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Response scenarios of households to drought-driven food shortage in a semi-arid area in South Africa

Delali Adjoa Akpalu



A thesis submitted to the Faculty of Humanities, University of the Witwatersrand, Johannesburg, in partial fulfilment of the requirement of the degree of Master of Arts in Development Studies (Coursework and Research)

JOHANNESBURG

2005

DECLARATION

I declare that this research report is my own original work. It is being submitted for the Degree of Master of Arts (Development Studies) in the University of the Witwatersrand, Johannesburg, South Africa. It has not been submitted for any degree or examination in any other University.

Supervisor:
Dr Emma Archer, University of the Witwatersrand, Johannesburg, South Africa.

…….
(Signature of candidate)

……day of……..2005

DEDICATION

I dedicate this Research Report to God for His glory and the great thing He has done. I also dedicate this work to my Hubby, Parents and the people of Thorndale.

Abstract

The goal of this research report was to profile the coping strategies of households in Thorndale to the effects and impacts of the 2002/2003 drought. Thorndale, the study site is prone to drought and thus experiences severe drought almost every year. The rationale behind the selection of Thorndale for the study was based on this fact, in addition to the fact that the study area is relatively unstudied. The study's major findings included inadequate agricultural extension service delivery in the community, while the drought's impacts were economic, social, nutritional and health, food shortage, environmental and wildlife. The most significant and largest impact was water shortage. These impacts led to increased household dependency on the natural capital component of livelihoods in addition to prostitution and the community's institutional arrangements. The main constraints households encountered in response to the drought's impacts included the lack of employment opportunities, financial and infrastructural problems among others. It is recommended that with respect to food security, efforts should be made to ensure the trickle down effect of national level assessment of vulnerability on annual basis to rural households in South Africa's drought-prone areas including Thorndale, in order to improve timely and practical solutions to issues of food insecurity. Furthermore, it should be ensured that the national level benefits of early warning systems trickle down to the local and community levels including Thorndale. Additionally, agricultural extension service delivery in the community needs to be improved.

Keywords: drought, rural people, perception, food shortage, vulnerability, responses, livelihoods, institutional arrangements, adaptation, resilience

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LIST OF SYMBOLS AND ACRONYMS

et al. - and others

ha - hectares

km - kilometres

km^{2} – square kilometres

no. - number

/ - or

$ - Dollar

& - and

% - percentage

e.g - for example

cont - continue

CWA - Country Women's Association

FIVIMS - Food Security and Vulnerability Information and Mapping Systems

FSA - Food Security Agency

GDP - Gross Domestic Product

HH - Household(s)

HIV/AIDS – Human Immuno-Virus/Acquired Immuned Deffiency Syndrome

IDS - Institute of Development Studies

NDMC - National Drought Mitigation Centre

NGOs - Non governmental organisations

NTFPs - non-timber forest products

per. comm. - personal communication

SSA - Sub Saharan Africa

SST - Sea Surface Temperature

Chapter One
INTRODUCTION

1.1. Background

Droughts are usually classified as meteorological, agricultural or hydrological on the basis of the variables under consideration. The essential variables in meteorological drought are rainfall, snowfall, and the speed as well as the direction of the wind, humidity and temperature. In agricultural drought, the key variables include the content of soil moisture and evapotranspiration. Analyses based on hydrological drought are mostly concerned with water in rivers, lakes, reservoirs and in the storage spaces of underground water. The variables that indicate the presence and severity of agricultural and hydrological drought however, originate from those associated with meteorological drought or at least are influenced directly by them. Rainfall is the single most essential of these, especially in South Africa. It often correlates quite well with humidity, temperature, and wind speed and direction, but more essential is the availability of rainfall data, which have been collected in many places over longer periods than any other variable (Zucchini and Adamson 1984).

Droughts in Southern Africa are an endemic climatic feature. Recurring intervals of dry spells have been recorded in the 1920s, 1940s, 1960s, 1980s, and more recently in the early 1990s (Nicholson and Entekhabi 1986; Tyson 1986; Glantz 1987). The drought of the early 1980s has been identified as one of the most severe on record. Between 1982 and 1993, two rainy seasons recorded less than 75% of normal rainfall, in 1982/1983 (average rainfall, 408 mm) and 1992/1993 (average rainfall, 484 mm) (Vogel 1995). The causes of these climatic processes have been well documented. For purposes of this research however, the impacts of and houlseholds' (HHs) responses to the 2002/2003 drought were examined for Thorndale, located in the semi-arid region of the Limpopo Province, South Africa.

The major findings of the study include inadequate agricultural extension services in the community, while the drought's impacts were economic, social, nutritional and health, food shortage, environmental and wildlife. The most significant impact was water shortage. These impacts led to increased household dependency on the natural capital component of livelihoods in addition to prostitution and the community's institutional arrangements. The main constraints households encountered in response to the drought's impacts include among others the lack of employment opportunities, financial and infrastructural problems.

1.2. Research problem

Several studies (e.g., Bratton 1987; Cohen and Lewis 1987; Glantz 1987; McCann 1987; Payne et al. 1987; Watts 1987; Herren 1991; Perkins 1991; Teklu et al. 1991; Kadomura 1994; Webb and von Braun 1994; Tiffen 1995; Vogel 1995; Scholes et al. 1996; Fauchereaus et al. 2003) have observed that drought is frequent in Africa. Drought can contribute to diminished food security on the continent. Some effects of drought may be immediately apparent, for instance, the withering of crops, dry water points, vegetation loss and hence reduced forage for livestock as it is in the case of Thorndale. There is often inadequate awareness of second and third order effects such as price increases, increased food imports, and surges in rural to urban rates of migration (Glantz 1987) and loss of natural vegetation. Vogel (1995) points out that while much is known about the causes of droughts however, particularly little is known about the impacts of drought on livelihood strategies in poor rural areas that involve the extraction of natural resource and agricultural practices. Consequently, a detailed assessment of how rural people respond to and/or cope with periods of environmental stress such as drought is essential. Furthermore, traditional views about indigenous people's mechanisms for coping with drought are poorly understood, especially with respect to inter-and intra-HH vulnerability before and during periods of food stress as well as the accompanying division of labour.

In view of the above synthesis, the study seeks to answer the following questions;

1) What were the effects of the 2002/2003 drought on households in Thorndale?
2) If households had diverse means of responding to drought, what were they?
3) What were the constraints encountered in responding to the drought?
4) Because the responses to the impacts may have implications for livelihoods, what will be the scenarios of the ensuing changes in livelihoods?

1.3. Aim

The aim of this research was to examine the impacts of the 2002/2003 drought and the corresponding responses to these impacts, constraints encountered in the response process as well as the implications of the drought for HH livelihood strategies and/or coping strategies. As earlier stated, the drought had impacts on water resources as well as food security resulting in food shortage. Other impacts included economic, social, community, environmental, health and nutritional effects. Consequently, HHs adopted multiple livelihood strategies under circumstances of macro-economic policy, labour market and climate

variability such as drought (Chambers 1997) as stated earlier. In some rural communities, such as the Gallo village in Mali, these strategies include the reduction of calorie consumption, temporary migration of non-lactating women, young men and middle aged men and women to urban areas in search of paid work as well as various income generating activities such as women undertaking cash crop production, e.g., cotton, cleaning wool and decorating clothes, undertaking gardens sponsored by the local women's organisation and investing in livestock (Cekan 1992). Such strategies also encompass the production of livestock as well as the harvesting of non-timber forest products (NTFPs) (Scoones 1992; Shackleton et al. 1999).

Drought affects HHs in the Thorndale community. Consequently, HHs undertake a combination of livelihood resources in the form of different kinds of capital that result in the ability of HHs to follow a combination of livelihood strategies such as the intensification or extensification of agriculture, the diversification of livelihoods and migration (Solesbury 2003). Drought may result in a reduction in crop yield, reduced livestock production and or migration. This results in changes in HH livelihood strategies taking into consideration the fact that in some cases crop production is rendered impossible as a result of drought. Livestock production is also reduced in some cases and grounded to a halt in other cases. Migration leads to a reduction in the availability of farm labourers, which in turn may affect agricultural productivity.

1.4. Objectives

The objectives of this research are;

1) To examine the impacts of drought on households,
2) To find out or profile how households respond to these impacts,
3) To examine the constraints to successful responses,
4) To examine the drought's implications for livelihood activities.

1.5. Definition of concepts

Drought

Drought is a normal recurrent feature of climate as earlier stated in section 1.1, although many erroneously consider it a rare and random event. It occurs in virtually all climatic zones although its characteristics vary significantly from one region to another. Drought is a temporary aberration and it differs from aridity, since the latter is restricted to low rainfall

regions and is a permanent feature of climate (Sarmiento 1998:2). Drought fundamentally occurs when a mismatch exists between the availability of water and the demands of human activities. Drought should not merely be perceived as a physical phenomenon or natural event. Instead, it should be viewed as the consequence of the interplay between a natural event and people's demand for the supply of water. It should be viewed, however, in relation to the needs of a given community. It is the failure of primary productivity that justifies attempts to scientifically explain and analyse the relations between hunger, and politics as well as administrative responses (Mortimore 1989). In both developing and developed countries, drought results in economic and environmental impacts as stated in section 1.3 as well as the personal hardship that underscores the vulnerability of societies (Sarmiento 1998).

Responses

Reponses to the effects and impacts of drought as earlier stated in section 1.1 can take the form of coping or adapting. Coping is defined as "a short-term response to an immediate decline in access to food". Adapting on the other hand implies "a longer-term change in the mix of ways in which food is acquired irrespective of the year in question" (Vogel 1995:251). Coping mechanisms for natural hazards such as drought are determined by perceptions of drought and vulnerability, preferences and budgets (Watts 1983; Downing et al. 1999). Such mechanisms are usually classified as the protection mechanism, which deals with the built environment and mitigation (socio-economic responses). Water reservoirs, dikes, heating and air-conditions, wind shields, storm shelters and irrigation are examples of the protection mechanism. Savings, mutual and commercial insurance, crop diversification, alternative sources of income, temporary migration, charity, government support and foreign aid are examples of the mechanism of mitigation (Downing et al. 1999).

Coping strategies may entail the diversification of income sources such as seeking second jobs, cultivating a variety of crops or livestock, migration, stocking up on various supplies, selling assets, sharecropping, borrowing or lending of various resources, drawing on common property resources such as pasture, village wells and trees, drawing on various forms of social and family relationships, participating in relief work and money lending. It has been argued that coping strategies are employed seasonally or in response to external shocks such as drought by relatively vulnerable HHs (Hussein and Nelson 2003).

Household

A HH can be identified as the key unit of production and consumption. A distinction can however be made between a core group of relatives who live together, work on the same fields and eat from the same pot, even in situations where social obligations are observed by an extended family (Bratton 1987). Maxwell (2001a) distinguishes between three types of HHs. These include enduring HHs, which continually maintain HH food requirements and supply, resilient HHs, which recover quickly after suffering shocks and fragile HHs, which increasingly become insecure in response to shocks such as those drought produces.

Food shortage

Drought may make food systems fragile since it may affect food production and thus crop yields resulting in food shortage as earlier stated in section 1.2. A major drought such as that of 2002/2003 projects the reproduction crisis onto a larger segment of a rural society. A subsistence crisis or a severe shortfall in harvest is in some respects an intensification of existing cycles and is in the long-term recursive, however, HHs do not arbitrarily respond to food shortage. During the normal season most families schedule their grain consumption. HHs plan and compute their domestic needs in relation to the quantity of their harvest. During periods of poor harvest when crop yields are reduced by drought HHs may sometimes be able to predict when their granaries will be exhausted. “HHs make pre-emptive decisions following a drought in an attempt to mitigate the somewhat predictable effects of a severe shortage or market distortion perhaps six months distant” (Watts 1983:430).

Livelihoods

A livelihood comprises people, their capabilities and their means of living, including food, income and assets. Tangible assets are resources and stores, and intangible assets are claims and access. A livelihood is environmentally sustainable when it maintains or enhances the local and global assets on which livelihoods depend and has net beneficial effects on other livelihoods. A livelihood is socially sustainable when it can cope with and recover from stress and shocks and provide for future generations (Chambers and Conway 1992). Livelihood strategies as stated above include the intensification (or extensification) of agriculture, livelihood diversification and migration. Agricultural intensification entails increased average input of labour or capital on a smallholding, either cultivated land alone or on cultivated and grazing land for the purpose of increasing the value of output per hectare (Hussein and Nelson 2003). Livelihood diversification is the process by which rural families construct a

diverse portfolio of activities and social support capabilities in their struggle for survival in order to improve their conditions of life (Ellis 1998; Francis 1998b). Migration forms a central component of livelihood diversification. In Ethiopia, Bangladesh and Mali, for instance, migration is widespread and in all three cases, it is linked to strategies of income generation (McDowell and de Haan 1997).

1.6. Conceptual Framework

The study considers one unit of analysis, individual HHs in Thorndale, whose response oriented livelihood scenarios are examined and analysed.

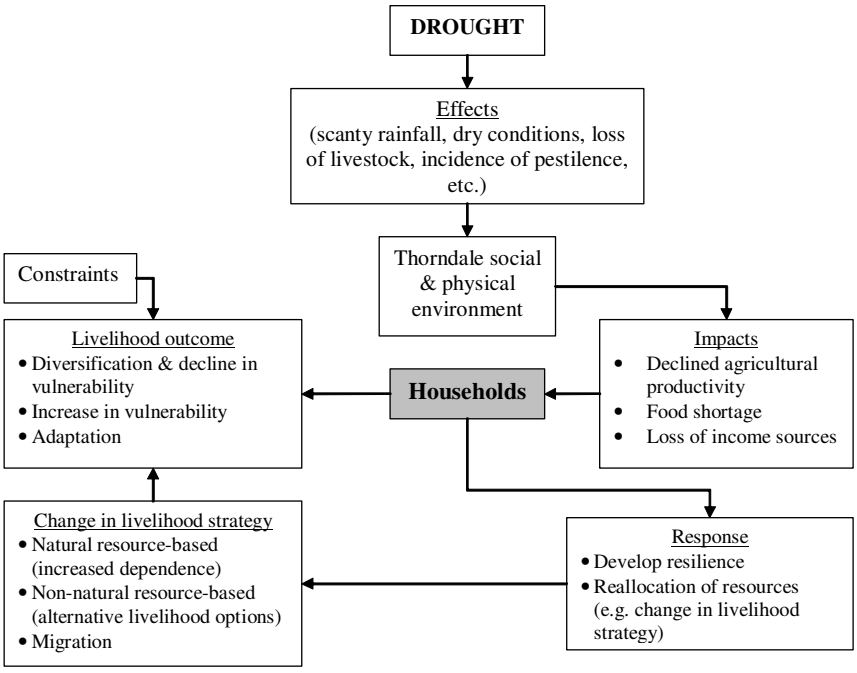

Figure 1: A conceptual framework showing response oriented livelihood scenarios

The framework as illustrated by Figure 1 in line with the objectives of the study gives an overview of the effects and impacts of the 2002/2003 drought, responses, change(s) in livelihood strategies, livelihood outcomes and constraints. The effects of the drought include scanty rainfall, dry conditions, loss of livestock and the incidence of pestilence on the social and physical environments of Thorndale. The impacts include declined agricultural productivity, food shortage, and the loss of income sources to mention but a few on HHs. In responding to the effects and impacts of the drought, HHs developed resilience as well as reallocated resources, for instance, a change in livelihood strategy. This change in livelihood strategy entailed natural resource-based strategies, such as increased dependence on the

extraction of NTFPs, non-natural resource-based, such as off-farm employment, and migration. Multiple strategies were combined by some of the HHs in their response to the drought's impacts. The resulting livelihood outcomes include diversification and decline in vulnerability, increase in vulnerability and adaptation. In responding to these effects and impacts, HHs encountered such problems as difficulty in the mobilisation of resources such as financial resources.

1.7. Theoretical framework

The political economy approach is an appropriate perspective for this study because it has been shown to have utilitarian and theoretical value in the two main elements encountered in this study, namely vulnerability and human (societal) adaptation to harsh environmental hazards such as drought. It also provides a broad multidisciplinary framework capable of incorporating a myriad of factors including economic, social and political elements, which are necessary for the explanation of the research findings.

Environmental disturbances (hazards) constitute threats to individuals experiencing them and thereby generating complex problems, which occur at various spatial and temporal scales (Watts 1983; Blaikie et al. 1994). Vayda and McCay (1975:411) observe that "any event or property of the environment which poses a threat to the health and ultimately the survival of organisms including people may be regarded as a hazard for them and that responding adaptively to such hazards involves in our view…not only deploying resources to cope with the immediate problem but also leaving reserves for future contingencies". Due to the complex nature of these problems a holistic approach is needed to achieve an understanding of social, economic and environmental issues. Furthermore, Blaikie et al. (1994) posit that the impacts of natural hazards including drought are products of the economic, social and political environments. Political, demographic and economic factors underlie the impact(s) of drought. These affect the allocation of assets, income and other resources between different groups of people.

Political economy with its multidisciplinary approach provides a versatile framework appropriate for the analysis of the data collected for this study. Political economy was used to describe many aspects of the interaction between humans and their environment. For instance, the political economy approach perceives adaptation as an interactive process between the relationship between environmental hazards such as drought and the essential

strengths and weaknesses of the social, political and economic systems (Watts 1983). Similarly, the study based on its second objective profiled HHs' responses amid the strengths and weaknesses of the social, political and economic environments.

Consistent with these ideas, political economy is particularly helpful in showing how people who are affected by drought may be differentially vulnerable (Watts 1983; Blaikie et al. 1994; Downing et al. 1999). According to Downing et al. (1999) vulnerability depends on human infrastructure as well as socio-economic conditions. Furthermore, vulnerability of HHs may be generated by economic, social and political processes (Herren 1991; Downing et al. 1999) that influence how drought affects them in varying ways and differing intensities. Such root causes are normally a function of the economic structure, legal definitions of rights, gender relations and other elements of the ideological order. These root causes reflect the distribution of power in a society. Societies, particularly villages respond[1] to hazards such as drought by reducing it or reducing their vulnerability. Coping mechanisms for natural hazards as stated earlier, are determined by the perceptions of hazard and vulnerability, preferences and budgets (Watts 1983; Downing et al. 1999).

Consistent with theories of political economy and pertinent to this study is the interaction between vulnerability to the impacts of drought and societal adaptation, given the constraints of natural resources available within a given environment. It is necessary to integrate our understanding of the political, economic and social processes about how drought impacts are responded to. In the analysis of this study, the framework provided by political economy is used to examine the impacts of the drought and the response factors as well as factors responsible for variations in responses to the drought.

1.8. Structure of the thesis

The thesis is presented in six chapters

[1] Village political economy structures drought responses in different ways. Thus in this case study, while the poor resort to the sale of livestock, pledged farms, incurred debts, sold their labour power, borrowed grain at usurious rates, their wealthy counterparts bought stock at deflated prices in conditions of oversupply, sold or lent to needy families, purchased wage labour at depressed rates and purchased the scarest resource such as land of all on their terms (Watts 1983).

Chapters One & Two present the research problem, aim, objectives, the definition of concepts, conceptual and theoretical frameworks and a description of the study area.

Chapter Three presents the review of relevant literature.

Chapter Four describes the methodology employed in the collection and analysis of the data.

Chapter Five presents results and discusses the analyses of the field data.

Chapter Six presents the conclusion, recommendations and suggestions.

This chapter has provided a presentation of the background to the study, research problem and questions, conceptual and theoretical frameworks among others. The next chapter describes the features of the study area.

Chapter Two

BACKGROUND OF STUDY SITE

This chapter describes the study area, outlining its characteristic features such as the location, climate, drought and vegetation, land use and socio-economic status, HH types, agro-pastoralism and the extraction of NTFPs.

2.1. Location

The study area is Thorndale ($31^0$28'E; $24^0$39'S), forming part of the former Gazankulu homeland located in the Bushbuckridge region of the Limpopo Province, South Africa (Dovie et al. 2002). Thorndale shares a common boundary with the Manyeleti Game Reserve yet has no resource use access to the reserve. The Bushbuckridge region ($31^0$0'-$31^0$35'E; $24^0$30'-$25^0$0'S) borders on the Klaserie-Orpen Road in the north, stretching to the Drakensberg escarpment in the west, to the border with Kruger National Park and the Sabie-Sand Game Reserve in the east (Shackleton et al. 1995). The study area reflects the characteristics of the majority of communal lands in the country, since it was created for relocated families during the apartheid regime. It is remote, and relatively unstudied which served as a justification for the selection of the site for this study. Figure 2 below is a map of the study site.

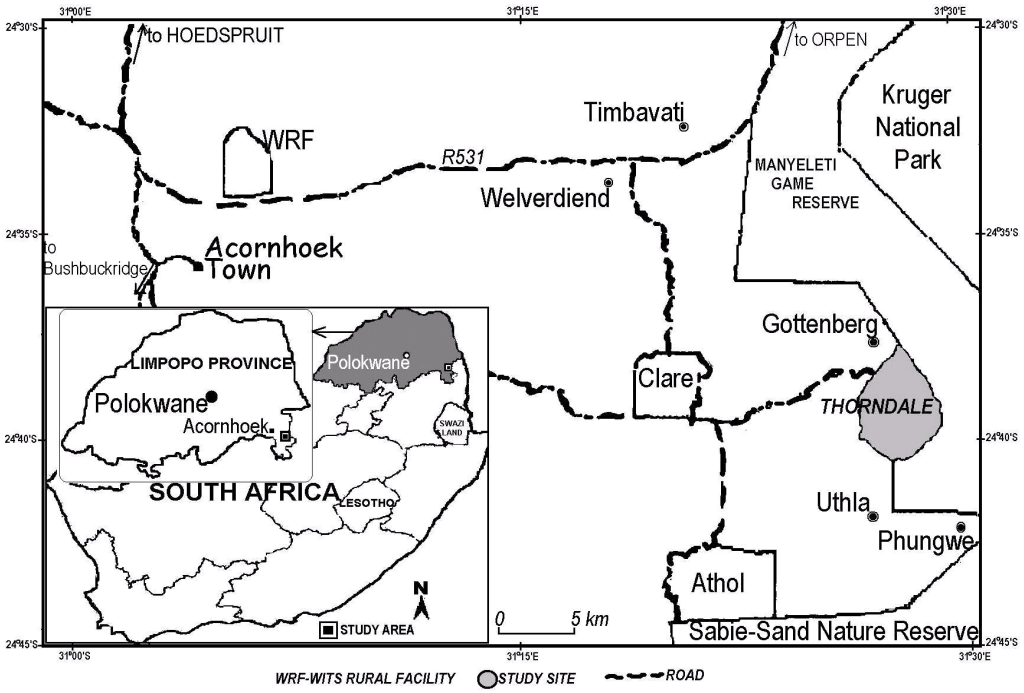

Figure 2: Map of South Africa showing Limpopo Province and the study site, Thorndale (Source; Dovie et al. 2005)

2.2. Climate, severe drought and vegetation

The Bushbuckridge region of which the study site forms part, experiences prolonged dry weather conditions annually and extreme drought events in certain years, e.g., 1982/1983, 1991/1992, 2002/2003. Mean annual rainfall is approximately 550 mm to 600 mm most of which is received between October and April, usually in the form of convectional thunderstorms. Mean annual temperature is approximately 22ºC. The Bushbuckridge region falls within a geographic area in the north of South Africa that, like other areas is prone to severe drought. This can result in significant rainfall deficits and drought variability (Fauchereau et al. 2003). The area may experience both prolonged and extreme drought and milder seasonal drought periods observed in the Bushbuckridge region, which coupled with delays in rainfall periods forces inhabitants to be more dependent on the savanna woodlands (Dovie et al. 2005).

