

The Contribution of Livestock Production to Drought Vulnerability Reduction in Mwingi District, Kenya.

By

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degree of Master of Arts (M.A) in Advanced Disaster Management.

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Declaration by the candidate

This project is my original work and has not been presented for any degree in any other university.

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This project has been submitted with our approval as university supervisors.

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Dedication

This work is dedicated to my husband Jean Claude for his love and commitment to see me through this project and to our lovely sons Mike and Ryan.

Abstract

Mwingi district records a 66% probability of food crop failure and consequently food shortage as a result of recurrent droughts. This situation compels farmers to engage in various coping mechanisms including livestock production and the use of livestock products.

Using interview schedules for both farmers and key informants, a study was conducted with the aim of finding out to what extent livestock production contributed to drought vulnerability reduction among farmers in Mwingi district. The study also sought to highlight the major constraints that handicap the livestock production. It also explored the existing and potential economic opportunities that lay untapped in the above-mentioned sector.

The data collected from both farmers and key informants, were analyzed both quantitatively and qualitatively. Thus, the study unveiled that farmers were involved in multiple farm and off-farm enterprises in order to diversify their income and ultimately, enhance their capacity to alleviate drought effects. Respondents' monthly income ranged between Ksh 1,000 and 20,000 with the majority (72.4%) situated within the range of Ksh 1,000 and 5,000. As the monthly income grew higher, the male respondents controlled it.

The majority of respondents stressed the important role played by livestock sector in reducing drought vulnerability. It was established that the majority of farmers rely on their livestock to survive the effects of drought as compared to other livelihood activities. Selling livestock and livestock products constituted their primary source of income in that it not only provided them with money to buy food in times of crisis, but it also constituted a living bank for all other households needs such as payment of school fees/hospital bills/dowry and other social and financial needs.

Unfortunately, livestock sector is not given priority in terms of development by both supporting institutions and farmers. The findings established that although farmers do enjoy the benefits secured from livestock keeping, their priority remained the improvement of crop farming rather than livestock production in terms of development. Therefore, its full potential remained untapped given the fact that most effort was concentrated on crop farming.

The study also identified some major constraints on livestock development. These were mainly, diseases and pests, scarcity of water, poor market systems, limited grazing land, lack of basic skills in animal husbandry and inadequate veterinary services.

Finally, the study explored a few ways in which livestock production functioned as both financial and social capital. Livestock ownership was considered as a source of income to draw upon when needs arise. It was found that livestock were used to cement social networks through borrowing, sharing and lending of animals. They were offered as gifts, payment of dowry or sacrifice during religious cults.

To make livestock production more profitable to farmers, the study recommended the accessibility and availability of veterinary services. Also improving livestock marketing systems and accessibility of water would impact positively on the development of the above sector. Thus, given adequate support, livestock development in the area of study will play a major role in building sustainable livelihoods in Mwingi.

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List of Abbreviations

ASALS	Arid and Semi-Arid Lands
ALRMP	Arid Land Resource Management
AU/IBAR	African Union/Interafrican Bureau for Animal Resource
CAHWs	Community-based Animal Health Workers
CARE	Cooperative American Relief Emergency
DFID	Department For International Development
DVO	District Veterinary Office
GDP	Gross Domestic Product
GOK	Government of Kenya
GTZ-IFSP/E	German Technical Co-operation Integrated Food Security Programme/Eastern
ILRI	International Livestock Research Institute
KCC	Kenya Co-operative Creameries
KMC	Kenya Meat Commission
LHAs	Livestock Health Assistants
LMD	Livestock Marketing Department
LM	Low Midland
NARC	National Rainbow Coalition
NGOs	Non-Governmental Organizations
SL	Sustainable Livelihoods
UNDP	United Nations Development Programme
UNEP	United Nations Environment Programme

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CHAPTER 1: INTRODUCTION

1.1 Background to the Study

Drought is a normal part of climate and virtually it occurs in all regions of the world. Drought is considered by many to be the most complex but least understood of all natural hazards, affecting more people than any other hazard.¹ For example, in sub-Saharan Africa, the droughts of the early to mid 1980 were reported to have adversely affected more than forty million people. (Office of Foreign Disaster Assistance, 1990). One of the lessons from Africa and elsewhere is that drought results in significant impacts regardless of the level of development, although the character of these impacts will profoundly differ.² For instance, in the United States of America, drought impacts are estimated to be between \$6 billion and \$8 billion annually and occur primarily in agriculture, transportation, recreation and tourism, forestry and energy sector (Hayes, 2003:16).

In Africa, droughts often cause large-scale water and food deficits, hunger, famine, exodus of people and animals, diseases, deaths, and many other severe chronic societal problems. "In 1985, thirty-five millions Africans were hungry because of the drought" (Timberlake, 1994: 9). However as the world Bank Senior Vice President Ernest Stern said in 1984" the famine is not only the result of inadequate rainfall. The effects of drought, in terms of its impacts on agricultural production, on the conditions of national economies and on people, are the results of long-term trends."(Timberlake, 1994:12). Therefore, the lack of a coherent framework in most drought prone countries for mitigating the effects of drought, combined with the failure to place disaster mitigation within a rural development perspective, is probably a major contributor to recurrent droughts and their consequences.

In Kenya, like in many sub-Sahara African countries, drought is not a new phenomenon. The country faces cyclic droughts every three to four years and major droughts about every decade. In addition, some parts of Kenya, especially the drier northern areas face drought every year and mostly rely on food relief from the Government and Donor Agencies. (UNEP, 2000:17) However, it should be recognized that communities living in drought prone areas, where rainfall is a major determinant factor of their food security have developed certain strategies and coping mechanisms to minimise drought vulnerability. For instance, nearly twenty years ago, Blackie et al, (1994:205)

¹ [Http://www.wrc.org.za/wrpublications/wrcdrought/pdfpapers/whilite.pdf](http://www.wrc.org.za/wrpublications/wrcdrought/pdfpapers/whilite.pdf)

² *ibid*

documented a wide range of more than seventy coping mechanisms that rural people used to survive drought. They ranged from boarding small children away in the home of more fortunate members of the extended family to reliance on non-farm income and the use of wild famine foods. Many of those coping mechanisms are still in place. But in addition, coping now includes neighbourhood-based women's self-help activity and highly developed knowledge of how to "play" the aid and relief systems.

Human response to drought can be characterised as a hierarchy of adjustments over time. Corbet (1988: 1107-1108) described drought coping mechanism framework for subsistence farmers which consists of three major stages:

- *Insurance stage*: At this level, households first attempt to buffer themselves by selling small ruminants or other "less essential" and more readily disposable animals, reducing food intake; collecting wild foods, conducting inter-household transfers of assets and loans; increasing production of "petty commodities" for sale; migrating in search of employment and selling personal possessions.
- *Crisis stage*: At this level households then begin to dispose of productive assets, which may include larger, more durable livestock such as cattle, sell agricultural tools, seek credit, and initiate further reductions in food intake.
- *Distress migration stage*: At this level people embark on mass migrations in search of food. This is a stage at which numerous deaths generally occur.

The above-mentioned human responses to drought could be seen as behaviours, which protect people from the adverse consequences of drought. The undertaken study looked into the human responses to recurrent droughts as practised by farmers in the area of study. The study was carried out in Mwingi District, which is a drought prone area. A special attention was given to livestock production as one major coping mechanism used by most farmers to counter-act the effects of drought. This led to finding out to what extent livestock production helped in reducing drought vulnerability.

