies and actions to reduce risk and adapt to drought and other climate risks (Chapter 6: Section 6.2). Households tended to select from the options available, which were often quite limited, but they would choose what worked best within their context and more so, what was affordable to them. This suggests a need for the promotion of externally supported risk-
reduction and adaptation interventions that respected context, included communities at the planning phase, and acknowledged cultural heritage in the areas in which they would be used (Chapter 6: Section 6.3). Essentially, external interventions faced the risk of rejection if they did not give due consideration to the context of the targeted communities (Traore & Owiyo, 2013). Inclusion of the targeted communities in the whole project cycle when establishing DRR and CCA projects would provide a sense of ownership amongst local communities, thus promoting sustainability. At the same time, some indigenous practices may no longer be relevant considering the changing socio-economic, political and demographic context and more importantly, the frequency of climate risks and severity of current trends of climate variability. The convergence of local and scientific knowledge and actions would thus need to be a negotiated process.

Indeed, if external interventions were to make any impactful contribution to rural livelihoods and climate risk reduction at both national and local levels, they needed to consider the suggestions below:

- The distribution of drought relief should be based on fair treatment of all households and transparency without any political influences or marginalisation of particular community groups, to avoid social conflicts arising among community members, as this would erode the social safety nets that existed in rural areas. If this was not considered, there was the potential for erosion of social capital and the social safety nets that existed in the study site.

- Assistance and/or assistance programmes through development partners and donor agencies should be integrated and aligned into the development objectives for each district, and coordinated by district councils in support of the DA’s office. Thus, all development activities in the district could be aligned to development plans. Needs assessments could be conducted to identify needs of poverty alleviation (sustainable rural livelihood strategies to attain SDGs) and development, while also tackling the root cause of climate risk vulnerability.
District Civil Protection Committees (DCPCs) should be better involved. All the
development partners in each district could merge their resources and align them to
development objectives for collective implementation of the development projects. In
addition, the DCPCs should meet more often, not only for the development of District
Civil Protection Plans, but also for the alignment of development programmes and
activities in the district, to focus more on poverty alleviation as it links to DRR and CCA.

Few indigenous strategies currently under use were identified as relevant in the current
context by the households (Chapter 6: Section 6.2), nor were these indigenous strategies for
drought and climate risk reduction and adaptation getting adequate support from government
departments, and there was a risk that local knowledge and practices would eventually die out
(Chapter 6: Section 6.4). Therefore, the need arose for support for the adoption and use of
indigenous strategies through local platforms (Chapter 6: Section 6.3). Additionally, there was
a need to consider an agglomeration of both indigenous and external interventions to produce
hybrid practices that appealed to and were relevant to local communities (Chapter 6: Section
6.3). Indigenous strategies for risk reduction and adaptation in rural communities should not
be overlooked; hence, there was need for government departments and external
organisations to consider the suggestions below:

- International organisations should appreciate the importance of indigenous
  knowledge in their different areas of operation and build their strategies around these
  through community engagement processes. This would help facilitate local community
  buy-in to their projects/ programs. Therefore, where appropriate, and after
  consultations, indigenous knowledge could be adopted for risk reduction and
  adaptation.

- There is a need to recognise the importance of indigenous knowledge and its
  integration into formal strategies for climate risk management to produce a hybrid
  system of climate risk management that would appeal to both scientific and local
  communities.
8.2.4. Organisational and Policy Frameworks

With the current policy and organizational framework set-up (Chapter 7: Section 7.2), reducing vulnerability to climate risks and building resilient livelihoods for rural households and communities might be a difficult task (Chapter 4: Section 4.2). Government departments for DRR and CCA in their plurality lacked both financial and human resources, which were key to implementation of policy and effective horizontal coordination amongst departments. There were several policies dealing with climate risks, yet there was no overall policy for climate change, that would cover all facets of climate risk management. Different policies have diverse goals and objectives, and there was potential for a mismatch in approach when dealing with vulnerability to climate variability and extreme weather events. Further, there was concern that addressing climate change as a standalone problem, without recognising that the underlying vulnerability to climate risks was essentially a poverty and development problem, would undermine current risk-reduction, adaptation and development efforts. Thus, climate sensitive livelihood activities like rainfed agriculture continue to place households at higher risk, and that fragmentation across government agencies in addressing DRR and CCA prevents communities from building resilience, adapting and reducing risk. Therefore, the need for an integrated approach targeting specific and generic adaptive capacities emerged (Eakin et al. 2014).

Considering that the National Climate Change Response Strategy (2013) was paving the way for the formulation of the Climate Change Policy, the Climate Change Management Department should consider the suggestions below:

- The Climate Change Policy for Zimbabwe should be formulated as a matter of urgency considering the fluctuation of weather trends and frequent occurrence of climate hazards especially drought. While formulating the policy there are a few issues to consider and these are:
  - The inclusion of local communities in the policy formulation process to ensure that their views were considered and that they were informed of how the country intended tackling the climate change problem.
• Integration of DRR, CCA and sustainable development should clearly be visible in the policy. This would provide recognition that vulnerability to climate risks was a development and structural problem and not only a specific climate problem.