Severe drought with periods of less than 75% of the mean annual rainfall occurs on average every 3.5 years based on over 20 years of rainfall data in the Bushbuckridge region, of which Thorndale is one of the villages (Dzerefos et al. 1995). More recently, drought has been reported as the most important cause of the loss of livestock such as cattle, goats and sheep in Thorndale and the third most important factor preventing a number of HHs from owning livestock (Dovie et al. 2005: 94). This confirms the fact that there is drought in Thorndale and if HHs can attribute the death of their animals and their inabilities to own animals to drought, then this could be severe. There are examples of drought that occurred in the summer seasons of 1982/1983, 1991/1992 that led to a drastic fall in livestock and crop productions (Vogel 1994a, 1994b) and most recently the 2002/2003 drought. As stated earlier, these droughts can reduce crop production, cause livestock death, and generally stress the food production system of rural people. The extreme drought events contribute to exposing weak and vulnerable HHs to outcomes of food shortages and scarcity of natural resources. As stated in section 1.1, this can lead to extremely negative impacts on society (Schulze et al. 2001; O'Brien and Vogel 2003).

As indicated above Thorndale is located in the savanna biome of the Bushbuckridge region, constituting the sour and mixed lowveld bushveld vegetation types (Low and Rebelo 1996; Mucina and Rutherford 2004). Thorndale has a relatively pristine woodland and grazing area bordering the Manyeleti Game Reserve (Dovie et al. 2005).

2.3. Land use and socio-economic status

The Bushbuckridge region covers a total area of 241,684ha. Land uses are communal rangelands (64.7%), plantation forestry (10.8%), dry-land arable agriculture (6.6%), irrigated arable agriculture (2.2%), residential (2.8%) and nature conservation (12.9%) (Shackleton et al. 1995). There are high population densities (>300 people/km^2 in the west and approximately 160 in the east), (Shackleton and Shackleton 2000). Thorndale has strictly zoned land use types and resource use is similar to that of other areas in communal lands. Land is categorized into arable and residential plots and residents are allowed free access for grazing and extracting of NTFPs in the remaining areas. Major livelihood income activities are the extraction of biological resources, mainly NTFPs from the savanna woodlands, crop production and livestock husbandry. Some studies (e.g., Dovie et al. 2002; Dovie 2004) have suggested that these resources are more important than farm and off-farm employment as well as social grants and remittances.

2. 4. Household types

Thorndale is remote as stated in section 2.1, cut off from major commercial centres, apart from a small and less developed town that is 12km away. With the exception of village primary school teachers and a few workers from Manyeleti Game Reserve, there is no other formal employment within several kilometres of the village (Dovie et al. 2005). The majority of HHs in Thorndale had at least one member who is engaged in formal or informal cash earning activities but often in the towns and cities. Certain HHs receive cash incomes from pensions, welfare and disability grants, remittances as stated above and gifts. The types of HHs in Thorndale include those who engage in the production of crops, those who are involved in livestock production, those who engage in the extraction of NTFPs and those who do a combination of these activities.

2.5. Agro-pastoralism

A survey conducted by Dovie in 1999 in Thorndale found that at the time crops were cultivated both around the homestead and in the arable fields. The four most cultivated were maize, peanuts, watermelon and common beans. The main task of women and children was the production of crops. The majority of the HH heads who farmed were the aged, ranging from 47-80 years, constituting 78.6% of the HHs in Thorndale. Ninety-six percent of HHs cultivate and harvest at least one type of crop (Dovie et al. 2003). Sixty-four percent of HHs owned cattle and goats, while 36% did not own any. The numbers of cattle owned per HH

ranged from two to sixty-seven animals, and one to thirteen for goats (Dovie et al. 2005). Some of the HHs that did not own any livestock benefited from strong social networks and kinship ties in the Thorndale community, which gave them access to livestock goods and services.

2.6. Extraction of non-timber forest products (NTFPs)

Empirical evidence indicates that rural communities and HHs engage in the gathering or extraction of wild foods (Herren 1991; Perkins 1991; Dovie et al. 2002; Dovie 2003). For instance, the extraction and consumption of twelve types of NTFPs often used as well as others with miscellaneous uses have been observed in Thorndale. The proportion of HHs that used various NTFPs was as high as 97.8% depending on the type of NTFPs. For instance, to over 90% of HHs, the most essential of these include wood for HHs' utensils, fuelwood, twig hand brushes and wild edible herbs, thatch grass for housing, weaving reeds, wild edible fruits and fencing poles are the most used NTFPs by HHs. Others include wild honey, mushrooms, construction reeds, indigenous wood for furniture, and bush meat (wild animal meat). Most of these resources were harvested from the woodlands (Dovie et al. 2002; Dovie 2003).

Irrespective of the wealth status of HHs they extracted NTFPs from the woodlands. Females in the most HHs did the extraction. There are no individual title deeds to the woodlands and anyone is allowed free access without any conflicts. Hence there is no explicit physical institutional control over the use of natural resources. The extraction of NTFPs for sale is not usually the norm, it is only associated with the construction of poles and fuelwood. Often there is no permission from the headman (the representative of the chief). The major drivers of the process of commercialisation through resident dealers who do the actual extraction are people who live outside the community. The communal rangeland is a common property resource and questions are therefore raised as to who benefits most and who manages it and with what authority and logistics for sustainable utilization (Dovie et al. 2002; Dovie 2003).

Having described the characteristics of the study area, namely, location, climate, severe drought and vegetation characteristics, land use and socio-economic status, HH types, agro-pastoralism and the extraction of NTFPs, attention now shifts to relevant literature pertaining to the study in the next section.

Chapter Three

LITERATURE REVIEW

This chapter examines relevant literature concerning issues regarding drought. First, it discusses climate and rainfall variability and the impacts of drought. Secondly, it explores the responses to such impacts including adaptation and coping strategies, institutional interventions and constraints encountered in the response process. Thirdly, it discusses HH livelihoods including assets, rural livelihoods and livelihood diversification.

3.1. Climate and rainfall variability

Rainfall variability in Southern Africa has undergone significant modifications, particularly in recent times. There has been an increase in inter-annual rainfall variability since the 1960s. In the light of this, droughts have become more intense and widespread (McCann 1987; Fauchereau et al. 2003; Lindesay 2003).

The geographic location, steep orography, contrasted oceanic surroundings and atmospheric dynamics of Southern Africa are conducive to extreme weather events and are associated with inter-annual rainfall variability. The consequences of extreme climate anomalies are often devastating to both human beings and property due to the fact that the major part of Southern Africa experiences poor infrastructure and low socio-economic development. For instance, 600 people died as a result of the February 2000 floods in northern South Africa, Mozambique and Zimbabwe, in addition to the destruction of 200 bridges and a 1000km road in South Africa (Fauchereau et al. 2003). Prolonged periods of drought were experienced in Southern Africa in the summer seasons of 1982/1983 and 1991/1992, which caused a severe reduction in crop and livestock production in many parts of the region (Vogel 1994a). These drought episodes highlighted the vulnerability of the region's food security as well as sources of water to such climatic anomalies (Fauchereau et al. 2003).

Southern Africa is perceived as one of the regions where potential changes in the hydrological cycle due to global warming could result in extreme negative impacts on societies. This is as a result of high vulnerability to weather and climate associated with the growing population as well as the resulting increased pressure on natural water storage capabilities (Schultz et al. 2001). It should however, be noted that during the 1970s, the loweveld region of South Africa experienced a decrease in rainfall (Mason et al. 1999).

3.2. Perceptions pertaining to drought

The common perception of drought is that it is a disaster. It is also perceived as a hazard. Hazards are physical or human-made phenomena, which may cause physical damages, economic losses or threaten human well-being in interaction with conditions of vulnerability (von Kotze and Holloway 1996). It has also been perceived as a business risk and not a natural disaster for instance, climate change is a risk to farm businesses as well as physical and social resources (Hayman and Cox 2003). Drought is perceived as a risk to the efficiency of the rural sector and hence national economy (Hayman and Cox 2003; O'Meagher 2003). It is recognised as a factor in divorce, suicide and illness in rural areas and thus a risk to the welfare of rural families and communities. It can serve as a catalyst for major upheavals in rural communities. It is the focal point for structural problems of farm size, the cost-price squeeze and the fragile interdependence of rural communities. However, Australia's Prime Minister Paul Keeping pointed out in 1994 that "drought and climate variability are part of the natural environment and does not constitute a natural disaster" (Hayman and Cox 2003:163).

Some Australians studies have for instance, observed drought as a consequence of not only low rainfall but rainfall deficiency as well and a risk on its own right. Drought and seasonal fluctuation conditions are perceived as normal recurring phenomena that need to be planned for just like any other business risk (Hayman and Cox 2003). Apart from the fact that drought is perceived as a risk in general, it specifically may be a risk to food security. More importantly, it is something that must be combated and battled with, with a plan of action for attack taking into consideration the fact that "drought grips, creeps, bites and decimates the land and people who are drought smitten, desperate and ruined" (Hayman and Cox 2003:162).

The perception of drought by the state is not necessarily the same as those of people who are directly affected by drought and who constitute social groups. Rural HHs who are most directly affected by drought, generally perceive drought as a "trait of life". The risk of drought has always been historically viewed not only through kinship bindings, but also from a very rational point of view with the overall objective to spread risks. Drought used to be perceived by HHs as a problem that concerns the family, ward or the tribe. It is perceived "as a group problem which was solved by consensus within the group" (Krüger 1999:181-182).

3.3. Impacts of drought

Agricultural drought may be regarded from an economic perspective as an exogenous or external variable that imposes significant constraints on production and income possibilities through its impacts on hydrological (O'Meagher 2003) and agronomic systems (Sarmiento 1998; O'Meagher 2003). These constraints in turn influence regional economic structures, patterns of settlement and eventually patterns of national economic development. The onset of drought may lead to a reduction in farm production, income, increase in the cost of inputs (O'Meagher 2003), as well as increase in the prices of food (Chambers et al. 1981; O'Meagher 2003). It may benefit farmers who are not affected by drought and in turn increase the vulnerability of the farm business of their affected counterparts.

Drought exerts pressure on farming families and communities (although some farming practices may also contribute to environmental degradation) (Cohen and Lewis 1987). It also has impacts both on the urban and other non-farm communities (Botterill and Fisher 2003), as well as results in the decline in agricultural output. For instance, it led to a 3% decrease in Zimbabwe's GDP (Bratton 1987) and a 50% decline in Kenya's maize production in 1984 (Cohen and Lewis 1987). It may also result in increased indebtedness culminating from the loss of productivity and thus income sources. Increased indebtedness (Watts 1983; McCann 1987; Mortimore 1989) and the loss of productivity also have a number of effects. These include the loss of employment opportunities as well as the stimulation of short term and permanent migration and hence farm labour shortage (McCann 1987; Mortimore 1989). The people more affected are HHs without readily available fiscal cash with the only option of either selling HH assets (Bratton 1987; Herren 1991; de Waal 1991) or seeking paid employment (Bratton 1987; Blaikie et al. 1994). Jobs may also be difficult to come by as a result of the effects of drought on the economy. Drought can exacerbate existing economic inequalities (Mortimore 1989; Herren 1991; Perkins 1991; Blaikie et al. 1994; Tiffen 1995) that often exist between HHs but are further compounded by drought and its associated impacts. For instance, in Dayi in northern Nigeria in 1987, the average proportion of grain needs met by production was found to be 1.20, ranging from 1.30 from rich families to 0.07 to the poor (Mortimore 1989). This may imply that the average grain needs production meets was 1.20, however, the grain needs of rich families (1.30) was higher than that of poor families (0.07).

Episodes of prolonged drought may have adverse economic implications for both local and regional non-farm businesses. Local and regional economies may experience an increase in the severity of drought impacts. Such episodes may ultimately flow through to other rural sectors such as forestry, fisheries and eventually to the economy as a whole. Flow-on impacts may include reduced non-farm production and employment, reduction in export income, increased consumer prices and reductions in national income. For instance, during 2002/2003 in Australia, a widespread drought was expected to reduce the national economic growth by 5.4 billion or 0.7 % points (O'Meagher 2003).

Livestock mortality is one of the most serious effects of drought (Bratton 1987; Mortimore 1989). For instance, between 1978 and 1983, the death of cattle was estimated at 36% of the communal land herds in Zimbabwe (Bratton 1987). Drought may result in the overall reduction in the numbers of livestock such as cattle, sheep, goats and chicken through disease, death and sale and/or the purchase of food (Watts 1983; Bratton 1987; McCann 1987; Mortimore 1989; Herren 1991; Perkins 1991; Tiffen 1995), while the consequent fall in prices may accelerate the process.

Consensus exists regarding the fact that climate change will worsen food security, due especially, to increased climatic extremes (McCarthy et al. 2001) and as stated in Chapter 1, may occur at various spatial and temporal scales (Watts 1983; Blaikie et al. 1994). The African continent has been observed to experience a major deficit in the production of food in many areas (McCarthy et al. 2001). Environmental change factors such as drought has differential impacts on various social groups. Frequently, it is the same food insecure people who are vulnerable to the effects of environmental change, especially drought. In rural areas, they include marginal and undiversified resource poor farmers, female-headed HHs, landless labourers, pastoralists and displaced people. Food shortage or food insecurity varies between groups (Moorehead and Wolmer 2001). Among farmers, food shortages are often caused by crop failures as a consequence of drought, plant disease, pests, natural disaster, civil disturbance or war (Cohen and Lewis 1987; Swift and Hamilton 2001). In Africa, food security may be affected by extreme events, especially droughts and floods (Cohen and Lewis 1987; Kadomura 1994; Scholes et al. 1996).

In most cases, drought may lead to the reduction of water in lakes, rivers, wells and boreholes. This has ripple effects on power generation since most countries on the African

continent and in other parts of the world depend on water in lakes and rivers, which in turn results in electric power rationing and load shedding, e.g., in Ghana (1982-1983, 1994) (McCarthy et al 2001) and Zambia (1992-1993) (Tiffen 1995; McCarthy et al 2001). The lack of rainfall may have serious and prolonged effects on the world's economies, causing a reduction in drinking water, agricultural productivity, extensive forest fires and disorders in electric generation and navigation (Sarmineto 1998).

Drought can have significant impacts on the health of human beings and these impacts are felt earliest in areas of chronic food deficit, especially in the lowlands and among the most vulnerable segments of the human population. For instance, in Zimbabwe, the Health Ministry reported in 1982 that in parts of the Matabeleland and Masvingo provinces about 70% of children were undernourished. Several other people recalled that the drought of the early 1980s were worse in comparison with those of the 1940s when "at least children had a bit of green maize and cattle had grass on which to feed" (Bratton 1987: 224). Additionally, teachers reported that school children reported to school without having eaten and fainted in the classrooms. In Zambia, a 1969-1972 survey showed that some children aged 0-4 suffered from drought-related, moderate to severe malnutrition (Tiffen 1995). In Africa, the prevalence of hunger provides an evidence of the consequences of chronic and episodic food insecurity and about two hundred million people are undernourished. In Central, Eastern and Southern Africa, over 40% of the population is undernourished. This number may have increased over the past few decades (McCarthy et al. 2001). Drought may also result in some children being underweight. Pregnant women and nursing mothers may also lack balanced diets. This is because most often there is the shortage of maize during such times, in addition to the shortage of such relishes such as legumes and vegetables which are good sources of essential amino acids, vitamins and minerals (Tiffen 1995). Furthermore, various sicknesses may be prevalent during periods of drought.

Drought becomes a crisis when it affects communities and families. It has been assumed to be a relatively slow phenomenon that could be expected and thus could be prepared for. Another deeply held assumption is that a 'community' is drawn together in some way during periods of drought crises and as the drought crisis continues casual labourers abandon agricultural production. There may be a decline in population, reduction of services, and fewer small businesses, less public transport, bank closures, high unemployment rates and the challenge of changing agricultural production as a result of drought. Another consequence is the way in

which social networks may fragment as a result of drought crises. Many people identify drought as the main reason why they no longer participate as much in activities that are not directly associated with farm production. For instance, in Australia, women were not able to participate in community activities such as Country Women's Association (CWA) or art groups because they felt that such activities were not contributing to the farm enterprise. Similarly, men were not involved in sporting activities. On the other hand, events associated with land care, agricultural field days and the sale of animals were considered worth the effort likewise expenditure on diminishing resources (Stehlik 2003).

Prolonged periods of drought have impacts on the propensity of farmers to organize themselves for production. Posner (1980:18) argues that, "greater uncertainty in food supply increases the demand for the principle of reciprocal exchange". It has been observed that mutual assistance, what (Watts 1983; Mortimore 1989; Blaikie et al. 1994, Devereux 2001a) term "the moral economy" with respect to social obligations exists to address the impacts of drought and is triggered by hardship situations. However, during periods of drought the system of social obligation may not function properly since people need to cater for their well-being above all else. This implies that the generalisation of hardship leaves no individual HH the chance in a position to help any other. As earlier stated drought has negative impacts on the farmer group's ability to pull resources such as draught power together at the level of production (Bratton 1987).

In the long term, drought may exacerbate existing social inequalities (Mortimore 1989; Herren 1991; Perkins 1991; Blaikie et al. 1994; Tiffen 1995) especially among village families. It may also result in the transfer of financial resources such as money and farm implements from poorer to richer farmers (Mortimore 1989). Family relationships undergo strain, especially when rural families visited their urban folks and were made unwelcome. More importantly, kin networks appear to be less extensive and less able to support families in times of drought (Vogel 1995).

Women may be responsible for various HH chores, however, these may be intensified and compounded during periods of drought. Furthermore, other gathering activities such as the collection of NTFPs are regarded as traditional female activities (Tiffen 1995; Dovie et al. 2002; Dovie et al. 2003). These activities are intensified during periods of drought. Female-

headed HHs (Tiffen 1995) are often likely to have to reduce the number of meals per day (Perkins 1991; Blaikie et al. 1994; Tiffen 1995) in their HHs.

3.3.1. Sequence of drought impacts

Drought impacts are often mostly felt by farm families as compared to most urban people who continue to receive their usual incomes and thanks to food imports, could continue to purchase food (Tiffen 1995) with some marked exceptions. The sequence of impacts associated with meteorological, agricultural and hydrological (Zucchini and Adamson 1984; Wilhite and Glantz 1985; Glantz 1987; Mortimore 1989; Vogel 1994a; Whittow 1996; Sarmiento 1998; von Kotze and Holloway 1999; Brignall et al. 1999; Botterill and Fisher 2003; National Drought Mitigating Centre (NDMC) 2003: O'Meagher 2003) drought as earlier stated in Chapter 1, further may make such differences more severe. The agricultural sector is normally the first to be affected by the commencement of drought since it relies on stored soil moisture, which is depleted by extended dry periods, while sub-surface water resources are often the last to be affected. The continuation of deficiencies in precipitation results in people who depend on water resources being affected by the shortages. A short term drought that persists for three to six months may have little impact on these sectors based on the characteristics of the hydrological system as well as water use requirement (Lindesay 2003; NDMC 2003).

The sequence of recovery is repeated for surface and sub-surface water supplies when precipitation returns to normal and meteorological drought conditions have abated. In which case, soil water is the first to be replenished followed by stream flow, surface water reservoirs and lastly ground water. The impacts of drought may diminish faster in the agricultural sector, due to its dependence on soil water, but this may continue for about a month or even years in other sectors depending on stored water or surface or sub-surface water supplies (Lindesay 2003; NDMC 2003).

3.4. Responses to drought

3.4.1. Developing resilience

Resilience is "the ability to build and increase the capacity for learning and adaptation" (Berkes et al. 2003:13). Developing resilience implies bouncing back after a shock. It particularly means that there are coping strategies in place that enable the successful

emergence from such shock or trauma posed by drought (Mortimore 1989; Perkins 1991; Botterill 2003; Stafford Smith 2003; Stehlik 2003). Research suggests that resilience is formed in families, between individuals and/or through their own networks, other family or social networks (Herren 1991; Blaikie et al. 1994; Botterill 2003; Stehlik 2003). Strategies for coping may vary across individuals, families and kinship networks, however. Individuals may identify a variety of personal coping strategies, in some cases relying on their spouses. In other cases, individuals draw on friendship networks established over several years in times of drought. For others, planning for the future enables less anxiety about the present (Stehlik 2003).

Resiliency may also occur at the community level during drought periods. Social solidarity and interaction at the community level enables a town or district to maintain its cohesion during difficult times. It is at the core of social cohesion and emerges most powerfully during times of crises. Studies identify the importance of concepts of community support, community empowerment and communal coping as "broad categories of community protective factors so that when a community moves through the process of resiliency, it becomes more successful at mastering adversity and change" (Stehlik 2003:93).

3.4.2. Adaptation Strategies

Adaptation to the above stated drought impacts take several forms. These may include long-term adjustments, which depend more on technological fix, which may entail low-cost technology such as the construction of reservoirs, boreholes and pipelines (Whittow 1996; Devereux 2001b). Dry season irrigation also constitutes a major buffer mechanism in the event of low or scanty rainfall (Watts 1983; Longhurst 1987). Another way of adapting to current climate variability is through the use of seasonal climate forecasting. Communities may be in a better position to adapt to longer-term climate changes, if farmers can adapt to current annual variability with the use of advance information on the future season's climate, in addition to institutional systems put in place to respond to short-term changes such as early warning systems (McCarthy et al. 2001). For instance, a seasonal maize water stress forecast for the primary maize growing regions of South Africa and Zimbabwe anticipates water stress six months before harvest time, with hind cast correlation over six seasons of 0.92 for South Africa and 0.62 for Zimbabwe based on correlations between water stress and records of historical global sea surface temperature (SST) and sea-level pressure (Martin et al. 2000). Similarly, in other regions and in terms of other crops, forecasts are possible.