1.2 Statement of the Problem.

Mwingi is one of the thirteen-districts of Eastern Province, situated in semi-arid lands with bimodal rainfall pattern (October-December and March-May rain), which is erratic and unreliable. This unreliability makes the district a disaster prone area. The district population is predominantly agropastoralist Kamba ethnic community. Among the others are Tharaka and Arab ethnic communities. The prevailing subsistence production systems are crop and livestock. The district records a 66% probability of food crop failure and consequently food shortage as a result of recurrent droughts (Office of the Vice-President, 1997:5).

As pointed out earlier, people living under such risky environments have developed coping mechanisms in order to survive negative effects related to drought such as famine, crop failure among others. These coping mechanisms include the accumulation of surplus in good years, in cash or assets such as cattle, and the use of this surplus during bad years. Other strategies include the use of diverse crop and livestock species, the pursuit of off-farm activities, and migration to earn cash during the long dry season (Nthiwa, 2001:7). Evidence shows that most farmers in Mwingi district rely on their livestock as an insurance against food insecurity. "Farmers normally sell their livestock during famine to buy food" (Office of the Vice-President, 1997:26).

It has also been noticed that the same drought coping mechanisms are practised in other areas with social-cultural and agro-ecological similarities such as Machakos District. According to Tiffen et al (1994:88-89) "Both cattle and goats had a social value as bride price. However, the animals also had value as an investment that could be sold in times of hardship. They were the chief cash earners, particularly in locations badly served by road."

Mwingi district has great potential in livestock production. About ninety percent (90%) of the district total area is suitable for extensive livestock production (Office of the Vice-President, 1997:23). Yet there is seldom effort to harness livestock potential so as to achieve both food security and economic growth. Most farmers continue investing more in food crop production rather than livestock. Consequently the trend over time of livestock population size, production and benefits are not well understood or are ignored. Major farm level factors limiting livestock outputs are not properly identified either. Particularly the contribution of livestock to drought vulnerability reduction is largely unknown to both the national government and external supporters. Therefore,

this study sought to establish the role played by livestock production in alleviating socio-economic effects of drought in Mwingi district. Its findings might be useful for local people; their leaders and decision makers in their effort to develop and adopt more sustainable solutions to drought vulnerability.

1.3 General Study Objective

The general objective of this study is to assess the contributions of livestock production towards the reduction of socio-economic effects of drought among Mwingi communities.

1.3.1. Specific Objectives

- To explore the major constraints on livestock production and establish their effects on the process of drought preparedness and vulnerability reduction
- To explore the existing and potential economic opportunities of livestock products and assess their impact on households income generation
- To find out to what extent coping mechanisms, especially livestock production reduces drought vulnerability among farmers.

1.4 Scope and Limitation

As noted earlier, there are several coping mechanisms that communities have developed to counteract drought related effects. This study, however, focused on livestock production as one major coping mechanism in order to thoroughly explore its contribution to drought vulnerability reduction. The study was carried out in Mwingi district, focusing on two divisions that presented the characteristics that suited the objective of the study. Mwingi district was chosen because it is situated in arid and semi-arid zone. Its climate is hot and dry for most of the year. The district has unreliable rainfall regime. It receives a bimodal pattern of rainfall with long rains being received between March and May and short rains being received from October to December. Because of the unreliability of rainfall, the district is faced with recurrent droughts that lead to severe food shortages and livestock death among other effects. However livestock production remains the major economic activity in the district. About ninety percent (90%) of the district total area is suitable for extensive livestock production (Office of the Vice-President, 1997:17).

The overall objective of the study is to determine the role played by livestock products as far as household food security is concerned. Thus, the researcher examined how livestock keeping helped reducing drought vulnerability among farmers. Major problems in the livestock sector and their contribution to drought vulnerability were also identified. Finally, this study explored potential economic opportunities of livestock products and their impact on household income generation.

1.5. Definition of Key Terms

The disaster literature provides little consensus within the professional community and the definitions of terms such as disasters, crisis, vulnerability, hazards, coping mechanisms and emergencies, that are frequently used in the discussion of disasters.

This is due, in part, to both fragmented international response to disasters and the fact that the distinctions are often subtle. For the purpose of this paper we have chosen to select simple conceptual definitions.

Coping Mechanisms: these are behaviours that protect people from the adverse consequences of a disaster.³

Disaster: a crisis that outstrips the capacity of the society to cope with it. It refers to a serious disruption of the functioning of a society, causing widespread human, material or environmental losses, which exceed the ability of the affected society to cope using only its resources. (Ahmed, 2000).

Drought: it is a complex, gradual and cumulative process with varying degrees of impacts on ecosystems and on human activities. There is no one universal definition for the term "drought". However most interpretations of drought include a meteorological element in which drought is defined as a significant decrease from the climatologically- expected precipitation. (Herlocker, (1999:7).

Farmer: a person who owns or manages a farm (both crop and livestock).

Food Security: is defined as the access by all people at all times to enough food for an active, healthy life. (Joachim, 1999:41).

Food Insecurity: is the lack of access to enough food. There are two kinds of food insecurity: *chronic food insecurity*, which results in a continuously inadequate diet, and *acute food insecurity* that is a temporary decline in a household's access to enough food. (Joachim, 1999:41).

Hazard: is a natural or human made phenomenon, which may cause physical damage, economic losses or threaten human life and well being if it occurs in an area of human settlement, agricultural or industrial activity. (Ahmed, 2000).

Livestock: the animals kept on a farm for use or profit. (Oxford Advanced Learner's Dictionary, 1995).

Preparedness: measures to ensure the readiness and ability of a society to forecast and take precautionary measures in advance of an imminent threat, and respond to and cope with the effects of a disaster by organising and facilitating timely and effective rescue, relief and appropriate post-disaster assistance. (Ahmed, 2000).

Slow-onset Disasters: (also called creeping disaster or slow-onset emergencies). Situations in which, the ability of people to sustain their livelihood slowly declines to a point where survival is ultimately jeopardised. Such situations are typically brought on or precipitated by ecological, social, economic or political conditions. (Ahmed, 2000).

Vulnerability: Blaikie et al. (1994:20) defines vulnerability as the capacity of a population to anticipate, cope with, resist and recover from the impacts of a natural hazard.

Vulnerability has also been defined as the condition of a given area with respect to hazard, exposure, preparedness, prevention, and response characteristics to cope with specific natural hazards. It is a measure of capability of this set of elements to withstand events of a certain physical character⁴

Vulnerability Reduction: could be defined as the capacity of potential victims to resist the stress caused by a hazard by warning them early about approaching hazards, while addressing the factors that make some people more vulnerable (e.g. socio-economic and political structure).⁵

⁴ www.uoguelph.ca/~jford01/vulnerability/vuln_definitions.pdf

⁵ (file://A:\DISASTER DIMENSION.htm/p:30)

CHAPTER 2: LITERATURE REVIEW

2.1 Background Information on Livestock Sector

Livestock contribute 10% to 30% of the agricultural Gross Domestic Product (GDP) and from 5% to 12% of the total GDP of most African countries (AU/IBAR, 2003). Recent estimates state that there are approximately one billion households in developing countries dependent upon livestock for food and economic security (Hefferman and Misturelli, 2000:1).

Pastoralists and agro-pastoralists occupy the vast dry lands of Kenya that make up to three quarters of the landmass of the country. "Presently over 50% of the country's livestock is based in the Arid and Semi-arid lands (ASALs). The livestock sector accounts for 90% of employment and more than 95% of family incomes in the ASALs" (GOK, 2003:45). However, livestock sector, which is very often associated with pastoralism, is surrounded by myths that affect its development.