- The DA and RDC offices should mainstream DRR and CCA policy and activities into their development plans so that when engaging with other development partners, the issue of climate change is included.

- The organisational set-up of government departments that deal with hydro-meteorological disasters and climate change should be reconsidered. The integration of these government departments would improve resource allocation and if managed effectively, improve the coordination and implementation of the yet to be formulated climate change policy alongside development plans in different districts of the country.

Having numerous government departments dealing with one aspect, in this context, vulnerability to climate risks, presented challenges for coordination efforts for the Department of Civil Protection (DCP) (Chapter 7: Section 7.2). Many government departments were increasingly bureaucratic, which was strangling the smooth flow of climate information and risk-reduction strategies, activities and processes (Chapter 7: Section 7.2.4). Resources required for numerous government departments were depleted, which was becoming a barrier to drought risk-reduction and adaptation actions, especially for Zimbabwe, with its collapsing economy. In the end, integrating DRR and CCA, and consequently merging government departments dealing with climate change related issues, would reduce cost burdens, increase capacity, and if managed effectively, might improve risk-reduction and adaptation activities (Begum et al. 2014).

For improving the organisational capacity for climate change and risk reduction and adaptation at all levels, the following suggestions could be considered:

- Agritex officers in all wards should be equipped with mobility to reach out to most parts of their operational area and disseminate climate change knowledge (including climate
and weather trends and implications for smallholder farming) and critical information at the community level.

- The Grain Marketing Board (GMB) should be targeted for revival through a strong injection of financial support to ensure that it encouraged competitive market prices that would incentivise even smallholder farmers. Such support could also encourage farmers to sell their surplus grain and gain income, while contributing towards boosting the national strategic grain reserves, which were important during drought periods.

- The Government Input Scheme, which assisted smallholder farmers, should ensure that inputs were provided timeously, that adequate quantities of seeds appropriate for the seasonal weather prediction were supplied, and that drought-tolerant crops (e.g. sorghum and millet) were promoted in areas frequently affected by droughts. Therefore, the provision of farming inputs to rural smallholder farmers should be area specific and not through a blanket approach to all areas across the country.

- The Environmental Management Agency (EMA), as a government agency with local establishment under the Ministry of Environment, Water and Climate (MEWC), should recognise that one of its key responsibilities was creating awareness of climate variability and change and associated risks, and the implications for community development pathways and livelihood strategies of rural households and smallholder farmers.

- Community radios could be established in each district, enabling discussions on development issues in the specific geographical areas. This would go a long way in assisting government departments and development partners to disseminate seasonal weather information and risk-reduction and climate change strategies to a large number of people in each district.
8.3. Synthesis and Addressing Objective 5: Hydro-Meteorological Disaster Risk Reduction and Climate Change Adaptation: Two Sides of the Same Coin

In earlier chapters (Chapter 1: Section 1.1.2 and Chapter 2: Section 2.2) the link between DRR and CCA was framed, because ultimately, these were both trying to address the same issue, that is, reduction of community vulnerability to climate related trends and events (UNDP 2002; Schipper & Pelling 2006), Mercer 2010; Rivera 2014; Kelman 2015; Kelman et al. 2015; Pelling 2015; Schipper et al. 2015). This was clearly illustrated in the conceptual framework in Chapter 2: Section 2.2 of this study. Community vulnerability was placed at the centre of the conceptual framework (Chapter 2: Section 2.2; Figure 2.1), illustrating its connection to other factors and its importance when dealing with both climate variability and extreme climate events. Evidence from this study indicated that Zimbabwe, like many other developing countries, had totally separated the policy and institutional frameworks for promoting CCA on the one hand and DRR (including hydro-meteorological disasters) on the other (see Chapter 7: Section 7.2). Yet, climate change impacts in the form of hazards and disasters (in this case drought disasters as in Chapter 5: Section 5.4) were becoming more apparent at all levels (Shaw et al. 2010a). Given the key findings of this study and their implications for DRR and CCA (Section 8.2), there was a need for policy makers and practitioners to revisit their approach and assess how they could improve on reducing vulnerability to climate risks.

There was profound similarity between drought DRR and CCA, especially regarding vulnerability, and the use of different terminologies could be put down to an issue of semantics (Kelman et al. 2015). The most effective way of addressing the risks posed by climate change and disasters was to lessen the underlying factors causing vulnerability to these climate hazards (Schipper & Pelling 2006; Olsson et al. 2014; Nagonda 2015). Some of the underlying factors of households’ vulnerability to climate risks (Blaikie et al. 1994; Turner et al. 2003; Winser et al. 2004; Schipper & Pelling 2006; Pelling 2015; Schipper et al. 2015) were discussed in this study - household livelihood capitals (Chapter 4: Section 4.2), primary sources of income (Chapter 4: Section 4.3.1) and primary livelihood activities (Chapter 4: Section 4.3.2). These
factors, as well as policy and organisational frameworks (Chapter 7: Section 7.2), contributed to the households’ vulnerability to drought hazards.