On the other hand, poor nations may adopt alternative adjustments that can conserve soil water and groundwater resources and are non-structural such as growing drought-resistant crops, e.g., millet and sorghum (Watts 1983, 1987; Bratton 1987; Cohen and Lewis 1987; Mortimore 1989; Whittow 1996), lowering numbers of grazing livestock, improving land-use and marketing regimes.

In Zimbabwe, farmers come together to listen to extension workers or share ideas pertaining to daily production, for instance, most farmers' single stands of maize are planted in rows based on the recommendations of extension service providers. They also engage in pooling labour together whereby farmers get together on one another's field for collective work (Bratton 1987) as well as the sharing of draught animals (Bratton 1987; Tiffen 1995) and farming equipment (Bratton 1987). This entails assisting group members with seasonal agricultural tasks such as planting, weeding and harvesting. A communal building and ploughing system is another way of coping with food shortage. It ensures a wider distribution of livestock among the population, especially during periods of drought and food shortage (Vogel 1995).

3.4.3. Adjustment or Coping Strategies

There are several coping strategies adopted by HHs in order to cope with the impacts of drought, which may be classified into three categories. These include autonomous or internal adaptation measures that do not alter the structures of the HH, e.g., the sharing of food with other HHs. Secondly, there are internal coping strategies that may affect the composition of HHs temporarily (Krüger 1999), for instance, the search for waged employment on the labour market, which usually includes migration (Longhurst 1987; McDowell and de Haan 1997; Krüger 1999; Hussein and Nelson 2003) and remittances as earlier stated in Chapter 2, from working relatives (Bratton 1987; Glantz 1987; McCann 1987; Herren 1991; Francis 1998a, 1998b; Adger et al. 2002). However, migration is embarked on after the sale of assets and is undertaken as an action of last resort (Blaikie et al. 1994). This is an indication of the importance of such assets to rural populations. Migration is not always an effective strategy, however. It may lead to an increasing shortage of agricultural labour force in the rural areas (Glantz 1987; Krüger 1999). Finally, there are strategies that involve external assistance, especially reliance on public relief measures (Krüger 1999).

Similarly, in non-famine contexts, poor people may adopt fewer options and cheaper diets, which are routinely used as a relatively costless way of making limited resources last longer (Longhurst 1987; Devereux 2001a). HHs experiencing food shortage, are forced to 'trade-off' short-run consumption needs against longer-run economic viability (Devereux 2001a). HHs therefore decide on whether to sell key productive assets (Longhurst 1987; Devereux 2001a) and buy food or hold on to these assets and go hungry as a way of protecting future livelihoods (Devereux 2001a). These choices may have some implications for the immediate survival and future viability of the HHs.

Such coping strategies show that rural people are able to respond and survive during food crises triggered by drought. Studies show however, that Africans do not always starve[2] as a result of drought-related shocks and food shortages. In fact, Seaman (1993:7) observes that, "in the current development jargon, Africans do not starve, they 'cope'". It is thus a widely known fact that people who are faced with food shortage make strategic decisions about how to meet their deficits in consumption. Case studies conducted in the 1980s from Africa and South Asia suggest that there is a common pattern in the nature and sequence of strategies adopted by rural people experiencing food crisis. Based on these studies, three distinct stages emerged associated with increasing desperation, namely, insurance mechanisms, e.g., savings, disposal of productive assets and destitution behaviour, e.g., migration (Devereux 2001a) as earlier stated.

HHs may also cope by engaging in transfers such as interest-free loans or loans with interest between friends and neighbours (Watts 1983, 1987; Mortimore 1989; Devereux 2001a). Informal safety nets, e.g., the sharing of food among HHs are also adopted. These include vertical transfers, e.g., from richer to poorer HHs as stated above and horizontal transfers, e.g., between equally poor HHs. Vertical transfers are purposely engaged in for affection, duty or patronage without the expectation of reciprocity. On the other hand, horizontal transfers are made in order to spread risk or smooth consumption over time with the

[2] Hunger is no disgrace but it can compromise a person's honour – African Proverb. Households do not respond arbitrarily to food crisis for which they are in some sense conceptually prepared, rather they do so serially, with respect to the intensity of what one might call famine 'signals' – Watts 1983.

anticipation that the assistance provided might be reciprocated in the future when the need arises (Devereux 2001a)

3.4.4. Institutional interventions

In the broadest sense institutional arrangements are understood as the rules and norms that govern individual and group behaviour (Swift and Hamilton 2001). They are essential in coping with the impacts of drought. Supplementary supplies of food are made available by social organizations such as the extended family, the market and the state. Inherent in the extended family system is the issue of reciprocal social obligation, which binds people together in rural areas in times of need (Bratton 1987).

For example, the Zimbabwean government instituted two-hunger assistance programmes namely, a monthly financial aid payment to indigent families and a children's supplementary feeding programme aimed at malnourished under age five children. The government also launched a programme of food aid in 1982, for the drought stricken south with the objective of coordinating and augmenting efforts at drought relief to supplement the efforts of the church and charitable organizations. However, in depending on the state for food rural dwellers may compromise their autonomy as providers of food on their own (Bratton 1987). Governments also distribute seeds, for instance, hybrid maize seeds in Zambia (Tiffen 1995) and seeds and fertilizer in Zimbabwe (Bratton 1987).

3.5. Constraints

There are some constraints encountered in the process of responding to the effects and impacts of drought. A peasant HH's prospect of agricultural production depends on both ecological factors such as rainfall and the organisational factors of access to and management of production resources. The lack of water is the major limiting factor in agricultural production (Bratton 1987; Hussien and Nelson 2003) and the greatest source of uncertainty for the farmer (Bratton 1987). Another inhibiting factor is the scale of production, especially its small nature as well as its inability to make economical use of new technologies or commercial services (Bratton 1987). The lack of productive and/or agricultural and financial resources and infrastructure (Bratton 1987; Hussein and Nelson 2003) and the lack of access to credit facilities (Hussein and Nelson 2003) are amongst other constraints HHs may encounter. Furthermore, small farmers encounter the scarcity of draught animals such as

cattle, camel, donkey and oxen. For example, the scarcity of oxen in Zimbabwe (Bratton 1987) and in Ethiopia (McCann 1987) many of which die due to drought is one of the main resource constraints that inhibits food crop production in addition to the shortage of rainfall and good quality land respectively (Bratton 1987).

3.6. Household livelihoods

3.6.1. Assets

Assets such as farming tools, land, jewelry, livestock or outstanding loans as stated earlier serve as a buffer against the impacts of drought. They are important for the sustainability of HHs and communities' livelihoods, hence different kinds and values of assets are held by both HHs and communities. For instance, productive assets represent the future stream of income or produce that will sustain HHs over time hence they are important for rural livelihoods. The opportunity cost of giving up these assets and hence becoming destitute is very high. During periods of drought these costs are weighed against other strategies to protect key productive assets such as incurring debt, selling 'liquid' assets or, as earlier stated, reducing food intake. In certain cases drought affected populations will choose to go hungry in order to preserve their assets and future livelihoods (Blaikie et al. 1994; Lautze 1997). Some people may also go hungry because they have no other options, namely, assets and livelihood strategies.

Those who need to dispose of their assets for survival purposes may however, realize only a fraction of their value as a result of desperation to sell and depressed famine prices; they may also encounter both high vulnerability and significant improvement. During periods of drought these depressed asset prices may be due to the fact that the market becomes flooded when HHs dispose of similar assets within a short period of time (Lautze 1997). Rural families lose their assets through reduced harvest, death of animals and their sale due to drought (Herren 1991; Perkins 1991; Blaikie et al. 1994; Tiffen 1995; Vogel 1995). They may lose 30-100% of their income in cash and in kind depending on the variety of income sources they had, unlike urban families as well as rural civil servants (Tiffen 1995) who have regular and secure income sources.

3.6.2. Rural livelihoods

Although agricultural production makes a small contribution to HH income, over one-third of rural HHs continue to engage in agricultural production making it the third most important livelihood tactic used in rural areas after remittances and wages from low-skilled jobs (May et al. 2000). Many HHs are heavily involved in commercial production of high value crops such as tea, coffee and tobacco in many regions, e.g., Central and Western Kenya. Other regions have been migrant-labour economies for several generations with farm output falling since at least the Second World War. Household differentiation is important in all these areas. There are HHs that made quite substantial incomes from livelihood strategies (Maxwell 2001b) such as farming, trading and migrancy but there equally are HHs that have little or no land or who never receive remittances. Such HHs may be forced to juggle several sources of income, none of them either substantial or particularly reliable for instance, small-scale trading, selling handicrafts and casual work on the farms of better-off HHs. These processes are also found in many other regions of Eastern and Southern Africa (Francis 1998a). In some regions as earlier stated people depend mainly on resources coming from urban areas in the form of wages and remittances (Bratton 1987; Glantz 1987; McCann 1987; Herren 1991; Francis 1998a, 1998b; Adger et al. 2002) and pensions or on seasonal labour on large and emerging farms (Francis 1999).

3.6.3. Livelihood diversification

Economic studies distinguish between several different categories and sub-categories of income sources with reference to diverse income portfolios (Francis 1998b). The primary categories of livelihoods as earlier stated are on-farm, off-farm (Longhurst 1987; Watts 1987; Francis 1998a, 1998b; Swift and Hamilton 2001; Bryceson 2002) and non-farm (Blaikie et al. 1994; Francis 1998a, 1998b; Bryceson 2002) income sources. On-farm income entails livestock and crop income and encompasses both consumption-in-kind or own farm output and cash income from output sold. Off-farm income refers to income generated from trading, wage and labour exchange on other farms within agriculture. It also includes labour payments in kind such as the harvest share systems and other non-wage labour contracts that remain prevalent in several parts of the developing world. Non-farm income refers to non-agricultural sources of income. Several secondary categories of non-farm income have been identified, these include non-farm rural wage employment, non-farm rural self-employment and urban to rural remittances arising from within national boundaries and international remittances arising from cross-border and overseas migration (Francis 1998b).

Livelihood diversification is neither just a rural nor only a developing phenomenon. It has been documented as a strategy of survival for urban dwellers in developing countries as well (Maxwell 1995). From the perspective of food security and environmental hazards such as drought, livelihood diversification is the most important strategy. It is increasingly becoming prevalent among farming families in developed countries as agricultural prices and other supports are removed (Kelly and Ilbery 1995). More generally, it is also an emerging feature of labour markets in the industrialised countries. It has been associated with the rise of part-time and home-based working patterns (Francis 1998b).

Livelihood diversification (Francis 1998b; Bryceson 2002; Hussein and Nelson 2003) is not synonymous with the diversification of income. Nonetheless, some economic studies of diversification focus on different sources of income (Reardon et al. 1992; Adams and He 1995). As stated above, these include on-farm, off-farm (Watts 1987; Francis 1998a, 1998b, 1998b; Hussein and Nelson 2003) and non-farm (Blaikie et al. 1994; Francis 1998a, 1998b; Swift and Hamilton 2001; Hussein and Nelson 2003) sources of incomes and remittances (Bratton 1987; Glantz 1987; McCann 1987; Herren 1991; Francis 1998a, 1998b; Adger et al. 2002) and their contributions and relationship to income levels, the distribution of income, assets, farm output among other variables (Reardon et al. 1992; Adams and He 1995). Income diversity refers to the composition of HH incomes at a given point in time. This is interpreted in terms of diversification as an active social process whereby HHs have been observed to engage incessantly in intricate portfolios of activities as earlier stated during periods of drought. However, HHs may not always be able to do this. Lack of comparable evidence across intervals of time implies that it is rarely possible to firmly state whether HH livelihoods are more diverse now than they were some decades ago (Heyer 1996; Reardon 1997). There seems to be an informed consensus for sub-Saharan Africa (SSA) that diversity has been increasing in recent times (Bryceson 1996). For instance, non-farm income is the source of about 30-50% of HH income in SSA and 80-90% in Southern Africa (Swift and Hamilton 2001). Livelihood diversification may also occur when rural people or producers change the composition of the agricultural products they produce (Hussein and Nelson 2003). Diversification implies a change from existing activity patterns. It may be both a path to a new livelihood outcome as well as an agent of social and cultural change.

Having examined climate variability, the perceptions of drought, impacts and sequence of the impacts of drought, adaptation and coping strategies, constraints, assets, rural livelihoods and

livelihoods diversification in this chapter, attention now shifts to research methodology in the next chapter.

Chapter Four

METHODOLOGY

In investigating the study's research questions the quantitative-qualitative approach was adopted. First, this chapter outlines the design of the research as well as the sampling approach employed. This is followed by the description of the data gathering instruments used as well as the statistical procedures used in the analysis of the data. Finally, the methodology's associated limitations, ethical issues and the significance of the study are presented.

4.1. Data generation

Figure 3 presents an overview of what was exactly done in terms of methodology as well as the data produced. The details of this overview are discussed below.

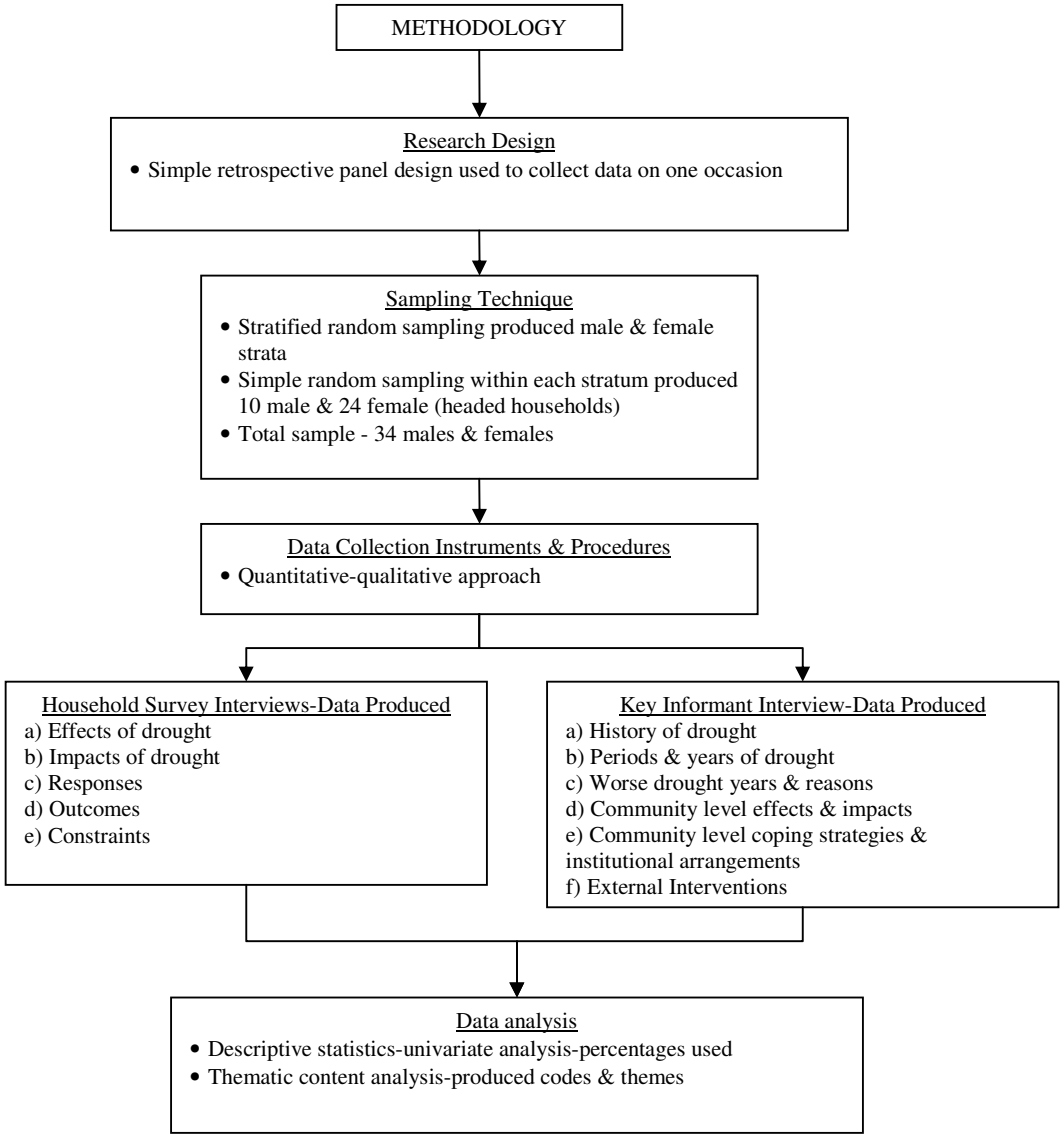

Figure 3: shows the methods used and the data produced

Research design

For the purposes of this study, the simple retrospective panel design, which involves the collection of data on one occasion only (de Vaus 2001) was adopted. The purpose of this approach was to describe the responses of HHs to the impacts of the drought. On the basis of this, HHs in Thorndale were asked questions about what the impacts of the 2002/2003 drought were, how they responded to these impacts as well as the constraints they encountered in responding to these impacts and how they overcame these constraints and the implications of the drought for HHs' livelihood strategies.

Sampling Technique

For the purposes of sampling, the stratified random sampling technique was adopted, the principle of which divided Thorndale's total population which was 450 inhabitants made up of 71 HHs (Dovie et al. 2005) into two different groups that reflected such characteristics as male(s) and female(s). Subsequently, within each stratum simple random sampling was performed, 10 male headed and 24 female headed HHs constituting a total of 34 males and females were selected. The idea was to select 17 male and 17 female headed HHs, however, it turned out that seven of the male headed HHs were actually headed by their female spouses since the males had out-migrated to other towns. The ages of the sample unit of 34 ranged from 26 to 85 years, was obtained after the selection. This gender based group constituted the first group of respondents, while the key informants constituted the second group. This sample unit/size was chosen based on university rules for masters' research reports, which stipulate a minimum of between 20-30 interviews or sample units. Additional reasons pertain to time, financial constraints and the degree of precision and accuracy required. The rationale however, for choosing this technique was because it produces representative samples (Goddard and Melville 2001; Kumekpor 2002; Neuman 1994, 2003), it accommodated the use of smaller groups as it was in the case of this study, ensured greater precision and accuracy, it saved time and preserved the proportion of even small samples (Bless and Higson-Smith 2000; Kumekpor 2002).

Data collection instruments and procedures

The quantitative-qualitative approach was used in the collection of data on the impacts of the drought as well as coping and/or adaptation strategies (livelihood strategies used) by HHs in response to the drought. The quantitative and qualitative techniques differ in many ways, e.g., the quantitative approach is used to collect hard data in the form of numbers, while the qualitative approach collects soft data in the form of impressions, words, sentences, photos, symbols etc. But the techniques complement each other as well (Neuman 2003). The approach combined quantitative-qualitative investigations, it thereby allowed for deeper exploration of the problem under investigation. For instance, the use of this approach enabled the construction of both open- and close-ended questions in the data collection instruments. The approach was a very useful tool for the data collection because it enabled the researcher to perceive research questions more critically using different methodologies and also enhanced the ability of the researcher to analyse and portray pertinent results of the findings. This approach enabled the exploration of research problems more intensively.

The research instruments contained questions that differed from one group to the other based on the nature of information expected from each group. For instance, in the case of the HH survey interviews, the information expected included the effects, impacts of the 2002/2003 drought and responses to these impacts as well as the constraints encountered at the HH level among others. On the other hand, the type of information anticipated from the key informants entailed the history of drought in the community, community level impacts of drought and how these have been responded to at the community level including institutional arrangements and external interventions among others. Nevertheless, questions directed to groups such as female and male-headed HHs contained an important number of open-ended questions since more descriptions were expected from them, in addition to close-ended ones. The same applied to the key informants. All interviews were administered in a more flexible way and the responses recorded.

Household survey interviews

HH survey interviews enabled the study of people's opinions about and associations with major social, economic and political issues and to locate individuals or groups with specific views on specific social issues such as drought (Kumekpor 2002). This instrument was used in the collection of data that were detailed and precise pertaining to specific HHs on coping and or adaptation mechanisms in relation to the drought. Furthermore, the instrument ensured the clarification of drought-related issues such as food and water shortages, provided an interpretation of the participants' responses and elicited better rates of responses. It was also helpful in interviewing respondents who could not read and write (Bless and Higson-Smith 2000; Goddard and Melville 2001).

For the HH interviews, the following were examples of the questions posed;

1) What were the effects of the 2002/2003 drought on the environment?
2) What were the impacts of the effects of the drought on your HH in relation to crops, livestock, cash income, the health of household members and social activities?
3) If your household had diverse means of responding to the drought, what were they?
4) What were the constraints encountered in responding to the drought?

Key informant interviews

These involved an interview process with identifiable elderly people who provided detailed information based on their expertise and/or knowledge (Bernard 1994; Wong et al. 2001).

These included objective insiders with many years of association with the village. The key informants included the headman, a teacher, a priest, a traditional healer, the chairman of the school governing board and an elderly woman. This paved the way for the tracking of the history of drought and the impact of other socio-economic and political factors and trends in Thorndale. Such events and trends were not captured in the HH interviews and therefore provided a broad overview of transformations that have occurred in HHs' responses to drought. The intention of this information was to guide the development of the scenarios under research question four as stated in Chapter 1. In all, six key informant interviews were conducted, constituted by three males and three females.

For the key informant interviews, the following were examples of the questions posed;

1) Is drought a problem in your community?
2) How often does drought occur in your community?
3) In your opinion which drought period has been the worse drought experienced in your community?
4) How did people in your community generally cope?

Type of data produced

Data obtained from HH interviews included;

1) The effects of drought (e.g., dryness of rivers, vegetation etc)
2) The impacts of drought (e.g., loss of animals, no farming, sickness etc)
3) The responses (e.g., migration, search for jobs, selling of assets etc)
4) The outcomes (e.g., more income, better life and suffering)
5) The constraints encountered (e.g., difficulty in mobilising resources such as money).

Data obtained from key informant interviews included;

1) The history of drought
2) The periods and years of drought
3) The worse drought years and reasons
4) Community level effects and impacts
5) Community level coping strategies and institutional arrangements
6) External intervention (e.g., government, NGOs and food parcels).