There are three important myths that influence inappropriate policies for pastoral communities (AU/IBAR, 2003). First and foremost it is widely believed that pastoralists are primitive and inefficient users of natural resources. The policy consequence is that pastoralists must settle down and be modernized. The second myth is the tragedy of the commons viewed as always being over-exploited and less productive compared with owned land. Its policy consequence is land alienation, conflict and privatisation. The third myth is the belief that Aid is the answer. This also has its own policy consequence, which is the never ending, and self-perpetuating crisis. Because of such held myths, the vast agricultural and pastoral potential of Asals remains largely untapped for the development of Kenya's livestock industry. Furthermore they undermine the true face of pastoralism and its value for the community and the nation at large. This impairs the general opinion about the contribution of livestock to livelihood sustainability and the economy of the nation at large.

This study, therefore, sought to highlight the positive side of livestock production focusing on its contribution to drought vulnerability reduction. It is the researcher's hope that the study findings will help development planners and decision makers to get a better understanding of the opportunities that lay unexploited in the ASALs.

2.2 Livestock Marketing in Kenya

In the past, the government was an important agent in livestock marketing. The government intervention was mainly through the parastatal body, Kenya Meat Commission (KMC) and a government department, the Livestock Marketing Department (LMD). These two organizations operated at higher scales than private traders and slaughterhouses until they collapsed in the 1980s. The two institutions had been established to promote meat industry for local consumption and export, and also to serve as means of destocking pastoral rangelands, which were considered overstocked. Besides they would buy drought-stricken livestock in emergencies. They ceased their operations in the mid 80s. In the meantime the private sector has not been able to operate at the same scale as the above two bodies, nor to fulfil the role of emergency buying in times of drought (ALRMP, 2001:8).

Whereas the economic trends seem to favour private enterprise in most business ventures, livestock marketing from the pastoral areas had not quite grown to the extent where it could have stood and flourished on its own when the bodies mentioned above collapsed. However, the current National Rainbow Coalition (NARC) government has recently re-created the ministry of livestock and fisheries development, which has embarked on the process of reviving KMC. Government support is still necessary to establish systems that will serve the industry to stand on its feet through private operations or marketing groups. The revival of KMC offers great hope in this regard.

2.3. Understanding Drought

2.3.1. Definition of Drought

In spite of all the inconveniences that drought causes all around the world, many drought phenomena are still insufficiently understood in terms of characterization and impact assessment. Difficulties have been encountered in finding a generally accepted definition of drought. This is because drought means different things to different people, depending on their specific interest in, or need for, rainfall. For instance, Jaetzold (1995:2), working in arid northern Kenya, defined drought as a significant reduction in forage and/or food production due to water deficiency during a rainy season.

Herlocker (1999:7) distinguishes four types of droughts:

- (a) A **meteorological drought** as that which is principally characterized by deficiency of precipitation from expected or "normal" amount over an extended period of time.
- (b) An **agricultural drought** as that which is characterized by deficiency in water availability for specific agricultural operation e.g. in soil moisture, which is one of the most critical factor in defining crop production potential.
- (c) An **hydrological drought** as that which is characterized by deficiency in surface and sub-surface water supplies, which lead to a lack of water availability to meet normal and specific water demands.
- (d) A **Socio-economic drought** as recognized only when it tangibly affects people's lives in terms of say, water rationing, increased prices or depressed earning power. Thus socio-economic definitions of drought relate supply and demand of specific goods. A drought related shortage of food crops, for example, marks a drought condition in the context of human needs.

There are clearly strong relationships between the four types of drought especially during prolonged periods of rainfall deficiency although with leads and lags in terms of their respective onsets and departure. Thus drought may be considered in general terms as a consequence of a reduction over an extended period of time in the amount of precipitation that is received, usually over a season or more in length.

Droughts are certain to occur in the dry lands such as Mwingi district (the study area). This is because Mwingi is characterized not only by low average annual rainfall but also by large variations in rainfall. Therefore, central to improving drought preparedness is the need to strengthen local coping strategies and provide new options for vulnerability and risk reduction. This study looked at the livestock production as one of the coping mechanisms used by farmers to survive recurrent droughts in Mwingi.

2.3.2. Drought Coping Strategies

Coping can be defined as "a short-term response to an immediate and unhabitual decline in access to food" (Davies, 1993:60). "Coping strategies are employed once the principal source of production has failed to meet expected levels, when insurance strategies have failed or are failing and producers have to literally cope until the next harvest" (Davies, 1993:65). Thus Davies separates insurance strategies and coping strategies. She defines insurance strategies as "those

activities undertaken to reduce the likelihood of failure of primary production" (Davies, 1996: 47-48). Insurance strategies are thus defined as those activities undertaken to avoid future livelihood stress and food shortages. However, it should include also those activities undertaken to reduce the likelihood of future entitlement failure altogether, rather than a failure of primary production alone.

Much research, mostly case studies, has been done on how the poor adapt to climate or weather hazards. For instance Chen's (1991:108) narrative of a drought-affected village in India contains a good summary of the coping strategies of the poor: "growing a mix of crops and/or rearing a variety of livestock, entering the labour and tenancy (sharecropping) markets as needed, drawing down stored goods or fixed assets, adjusting consumption, borrowing, using common property resources, migrating (seasonal), and drawing upon traditional social security arrangements.

As far as Mwingi district is concerned, livestock production could be considered as both coping and insurance strategies. It is a fact that farmers resort to selling their livestock in order to buy food, as a way of coping with harvest failure. However, they also keep livestock as a buffer against future food and livelihood stress, thus preventing the likelihood of future entitlement failure.

Investing in food stores, saleable assets, human resources and social networks can also be called insurance strategies. According to Ellis (1998:4), rural livelihood diversification can be defined as "the process by which rural households construct a diverse portfolio of activities and social support capabilities in their struggle for survival and in order to improve their standards of living." Thus, livelihood diversification is an insurance strategy because it enhances a household's portfolio of options to deal with crises.

In a study conducted by Heffernan and Misturelli (2000) in Kenya covering five districts (Samburu, Garissa, Machakos, Baringo, Kajiado) and Kariobangi as one of the largest slum area of Nairobi, they found that on average households were involved in 3.6 different livelihood activities. Households pursued a wide variety of activities ranging from livestock marketing to petty trade to selling water, firewood and charcoal. Over thirty different activities were reported across the six districts. More important is that in all districts; livestock keeping was considered to contribute the most to household income. It exceeded petty trade activities, business and wage employment (Heffernan and Misturelli, 2000:25-26).

In this study, focus was on livestock production as a major activity undertaken by farmers to avoid food shortages, which came about as a result of drought crisis. This is because the value of livestock as a store of wealth is underestimated. This is especially important for agro-pastoralists who own just a few animals as a safety net against misfortune and for use in times of cash needs (funerals, school fees, etc.) Furthermore, livestock held by farmers in the study area represents livelihood, income and employment. However, its importance to national economies is masked by the fact that many livestock transactions take place by barter, and tax-revenue is not gained from poor farmers who interact largely within an informal economy. Nonetheless, the commensurate increase in demand from the urban sector for livestock produce means that livestock can potentially play an increasingly important economic role. It was therefore, important to highlight all the benefits that can be derived from livestock production through empirical research.