The assessed livelihood capitals, sources of income and livelihood activities as discussed in Chapter 4 and Section 8.2.1 of this chapter, brought insights into poverty levels in the study area. To address this issue, reducing vulnerability to climate risks needed to be mainstreamed with poverty reduction, considering that poverty is a condition and determinant of vulnerability (Thomalla et al. 2006; Schipper & Pelling 2006; Olsson et al. 2014; Nagonda 2015; Schipper et al. 2015). This required DRR and CCA to be mainstreamed into development planning and processes (Chapter 2: Section 2.2, Section 2.3.3.1; Chapter 7: Section 7.2, Section 7.5) (Schipper & Pelling 2006; Pelling 2015). These two communities of practice (DRR and CCA) both placed emphasis on the importance of sustainable natural resources management, and biodiversity for ecological resilience and livelihood security, as they considered the rural poor, whose livelihood activities are embedded in natural resources, to be exposed to climate risks (see Chapter 4: Section 4.3.1) (Mitchell & van Aalst 2008; Practical Action 2009; Kelman 2015; Nagonda 2015). Lastly, for both DRR and CCA, dealing with climate risks includes reducing risk before occurrence of the hazard, through early warning systems and even in non-hazardous seasons by showing a long-term perspective to resilience building (Winser 2011; Herron et al. 2015). In this study, the Department of Civil Protection (DCP), which deals with disaster management in the country, was established in the 1980s, while the Climate Change Management Department (CCMD) was more recently established (in 2013), indicating that CCA in Zimbabwe is in its infancy and has a lot to learn from the DCP approach to DRR (see Chapter 7: Section 7.2). Thomalla et al. (2006) argue that the main difference between the two lies in the political prominence and recognition that CCA receives internationally. In addition, drought DRR is more real – a felt event, while climate change is happening in the background, except where linked to extreme events (Rivera, 2014). In actual practice, DRR and CCA are similar (Serrao-Neuman et al. 2015).
Authoritative organisations on climate change (IPCC and UNISDR) are now stressing the need to integrate DRR and CCA simultaneously in order to achieve coordinated actions (IPCC 2014; Nagonda 2015; Rivera et al. 2015; Schipper et al. 2015). Essentially, this stance by these organisations is a call that signifies the CCA-DRR synergies, yet some organisations and government departments are slow to realise there is need for a mutual marriage of these two practices (Kelman et al. 2015). Therefore, continuing to treat extreme weather events and climate variability separately might be missing the main ingredient in dealing with climate risks; it is also resulting in the duplication of DRR and CCA efforts and the misdirecting of resources that if combined for a common cause, could improve efforts at both local and national levels. Therefore, a fragmented and sectoral approach to this complex problem will not bear any positive results (Shaw et al. 2010a). Since climate variability and change drives hydro-meteorological hazards and vulnerabilities, and since DRR efforts provide more comprehensive views of vulnerability and resilience, some argue that a prudent place for climate change would be within DRR (Shaw et al. 2010b). However, others have taken the opposite view, for example, DRR is included in the National Climate Change Response White Paper (2016) and in the 2016 draft National Adaptation Strategy for South Africa. Therefore, little reason exists to separate DRR, CCA and sustainable development, since they all examine and aim to deal with community vulnerability and/or resilience (Kelman et al. 2015).

8.4. Conclusion
In this study, it was shown that the occurrence of a drought disaster cannot only be attributed to too little rainfall received, but that other factors (socio-economic, policy and institutional, cultural and traditional, and political) also play a role in the vulnerability context. Rural households are already marginalised and excluded from mainstream development activities, leaving them in poverty (Eakin et al. 2014). Poverty levels were further exacerbated as households continued to draw from their asset base to reduce the impacts of successive droughts. This also impacted negatively on their livelihood activities and more so, on their specific and generic adaptive capacities for dealing with climate risks. Moreover, households’ vulnerability was exacerbated by fragmented policy frameworks and organisational set-ups.
that were not favourable for effective coordination and intervention efficiency among affected communities. Yet, little reason exists to separate CCA and DRR, since both examine and aim to deal with many similar processes, including community vulnerability and resilience to climate risks (Kelman et al. 2015). Kelman et al. (2015) further argue that for government departments and development partners to successfully deal with vulnerability to climate variability and change and extreme weather events, CCA must become one of the DRR processes, while DRR must sit within sustainable development to circumvent seclusion from topics wider than disaster risk reduction.
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