To reiterate, the data was used to answer the following research questions;

1) What were the impacts of the 2002/2003 drought on the Thorndale community?
2) If households had diverse means of responding to the drought, what were they?
3) What were the constraints encountered in responding to the drought?
4) Because the responses to the impacts may have implications for livelihoods, what were the scenarios of the ensuing livelihoods in the community?

4.2. Data analysis

The main findings related to each objective were analysed and described. Thematic content analysis was employed for the development of codes and themes. In this regard, the process of analysis entailed two stages, the first of which entailed the development of themes and codes and the second involving the validation and usage of the codes. The kind of themes included HH structure, ecological context, and division of labour, effects, impacts, responses, constraints and diversification of livelihoods. However, within the first stage, the data-driven approach was used in the development of codes. From this approach codes were generated from the raw information. This approach produced a result that had a higher inter-rater reliability (Boyatzis 1998). Afterwards the codes were applied to the raw information, validity was determined and the results interpreted. Furthermore, the univariate analytical component of descriptive statistics was used in the analysis of the data. Descriptive statistics are statistical computations used in organizing and describing the characteristics about a data set of a sample and the relationships existing between the variables of the sample (Salkind 2000; de Vaus 2001; Greenstein 2003). Frequencies were used in breaking down the overall data into categories and they were presented as percentages of the total (Babbie 1992; Salkind 2000; de Vaus 2001; Greenstein 2003; Newman 2003). Subsequently, the results were presented. All the interpretations emerging from the different questions were drawn together, contradictions raised, similar interpretations merged and conclusions drawn on the basis of which recommendations were made.

4.3. Limitations of method

There were some problems of interviewing that arose in the course of the study such as unfriendly interviewing atmosphere, framing questions improperly, errors and omissions in the recording of responses. These problems were addressed by adopting a pleasant interviewing approach, paying careful attention to the language and phraseology of questions

as well as regular inspection and reviewing of each completed schedule respectively (Neuman 1994, 2003; Kumekpor 2002). There was also the issue of interviewer bias, the remedy of which lay in the survey researcher proscribing the interviewer to reduce bias (Neuman 1994, 2003).

Language barrier

A problem was encountered with respect to language. This was due to the fact that the people of Thorndale are part of the marginalised and minority ethnic group in South Africa and are Shangaans (Dovie et al. 2005). Thus, the services of an interpreter, Jethro Monareng, a BSC honours holder who hails from Acornhoek in the Bushbuckridge Region was employed. He speaks Shangaan and has been doing this translation work for years. Mr Monareng translated and administered the survey instruments. This further raised problems of more time being spent on each interview than was initially anticipated. This issue, in addition to the fact that the interpretation of the interviews might not be exactly the same meant that the whole interview process became very cumbersome.

Respondent burden

Panel studies impose a considerable degree of burden on the participants especially if the interviews are lengthy or intrusive. More importantly, a great degree of respondent burden is a problem since it can produce high levels of attrition and hence the loss of the quality of the data collected (de Vaus 2001). As a result the interview schedules were brief, concise and precise in order to avoid burdening the participants.

Respondent recall

The issue of distortion was one other problem that was encountered, in the usage of the simple retrospective panel design as earlier stated in section 4.1, as a result of reliance on respondent recall.

Cost issues

Face-to-face interviews are the most expensive data collection instruments. They were used, however, because they have the tendency or capability to yield the best responses from the research participants.

4.4. Ethical issues

An introductory letter was given to the headman of the Thorndale community in addition to an introductory meeting way ahead of the study (the actual field work). Confidentiality, anonymity and informed consent were ensured and sought respectively in conducting this research. Besides, the nature of the design ensured that there was less intrusion on the privacy of the participants.

4.5. Significance of the study

The significance and contribution of the study lies in the contribution it makes to knowledge and literature in the topic area, policy considerations and to practitioners (Punch 2000:74). It is anticipated that this study will add to the few studies that have been conducted and the literature available on this topic, especially in the case of Limpopo Province.

After describing the methodology used in the collection and analysis of data among others, attention now shifts to the presentation of results and discussions in the next chapter.

Chapter Five

RESULTS AND DISCUSSION

This chapter deals with the presentation of data and analysis of the findings on the basis of the research objectives indicated in Chapter 1. The issues in this chapter range from HH information, dealings with extension officers, the perception and characteristics of the 2002/2003 drought, the HH level impacts of the drought and community level impacts of drought in general. It also discusses with responses at the HH and community levels to these impacts, institutional arrangements, external interventions as well as the constraints encountered at both levels, and finally the implications of the 2002/2003 drought on HHs' livelihood activities. Furthermore, it should be reiterated that the study consisted of two major groups. The thirty-four male and female headed HHs constituted the first group from whom data on HH level impacts, responses and constraints were obtained, while the six key informants constituted the second group that provided data on community level impacts, responses and constraints as stated in Chapter 4.

5.1. Household information and dealings with agricultural extension officers

Data on HH information provided in this section were collected during the interviews. The information on HH includes HH size, crop and livestock production. The information served as a basis for the interpretation of data analysed in the subsequent sections. Dealings with extension officers are also discussed in this section.

5.1.1. Household size

The population of Thorndale has been estimated at 450 persons, which constitutes 71 HHs (Dovie et al. 2005). Out of the 71 HHs, 34 participated in the study as stated in Chapter 4. The HH members of the 34 participating HHs ranged from one to sixteen members. Table 1 below indicates that 20.6% of the HHs consisted of five members, 17.7% consisted of six members, collectively 17.7% consisted of one, three and seven members, 11.8% and 11.8% consisted of four and nine members respectively, 8.8% consisted of twelve members, while 10.6% consisted of eight, eleven, thirteen and sixteen members collectively.

Table 1: Household composition in Thorndale

No. of HH members	*HH (%)*
1	5.9
3	5.9
4	11.8
5	20.6
6	17.7
7	5.9
8	2.9
9	11.8
11	2.9
12	8.8
13	2.9
16	2.9

The number of people in the HH is important when it comes to issues of food consumption especially during times of food shortage. This implies that when food and water are scarce or in short supply, the little available would have to meet the dietary needs of large numbers of people. This further means that hunger will only be partially satisfied, particularly when the HH is not able to secure enough food for its members. One thing observed in the field was the fact that the head of one HH, which consisted of 13 members and the second largest HH in the study, was a commercial farmer. One would expect that he would have enough food available to his HH during times of food shortage, compared to people who produce on a much smaller scale. However, for one reason or the other, he did not have a bumper harvest the season before the drought set in, and his HH suffered food shortage like all other small-scale farmers/producers and or other HHs.

5.1.2. Types of crops produced in Thorndale

The purpose of this result is to present crop production undertaken at the HH level. The groups of people (gender) who were directly involved in these production activities were not considered. The production of crops was undertaken by 94.1% of the HHs, while 5.9% did not. Out of this, 85.3% engage in the production of maize, peanut (35.3%), common beans (47.1%), bambarra beans, cassava, sweet potatoes, wild edible herbs and onions (64.8%). In addition to lettuce, spinach, tomatoes, cabbage and carrots (55.9%), okra, traditional vegetables, beetroots and butternuts (52.9%), pumpkin (47.1%) and water melon (32.4%), pawpaw, guava, mangoes, oranges, banana and grapes (47%) are grown (Table 2). According to the HHs, under normal circumstances they produce above average and even better but

during the 2002/2003 drought, they had no crop yields due to the lack of rains coupled with dry spells.

Table 2: Crop types in Thorndale

Crop types	*HH (%)*
Maize	85.3
Peanuts	35.3
Common beans	47.1
Bambarra beans	26.5
Cassava	5.9
Sweet potatoes	5.9
Wild edible herbs	11.8
Onions	14.7
Lettuce	2.9
Spinach	26.5
Tomatoes	14.7
Cabbage	5.9
Carrots	5.9
Okra	8.8
Traditional vegetables	26.5
Beetroots	14.7
Butternuts	2.9
Pumpkin	47.1
Water melon	32.4
Pawpaw	8.8
Guava	8.8
Mangoes	8.8
Oranges	5.9
Banana	11.8
Grapes	2.9

5.1.3. Types of livestock produced in Thorndale

The purpose of the results in this section is to present asset possession at the HH level, without considering the ownership of assets (livestock) in general. The majority of HHs (67.6%) engaged in livestock production, while 32.4% did not. Those HHs who did not engage in livestock farming gave various reasons for their non-engagement in this activity. In illustration, some HHs (4.3%) stated that all their goats died during the 2002/2003 drought. Others (4.3%) reported that their HHs did not engage in livestock production because of the rampant drought that the community experiences, which caused the loss of livestock through death. This was compounded by their inability in the community to prevent the animals from dying by providing them with medication and fodder. Dovie et al. (2005) have observed that

in Thorndale the lack of money was the most important reason why 56% of HHs did not own livestock, followed by the absence of herders and the loss of animals through drought. Other HHs had their livestock, especially chickens, stolen. Most HHs (58.8%) engage in the rearing of chickens, which makes them the most prevalent livestock produced in the community, while a minority of HHs (26.5%) engage in the production of donkeys, goats, guinea fowls and ducks (Figure 4).

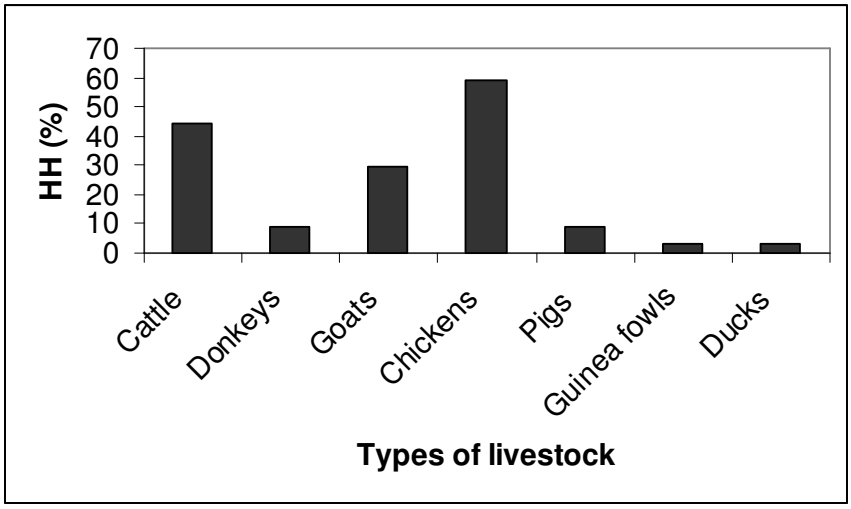

Figure 4: Production of livestock in Thorndale

5.1.4. Dealings with agricultural extension officers

As stated in Chapter 3, studies have shown that during drought periods the agricultural sector is usually the first to be affected as a result of its dependence on water for its activities (NDMC 2003). Consequently, farmers need to have contacts with an extension officer(s) with the aim of receiving advice regarding their productive activities (Bratton 1987), yet the majority (64.7%) of Thorndale's HHs did not have such contacts. This may be due to the fact that some of these HHs did not engage in the production of crops and/or livestock, e.g., some HHs are woodcutters and fuelwood sellers. Others may engage in crop production but do not have the opportunity to contact or deal with an extension officer due to other reasons. However, a minority of them did have contacts or dealings with such officers. HHs in this category have contacts with extension officers once a month (14.7%) and once in 2-3 months (2.9%) (Figure 5). Out of the 35.3% of HHs who had contacts with an extension officer, 41.7% were males and 58.3% were females.

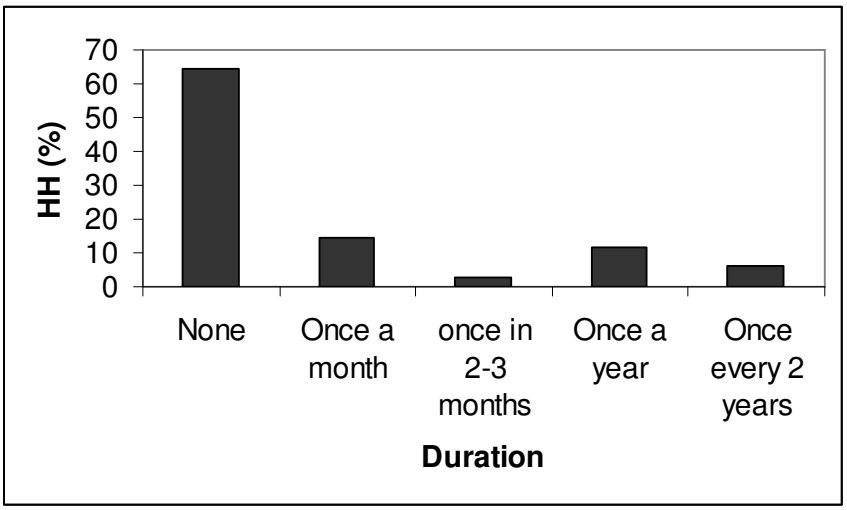

Figure 5: Contacts with extension officers

The 35.3% of HHs who have had contacts with extension officers indicated that the advice as well as assistance they received entailed farming practices such as buying seeds needed for crop production and storing the produce harvested for eventualities such as droughts. In addition to learning how to prevent the ongoing mortality of livestock, they learn how to vaccinate livestock, how to get medication for livestock, how to get supplements, starting home and community gardening, provision of seeds and sometimes money as well as refraining from eating animal carcasses resulting from the deaths caused by drought. The HHs indicated that such advice were useful because people were helped with financial resources such as money for exactly what they required for production purposes. The advice yielded good results, for instance, people refrained from eating animal carcasses, the community could start selling its produce and such advice enabled the storing of produce, especially mealie meal (maize meal).

Other HHs who received advice from the extension officer(s) (8.3%) stated that the advice was not useful since the livestock continue dying. They explained that the extension officers were deceiving them. This may imply that such people did not believe or have confidence in the advice they received from these officers. This may also imply that such HHs/farmers did not receive the exact advice they require for their specific and unique situations. Similarly, agricultural extension officers have been criticised for ignoring the diversity in approaches to farming activities even among neighbours with similar resources (Hayman and Cox 2003). HHs (16.7%) reported that the extension officer(s) promised to give them seeds (starter

packs) but did not honour the promise. Another challenge facing the services of the extension officers is the HHs' (8.3%) complaints that quality training and guidance were lacking and therefore were inadequate particularly with respect to the advice to start home and community gardening. Another essential observation by 8.3% of the sample is the fact that things would have been better if the extension officers visited the community, especially farmers more often.

These results are important because extension officers are supposed to assist farmers in the application and adoption of appropriate technology, identify and establish contact with farmers as well as assist farmers to identify problems and advice on remedies to these problems, identify and forecast pest and disease outbreaks and educate farmers in farming practices. Furthermore, the intention of agricultural extension services is to ensure equity in agricultural service delivery by improving access to the underserved. However, these results may be an indication of the fact that a loophole exists in these functions and extension service delivery as a whole, implying that some rural communities including Thorndale are underserved in terms of the delivery of such services. These loopholes need to be strengthened to ensure that the underserved are served.

5.1.5. Summary

In discussing issues pertaining to the impacts of the drought and the corresponding responses, issues of the size of HHs, the types of crop and the livestock production they undertake are crucial, because the impacts affect the HH as a whole. This is equally related to HH responses especially when it comes to the issue of food consumption. It was found that the largest HH in the study consisted of 16 members and the smallest HH consisted of one member. As earlier stated, one other HH that consisted of 13 members' head is a commercial farmer. Furthermore, the majority of HHs engaged in the production of maize, while minority engaged in butternut and grape production. Most HHs engaged in the rearing of chickens, which makes them the most produced livestock in Thorndale, with cattle being the next highest produced livestock. However, guinea fowls and ducks were the least produced. An important aspect of agricultural productivity lays with dealings with extension officers for purposes of obtaining advice. The study revealed, that majority of the HHs did not have contacts with extension officers. The explanation for this includes the fact that some HHs are neither crop nor livestock producers. Furthermore, most of those who dealt with such officers indicated that the advice they received were useful.

Having mentioned the above issues attention now shifts to the impacts of the 2002/2003 drought, the responses to these impacts, the constraints encountered as well as the drought's implications for HHs' livelihoods.

5.2. The consequences of the 2002/2003 drought

The data presented in this section addresses with the first objective set out for the study. The section presents results on the general history of drought in the community obtained from key informants interviews and the perceptions of HHs about the 2002/2003 drought in relation to the consequences of the 2002/2003 drought on HHs and the environment obtained from HH survey interviews. In addition, it presents results on community level impacts of drought in general. The data obtained from key informant interviews confirmed responses from the HH level as well as indicated the community level impacts of drought in general as earlier stated.

5.2.1. Drought experience in Thorndale

According to the key informants drought is a problem in the Thorndale community. They explained that drought affects everything and all aspects of their lives, further indicating, e.g., that drought caused the shortage of water (20%) in the community, while (4%) indicated that it also caused the sale of livestock (Figure 6).

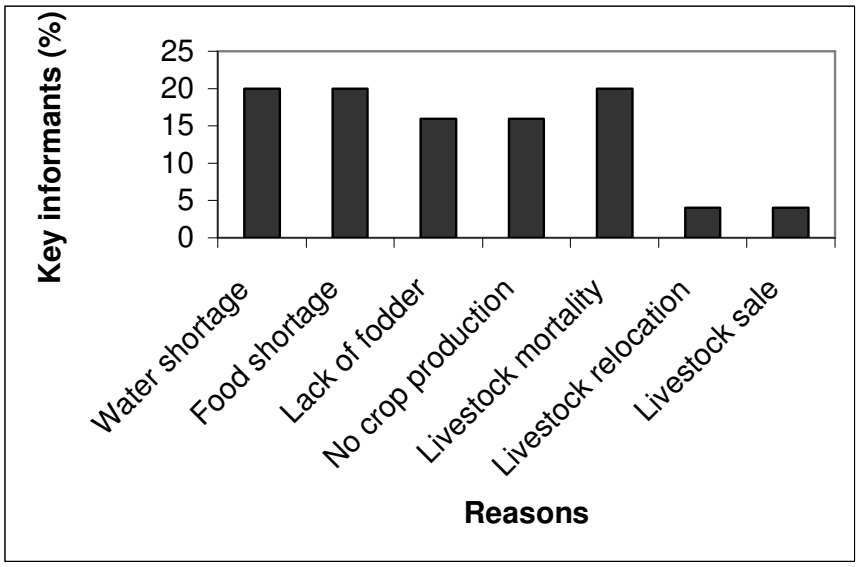

Figure 6: Reasons why drought is a problem in Thorndale

Drought causes the shortage of food, water, fodder, the mortality of livestock and thus led to the compulsion to sell and/or send livestock to safer communities where there was no drought or where fodder and water can be obtained. It also led to a reduction in or no crop production. It was observed that due to the shortage of water during periods of drought in the community, HHs had to travel long distances, for instance, l0km to fetch water. Livestock producers, who could afford it, usually undertake the relocation of livestock that was usually caused by water and fodder shortages in the community, while others fetch fodder from other communities for feeding their livestock. They further explained that the mortality of livestock such as draught animals affect the entire community since the whole community both livestock owners and non-owners benefit, e.g., other community members can hire or rent them for their individual productive and/or other uses. Studies (e.g., Bratton 1987; Watts 1987; Tiffen 1995) confirm that livestock mortality, including draught animals affects an entire community. Dovie et al. (2005) have observed that non-livestock owning HHs in Thorndale enjoy benefits in the form of gifts or cheaper goods and services. This may signify social or moral obligation towards one another, or mutual help tradition among members of the community.

5.2.2. Frequency of drought occurrence in Thorndale

The key informants (composed of the headman, a teacher, a priest, traditional healer, chairman of the school governing board and an elderly woman) indicated that drought occurred almost every year in their community particularly during the July-August-September period. Figure 7 indicates some of the drought years they identified. The most frequently mentioned drought years were 2002/2003 (20%) and 1997 (6.7%). The interval in the drought years range from one year to between nine and ten years. In explaining the causes of drought one key informant stated that ‘solar eclipse’ was the cause of the droughts and that “‘solar eclipse’ affects everybody and even everything including Human Immuno-Virus/ Acquired Immune Deficiency Syndrome (HIV/AIDS) and livestock” (Ngobeni, August 2005).

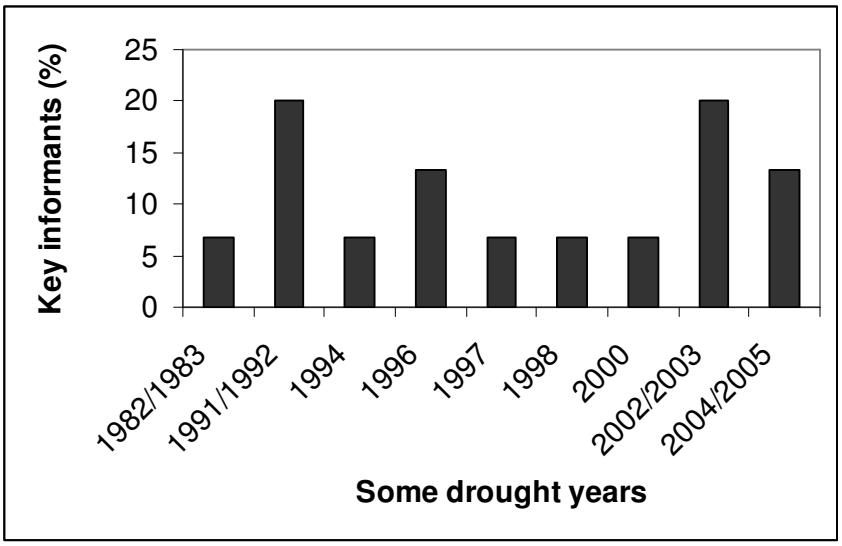

Figure 7: Drought years in Thorndale

5.2.3. Worst drought experienced

As it can be seen, the community battles with several severe drought episodes (Figure 8). According to the majority (42.8%) of the key informants the 2002/2003 drought was the worst drought the community has ever experienced. They explained that during the 2002/2003 drought vegetation withered, there were severe water and food shortages coupled with the lack of rainfall, their inability to farm as well as the massive mortality of livestock.