2.3.3. Livelihood Strategies of Households

Strategies applied to the mitigation of drought impacts may use two types of measures: proactive and reactive (Vujica and Vlachos, 1983:77) *The proactive measures* are defined as all measures conceived or prepared by the conscious and systematic actions, that may help in the alleviation of drought consequences. These include for instance diversification and mobility of assets and income sources and investment in various social claims. Accumulation of wealth in the form of livestock, diversified in terms of species and often spread in different herds as part of mutual lending agreements, is a common measure for risk preparedness. Other proactive measures include diversification of cropping and combination of cropping and livestock holding, in addition to holding wealth in the form of grain stores, jewelry or bank deposits. Agriculture based strategies include water harvesting technologies, cultivation of drought-resistant and early crop varieties, storage of fodder, and off-season gardening.

The reactive measures are defined as those measures that are basically improvised once a drought is set on and the visible impacts are already underway (Vujica and Vlachos, 1983:77). For instance the request for emergency food aid from concerned agencies or the set up of food for work activities are reactive measures. These reactive measures may also include the alternative of doing nothing, usually applied under the conditions that individuals or organizations have enough resilience to sustain impacts and a post drought recovery. Thus the difference between the proactive and reactive measures is mainly in the approach: planning contingencies versus improvisation of various ad hoc measures. It may be further important to stress that the decrease in various drought impacts in

proactive measures should sufficiently exceed their cost in comparison with the effects of implementing reactive measures. For instance, it is argued that in Kenya the total cost of distribution food relief during the 1999-2001 drought was equivalent to the cost of "doing nothing" to address the food insecurity and drought-related crisis among vulnerable communities in the longer term. This cost amounted to Kshs. 15 billion (AU-IBAR, 2001: 65). The above example is an illustration of an urgent need of policy shift from reactive measures that prove to be costly and short-term solutions to pro-active measures that aim at sustainability of livelihoods.

This study sought to establish whether investing in and supporting livestock production in ASALs constituted a considerable step towards long-term solutions to food insecurity hence contributing to sustainable livelihoods and economic growth. As stated by the Government of Kenya, (GOK, 2003:45)" the development objective in arid and semi-arid areas is to strengthen rural livelihoods through support to livestock and range management, eco-tourism, and where feasible initiating long-term irrigation projects to contribute to the overall food production and security in the country". The above objective will not only promote sustainable livelihoods but also militate against the rampant poverty in ASALs (GOK, 2003:45).

2.4. Vulnerability Reduction

2.4.1. Understanding Vulnerability.

For many years, it was assumed that natural hazards - and many of them associated with the climate and weather-caused natural disasters among human populations. It is now widely recognised that natural hazards do not necessarily lead to disasters (Cannon, 1990: 1). A drought does not have to result in a famine. Hazards become disasters when they hit vulnerable people. They act as trigger events. However, natural factors do not only act as trigger events. In agricultural settings, for instance, natural factors largely determine people's entitlements to food and livelihoods in "normal" years; their prospects for creating a surplus and their ability to accumulate assets that reduce vulnerability.

Rural people who live in areas that are endowed with high quality natural resources and a favourable climate have a more reliable set of entitlements than people in risky environments with poor soils and little wild resources. Thus natural factors can act as trigger events as well as causes of vulnerability. Therefore, to explain why some people live in areas with low quality natural

resources (marginal areas), underlying factors in the social, political, economic and cultural domain should be considered.

Two earthquakes with the same intensity in two different places can cause high mortality in one place and only small material damage in the other. When an area is affected by floods, for one family this can result in a tragedy from which it might take years to recover, while for a neighbouring family, it might be a mere disturbance of daily life. Thus a natural hazard becomes a disaster when it hits vulnerable people (Blaikie et al, 1994: 22; Cannon, 1990: 1). While the natural hazard acts as a trigger event for a disaster to occur, the underlying explanations are to be found in people's vulnerability. These explanations are often economic and political. According to Ribot (1995:121) "Inequality is the basis of vulnerability ". It is not easy, however, to uncover the economic and political processes that make some people in a community vulnerable and others secure.

The concept of vulnerability needs further explanation. Vulnerability is often confused with poverty, but although poor people are usually more vulnerable than rich people, the two concepts are not the same. Vulnerability, to distinguish it from poverty, is "not lack or want, but defencelessness, insecurity and exposure to risks, shocks and stress" (Chambers, 1989:1). Vulnerability has an external side of exposure to risk and an internal side that consists of the inability to cope without damaging loss (Chambers, 1989:1) and the limited potential for recovery (Watts and Bohle, 1993:45). Vulnerability and its opposite resilience are thus determined by the degree of risk exposure, coping capacity and recovery potential (Bohle et al, 1994: 39). The above definition helps us to distinguish vulnerability from poverty. We talk of vulnerability as relative to a certain hazard (Blaikie et al, 1994: 59) and a certain consequence (Ribot et al, 1996: 16).

People are vulnerable in different degrees to different hazards and consequences. For example, subsistence farmers are more vulnerable to food insecurity (consequence) caused by drought (hazard) than businessmen. The latter group on the contrary, although generally less poor, may be more vulnerable to food insecurity triggered by hyperinflation because they rely more on the market for their food needs. Thus the difference between poverty and vulnerability lies in the external side of vulnerability: the exposure to risk. The internal side is more directly related to poverty. Inability to cope and recover is mainly caused by a lack of resources, alternatives and buffer capacity,

associated with poverty. The undertaken study sought to establish major factors that cause the inability to cope with drought.

2.4.2. Focus on Vulnerability Reduction.

The nature of the vulnerability of farmers in Asals is complex and varied. Hence there are no straightforward solutions for risk reduction for the farmers. It will require multi-dimensional approaches and innovative institutional arrangements to achieve the goal of risk reduction for the farmers. Nonetheless, the overall objective of risk reduction for the farmers should be to make development sustainable for them. This is because response to high levels of vulnerability cannot merely be in the form of emergency aid once drought has struck.

Presuming that the overall objective of drought management is progressively to minimise the impact of drought on the population, vulnerability to droughts can only be decreased if the factors that contribute to it are tackled. This means creating structures and institutions that capacitate communities in the recognition that decreasing vulnerability is the same as increasing capacities. This requires concerted efforts at different levels and across different sectors to devise effective mechanisms for risk reduction for the farmers.

As far as livestock production is concerned in ASALS, reviewed literature reveals that much effort is spent more on providing animal health services. For example Cinnamond and Eregae (2003) conducted a study on the selection processes, impact and sustainability of community-based animal health workers (CAHWs) in pastoralist areas of Kenya. Rubyogo et al, (2003) also conducted a case study of community-based animal health workers in Mwingi district/Kenya. Both studies mainly deal with one aspect of livestock production, which is animal health service delivery. Though animal health care plays a great role in improving livestock production, there is need to revive other aspects of livestock production such as management, animal husbandry, stocking and destocking and animal feeds; among others. This would help in enhancing not only productivity but also the overall management of livestock products both during normal times and drought stricken periods. Furthermore, it will lead to developing more sustainable solutions to drought vulnerability.

2.5. Theoretical Framework

2.5.1. Vulnerability Views

Vulnerability is now a widely accepted concept in social science. Various authors have come up with historical overviews of how understanding of vulnerability has shifted and enlarged, or how different actors perceive disasters and vulnerability (Cannon, T. 1994; Anderson, 1995; Smith, 1996). In short, three different views and resulting strategies to address vulnerability are distinguished: -

➤ Nature as cause

Technological, scientific solutions: this view blames nature and natural hazard as the cause of people's vulnerability, which fluctuates according to the intensity, magnitude and duration of external shocks. Vulnerability results from hazards (including intensity) and risk (exposure to events, measured in terms of proximity). To reduce vulnerability, systems for predicting hazards, and technologies to enable human structures to withstand negative impacts are designed and applied (e.g. equipment to monitor seismic activity, weather forecasting, remote sensing for drought and fire monitoring, water control systems, building code regulations, etc.)