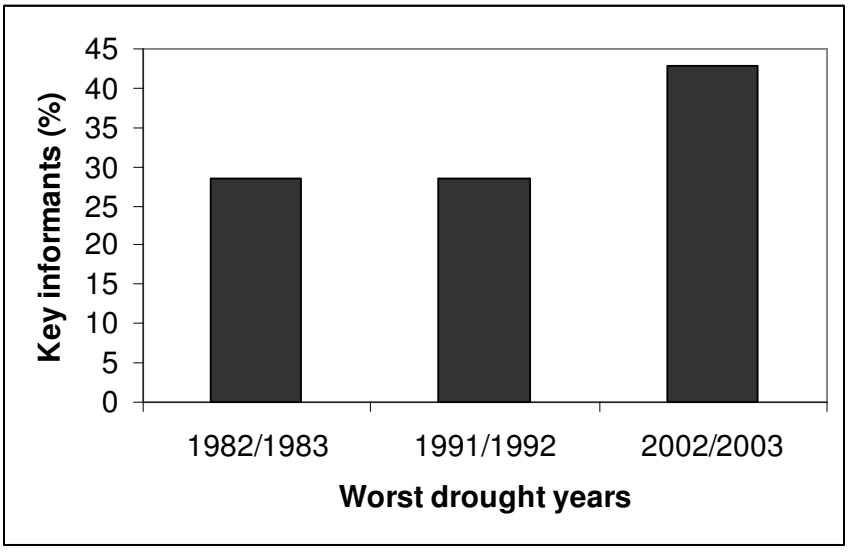

Figure 8: Worst drought years in Thorndale

Similarly, 28.6% indicated the 1982/1983 drought as the worst drought period. According to them, there were severe shortages of water, food, inability to farm and high food prices especially mealie meal during the period. This resulted in the entire community depending on yellow corn/maize for their dietary needs. They further explained that during the 1982/1983 drought, there was a massive mortality of livestock in addition to the withering of crops and vegetation as stated above. Furthermore, during the 1991/1992 drought, there was no rain and crop production, vegetation withered and there was also massive livestock mortality. The above stated issues are indicative of the fact that all these three worst drought years have several characteristics and/or impacts in common.

5.2.4. Perception, duration and characteristics of 2002/2003 drought

Drought occurs with various levels of magnitude. In other words, they could be mild, moderate or extremely severe such that conditions of life become unbearable. As Figure 9 indicates, 24% of HHs perceived the 2002/2003 drought to be very severe, while 38% stated that the drought was moderate. The reason for these diverse perceptions may be due to the severity and magnitude of the impacts of the drought on the various individual HHs.

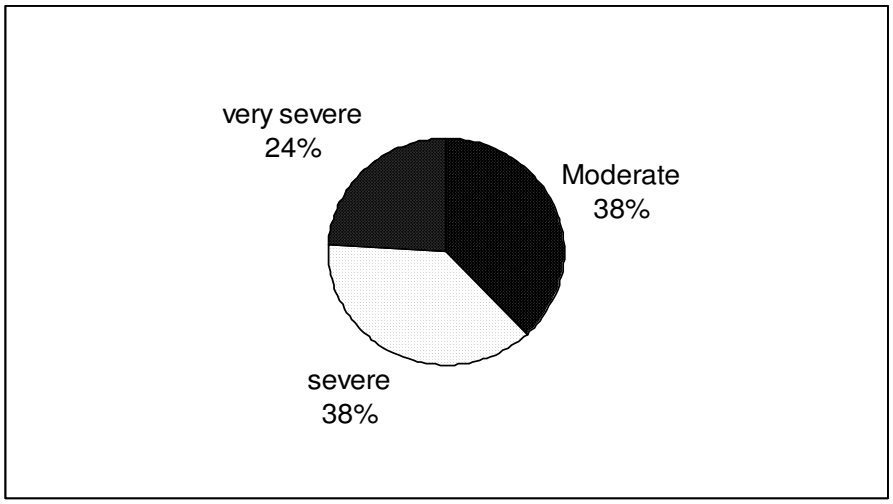

Figure 9: HHs' perception about the 2002/2003 drought

In all the severe drought periods such as that of 2002/2003, large numbers of livestock died. Livestock, particularly cattle were moved to other areas/communities during the 2002/2003 drought in order to obtain fodder and water for them as a way of preserving their lives. Temperatures were high during the 1991/1992 and 2002/2003 drought periods. Furthermore,

unlike other drought periods the 2002/2003 drought was severe, though it was easier to undertake coping strategies.

With respect to the duration of the drought, 58.8% of the HHs stated that the 2002/2003 drought lasted for a year, 5.9% indicated that the drought lasted for six months, 11.8 % stated that it lasted for a few months and 23.5% stated that it lasted for a season (Table 3). These divergent responses may have been due to the fact that the HHs' anticipation of the rain was long overdue such that they lost track of time with respect to the drought's duration when they finally realized the inevitable, which was the absence of the rain as well as the severity of the drought's impacts on their HHs.

Table 3: Duration of the 2002/2003 drought, these are HHs' perceptions

Duration	***HH (%)***
Few months	11.8
A season	23.5
6 months	5.9
A year	58.5

The perceptions of HHs regarding the characteristics of the drought varied. As Table 4 demonstrates the characteristics of the 2002/2003 drought encompassed the late start and early ending of the season (18.1%), dry spells, no rain, hot sun and thunderstorm (29.4%) as stated in Chapter 2, water shortages, poor crop production, withering of crops and food shortage (22.4%). The other characteristics included ailing and mortality of livestock (7.8%), the blowing away of topsoil, hard and unproductive soil (3.5%), sickness (1.7%), withering vegetation, as well as wildlife mortality (20.7%).

Table 4: Features of the 2002/2003 drought

Characteristics	*HH (%)*
Late start of season	14.6
Season ended early	3.5
Dry spells	12.1
No rain	12.1
Hot sun	4.3
Thunderstorm	0.9
Shortage/scarcity of water	12.9
Poor crop production	1.7
Crops withered	3.5
Shortage of food	4.3
Ailing & mortality of livestock	7.8
Hard soil	0.9
Unproductive soil	0.9
Wind blows off fertile topsoil	1.7
Sickness	1.7
Vegetation withered	19
Wildlife mortality	1.7

5.2.5. The 2004/2005 drought

Sixty-two percent of the HHs indicated that the community experienced drought during the period of 2004/2005, while 38% indicated that there was no drought at the time of the study. Sixty-two percent of those in the 62% category indicated that it was moderate in terms of its magnitude and severity, while 19 % stated that it was severe. The 38% who stated that there was no drought during the period of 2004/2005 explained that the community experienced drought, however, it was not as severe as those of 2002/2003, 1991/1992 and 1982/1983. They further explained that they at least had water, the vegetation is intact and not dry and withering, and crops and livestock are not dying (Figure 10).

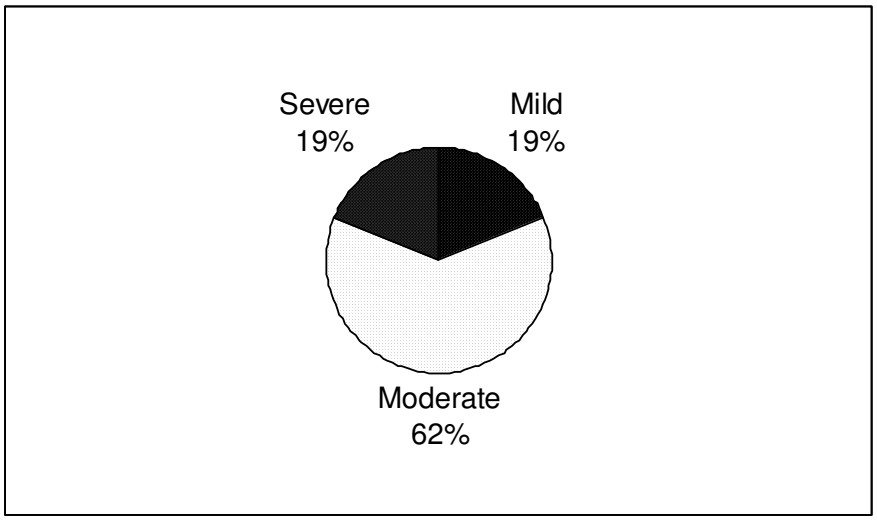

Figure 10: HHs' perception about the 2004/2005 drought

The HHs made comparison between two drought periods. They stated that 2004/2005 drought was associated with short spells of rainfall in February 2005, while it never rained during the 2002/2003 drought. They further stated that there were no crop yields, no water, vegetation withered, coupled with livestock mortality and human suffering during 2002/2003 drought. This was compared to the mild/moderate drought periods such as the 2004/2005 during which there was at least some amount of crop yields, rain and, water and vegetation without much human suffering. In illustration some of the HHs stated that "we get rain now than it was the case in 2002/2003" (Mkansi, pers. comm). Others also stated that the 1991/1992 drought was severer than the 2002/2003 drought since larger numbers of livestock died. The 1991/1992 drought resulted in the complete drying of the dam in the community coupled with massive wildlife mortality (especially birds) as well as no farming activity.

5.2.6. Consequences of the 2002/2003 drought

Generally, as stated earlier, drought has effects and impacts on HHs, communities and national economies as a whole. In line with the first objectives of this study, the effects and impacts of the 2002/2003 drought on HHs in Thorndale have been profiled in the section. The impacts have been categorised into economic, food shortage, water shortage, nutritional and health, social and community, the environment and wildlife (Figure 11). These are discussed in detail below.

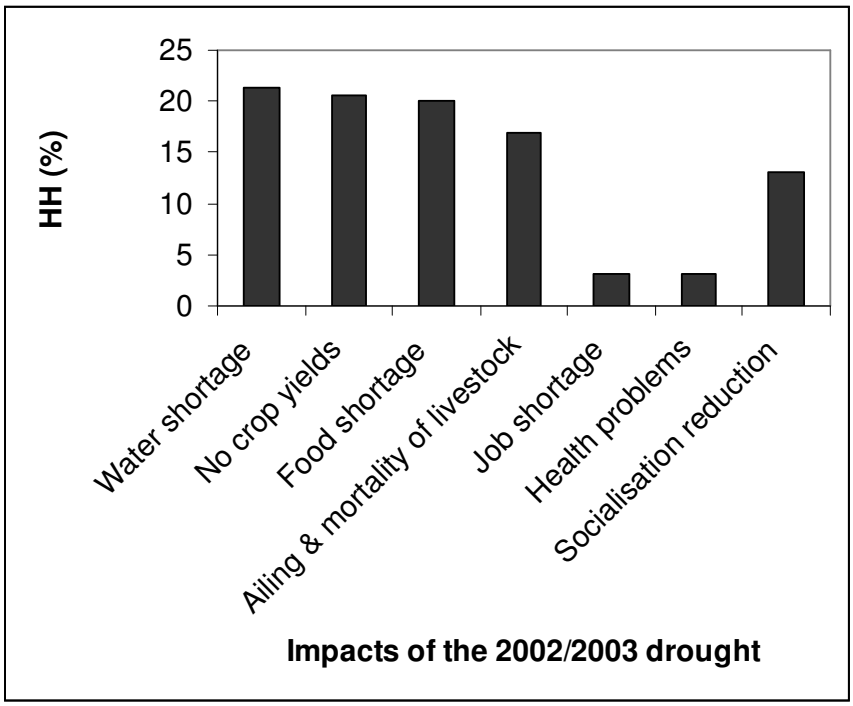

Figure 11: Impacts of the 2002/2003 drought

Economic impacts: According to 20.6% and 16.9% of HHs respectively the lack of crop yields and the loss of livestock through their sale and death negatively affected their incomes and therefore the finances of the HHs involved in these livelihood activities. These may have long-term effects on the community. The reduction in herd size may have long-term or permanent effects on the affected HHs. In terms of ranking, 8.8% of HHs indicated the failure of crops/no farming as the most important impact of the drought (Figure 12). They further explained that crops/farming ensures the availability of food and its associated ingredients, for instance, mealie meal, vegetables and legumes. Some of the HH (5.9%) stated that the death[3] of livestock is the first most important impact because livestock is their life's bank and their lost through sale and mortality as a result of the drought is a loss of valuable money and productive resources. Studies (e.g., O'Meagher 2003) confirm that the onset of drought leads to the reduction in farm production and incomes, while the decimation of livestock herds has probably been observed as the most serious long-term effect of drought (Bratton 1987; Mortimore 1989) on the economy of communal lands (Bratton 1987). This livestock

[3] The death of livestock (cattle) may render the small peasant incapable of renewing his reproduction on its former scale. He then falls into the clutches of the usurer and once in the merchant's power, he can never extricate himself – Karl Marx, capital Volume 3.

mortality may result in HHs in Thorndale losing their income earning sources. Certain HHs (3.1%) stated that the drought caused shortages in the availability of jobs in the community and surrounding areas. On the basis of ranking, 2.9% of HHs indicated that the lack of jobs was their first priority with respect to the impacts of the drought because they need jobs through which incomes can be derived and with which food and other purchases can be made. Bratton (1987) and Blaikie et al. (1994) have argued that during periods of drought crisis, jobs are lost but it is equally difficult to find other alternative employment opportunities.

Impacts on water resources: Some of the HHs (21.3%) indicated that water shortage was one of the key impacts of the 2002/2003 drought. In terms of ranking, 44.1% of the HHs stated the shortage of water as the first most important impact of the 2002/2003 drought on their HHs. They further explained that it was their number one drought-related problem. The HHs also indicated that the drought resulted in the drying up of the dam in the community, further resulting in the need to walk for over l0km in search of and to obtain water. Some HHs (2.9%) reported that they were sun beaten as a result of going in search of water. Sarmineto (1998) confirms that the lack of rainfall had serious and prolonged effects on the world's economies causing a reduction in drinking water and agricultural production. Other studies posit that the desiccation of domestic water supplies is the most immediate side effect of drought (NDMC 2003).

Impact on food security: Food security, like water resources, was also seriously impacted on by the 2002/2003 drought. According to 20% of HHs the shortage of food is another important impact of the drought, while 35.3% indicated food shortage as their first most important impact in order of ranking. They explained that food is the source of energy and nothing can be done without energy, which food provides. The drought resulted in high food prices as stated in Chapter 1, studies confirm that the onset of drought can result in an increase in the prices of food (Chambers et al. 1981; O'Meagher 2003). Food shortages may be caused by crop failure as a consequence of drought (Cohen and Lewis 1987). Furthermore, maize yield is impacted by drought, while the production of groundnuts, beans, cowpeas and other crops essential for varied and balanced diets may be diminished due to drought, for instance, in Zimbabwe, Zambia (Tiffen 1995) and in other parts of the world. Consequently, HHs' ability to meet their dietary requirements reduces as drought deepens (Bratton 1987) and hence food shortage may result (Chambers et al. 1981).

The shortage of food caused by the drought's impacts led to stealing by 2.9% of HHs in order to satisfy their hunger. However, in so doing they deprive their victims of their assets on which they also needed to depend in order to cope with the drought. This implies that drought can stimulate social vices such as stealing.

Nutritional and health impacts: The HHs (3.1%) stated that nutritional and health problems particularly malnutrition in both children and adults was one of the impacts of the drought, in addition to diarrhoea, stomach pains, other sicknesses and death caused by malnutrition. According to 20.6% of HHs they had to walk long distances to send family members to the clinic. In terms of ranking, 2.9% of HHs indicated that the nutritional and health aspect of the impacts of the drought was very important to them in terms of priority. It was also indicated by 2.9% of HHs that a HH member died as a result of the drought. Other studies confirm that the nutritional and health impacts of drought affected the health of human beings and may lead to undernourishment (Bratton 1987; Prah 1988) in children, malnourishment (Prah 1988) in both children and adults leaving little or no food and fodder for humans and livestock respectively (Bratton 1987). Perkins (1991) confirms that the herder and sandveld dwellers in the Kalahari region of Botswana also experience widespread malnutrition during periods of drought. Drought may also result in some children being underweight, while sickness may be prevalent during periods of droughts especially malaria, diarrhoea and skin infections (Chambers et al. 1981; Mortimore 1989). The impacts of drought sometimes result in the death of human beings, e.g. in Zambia (Tiffen 1995) and elsewhere in the world.

Social and community impacts: According to 13% of HHs the 2002/2003 drought resulted in the reduction in socialisation in the HHs and the community as a whole. This was because food was scarce and it was hard to socialise while hungry. This may have created a situation where every HH did everything possible in its power for itself without much attention to other social obligations and networks. In many cases, social security networks (Mortimore 1989; Herren 1991; Blaikie et al. 1994) are undermined and reduced in importance as a result of droughts (Herren 1991), for instance, in Chad in the 1980s, long droughts have led to the 'weakening of the social structure' coupled with the fact that "mutual help traditions have shown signs of strain" (Watts 1983:53).

The study also revealed that the drought increased women's workload. For instance, women retained their responsibility for the collection of water, which becomes a more time

consuming job during periods of drought due to the greater distances to the points of water collection (over l0km). There were long queues as well as having to wait once there. Women (2.9%) in the community stated that during the drought they went searching for water, while their husbands were at home. According to Bratton (1987) during drought periods in Zimbabwe, village women in Filabusi walk for a distance of between fifteen to twenty kilometres in search of water. Chambers et al. (1981) and Tiffen (1995) confirm that drought increases the workload of women more than men's (Tiffen 1995).

Having mentioned the various impacts of the 2002/2003 drought as stated above, the HHs were asked to rank their responses (impacts) in order of importance and subsequently giving reasons for their respective rankings. The findings from the study showed that all the impacts of the effects of the 2002/2003 drought were important to the HHs considering the fact that they may have affected all aspects of their lives and the livelihoods of the HHs in the community. Food and water shortages, crop failure, loss of livestock through sale and death, job shortages and health problems were exceptionally important to the HHs (Figure 12).

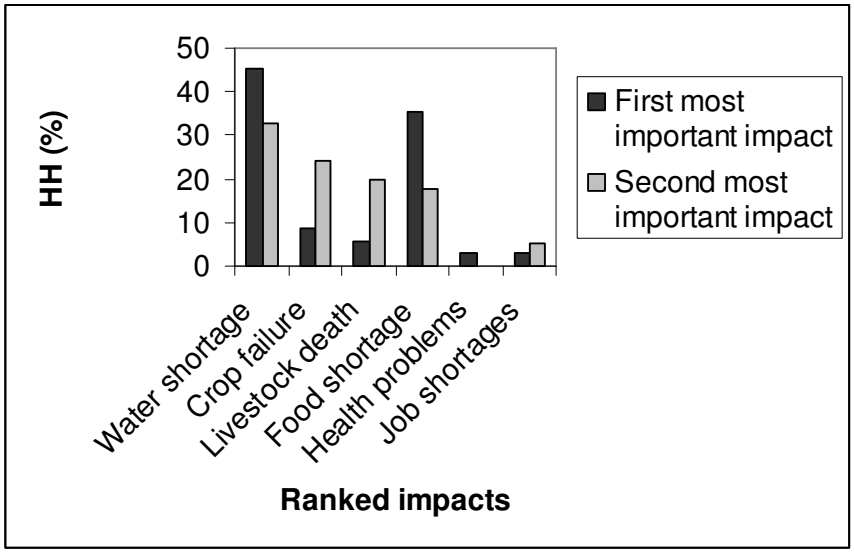

Figure 12: Ranked impacts of the 2002/2003 drought by HHs a) 1st most important and b) 2nd most important. For the corresponding reasons for such rankings see Appendix A.

5.2.7. Effects of the 2002/2003 drought on the environment and wildlife

The drought had effects on the community's natural vegetation thus causing the withering of trees and grasses and wildlife mortality through hunger and thirst according to 38.1% and

25% of HHs respectively. The drought also had effects on the water resources in the community as stated in section 5.2.6 resulting in the drying of the water in the dam, further resulting in the muddiness of the water which hindered its human use (Figure 13). Other studies confirm that drought leads to a reduction of water in dams, wells, boreholes, lakes and rivers, e.g., the river Kafue (Tiffen 1995; McCarthy et al. 2001). Some of the HHs (0.6%) stated that they could not fish because the water in the dam and river dried up, consequently most of the fishes died. The effects of drought on wildlife and various other varieties of fish are due especially to the shortage of water (Tiffen 1995).

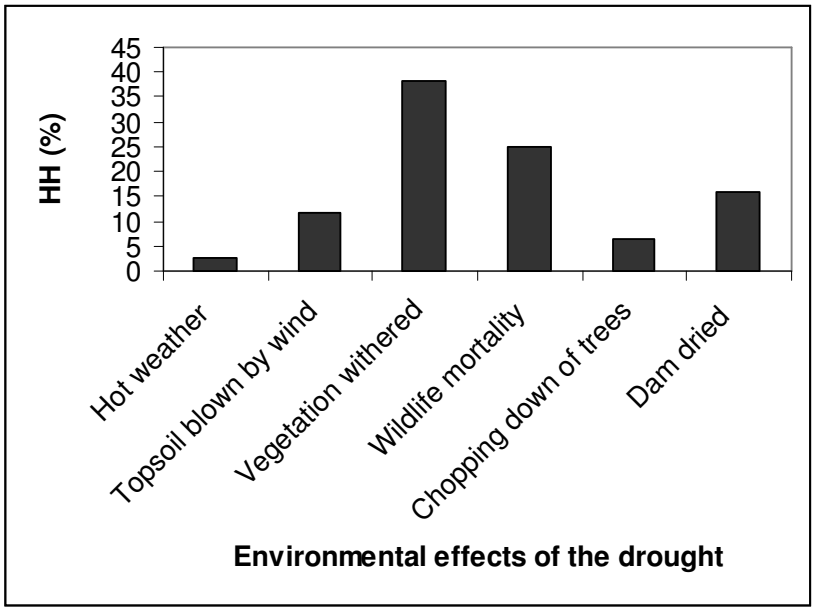

Figure 13: indicates the effects of the 2002/2003 drought on the environment and wildlife

Some of the HHs (6.6%) in the community partly responded to the drought and its associated impacts by cutting/chopping down trees and selling the wood, coupled with the drying of vegetation during the drought. These contribute to deforestation in the community. The topsoil was blown off by the wind during the drought according to 11.8% of HHs, rendering the soil infertile/unproductive. Others reported that temperatures were extremely hot/warm making them very uncomfortable. The fact that drought represents a significant seasonal moisture deficit below long-term average levels for a given locality (Webb and von Braun 1994) compounds the effects of high temperatures. The case of Thorndale illustrates this effect.

5.2.8. Community level effects and impacts of drought

Responses from the key informants in this section confirmed the effects and impacts of the 2002/2003 drought on HHs in the community as stated in sections 5.2.6 and 5.2.7 respectively as well as indicating the general effects and impacts of drought in the community as a whole. They indicated that the lack of rainfall (33.3%) and the late ending of the season (33.3%) are the effects of drought in terms of rainfall variability at the community level. In economic terms the informants stated livestock mortality (38.5%) and the disruption in farming activities (7.7%) as the impacts of drought. Food shortage (35.3%) and health problems (29.4%) were the nutritional and health impacts of drought. Reduction in social activities/socialisation (50%) and the lack of social activities (12.5%) were the social impacts of drought in the community. Wildlife mortality (50%) and the withering of vegetation, namely, trees and grasses (16.7%) were the environmental impacts of drought at the community level (Figure 14).

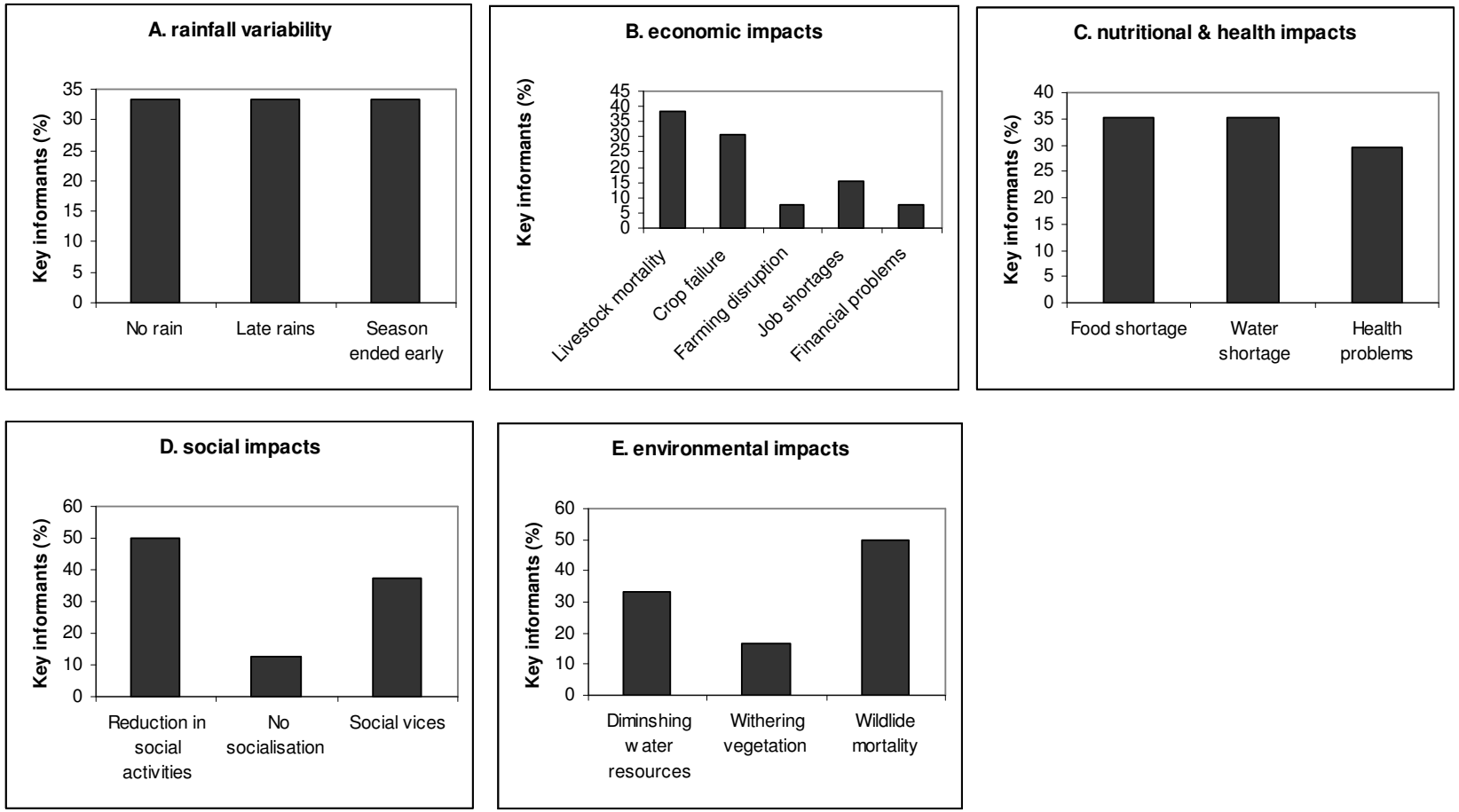

Figure 14: Community level impacts of drought a) rainfall variability; b) economic impacts; c) nutritional and health impacts; d) social impacts; and e) environmental impacts

5.2.9. Summary

Drought appears to follow a cyclical pattern in Thorndale with a number of consecutive dry years serving to drastically reduce crop and livestock productions such as cattle herds as well as other assets and negatively affecting livelihood strategies and causing HH food shortage(s). The impacts of drought at both HH and community levels were economic (e.g., shortages of jobs, food and water shortages), social and community, environmental as well as wildlife mortality. Existing socio-economic inequalities were further exacerbated by drought. These impacts were stated by the HHs at the HH level and confirmed by the key informants who in turn listed drought impacts at the community level.

The key informants indicated that at the community level the impacts of drought included food and water shortages, sickness, death of livestock, the disruption in farming activities as well as no crop production and a reduction in farming activities and socialization. The environmental impacts include the withering of vegetation and the mortality of wildlife.

Having discussed the impacts of the drought and drought in general at both the HH and community levels respectively attention now shifts to HH and community level responses to these impacts.

5.3. Drought-coping responses

This section addresses the second and third objectives set out for the study. The section comprises of a description of HHs' responses to the drought, community level responses and institutional arrangements as well as the difficulties encountered in responding to the impacts of drought and how these constraints were overcome, and external interventions in response to drought in the community. First, a presentation of results and discussion of HH level coping strategies, combination of coping strategies, assistance from friends and neighbours, effectiveness of HH coping strategies and difficulties encountered is presented. This is followed by a presentation of community level coping strategies, the sufficiency of these coping strategies and finally, a presentation of results on non-governmental organisations (NGO) and external interventions as well as constraints encountered at the community levels.

5.3.1. Household level coping strategies

As stated earlier in section 5.2.6, the impacts of the drought were food and water shortages, economic, nutritional and health and social in nature. As to whether HHs did something as a way of minimizing the impacts of the 2002/2003 drought, the majority of them (97%) stated that they did something about the drought as a way of minimizing its impacts or overcoming them, while 3% indicated that they did nothing to mitigate the impacts. These HHs (97%) may have been more impacted by the drought, which may be an indication of the fact that they were more vulnerable, while (3%) were less vulnerable because they had external/substantial incomes and thus were less impacted by the drought. They therefore were in a better position to withstand the consequences of the drought.

As stated in Chapter 1, Blaikie et al. (1994) have argued that natural hazards such as drought are products of economic, social and political environments. Furthermore, political, demographic and economic factors underlie the impacts of drought. This is exactly what the study revealed especially that economic factors underlie the impacts of the drought. This also shows imply that people's vulnerability is generated by economic, social and political processes which influence how drought affects people in varying ways, degrees and differing intensities (Downing et al. 1999). The intensity of the drought's impacts on the HHs may differ for each individual HH. This in turn attests to their differential vulnerability to the impacts of the drought. As stated below, this may be explained by the fact that the majority of the HHs responded to the impacts of the drought by adopting various coping strategies since they were more impacted by the drought, while the 3% may not have experienced the same level of vulnerability. Vulnerability is the exposure to contingencies. It varies based on the availability of and accessibility to economic and/or financial resources. In the case of this study climate change variability is one of the many factors that affected vulnerable people. In this context therefore vulnerability and adaptability are related in various non-trivial ways. Additionally, geographical location, socio-economic factors and contextual factors such as dependency affect vulnerability. Poor farmers/HHs were thus more vulnerable to drought due for instance, to limited access to resources.

The study revealed that the community experiences drought almost every year with varying magnitude as stated in section 5.2.2. Consequently, this certainty of seasonal rainfall variability implies that HHs in the community have developed diverse means of coping or adapting to the impacts of drought. The strategies with which HHs cope with drought vary

based on the type and amount of resources available to individual HHs. These resources are natural, economic and social in nature. In the case of the 2002/2003 drought such coping/adapting mechanisms have been categorised into income, consumption, production and migration responses. Furthermore, the HHs had thirty-two different coping strategies with which they coped with the 2002/2003 drought. This confirms the fact that HHs/farmers have the ability to respond to physical environmental disturbances, for instance, drought through sequences of complex decision making based on traditional agronomic knowledge and experimentation (Watts 1987; Teklu et al. 1991).

Income responses: During the period of the drought a proportion of HHs (46%) adopted income responses. The HHs derived their income from diverse sources. These sources include wage income, especially husband's income, social support grants such as child support and disability grants, search for jobs, the sale of animal bones, fuelwood and fodder. In this category, the husband's income and social support grants constitute the normal income characteristics of the HHs and thus constitute their indirect responses to the drought. The search for jobs and the sale of bones derived from animals, fuelwood and fodder constitute the HHs' direct income changes in response to the drought. The details can be found in Appendix B. The sale of resources derived from the immediate environment for cash (Vogel 1995) have been documented. It has been observed that HHs cut and sold fuelwood and fodder (Watts 1983; Mortimore 1989), however, in Thorndale as the study indicates, the rights to cut is conserved by the state and therefore national authority by-laws.

Some of the HHs derived their income from the sale of vegetables, assets (e.g., livestock, clothes), pension, informal employment, the brewing of traditional African beer, sewing contracts and mat weaving. These constitute the normal income characteristics of the HHs, however, these were depended on in response to the drought and thus an indirect response to the drought as stated above. Additionally, the operation of a new tuck/spazashop constitutes the HHs' direct income changes in response to the drought. If too many assets (livestock) were sold it would erode HHs' production base. Furthermore, cattle are vital to the life of small farmers in their own right as a source of food, cash and prestige in addition to the draught power and manure they provide for and contribute to arable agriculture for instance, in Zimbabwe (Bratton 1987). Studies confirm that HHs generate cash through craft production, for instance, weaving (Watts 1983; McCann 1987; Mortimore 1989). The HHs in the study also depended on remittances. HHs had been observed to receive remittances as

stated in Chapter 3 from working relatives (Bratton 1987; Glantz 1987; McCann 1987; Herren 1991; Francis 1998a). Remittances enhance resilience through the spreading of risks and broadening the opportunity for real changes in well being (Adger et al. 2002). All these have been referred to as 'a bundle of endowment and exchange entitlements' (Sen 1981).
The key informants indicated that in addition to all these coping strategies some people (HHs) in the community also engage in prostitution (7.1%), while the community care group feeds hungry children (7.1%). As studies (e.g., Longhurst 1987; Hussein and Nelson 2003) confirm prostitution has been identified as one of the income diversification strategies employed by women in Mali's urban centres. It may be held as female-headed HHs' advantage over males. Thus prostitution may be said to ensure the survival of the HH in times of stress such as drought. This implies that coping strategies available to women differ from those men draw on (Hussein and Nelson 2003).

Consumption responses: A proportion of HHs (35.4%) employed various consumption mechanisms in responding to the impacts of the drought. Water is life's essential, however, as earlier stated, it was one of the resources affected by the drought resulting in its scarcity. Some of the HHs thus developed water acquisition strategies such as digging the dam site for water, the collection of water from other communities such as Manyeleti and Gottenberg as well as petitioning the government for water. In response the government provided the community with water reservoirs and compound stand pipes. This was confirmed by 85.7% of the key informants. Some people drank the urine of livestock such as cattle. Some of the HHs depended on stored maize and food parcels in response to the food shortage caused by the drought. The stealing of other HHs' goods was employed by some people, in response to the impacts of the drought. As stated in section 5.2.6, this implies that drought can stimulate social vices such as stealing. The details of these consumption responses can be found in Appendix B.

Some of the HHs slaughtered livestock such as chicken and cattle for meat, while others depended on meat from dead animals including dead bush meat. Dietz (1991) confirms that during periods of drought crises among the semi-pastoral Pokot in Kenya and Uganda people affected by drought slaughter animals for meat as well as eat dead animals. Additionally, the

study revealed that some of the HHs also bought food on credit[4], while others depended on supplies of wild foods (NTFPs). Several studies confirm that farmers often adopt such strategies as harvesting of wild foods supplied by wild leaves, roots and grains (Watts 1983; Bratton 1987; de Waal 1989; Mortimore 1989; Herren 1991; Perkins 1991; Moorehead and Wolmer 2001; Dovie et al. 2002; Dovie 2003). This is done when the viability of the household as a productive and reproductive unit is threatened by food shortage. Women and children are responsible for the collection of these foods (Mortimore 1989; Dovie et al. 2002; Dovie 2003).

In certain parts of Zimbabwe including Mberengwa, wild fruits used as stock-feed were dried and ground into powder for making porridge; grass seeds are gathered, pounded, cooked and served for the same purpose in Binga. In Rushinga, people depended on the roots, fruits and leaves of the baobab tree (Bratton 1987). The majority of wild leaves, roots and fruits are used extensively during better periods for the supplementation of staples and not by the poor only, but they are brought into different and more intensive use in times of food shortage (Mortimore 1989).

Some HHs in Thorndale reduced food intake, while others stayed hungry in order to preserve food. Some studies posit that female headed HHs (Tiffen 1995), are most likely to have to reduce the number of meals per day (Perkins 1991; Blaikie et al. 1994; Tiffen 1995). This study revealed that 6.6% of HHs consisting of both male and female-headed HHs reduced their rates of consumption, while female-headed HHs (13.2%) stayed hungry during the period of the drought.

Production responses: In terms of production, a proportion of HHs (16.8%) employed various production strategies in response to the impacts of the drought. Consequently, some of the HHs started home gardening in response to the drought, where they engaged in the production of diversified crop portfolios such as banana, maize, peanuts, pumpkin, common beans, cabbage, tomatoes, mangoes, water melon, spinach, onion, lettuce, beetroot, guava, orange, okra, sweet potato, pawpaw, grapes, wild species and cassava (Akpalu 2005, personal observation). The HHs indicated that they watered these gardens manually. Such crop mix

[4]" The anomaly of the agrarian markets forced the marginal subsistence producers into an unusual exchange relationship via the market. They did not benefit from the market under these circumstances, they were devoured by it. Especially during bad years petty producers were compelled to buy additional grain and go worse into debt. Then in good years and low prices they found it difficult to extricate themselves from accumulated debts" (Watts 1983:252).

diversity allows the HHs to follow a production schedule that is flexible with respect to their responses to varying patterns of rainfall (Teklu et al. 1991). Due to the withering of vegetation caused by the drought, there were no grasses for livestock to feed on as a result of which some fell ill and died. In response to this, some of the HHs relocated their livestock to other communities, where fodder and water were available, bought fodder for their livestock, while others bought medicine (vaccine) as well as used tree branches as medicine for their ailing livestock. In so doing, they preserved the lives of their livestock. The details of these production responses can be found in Appendix B.

Migration responses: With respect to migration responses, a proportion of HHs (1.8%) employed various migration strategies in response to the impacts of the drought. In arid and semi-arid areas migration is regarded as an important coping mechanism during drought periods (Vogel 1995). Some of the HHs engaged in migrant labour as a result of the lack/shortage of jobs in the community, while others embarked on migration in search for jobs in other rural and urban areas. The details of these migration responses can be found in Appendix B. Such responses as Krüger (1999) posits are internal coping strategies that may affect the composition of HHs temporarily. As stated in Chapter 3, studies confirm that during periods of drought crises HHs search for waged employment on the labour market which usually includes migration to urban centres (Watts 1983; Longhurst 1987; Mortimore 1989; Herren 1991; Blaikie et al. 1994; Vogel 1995; Krüger 1999; Devereux 2001a; Swift and Hamilton 2001; Dovie et al. 2002; Dovie 2003; Hussein and Nelson 2003).

5.3.1.1. Combination of coping strategies adopted by households

The HHs employed diverse combinations of coping strategies in coping with the drought based on their level of vulnerability to the effects and impacts of the drought. Consequently, 39.4% of the sample particularly female headed HHs adopted four strategies, while 3% of HHs adopted one coping strategy, particularly female headed HHs (Figure 15). All these diverse combinations traverse income, consumption, production and migration responses as stated in section 5.3.1. Furthermore, HHs' combination of coping strategies may be an indication of their adaptability to the drought.

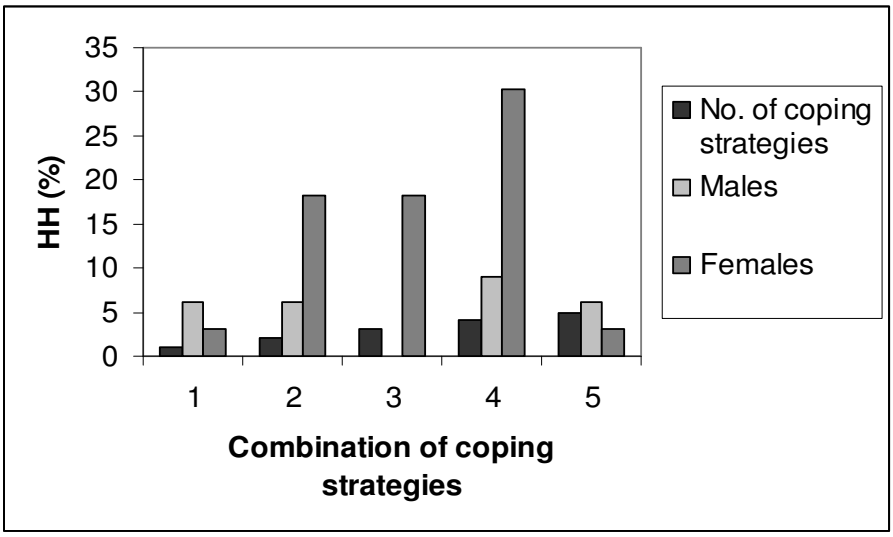

Figure 15: Combination of HHs' coping strategies

Most of the HHs (52.9%) reported that the coping strategies they adopted during the 2002/2003 drought were different from those adopted during other drought periods. Reasons provided were that some of them asked relatives for support, depended on stored food and food parcels and engaged in home vegetable gardening, while they bought vegetables during the 1991/1992 drought. They also bought fodder for their livestock due to the lack of fodder, which they did not have to do during the 2004/2005 drought. For instance, during the 2002/2003 drought some of the HHs cut down on their consumption and walked several kilometres to fetch water. Some of the HHs could not cut wood to be sold as wood and fuelwood since national by-laws forbid that and were arrested when caught cutting down trees illegally. On the other hand, 41.2% of HHs reported that the strategies they adopted were the same, implying that they adopted the same strategies they adopt during other drought periods during the 2002/2003 drought, while 2.9% had no strategy for coping with the drought. Some of the HHs reported that the former government provided them with some temporary jobs, which helped them during the previous drought periods. These were, not available during the period of the 2002/2003 drought.

The production of livestock is undertaken by 79.4% of HHs while 9.6% sold their productive assets (e.g., livestock) in response to the drought. Meanwhile, not selling such assets (e.g., livestock) may have cultural connotations in addition to the prestige attached to such assets. This may explain why only the above stated proportion of HHs sold their livestock in response to the drought. Additionally, drought-related deaths of livestock especially cattle

may be another reason. However, too much sale of livestock as earlier stated in section 5.3.1 may result in the reduction in the production base of the HHs involved. Hence, there is a limit to the quantity of assets (e.g., livestock) sales pursued.

5.3.1.2. Assistance from friends and neighbours

During periods of drought crises, social networking plays an important role in helping the affected HHs to develop resilience. Consequently, 45.2% of HHs received assistance from relatives. These included food supply, such as mealie meal, aloe, magnesium, water, medicine, encouragement to practice home gardening, dry okra, money and fodder for a period of between three weeks and one year. Households (38.1%) received help from friends and neighbours that entailed the sharing of food and eating together for the duration of between two weeks to six months. As stated in Chapter 1, some other studies confirm that in some instances such as droughts and famines, informal safety nets, e.g., the sharing of food among HHs are adopted (Devereux 2001a). Some of the HHs (5.9%) sent their children to live with relatives (Table 5). Studies conducted in the semi-pastoral Pokot regions of Kenya and Uganda (Dietz 1991) confirm that during times of drought mouths that were not productive were sent to relatives (Longhurst 1987; Dietz 1991: Devereux 2001a; Swift and Hamilton 2001).

Table 5: Types of assistance received from relatives, friends, neighbours & government

Source of assistance	*Types of assistance*	*Duration*	*HHs (%)*
Relatives	Food supply (mealie), aloe, magnesium, water, medicine, encouragement to engage in gardening, Dry okra, money, fodder	3 weeks – 1 year	45.2%
Friends/neighbours	Mealie, water, shared food, ate together	2 weeks – 6 months	38.1%
Government	Food parcels, pension, pieces of jobs	3 months – 3 years	16.7%

Government assisted 16.7% of HHs with food parcels, pension, temporary jobs, for the duration of three months to three years. Some 2.9% of the HHs provided assistance to both relatives, for whom they bought food, friends and neighbours with whom they shared their meals. The HHs in this category also received food parcels from government for a duration of

four months. Certain HHs (23.5%) did not receive any assistance from relatives, friends, neighbours and government since they could fend for themselves. They in turn, assisted relatives, friends and neighbours with food supply for the duration of the drought. Such strategies involved external assistance especially reliance on public relief measures (Krüger 1999). For instance, during times of food shortage governments, NGOs and other charity organizations and individuals provide affected people with interventions such as food aid, for instance, in Somalia in 1992 (Whittow 1996).

5.3.1.3. Effectiveness of household coping strategies

According to 84.4% of HHs, the coping strategies they adopted during the drought were effective, for instance, 'one HH constructed a storage facility and stored grains. This enabled the effectiveness of the HH's coping strategies' (Interview, August 2005). Probably these HHs were able to develop resilience as a result of the effectiveness of their coping strategies. In illustration, 2.9% of HHs explained that their coping strategies were effective because 'the sale of cattle ensured the availability of money for the purchase of food for their HHs. This was effective because it minimized the severity of the drought's impacts' (Interview, August 2005). However, as stated in section 5.3.1, if too many cattle are sold it would erode HHs' production base. HHs in this category consisted of 22.2% males and 77.8% females (Figure 16). A minority of HHs (25.9%) in this category employed the same coping strategies they have been adopting during previous drought periods, while 74.1% adopted different coping strategies in response to the drought. As stated in Chapter 1, such HHs may be referred to as 'resilient HHs' (Maxwell 2001a). Thus such HHs may be said to have adapted to the drought. On the other hand, the coping strategies adopted by 15.6% of HHs were not effective enough to ensure the alleviation of the hardship caused by the drought. However, they had no other livelihood options available to them - coupled with this, there were no jobs available. This category of HHs, were comprised of 66.7% males and 33.3% females. Fifty percent of HHs in this category employed the same coping strategies they have been adopting during previous drought periods while 50% adopted different coping strategies in response to the drought. This may be an indication of the fact that as a result they were not able to develop resilience. It is likely that such HHs as mentioned earlier in Chapter 1, may be 'fragile HHs' since they were insecure in response to the shock (Maxwell 2001a) produced by the drought.