The above view applies to Mwingi district in that it is a semi arid area where droughts are expected. However, nature should not be blindly blamed as the sole cause of people's vulnerability to drought. Instead one should ask what mechanisms or strategies have been put in place to help reduce people's vulnerability. Also how effective are those mechanisms (e.g. meteorology department in Mwingi).

➤ Cost as cause

economic and financial solutions: in spite of increasing technological and scientific capacity, people continue to suffer, because prediction and mitigation technologies are so costly. Economists develop and still improve methods to assess the costs of losses from disasters to calculate whether, when, how and where reducing vulnerability is viable. In this view, vulnerability will be reduced if national governments adapt safety nets, insurance, calamity funds and provide financial assistance to build up people's assets (World Bank, 2001:135). People living in risky environments in most underdeveloped countries are left to their own divine advice when it comes to dealing with hazards. For instance in Mwingi, institutions dealing with warning systems are either inexistent or inefficient.

➤ Societal structures as cause

political solutions: this view observes that disasters have differential impact on people who live in hazard-prone areas. It is not only the exposure to hazards that puts people at risk, but also socio-economic and political processes in society that generate vulnerability. These create the conditions that adversely affect the ability of communities or countries to respond, to cope with or recover from the damaging effects of disaster events. These conditions precede the disaster event, contribute to its severity and may continue to exist even afterwards (Anderson, 1989:10; Blaikie, 1994: 9). “Reducing the vulnerability of the poor is a development question, and such a question must be answered politically” (Cuny, 1983:7). In this perception, a safer environment can only be achieved if disaster response changes the processes that put people at risk. The long-term solution lies in transforming the social and political structures that breed poverty and the social dynamics and attitudes that serve to perpetuate it (Heijmans and Victoria, 2001: 16).

The three views are not exclusive. Most disaster response agencies combine the first two views in their analysis and actions, like most international humanitarian agencies. They perceive ‘vulnerability’ as the result of both external dynamics and lack of financial capacity. In their analysis, poor people are plagued by critical trends, shocks and seasonal problems, which lie far beyond their control. To help them, support focuses on relief and disaster prevention, like scientific forecasting and warning equipment to give vulnerable populations time to move out, and on financial assistance to build up people’s assets – including insurance (Annan and Bender, 1999).

This theory is relevant to the study, especially the third view of vulnerability, in that farmers are vulnerable to recurrent droughts, which result in food shortage and livestock loss. However, whether or not farmers go hungry depends on the degree of exposure to drought and the strength of insurance strategies and buffer capacity. Furthermore from the earlier discussion it has been shown that the ASALs have been given less attention in terms of their development. Nonetheless farmers in the area of study have developed insurance strategies such as bee keeping, charcoal burning, and migration to urban area in search of employment and livestock keeping among others, through which food insecurity can be avoided. It is assumed that if given necessary and adequate support from government and other development partners, livestock keeping would play a major role in building sustainable livelihoods hence reducing vulnerability in Mwingi district.

2.5.2. Sustainable Livelihoods Theories (SL)

Once the type of vulnerability of a certain group of people has been identified, the next step should be to devise ways that sustain local efforts towards vulnerability reduction. Hence sustainable livelihoods theory appears to be an adequate complement of the vulnerability theory discussed above as far as this study is concerned.

There exist different sustainable livelihoods approaches. For instance, there is the approach developed by the Department For International Development (DFID). CARE and United Nations Development Programme (UNDP) have also developed their respective approaches. However, they all have in common the fact that they start from a developmental standpoint and put livelihoods at the centre of the discussion. They also consider vulnerabilities, of all kinds, as part of the context in which livelihoods are shaped. For the purpose of this study, DFID's approach was used to show how relevant it is to the study.

2.5.2.1 Basic Approach.

The Sustainable Livelihood theory helps understand and analyse poor people's livelihoods. A livelihood is defined as "the capabilities, assets (including both material and social resources), and activities required for a means of living. A livelihood is sustainable when it can cope with and recover from stresses and shocks and maintain or enhance its capabilities and assets both now and in the future, while not undermining the natural resource base" (Carney, 1998:4).

2.5.2.2. Main Components of Sustainable Livelihood Approach

a). Vulnerability Context.

As pointed out earlier, a central feature of this approach is that it views people as operating in the context of vulnerability. This frames the external environment in which people exist and is responsible for many of the hardships faced by the world's poorest people. The factors that make up the vulnerability context are important because they have a direct impact upon people's assets and the livelihood options that are open to them. The model presents three types of vulnerability that is shocks, trends and seasonalities (Hefferman and Misturelli, 2000:3). Trends are long-term and usually large-scale. They include population trends, resource trends, economic trends (both national and international), trends in governance and politics, and technological trends. They have a particular important influence on rates of return from chosen livelihood strategies. Shocks include human health shocks (epidemics), natural shocks (e.g. drought, floods), economic shocks (e.g. rapid

change in exchange rates), and conflict and crop/livestock health shocks. Shocks can destroy assets directly (e.g. in case of floods, earthquake). They can also force people to dispose of assets as part of coping strategies. Seasonality is expressed through seasonal shifts in prices, production, food availability, employment opportunities and health. The vulnerability context of the study area is mainly characterized by the recurrent droughts with their effects and consequences on people's livelihoods.

b). **Livelihood Assets**

The approach breaks assets ("capital") into five categories human, social, natural, physical and financial capital (Hefferman, and Misturelli, 2003:3)

- *Human capital*: e.g. skills, knowledge, ability to labor, good health.
- *Social capital*: e.g. networks and connections, self-help groups, relationships of trust, reciprocity and exchange.
- *Natural capital*: e.g. land, forests, marine/wild resources, water.
- *Physical capital*: this is the basic infrastructure and producer goods needed to support livelihoods. Infrastructure includes affordable transport; secure shelter, adequate water supplies and sanitation, access to information. Producer goods are the tools and equipment that people use to function more productively. E.g. tractors, draught animals, oxen ...
- *Financial capital*: e.g. savings and credit, and inflows of money other than earned income.

Considering farmers in the study area, the approach can be used to show the strengths and weaknesses of different types of asset, their relative importance and the linkages between them. However, the study will focus on livestock as both financial and social capital and establish how livestock keeping could be used as an entry point for strengthening livelihood security.

c). **Transforming Structures and Processes**

Transforming structures are public sector, private sector and civil society organizations. They set and implement policy and legislation, deliver services, purchase, trade and perform many other functions that affect livelihoods. Transforming processes determine the way in which structures and individuals operate and interact. They include policies, legislation and other rules that regulate access to assets, markets, and culture and power relations in society. Transforming structures and processes can reduce or worsen the impact of external shocks on vulnerable people for example through lack or inexistence of policies that support local efforts of vulnerable people to enhance their livelihoods. Thus it is important to find out whether there exist transforming structures and processes in the study area supporting people's efforts towards vulnerability reduction.