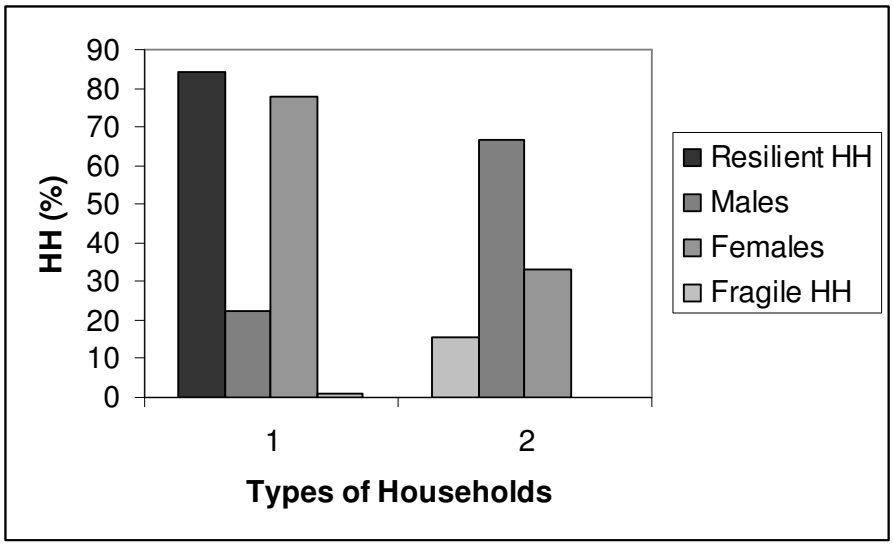

Figure 16: Categorisation of HHs on the basis of response to the drought

5.3.1.4. Difficulties encountered at the household level

In responding to environmental hazards such as droughts, certain difficulties may be encountered. In the case of the 2002/2003 drought the HHs encountered some constraints, e.g., 97.1% of HHs encountered difficulties in responding to the effects and impacts of the 2002/2003 drought, while a minority (2.9%) did not experience any constraints. Most of the HHs who encountered constraints endeavoured to overcome some of these constraints by doing something about them. In other cases, however, they did nothing, because there was nothing they could do (Figure 17), the details of these can be found in Appendix C.

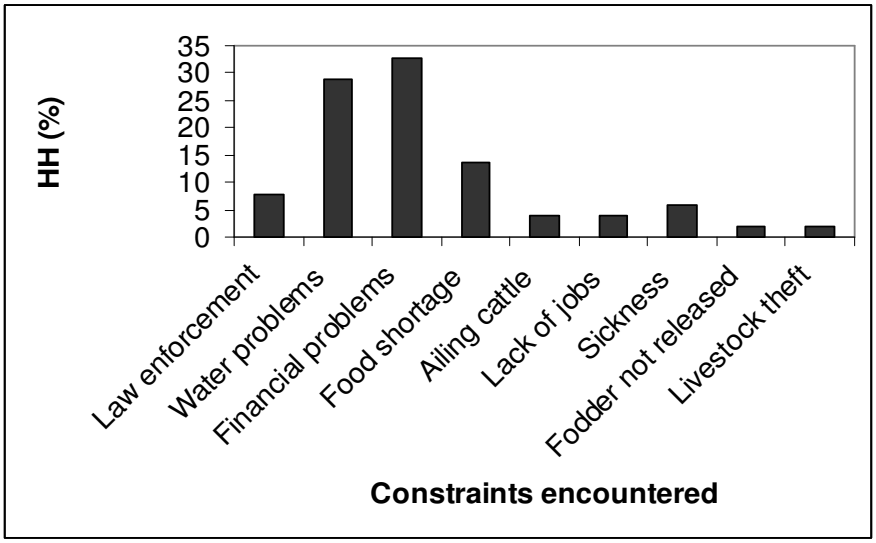

Figure 17: Constraints encountered at the HH level

The constraints include law enforcement on tree cutting encountered by a proportion of (7.7%) of HHs. The HHs resolved these problems by getting a permit, acting in defiance as well as paying fines. With respect to water problems (28.8%) the HHs resolved these by petitioning the government for water and obtained water from other communities. Financial problems (32.7%) were responded to by sending children to relatives, sale of assets, clothes, wood and traditional African beer, improvision of medication for ailing livestock, engagement in casual and migrant labour, usage of pension benefits, purchase of small quantities of food, the purchase of items on credit as well as doing nothing about the difficulties encountered. However, as stated in section 5.3.1, if too many assets (livestock) were sold it would erode HHs' production base. The scarcity of food and ailing livestock were the other difficulties encountered by 17.3% of the HHs. The HHs overcame these problems by depending on income and the profit from father's business, eating dry foods, the opening and operation of a spaza (local small) shop, the purchase of fodder and vaccine as well as the sale of wood. With respect to the lack of jobs the affected HHs (3.8%) joined the community garden squad in addition to depending on support from the government. For the problem pertaining to sickness, the affected HHs (5.8%) walked long distances to the clinic in other communities. Certain HHs (1.9%) could not access the fodder provision government made as a result the fact that the officials in-charge did not release the fodder. The HHs followed up, however, to no avail. Finally, the theft of livestock (1.9%) was solved by taking loans from friends and neighbours. It has been confirmed that in both commercial and communal areas, livestock particularly cattle theft increase during periods of drought. Such animals may be sold in the informal markets or slaughtered for food (Bratton 1987).

5.3.2. Community level coping strategies, governmental intervention and institutional arrangements

There are community level coping mechanisms and institutional arrangements for drought in Thorndale. These responses have been categorized into consumption and production mechanisms and institutional arrangements.

Consumption and production mechanisms: During periods of drought the community care group fed hungry children in the community as stated in section 5.3.1. Some community members also advise other members on how to cultivate and manage a home garden, farming, livestock production and how to economically manage water. A veld-grazing project instituted by the government was in progress, the purpose of which was to establish veld-

grazing camps for livestock in the community especially during periods of drought. The government provided wires and poles for this purpose. Secondly, there was a community garden instituted by the community to help very needy people during periods of drought (Table 6). However, one problem involved the criteria they used to ascertain the very needy from those who were generally needy. Perhaps they could be given the benefit of the doubt knowing that they know their members very well. Thirdly, the key informants (16.7%), particularly the headman (Iduna) complained that participation in farming activities in the community garden was poor, in addition to the fact that some community members stole crops from the garden.

Table 6: Community level coping mechanisms

Mechanisms	***Key informants (%)***
Consumption mechanisms	
Care group fed hungry children	6.7
Production mechanisms	
Government provided seeds	6.7
Community garden	40
Veld-grazing project	40
Institutional arrangement	
Permission to relocate livestock	6.7

Institutional arrangements: Institutional arrangements may help in coping with the impacts of drought (Bratton 1987; Cohen and Lewis 1987; McCann 1987; Blaikie et al. 1994; Swift and Hamilton 2001) such as food shortage (Bratton 1987; Cohen and Lewis 1987). According to the headman, there was an institutional arrangement in the community in aid of coping with drought. This entailed the need to ask permission from the chief through the headman to temporarily migrate and/or relocate livestock to other communities where fodder and water were available. The permission seeker also needed to state in the permission letter how long he or she would be away or how long the relocation of livestock was going to take. Additionally, in the case of livestock relocation, permission also needed to be sought from the 'dip inspector'. The temporary migration and/or the relocation of livestock were embarked on only when these two permissions were granted.

5.3.2.1. Sufficiency of community level coping strategies

As to whether the coping mechanisms for drought stated above were sufficient, 66.7% of the key informants reported that they were sufficient, while 33.3% reported that they were not sufficient. Those who said the mechanisms were not sufficient explained that people were not available at the community garden for communal farming in order to secure food/grains in preparation against food shortages caused by drought. Secondly, some community members stole crops from the garden, consequently, not much was obtained from the garden in addition to the fact that livestock and wildlife destroyed the crops in the garden. Finally, the shortage of water and the inadequacy of farming implements reduced the harvest obtained. The community also lacked a health post or clinic. In this context, therefore, the community needs more reservoirs and a community health post or clinic.

5.3.2.2. NGO and food security interventions

During periods of drought, there were several interventions emanating from NGOs, government and other charity organizations and churches. The study revealed that there had been an NGO intervention in the community (33.3%), particularly the Lion Foundation, while 83.3% of informants reported that there had not been any NGO intervention in response to drought in the community. According to the headman, this NGO assisted with the fencing of the community garden. Furthermore, the community received food security interventions in response to drought, thus 35.3% of the key informants indicated school feeding instituted by the government as one of such interventions. In addition to this, there has been financial support (5.9%) as well (Figure 18).

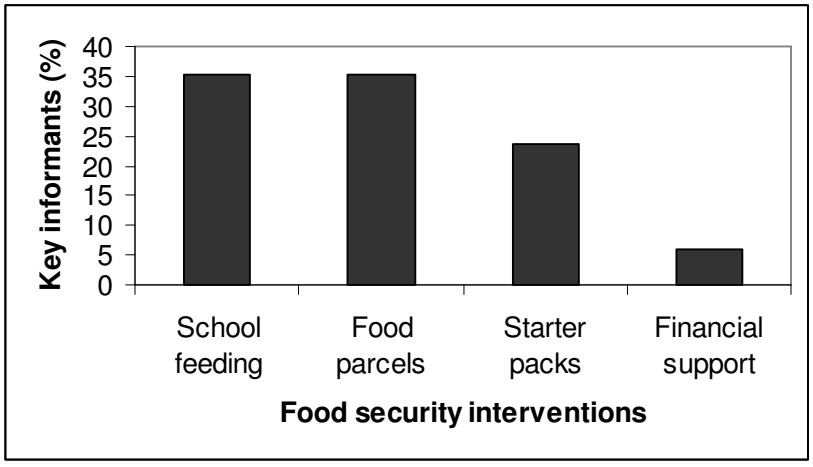

Figure 18: Food security/external interventions in Thorndale

5.3.2.3. Difficulties encountered at the community level

Several constraints were encountered at the community level in responding to the impacts of drought, some of which were dealt with collectively. According to the key informants, water problem (29.4%) was one of such constraints, in which case the community collectively petitioned the government for water (31.3%). There were also problems of the lack of social amenities (5.9%), farming facilities (5.9%) as well as the shortage of jobs (5.9%). In order to resolve these problems, the HHs in the community collectively petitioned the government. There were financial problems (17.6%), livestock mortality (17.6%), livestock killed by wild animals such as lions (5.9%), drying vegetation (5.9%), in addition to the derivation of little money from the sale of livestock (5.9%). These problems were overcome through financial contributions, sale of assets, assistance from relatives (18.8%), the purchase of mealie ash and waiting for the rain (6.3%) respectively (Table 7). However, as stated in sections 5.3.1, 5.3.1.1, 5.3.1.2 and 5.3.1.4, asset sales may reduce the production base of the HHs involved.

Table 7: Community level constraints and reactions

Community level constraints	***Key informants (%)***	***Collective overcoming of constraints***	***Key informants (%)***
Water problem	29.4	Petitioned government	31.3
Social amenities problems*	5.9		
Lack of farming facilities	5.9	Petitioned government	6.3
Shortage of jobs	5.9	Petitioned government	6.3
Financial problems	17.6	Financial contributions Sale of assets Asked relatives for help	18.8
Derived little money from livestock sales	17.6	Nothing was done	6.3
Drying grasses	5.9	Waited for the rain	6.3
Livestock mortality	5.9	Bought mealie ask Nothing was done	6.3
Livestock killed by lions	5.9	Nothing was done	6.3

* Implies no reaction provided

5.3.3. Summary

Responses to and/or coping with the impacts of drought vary as indicated in section 5.3.1. The affected HHs in the community had to survive and they thus adopted several physical and survival strategies in order to secure food during and after the drought. They organised hunting parties to get food, eating a variety of wild foods, which are often regarded as non-food, 'poverty food' or 'famine food' during 'normal' situations. Other non-cash food

acquisition strategies of a curative nature were those where (unproductive) mouths were sent away to relatives or to other less affected families. Survival strategies such as eating dead animals, slaughtering animals for meat were also adopted. HHs in the community also sold assets such as livestock, depended on social networks and/or the extended family as well as institutional arrangements and interventions. Finally, the absence of an effective early warning system continues to delay the development of effective management strategies of drought in the community.

Certain factors however, were at play with respect to the ability of the HHs to respond adequately to the effects and impacts of the drought. The lack of employment or unemployment was the main economic factor, which inhibited most of the HHs in the community from adequately responding to the effects and impacts of the drought. Secondly, the lack of financial resources, for instance, money was another factor linked to unemployment that acted as an impediment to the ability of the HHs to respond adequately to the drought. Thirdly, socio-economic factors such as the lack of social amenities namely, good roads, electricity and clinics inhibited most of the HHs in the community from adequately responding to the effects and impacts of the drought at the HH level and droughts in general at the community level.

5.4. Implications of the 2002/2003 drought for livelihoods

This section addresses the fourth objective set out for the study. The section presents a description of the current livelihood activities HHs engaged in on the basis of gender, with the aim of showing the livelihood activities both gender undertake in the community as well as the subsequent changes in livelihood activities caused by the drought. However, for the purposes of illustration a synthesis of HHs' responses to the drought in sections 5.3.1 and 5.3.1.3 will be adopted in this section.

5.4.1. Current livelihood activities

Table 8 below lists the livelihood activities the HHs currently engaged in. Crops/farming was the livelihood activity that the majority of the HHs (19.8 %) engaged in. This is followed by the production of livestock by 16.1% of HHs, the extraction of veld products (NTFPs), formal employment, informal/self employment and kinship ties constitute 35% collectively. Some HHs (4.2%) engaged in such livelihood activities as fishing, migrant labour and mat

weaving. Remittances, pensions as indicated earlier, social grants namely, child support and disability grants and traditional healing were the current livelihood activities of 15.2% of HHs. The sale of wood, clothes, biscuits, fruits, the operation of a spaza (local small) shop, building and welding were the livelihood activities 9% of the HHs engaged in.

Table 8: Current livelihood activities in Thorndale on the basis of gender (percentages in parentheses)

Activity	*Male*	*Female*	*Total*
Livestock	10 (5.9)	17 (10.2)	27 (16.1)
Crops/farming	9 (5.4)	24 (14.4)	33 (19.8)
Formal employment	0 (0.0)	3 (1.8)	3 (1.8)
Informal/self employment	4 (2.4)	10 (5.9)	14 (8.3)
Mat weaving	1 (0.6)	1 (0.6)	2 (1.2)
Fishing	1 (0.6)	2 (1.2)	3 (1.8)
Migrant labour	1 (0.6)	2 (1.2)	3 (1.8)
Extraction of NTFPs	5 (3.0)	13 (7.8)	18 (10.8)
Kingship ties	5 (3.0)	7 (4.2)	12 (7.2)
Remittances	1 (0.6)	11 (6.6)	12 (7.2)
Pensions	4 (2.4)	6 (3.4)	10 (5.8)
Disability grants	1 (0.6)	0 (0.0)	1 (0.6)
Child support grants	6 (3.4)	13 (7.8)	19 (11.2)
Traditional healing	0 (0.0)	1 (0.6)	1 (0.6)
Sale of wood	2 (1.2)	2 (1.2)	4 (2.4)
Sale of clothes	0 (0.0)	1 (0.6)	1 (0.6)
Sale of biscuits	1 (0.6)	2 (1.2)	3 (1.8)
Sale of fruits	1 (0.6)	0 (0.0)	1 (0.6)
Spaza (local) shop	0 (0.0)	1 (0.6)	1 (0.6)
Builder	2 (1.2)	2 (1.2)	4 (2.4)
Welding	1 (0.6)	0 (0.0)	1 (0.6)

5.4.2. Changes in livelihood activities

As stated earlier, livelihood activities are impacted by environmental hazards. The study revealed that the community experiences drought almost every year as indicated in sections 5.2.2 and 5.3.1, however, the magnitude and severity of drought varies from mild or moderate, where the associated consequences for HH livelihood activities are minimal or manageable on one hand. On the other hand, drought could be severe and very severe, where the consequences are tremendous to the extent that it results in serious changes in HH livelihood activities. The 2002/2003 drought was one of the severest drought periods in the history of the community, which resulted in the reduction in both agricultural and non-agricultural activities thus affecting HHs' livelihood activities. As a result of the drought, 91.2% of the HHs experienced changes in their livelihoods. For instance, it resulted in 0.6%

of fishermen's inability to fish since the drought resulted in a shortage of water in the dam and river.

As a result of the drought crop-producing HHs could not farm during the farming season in 2002/2003, which the majority of the HHs (19.3 %) engaged in. This was followed by the reduction in the production of livestock by 14.9% of HHs, the extraction of veld products (NTFPs), formal employment, informal/self employment and kinship ties constitute 35% collectively. Some of the HHs (4.2%) could not engage in such livelihood activities as fishing as stated above, migrant labour and mat weaving. Additionally, the value of incomes obtained from such livelihood activities as remittances, pensions as stated above, child support and disability grants and traditional healing, which 5.2% of HHs engaged in were reduced as a result of the drought. This may be due to the fact that during the drought food prices increased as stated earlier, implying that more money was needed for purchasing any quantity of food and food supplements required for HHs' consumption. The sale of wood, clothes, biscuits, fruits, the operation of a spazashop, building and welding being the livelihood activities 9% of the HHs engaged in were also affected by the drought. This may be due to a reduction in sales and contracts since the purchases of food were the main priority, concern and need during the drought (Figure 19).

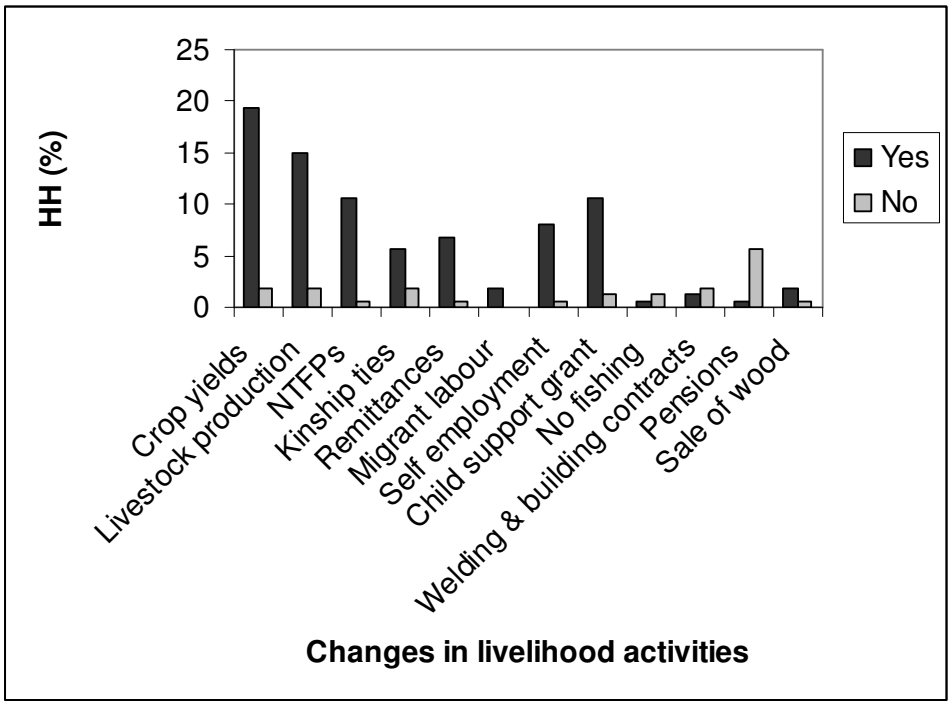

Figure 19: Changes (negative) in livelihood activities due to the 2002/2003 drought

Income(s) obtained from migrant labour's value reduced, while the bulk of any income was spent on food. Certain HHs (3.2%) lost their jobs, which were the source of their livelihoods as a result of the drought. Consequently, the drought had a negative impact on the HHs' "bundle of entitlements" (Sen 1981). However, a minority of HHs (8.2%) indicated that the drought did not cause any changes in their livelihood activities. These HHs engaged in and/or received a combination of formal and informal/self employment, remittances, child support grants, home gardening and pensions.

5.4.3. Scenarios of ensuing changes in livelihoods

As stated in sections 5.2.6 and 5.2.7, the 2002/2003 drought had several impacts on HHs including economic, social and community, food shortage and nutritional and health impacts. It also had impacts on water resources, the environment and wildlife. In reaction, 97% of HHs made the effort to do something about the impacts of the drought as a way of minimizing these impacts or overcoming them, while 3% indicated that they did not do anything about the impacts as earlier stated in section 5.3.1. Consequently, the HHs employed several livelihood strategies, which include income, consumption, production and migration responses employed by a proportion of 46%, 35.4%, 16.8% and 1.8% of HHs respectively as a way of coping with these impacts. The details can be found in Appendix B as stated in section 5.3.1.

Assets are the fundamental base of livelihoods. The impacts of the drought affected this base of livelihoods. The loss of livestock through mortality and sale resulted in changes in and the reduction in the number of livestock in the HHs and the community as a whole. As earlier stated in section 5.3, this may result in the erosion of the production base of the HHs involved. Hence the drought made it impossible for HHs to protect their essential assets. Farming is essential as a direct source of employment and income and indirectly as a source of a range of activities namely, the supply of farm inputs such as seeds, technical assistance, irrigation work and roads. Yet farming or agricultural production is usually the first to be affected by environmental hazards such as drought as stated earlier. Environmental hazards such as droughts thus require HHs (Francis 1998b) to construct livelihoods (Swift and Hamilton 2001) from a medley of different resources and activities. Livelihood diversification may be an indication of increased vulnerability most especially during periods of drought. In this case, it may either be a response to the failure of previous livelihood

strategies or the path to future accumulation and investment, which will over time lead to a cumulative improvement in the outcome of livelihoods.

Most of the HHs diversified their livelihoods by adopting a combination of livelihood strategies in responding to the drought's impacts. As stated earlier in section 5.3.1.1, a majority (39.4%) of female-headed HHs adopted four strategies. These include the sale of assets, remittances, support from relatives, informal/self employment, pension, reduction in consumption, relocation of livestock, wage income, sale of vegetables, wood and animal bones, social grants (child support and disability grants), the purchase of food on credit, sewing, slaughtering of livestock (chicken and cattle) for food, dependence on stored maize, and home gardening as stated in section 5.3.1. Migrant labour, the sale and purchase of fodder, fetching water from other communities as well as digging the dam site for water and the provision of water by the government, remittances and casual income constitute the combination of five livelihood strategies (Figure 20).

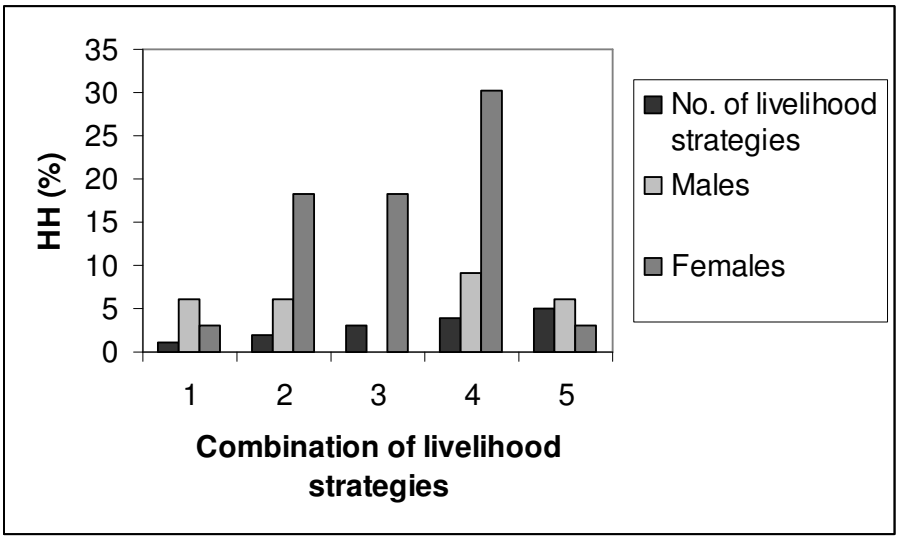

Figure 20: Combination of livelihood strategies adopted by households

Some other HHs (3%) adopted only one strategy particularly female-headed HHs, namely, the sale of wood and cattle relocation. The combination of two livelihood strategies is composed of remittances, dependence on stored food, pension, home gardening, sale of wood and assets, wage income, relocation of livestock and spaza shop operation. The combination of three livelihood strategies included the sale of vegetables, clothes and wood, home gardening, remittances and reduction in consumption. However, as stated in section 5.3.1 too much sale of productive assets (e.g., livestock) may erode HHs' production base. The HHs

may have been diversifying their livelihood strategies, however, this phenomenon may have being intensified in response to the drought. The fact that the HHs diversified their livelihood strategies in response to the drought may be an indication of their adaptability to the drought as stated in section 5.3.1.1. Consequently, Hussein and Nelson (2003) confirm that diversification of livelihoods is a form of adaptation. Diversification is a form of security, which may affect the actual livelihood strategies pursued due to the fact that a HH may be capable of diversifying its activities. This may be economically sensible with respect to the objectives of risk minimization (Swift and Hamilton 2001).

It is possible that using a combination of livelihood (adaptive) strategies was effective and conducive for the HHs that used them based on their socio-economic and political statuses and circumstances in the community. Deciding to use one or more combinations of livelihood strategies also depends on natural and economic resources available to the HHs as well as their levels of vulnerability to the impacts of the drought. The outcomes of HHs' responses to the drought include more income for drought-stimulated asset sales, although as stated above this could erode the HH's production base. This may mean that buyers benefited more than the sellers. Some of the HHs experienced a better life especially, those who operated new petty trade shops. Some other HHs (2.9%) suffered as a result of the fact that they had no livelihood options with which to cope with the effects and impacts of the drought. During good seasons relatively well-off farmers employed poorer neighbours and relatives, however, this was impossible during the drought. Consequently, some HHs (3.2%) lost their sources of income during the period of the drought including the farmers themselves. HHs thus used their capabilities, skills and knowledge to diversify their income sources and set off risks as stated above. These led to improved food, water, nutritional and health security and reduction in vulnerability as well as increase in well-being. As stated in section 5.3.1.1, the participation of HHs in various livelihood options and the relative contribution of these livelihoods have been analysed by several studies (e.g., Ellis 1998; Mohasi and Turner 1999; May et al. 2000; Bryceson 2002). Rural livelihoods in Southern Africa have been characterized by the relative contributions of each livelihood option (Dovie et al. 2005).

Therefore while many agrarian livelihoods such as crop and livestock production were in crisis during the drought there were other rural livelihoods that emerged that also addressed the material, human and food needs of the HHs. These include a combination of on-farm namely, gardening by (18.2%) of HHs and non-farm, namely, the operation of spazashop and

petty business activities by (6.1%). These livelihood strategies constitute the HHs' direct responses to the drought. Non-farm income sources become more essential especially when disasters temporarily disrupt farming activities and the production of livestock. In Africa, studies confirm that crafts, extractive enterprises such as the making of charcoal, honey and gum (arabic collection) are drought coping mechanisms. The brewing of beer is another important source of income particularly for women (Blaikie et al. 1994).

Rural livelihoods can be conceptualised in terms of access to resources (Berry 1989; Blaikie et al. 1994), entitlements (Sen 1981) and vulnerability. A range of on-farm and off-farm activities constitutes livelihoods that together constitute a variety of procurement strategies for food and cash. In this study, each individual HH therefore had several possible sources of entitlements, which constitute their livelihoods. The risk of a livelihood failure caused by the drought determines and is affected by HHs' vulnerability to income, food, health and nutritional insecurity. Consequently, the greater the share of resources devoted to food and health service acquisition, the higher the HHs' vulnerability to food and health insecurity. In this context, therefore, livelihoods are secure when HHs have secure income earning activities including reserves and assets, it offsets risks and eases the shock from the drought. Drought is a major risk factor for the sustainability and thus has implications for HHs' livelihoods. The drought resulted in the loss of agricultural incomes. As studies confirm rural HHs in Botswana think that to a lesser degree drought is a matter of life and death and to a larger extent a problem of deteriorating assets (Krüger 1999).

As stated in section 5.3.1.3, the majority of the HHs (52.9%) reported that the livelihood strategies they adopted during the 2002/2003 drought were different from those adopted during other drought periods. This was because some of them asked relatives for support coupled with the dependence on stored food and food parcels, engagement in home vegetable gardening, while they bought vegetables during the 1991/1992 drought. They also bought fodder for the livestock due to the lack of fodder, which they did not have to do during the 2004/2005 drought. Some HHs could not cut trees for sale as wood and fuelwood because national by-laws forbid the act and were arrested when caught illegally cutting down trees. The HHs also indicated that the former government provided them with some jobs, which helped them during previous periods of drought. However, they could not access such jobs during the 2002/2003 drought. This used to be national policy implemented countrywide by the previous government. According to 41.2% of HHs the livelihood strategies they adopted

were the same, implying that they adopted the same strategies they have been adopting during other drought periods during the 2002/2003 drought. Some other HHs (2.9%) reported that they had no livelihood strategy for coping with the drought.

Most HHs (84.4%) reported that the livelihood strategies they adopted for the 2002/2003 drought were very effective. This was because they enabled the alleviation of the hardship caused by the drought, e.g., the lives of human beings and livestock were saved. This category of HHs consisted of 22.2% males and 77.8% females. HHs (25.9%) in this category employed the same livelihood strategies they have been adopting during other drought periods while 74.1% adopted different livelihood strategies in response to the drought. HHs in this category may be referred to as 'resilient HHs' (Maxwell 2001a) as stated in section 5.3.1.3. On the other hand, according to 15.6% of HHs the livelihood strategies they adopted were not effective enough to ensure the alleviation of the hardship caused by the drought however, they had no other livelihood options available to them. In addition to this there were no jobs available. This category of HHs consisted of 66.7% males and 33.3% females, 50% of who employed the same livelihood strategies they have been adopting in response to previous drought periods, while 50% adopted different livelihood strategies in response to the drought. It is likely that such HHs as stated earlier in section 5.3.1.3 may be termed 'fragile HHs' since they were insecure in response to the shock (Maxwell 2001a) produced by the drought. As stated earlier, during periods of drought crises jobs are lost, but it is equally difficult to find other alternative employment opportunities (Bratton 1987; Blaikie et al. 1994).

Another component of the ensuing livelihood outcomes is the engagement of some of the HHs in home gardening. Most of the HHs in Thorndale may have adopted home gardening as one of the main ways of adapting to climate variability such as drought, with which they practice polyculture or intercropping or mixed cropping (Watts 1983, 1987; Bratton 1987; Mortimore 1989; Blaikie et al. 1994). As stated in section 5.3.1, they cultivate a variety of crops on a small piece of land. The crops most of the HHs plant include banana, maize, peanuts, pumpkin, common beans, cabbage, tomatoes, mangoes, water melon, spinach, onion, lettuce, beetroot, guava, orange, okra, sweet potato, pawpaw, grapes, wild herb species (morogo) and cassava (Akpalu 2005, personal observation) in their gardens. They manually watered these crops with muddy water collected from the virtually empty dam in order to

derive food supplements. However, majority of the HHs were denied the cultivation of these on their regular farms as a result of the lack of rain associated with the drought.

5.4.5. Summary

HHs managerially draw on their assets during periods of drought crises. In so doing, they cope with drought by flexibly adapting to its effects and impacts as well as taking advantage of new opportunities. Consequently, HHs are able to pursue different livelihood adaptations to environmental hazards such as drawing on their ability to adopt different livelihood strategies dependent on their skills, knowledge and ability to provide labour. In Africa, agricultural production such as farming is risky considering the fact that crop yields and livestock quantity are subject to climate change uncertainties as well as the supply of input. Thus farming incomes are subject to uncertainties pertaining to yields and prices as a result of the drought. In such a context, the diversification of income sources becomes crucial and is pursued through the diversification of their sources of livelihoods and thus minimizing their risks the best way they can by combining one or more of petty trading, craft production, gardening and seasonal migration. Most of the HHs depended on the urban economy for part of their livelihood strategies such as remittances to supplement their farm income. These diverse livelihood strategies employed by HHs, ensured livelihood outcomes such as more income, increased well-being, reduced vulnerability and improved food security.

The next chapter concludes the study's findings and provides recommendations after a presentation of the results and discussions.

Chapter Six

CONCLUSION

Advice from agricultural extension officers plays a significant role in HHs' agricultural productivity, yet the majority of the HHs in the study's sample had no contacts with such officers, while a minority does. This implies that more work needs to be done with respect to the provision of agricultural extension services. This may ensure improvements in their capabilities and/or adaptation(s) in terms of stressful events such as droughts.

The study revealed that the drought was a hazard, which caused physical damage, economic loss and threatened human well-being, in interaction with conditions of vulnerability. It further revealed that the impacts of the 2002/2003 drought are economic, resulting in the loss of livestock, no crop production, the loss of jobs and incomes, social and community impacts. The drought also had impacts on food security, nutritional and health statuses, water resources, the environment and wildlife. These impacts of the drought were compounded by the lack of employment opportunities in the community. The study also revealed that the problem of employment opportunities is worse now under the democratically elected government than during the apartheid regime. According to the HHs the apartheid government used to give them some temporary jobs, which helped them during periods of drought crises. However, in spite of all the negative impacts of the drought stated above, the drought also had positive impacts, for instance, village institutions were strengthened through the formation of drought committees. Such committees helped in obtaining basic amenities such as water reservoirs and compound standpipes. It further stimulated community solidarity in working together for community facilities, for instance, the community's garden. It also changed crop diversification attitudes.

Food and water are human being's most basic needs, however, without water, the production of food is impossible. This is why drought and water scarcity may translate into a decline in the production of food and hence an increase in the shortage of food and thus hunger. The study revealed that a drought event is perceived as a major reason for deteriorating opportunities for income generation as well as the decline of the value of productive assets and the subsequent increase in food shortage. This perception of drought is in line with Sen's approach of 'declining entitlements' (Sen 1981).

Food is only one important basic need among several other human needs, hence adequate food consumption may be sacrificed for other important needs. When the 2002/2003 drought struck one consequence was food shortage. In response to this HHs adopted a wide range of livelihood strategies by diversifying their sources of income including migration and migrant labour, intensifying secondary occupations such as petty trades and craft productions and dry season irrigation of home gardens. The HHs also drew on social relationships such as kinship and informal credit networks, drawing on communal resources such as the community communal lands and forests which serve as sources of types of food, medicinal herbs, fuelwood and fodder. Furthermore, the HHs drew on stored food and adjusted consumption patterns as well as drawing on assets and food parcels from government. In responding to the drought, however, HHs encountered constraints that were both internal and external to the community. On the one hand, the internal constraints include poverty, the lack of grazing area in the community and the loss of livestock to predatory wildlife and death. On the other hand, the external constraints encompass the lack of social amenities such as good roads, electricity and health posts or clinics as well as the lack of weather forecast information.

Linked to the preceding paragraph, the 2002/2003 drought had serious implications for livelihoods in the community. These include the reduction in and/or the total halt in agricultural productivity, the gathering of NTFPs, craft productions and kinship ties. In response, the HHs diversified their livelihoods as a way of surviving, the outcomes of which include a reduction in vulnerability, better life, improved food security and well-being. However, not all the HHs diversified their livelihoods, 90.9% diversified their livelihoods. Meanwhile, the results showed that female-headed HHs diversified their livelihoods more than their male counterparts. Furthermore, women generally may be the gender that undertakes several livelihood activities at a given point in time. HHs' diversification of livelihoods may be an indication of increased vulnerability most especially during drought and thus it may either be a response to the failure of previous livelihood strategies or the path to future accumulation and investment which will over time lead to a cumulative improvement in the outcome of livelihoods as stated in section 5.4.4. Such HHs may have been more impacted by the drought. On the other, 9.1% of the HHs did not diversify their livelihoods in response to the drought. This may be due to unavailability and/or inadequacy of livelihood options to such HHs.

It is a fact, however, that drought is here to stay and that its recurrence cannot be prevented. However, its devastating effects and impacts on life and property can be reduced considerably when society is made much less vulnerable to it. Therefore issues such as the uneven development of rural areas as well as the continuous hardship of the lives of agriculturalists and pastoralists must be addressed. The crucial factor in any strategic move to minimize the effects and impacts of drought should first and foremost be foresight. Drought impacts should be addressed in the formulations of policy and the development of infrastructure. Furthermore, measures such as the conservation of water, irrigation as well as the use of underground water resources should be prioritised. These may go a long way to ensure the security and sustenance of livelihoods especially rural livelihoods.

6.1. Recommendations

Most of these recommendations are already in place, for instance, the early warning system, drought response policy, improvement in studies on maize culture and adaptation to climate change. However, the benefits have not actually and really trickled down to most if not all rural communities such as Thorndale. At this stage, it is suggested that government policy makers and implementers should ensure that the national level benefits of these programmes such as remote sensing satellites, early warning systems (Mason et al. 1996; Mattes and Mason 1998; Washington and Downing 1999; Dilley 2000) and the assessment of South Africa's drought-prone areas including HHs, research into the improvement and development of varieties of maize that are higher yielding, drought-resistant, early maturing and disease and pest tolerant (Omenda et al. 1998; O'Meagher 2003) among others trickle down to the local (rural) level. Others such as food security agency (FSA) is in the process of being instituted known as food security and vulnerability information systems (FIVIMS). The implementation of these programmes and initiatives should be broad based to ensure that both the national and local levels are the beneficiaries. Studies show that major subgroups of potential users of climate information may be the ones who are underserved as a result of the design and provision of climate forecast (Archer 2003). In the light of this, efforts should be made to reach out and serve the underserved communities to ensure progress in development in terms of these issues.

Better adaptation to climate change could also evolve from the use of improved technologies, for instance, irrigation of crop husbandry (Omenda et al. 1998). Better soil and water conservation practices, crop varieties that are more tolerant to drought such as sorghum and

millet, improved weed control, use of extensive irrigation are recommended for the Thorndale community to enable the adaptation to changes in weather (climate) (McCarthy et al. 2001). Some of these measures as stated earlier are already in place and thus the trickle down effect is what is being emphasized.

Extension services should be improved to ensure that all these information and technology stated above could actually be made relevant and accessible to farmers on the ground. Furthermore, extension services should be more demand-driven and client focused. They should be more pluralistic, flexible and responsive to the changing socio-economic environments, particularly in the rural sector as well as ensure the provisioning of services to small-scale and poorly resourced farmers. They should also be made more pro-active in the development of business and marketing skills for farmers.

Farmers should invest in climate and drought risk management information, plant, equipment, planning and decision support systems to ensure that farm products are geared to deal with the onset of drought as well as its possible longer term implication for agricultural productivity (O'Meagher 2003).

The recurrent nature of drought demands that rural HHs and people in general should develop strategies that are adaptive to it in order to ensure the sustainability of their livelihoods. Consequently, drought policies should empower the people to develop adaptive strategies toward sustainable livelihoods (Omenda et al. 1998). Government and/or NGOs should also institute 'food-for-work programmes' to be implemented in the nation's drought-prone areas if this is not already in place.

6.2. Suggestions for further research

First of all, since drought is a recurrent environmental hazard in Thorndale there is the need to find out how prepared the HHs in the community are for its occurrence. Secondly, research should probe the availability of credit facilities/schemes in the community as well as how accessible this scheme is to the HHs. Finally, research should also explore whether agricultural extension officers and services may play a more supportive role during drought periods.

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APPENDICES

Appendix A: Rankings of the most important impact of the 2002/2003 drought on HHs

Rankings of Impacts	*Reasons*	*HH (%)*
1st most important impact		
Water shortage	Life's essential	47.1
Food shortage	Food is the sources of life	35.3
Crop failure	No food without crops	8.8
Health problems	Health is life	2.9
Death of livestock	Life's bank	2.9
Job shortage	Brings money	2.9
2nd most important impact		
Food shortage	Leads to the lack of energy	17.6
Crop failure	Ensures availability of food ingredients	23.5
Water shortage	Water is life's essential	32.4
Death of livestock	Source of savings	20.6
Lack of jobs	Need jobs to be able to earn income for purchasing items	5.9
3rd most important impact		
Water shortage	Life's essential	12.1
Food shortage	Affects household's nutritional requirement	12.1
Crop failure	Affects food supply	15.2
Death of livestock	Mini bank, cannot live without it	30.3
Lack of jobs *		3.3
Health problems*		15.2
Reduction in socialization	Were not able to socialise	12.1
4th most important impact		
Water shortage *		10
Food shortage	Life's essential	13.3
Crop failure	Crops are sources of food without which there is a problem	33.3
Death of livestock	Their deaths have serious impacts	20
Lack of jobs*		3.3
Reduction in socialization	We need to socialise because we are social beings	16.7
Reduction in the value of money *		3.3
5th most important impact		
Water shortage	Important for farming purposes	9.5
Food shortage*		4.8
Health problems*		4.8
Crop failure*		23.8

Appendix A: Rankings of the most important impact of the 2002/2003 drought on HHs (cont.)

Rankings of Impacts	*Reasons*	*HH (%)*
Death of livestock	Got ill during the drought	14.3
Reduction in socialisation	Time spent on searching for food and water	42.9
6th most important impact		
Food shortage	Prefer pension for grandma not to be spent on food	20
Health problems	People suffered from food related sickness	20
Reduction in socialization	Will not socialise while hungry	60

* Implies no reasons were provided.

Appendix B: HH level responses to the 2002/2003 drought

Strategies	*HH (%)*
Income responses	
Child support grant	1.9
Disability grant	1.9
Search for jobs	7.7
Sold fuelwood	21.2
Sold vegetables	5.8
Sale of assets (livestock)	9.6
Sold fodder	1.9
Sold animal bones	1.9
Sold clothes	1.9
Opened tuck/spazashop	3.8
Pension	5.8
Remittances	23.1
Husband's income	1.9
Informal employment	3.8
Brewing traditional African beer	1.9
Sewing contracts	1.9
Mat weaving	3.8
Consumption responses	
Reduced food intake	5
Dug dam site for water	22.5
Collected water from other communities	15
Asked government for water	5
Used stored maize & food parcel	7.5
Depended on NTFPs	25
Slaughtered livestock for meat	5
Eating dead animals	2.5
Bought food on credit	2.5
Stayed hungry to preserve food	8
Production responses	
Started vegetable garden	26.3
Relocation of livestock	21.1
Bought fodder for livestock	31.6
Bought medicine/vaccine for livestock	15.8
Tree branches for medicine for livestock	5.3
Migration responses	
Migrant labour	50
Migration	50

Appendix C: Constraints encountered at the HH level in responding to the 2002/2003 drought.

Constraints	***HHs (%)***	***Overcoming the constraints***	***HH (%)***
Arrested for cutting trees	7.73%	Pay fine after detainment	25%
		Defiance	25%
Law enforcement on tree cutting		Got permit	50%
Water problems	28.8%	Fetched water with containers	7.7%
		Hired vehicle for water collection	7.7%
		Collected water from other communities	53.8%
		Government water	23.1%
		Petitioned government	23.1%
Financial (money) problems	32.7%	Sent children to live with neighbours	5.9%
		Sold clothes	5.9%
		Used tree branches for medicine for livestock	5.9%
		Engaged in casual jobs	5.9%
		Sold African beer	5.9%
		Got pension from government	11.8%
		Cut wood & sold	11.8%
		Did nothing	5.9%
		Bought little food	5.9%
		Sold assets (livestock)	5.9%
		Engaged in migrant labour	5.9%
Expensive mealie meal		Used pension pay	5.9%
Lower values for assets sold		Did nothing	5.9%
Insufficient pension pay		Bought things on credit	5.9%
Reduction in the value of remittances		Cut trees & sold wood	5.9%
Lack of food	13.5%	Depended on wage income	37.5%
		Ate dry food	12.5%
		Started a spazashop	12.5%
		Started backyard gardening	12.5%
		Depended on father's business	12.5%
		Bought fodder	12.5%
Ailing cattle	3.8%	Bought vaccine & fodder	50%
		Cut trees & sold wood	50%
Lack of jobs	3.8%	Joined community garden squad	50%
		Support from government	50%
Sickness (cholera)	5.8%	Walked long distances to the clinic	300%

Appendix C: Constraints encountered at the HH level in responding to the 2002/2003 drought (cont.)

Constraints	***HHs (%)***	***Overcoming the constraints***	***HH (%)***
Government provided fodder but the controllers in charge do not release them to the them to the affected communities	1.9%	Followed up but got nothing	100%
Theft of livestock	1.9%	Took loans	100%