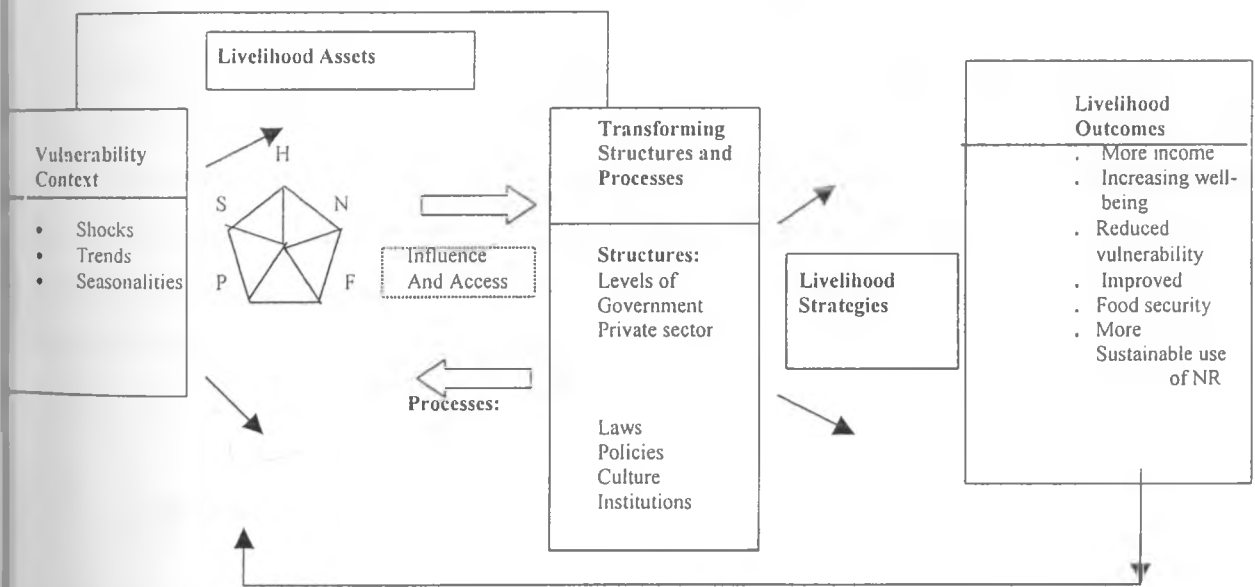
d). **Livelihood Strategies**

The key strategies in rural areas can be categorized as natural resource based, non-natural resource based or migration (Goldman et al, 2000). The S L approach seeks to understand the many factors influencing people's choice of livelihood strategy and then to reinforce the positive aspects and mitigate the constraints. In the study area, farmers seem to invest more in food crop production rather than livestock production. It would be interesting to find out factors influencing the above situation through research.

e). **Livelihood Outcomes**

These include more income, increased well-being, reduced vulnerability, improved food security, more sustainable use of natural- resource base (Hefferman and Misturelli, 2000:3). It is one of the objectives of the undertaken study to find out to what extent does livestock keeping contribute to the above-mentioned outcomes.

2.6. **Conceptual Framework. (Adapted from Carney 1998:4)**



H=Human capital; S=Social capital; P=Physical capital; F=Financial capital; N=Natural capital.

Overall, the SL framework is a good model for viewing livelihoods in all their aspects, and in setting risk reduction and hazard vulnerability in the wider vulnerability and livelihood context. The model portrays the five capital assets on which a household depends: human capital, physical capital, social capital, financial capital and natural capital. Farmers in the area of study not only have needs but also resources or assets namely arable land, livestock, social resources (e.g. friends,

self-help groups). They are also vulnerable to a range of challenges and reducing vulnerability may be a higher priority than increasing production, or the quantity of their assets.

Using the above model, livestock production was examined as both financial and social capital. Under financial capital, the researcher examined livelihood activities, the seasonality of incomes and how farmers ranked their income sources. More importantly the viability of livestock related activities were explored by examining the income derived from livestock sales, the means in which herds were acquired, herd health constraints and management issues.

Though social capital was not be easy to measure, the researcher explored social capital by analysing those formal and informal institutions that farmers may draw upon in times of trouble. Consequently, the study analysed the variety and strength of associations that were available to farmers. Thus, social capital was measured via the level of access to institutions, rather than by the level of associational activity or membership in groups. Both farmers' access to social capital and the manner in which livestock functioned as a form of social capital were examined.

Transforming structures and processes which include the government and private sector and the laws, policies and institutions therein were also examined, their impact on the vulnerability context in the area of study (recurrent droughts) in which the livelihood activities (e.g. livestock keeping) of the farmers occur. This brought out the role played by the above-mentioned institutions in the livelihood strategies (livestock related activities) that farmers pursue in order to achieve certain livelihood outcomes (e.g. more income, increased well being, reduced vulnerability, improved food security, etc.)

2.7. Hypothesis of the Study

In this study the researcher tested only one hypothesis. The hypothesis the study tested is that there is correlation between livestock production and vulnerability reduction. In the above hypothesis, the independent variable is livestock production and the variety and quantity of livestock products measured it. The dependent variable is vulnerability reduction, which was measured by the number of income or food generating strategies, such as petty trade, shamba, firewood/charcoal business, casual labour, livestock sales, seasonal labour migration that were available to farmers in the area of study.

CHAPTER 3: METHODS

3.1 Description of the Research Site

This research was conducted in Mwingi District. Mwingi is a relatively new district carved out of Kitui District in July 1993 (Office of the Vice-President, 1997:4). It is one of thirteen districts in Eastern Province. It covers an area of 10,031km² and has a human population of 355,000 inhabitants grouped in 55,000 households and an average population density of 37 inhabitants /1km² (GOK, 2002:4). The district is mainly semi-arid, with 80% of its landmass classified in the low midlands five (LM5) agro-ecological zone (Office of the Vice-President, 1997:5). The district is a drought-prone area with 66% probability of crop failures (Office of the Vice-President, 1997:14). The district population is predominantly Kamba ethnic community (95%). The remaining 5% is divided between the Tharaka ethnic community (4%) and a small mixed ethnic minority of Arabs and others (Rubyogo et al, 2003:9).

Mwingi district was chosen as the focus of the study because agro-pastoralism (crop and livestock) is the district population's economic mainstay. Since there is a 66% probability of food-crop failure, the rural population considerably relies on off-farm food supply from the grain market by selling their animals. Livestock are therefore used as living banks in case of cash needs. They are also used for ploughing/weeding and as a source of draught power. This study sought to establish the role-played by livestock keeping as far as drought vulnerability reduction was concerned. It focused on finding out the extent to which livestock keeping helped farmers survive prolonged periods of drought. It also sought to highlight what other benefits were derived from this sector so as to improve farmers' livelihoods and established its economic potential.

3.2 Sampling Procedures

The divisions of Migwani and Nguni were purposively selected to suit the objectives of the study. In both divisions, farmers keep livestock and grow crops. However, Nguni division experiences higher crop failure than Migwani because it is situated in the low potential zone of the district, which receives an average rainfall of between 250mm and 500mm per year (Office of the Vice-President, 1997:14). Thus, comparing these two divisions in terms of their reliance on livestock to counteract the negative impacts of drought crises on farmers' livelihoods helped the researcher capture the contribution of livestock to drought vulnerability reduction. Furthermore, within each of the purposively selected divisions, one sub-location was randomly selected (Kyamboo sub-

location in Migwani and Mbovu sub-location in Nguni) to form one sample of sixty farmers using systematic random sampling.

This was done as follows. A list of all livestock keepers was obtained from the chairperson of the livestock-keepers self-help group in both sub-locations. The total number of livestock keepers was divided by the sample size in each sub-location to get the sample interval size. The sample size in each sub-location was thirty (30). Thus, in Kyamboo sub-location the total number of livestock keepers was 450 divided by 30 (the sample size) to get 15 as the sample interval size. In Mbovu sub-location the total number of livestock keepers was 887 divided by 30 (the sample size) to get 29.5 rounded to 30 as the sample interval size. The starting point on the lists of farmers who were to form the sample needed, was picked at random. This was done in order to give every member of the population of livestock keepers a chance to be part of the sample.

In addition, four key informants were purposively selected from the various categories of people who are familiar with the livestock sector in ASALS to get in depth information.

3.3 Methods of Data Collection

3.3.1 Interview Schedule.

An interview schedule was used for farmers. A set of questions was used to interview these farmers to cater for those who were not comfortable with a questionnaire probably because of their educational level. The interview schedule included both open and close-ended questions so as to create room for the respondents to express themselves freely.

3.3.2 Key informant interviews

Key informant interviews of respondents purposively selected were carried out. This was done using an interview guide to obtain the needed information. Key informants are the people with sound knowledge and competence to provide the required information.

3.3.3 Secondary data

A review of secondary data was used to supplement the primary data. This included a review of books and information from organizations which deal with livestock sector, namely the ministry of livestock and fisheries development, International Livestock Research Institute (ILRI), African

Union/Inter-African Bureau for Animal Resources (AU/IBAR), German Technical Cooperation (GTZ), Arid Land Resource Management Program (ALRMP).

3.4 Data Analysis

Both quantitative and qualitative research techniques were used. The quantitative phase helped the researcher to come up with both descriptive and inferential statistics necessary to make deduction for this research. The qualitative component filled in the gaps and also provided additional information.

3.4.1. Unit of Analysis and Unit of Observation

According to Baker (1994), the social entities whose social characteristics are the focus of the study would be the units of analysis. They are the collection of things that will be studied (Baker, 1994:102). Thus, the primary unit of analysis in this study was the livestock keeper. Livestock keepers also constituted the unit of observation in that they were the chief providers of information about the role played by livestock to sustain their livelihoods in times of severe drought.

3.4.2. Independent and Dependent Variables

In this study the independent variable is "livestock production". The variety and quantity of livestock owned by farmers measured the above-mentioned independent variable. The dependent variable is "vulnerability reduction." This study sought to establish the extent to which livestock production reduces vulnerability. Blaikie et al. (1994:20) defines vulnerability as the capacity of a population to anticipate, cope with, resist and recover from the impacts of a natural hazard." Hence vulnerability involves much more than the likelihood of people being injured or killed by a particular hazard, and includes the type of livelihoods people engage in, and the impact of different hazards on them. Consequently, the number of diversified livelihood activities such as crop production, petty trade, firewood/charcoal business, casual labour, livestock sales, seasonal labour, migration among others that generate income or food and are available to farmers were used to measure the extent of vulnerability in the area of the study. Thus, the more a farmer is involved in different livelihood activities, the better his/her chances of surviving drought effects.

3.5 Field Experience

In this section, the researcher points out some of the problems encountered when collecting field data and how they were dealt with. First and foremost, the researcher had to deal with the issue of

translation (English/Kiswahili). This is because most respondents were not capable of expressing themselves meaningfully in English. Thus, the researcher had to translate, sometimes even interpret the questions into Kiswahili language during the interviews. Being herself a foreigner from a French speaking country, though she knows and can express herself fluently in Kiswahili, both her accent and Kiswahili vocabulary betrayed her. However, to overcome this problem the researcher worked with a research assistant (an agriculture officer and Kamba man from Mwingi) to be able to communicate effectively with the respondents. Nevertheless, the above exercise was time consuming and had its effects on the initial work plan. Also, since the interview schedule had many open-ended questions, it was not always easy to cut short some respondents who were carried away and were not mindful of the time. Thus, instead of spending fifteen days in the field as initially planned, the researcher had to add five more days, and this had its effect on her budget.

Another problem was that most respondents expected to be paid or given a reward after the interview. This situation made the researcher and her assistant explain carefully what the exercise was all about and why it involved their input before starting the interview. Then the respondents were asked if they were willing to assist the researcher with the information she needed even though it was free of charge. The researcher discovered that a good and clear introduction of the whole exercise made things easier for both the respondents and the researcher.

To move from one division to the other was also a problem because of scarcity of public transport, but also there is no direct road from Nguni to Migwani. Thus one had to go back first to Mwingi town (Central) and then proceed to either direction. To overcome the problem of transport, the researcher had to use her assistant's motorbike not without contributing with some fuel. Last but not least was the fact that data were collected in rural areas as mentioned earlier. Therefore, it was not always easy to meet some basic needs such as clean drinking water or a decent restaurant. Thus, the researcher had to live on bread and soft drinks most of the time enjoying a good meal only when back to Mwingi town.

However, despite the above-mentioned difficulties, it was a very good experience to get in touch with some harsh realities related to drought and its effects, that have become part and parcel of the respondents' daily living. Though they live in a harsh environment, farmers are not hardened. On the contrary the researcher was touched by their kindness, friendly hospitality, willingness and patience to be interviewed.

CHAPTER 4: QUANTITATIVE ANALYSIS OF FIELD DATA

4.1. Descriptive Statistics

Descriptive statistics are procedures used to summarize and organize data, thereby enabling the researcher to describe and explain findings in an effective and meaningful way. These procedures were applied in this study by use of percentages, frequency distribution tables and pie charts. Hence patterns of relationships were identified and variations captured.

4.1.1. Socio-economic Characteristics of Respondents

This section descriptively presents the data gathered from livestock keepers in Migwani and Nguni divisions respectively. The socio-economic parameters considered during the study comprise respondents' gender, level of education, monthly income, occupational status and number of children. These socio-economic characteristics highlight the features of respondents who struggle to reduce their vulnerability to recurrent droughts in their region.

4.1.1.1. Gender Distribution

The sample comprised both male and females as is illustrated in table 1 below:

Table 1: Gender distribution of the sample

Gender	Migwani Division		Nguni Division		Totals	
	Frequency	Percent	Frequency	Percent	Frequency	Percent
Male	16	53.3	19	63.3	35	58.3
Female	14	46.7	11	36.7	25	41.7
Total	30	100	30	100.0	60	100

Source: Field data.

Both divisions had good representation of males and females though the males' representation (58.3%) was slightly higher than females (41.7%). This indicates that livestock keeping is not a prerogative of males. Females play a significant role in this sector. Thus, in the event of initiating a project on livestock development as a way of reducing farmers' vulnerability to recurrent droughts, the views of both sexes would be equally important to avoid gender biases

4.1.1.2. Educational Level Achieved

Respondents in the sample achieved a certain level of education as illustrated in Table 2.

Table 2: Respondents' level of education

Education level	Migwani Division		Nguni Division		Total	
	Frequency	Percent	Frequency	Percent	Frequency	Percent
Primary school	15	50.0	13	43.3	28	46.7
Secondary school	11	36.7	10	33.3	21	35.0
No formal education	3	10.0	7	23.3	10	16.7
Adult education	1	3.3			1	1.7
Total	30	100	30	100.0	60	100

Source: Field data.

Twenty-eight out of 60 respondents had completed their primary school, 21 had completed their secondary school, 10 had no formal education and 1 respondent did adult education. Those who went through primary education formed the highest percentage (46.7) among the respondents. Thus, it is suggested that the low level of educational achievement could be held as a limiting factor for most farmers seeking to adopt new techniques and strategies, that enhance their farming productivity (both crop and livestock) and help reducing their vulnerability to recurrent droughts.

4.1.1.3. Marital Status

Table 3 highlights Respondents' marital status. The majority (83.3%) were married, and only 3.3% were single. Others were widowed (11.7%) and divorced (1.7). This implies that the majority (83.3%) of those interviewed had chances of extra labour support mechanism from their spouses to carry out effective livestock and crop production along with other income-generating activities, unlike those who were widowed, divorced or single.

Table 3: Respondents' marital status.

Marital status	Migwani Division		Nguni Division		Total	
	Frequency	Percent	Frequency	Percent	Frequency	Percent
Single	-	-	2	6.7	2	3.3
Married	25	83.3	25	83.3	50	83.3
Widowed	4	13.3	3	10	7	11.7
Divorced	1	3.3	-	-	1	1.7
Total	30	100	30	100	60	100

Source: Field data.

4.1.1.4. Number of children

The approximate number of children in respondents' families was established as illustrated in Table 4: Fifty percent of respondents had 1-5 children, 36.7% had 6-10 children and 10% had 11-15 children. One respondent had 19 children and a newly married respondent had no child. Thus, on average, respondents had 6 children in their families. This means that the number of people consuming food within a household is actually high. Therefore, these families are susceptible to frequent food shortages given the periodic crop failures in the region. However, this figure also suggests the potential labour, which can effectively be utilized to improve both crop and livestock production.

Table 4: Number of children in the respondents ' families.

No of children	Migwani Division		Nguni Division		Total	
	Frequency	Percent	Frequency	Percent	Frequency	Percent
None			1	3.3	1	1.7
1-5	14	46.7	16	53.3	30	50.0
6-10	13	43.3	9	30.0	22	36.7
11-15	3	10.0	3	10.0	6	10.0
16-20			1	3.3	1	1.7
Total	30	100	30	100	60	100

Source: Field data

4.1.1.5. Occupational Status

The main livelihood activity pursued by respondents was farming (crop and livestock). However, some respondents were also involved in other activities as illustrated in Table 5.

Table 5: Respondents' occupational status per division

Occupations	Migwani Division		Nguni Division		Total	
	Frequency	Percent	Frequency	Percent	Frequency	Percent
Farming	22	73.3	21	70.0	43	71.7
Farming/retired teacher	1	3.3	2	6.7	3	5.0
Farming/Business	1	3.3	5	16.7	6	10.0
Farming/Machine operator	-	-	1	3.3	1	1.7
Farming/Masonry	1	3.3	1	3.3	2	3.3
Farming/Teacher	2	6.7	-	-	2	3.3
Farming/Social worker	1	3.3	-	-	1	1.7
Farming/Pastor	1	3.3	-	-	1	1.7
Farming/Watchman	1	3.3	-	-	1	1.7
Total	30	100	30	100	60	100

Source: Field data

All the respondents were farmers, a few were venturing into business (16% in Nguni) while others combined farming and teaching (6.7% in both divisions). However, most farmers (70% in Nguni and 73.3% in Migwani) rely on their farming activities (crop and livestock). Given the unreliable and erratic rainfall pattern in the area, these results imply that farmers had multiple activities in order to diversify their income sources and reduce their vulnerability to recurrent droughts.

4.1.1.6. Estimated Monthly Income

The approximate respondents' estimated income level was also calculated as shown in Table 6.

Table 6: Respondents' monthly income from all sources

Income levels	Migwani Division		Nguni Division		Total	
	Frequency	Percent	Frequency	Percent	Frequency	Percent
Less than 1000	2	6.7	2	6.7	4	6.9
Ksh. 1000 to Ksh. 5000	19	63.3	23	76.7	42	72.4
Ksh.5001 to KSh10000	7	23.3	4	13.3	11	19.0
Ksh.10001 to Ksh.20000			1	3.3	1	1.7
Total	28	93.3	30	100.0	58	100

Source: Field data.

Two respondents out of 30 did not disclose their monthly income in Migwani whereas in Nguni, all the 30 respondents did. The problems in household income calculations are well known and were recognised in this study. However, a rough estimation of income was required to establish the importance of livestock to livelihood security. Hence, to estimate the total household income, the earnings from livestock sales, milk sales and that derived from non-livestock livelihood activities were summed. Thus, the following figures are a result of deduction from the respondents' earnings per year converted into earnings per month. The majority of respondents in both divisions earned between Ksh 1,000 and 5,000 per month (76.7% in Nguni and 63.3% in Migwani), some earned between Ksh. 5,001 and 10,000 (13.3% in Nguni and 25% in Migwani), a few earned less than Ksh 1,000 (6.7% in Nguni and 7.1 in Migwani). Only one respondent earned between 10,001 and 20,000 in Nguni. This is an indication-of the low purchasing power of the majority (72.4%), which is especially felt during times of crisis. For instance, when farmers experience crop failure, they hardly had enough money to buy foodstuff.

The above-mentioned socio-economic characteristics of the respondents indicate that most farmers are poor people. The majority are married with an average of six children in their families. Most of

them attended school up to primary level. Their level of income is very low. Consequently, these factors combined with periodic recurrence of droughts in the area of study may contribute to farmers' vulnerability.

4.1.2. Description of Relationships between Selected Socio-economic Variables.

The following section highlights relationships between selected socio-economic variables namely, gender, level of education and number of children on one side and level of monthly income on the other, using cross-tabulations. These cross-tabulations are a step further in establishing whether a given variable influences another across the sampled population of the study and the implication as far as drought vulnerability is concerned. Although the sampled population was 60 respondents, cross-tabulation tables indicate that n=58 because of 2 respondents who did not disclose the information about their monthly income.

4.1.2.1. Income and Gender.

As indicated in table 6, two respondents from Migwani division did not disclose their estimated monthly income. This is reflected in table 7 where only 23 out of 25 females in the sample indicated their monthly income. The relationship between estimated monthly income and gender revealed that there were some discrepancies between the two groups as shown in the Table 7.

Table 7: Relationship between estimated monthly income and gender

Monthly income		Gender	
		Male	Female
Less than 1000	Count	3	1
	% of Total	8.6%	4.3%
KSh. 1000 to KSh. 5000	Count	22	20
	% of Total	62.9%	86.9%
Ksh.5001 to KSh10000	Count	9	2
	% of Total	25.7%	8.7%
KSh.10001 to Ksh.20000	Count	1	
	% of Total	2.9%	
Total	Count	35	23
	% of Total	100.0%	100.0%

Source: Field data;

Out of 35 male respondents, 22 (i.e. 62.9%) earned between Ksh 1,000 and 5,000. Female respondents were 23. Out of 23 female respondents, 20 (i.e. 86.9%) earned a monthly income estimated between Ksh 1,000 and 5,000. Thus, the majority of both male and female respondents

earned a monthly income ranging between Ksh 1,000 and Ksh 5,000. However, a few male respondents (10 out of 35) earned a monthly income above Ksh 5,001. Only 2 female respondents (i.e. 8.7%) had their monthly income estimated between Ksh 5,001 and 10,000. Thus, there are some discrepancies among male respondents as regard to their estimated monthly income. Female respondents on the other side are concentrated within the income bracket of Ksh 1,000 and 5,000. It was observed that as the estimated monthly income grew higher, it tended to concentrate in the hands of male respondents as compared to their female counterparts. There is need, therefore, to empower women financially given their considerable contribution to livestock keeping and livelihood security.

4.1.2.2. Income and Level of Education

Table 8 relates respondents' estimated monthly income to their level of education.

Table 8: Relationship between Level of Education and Monthly Income

Monthly income	Level of Education of respondents			
	Primary school	Secondary school	No formal education	Adult education
Less than 1000	3 11.1%		1 10.0%	
KSh. 1000 to KSh. 5000	17 63.0%	15 75.0%	9 90.0%	1 100.0%
KSh.5001 to KSh10000	6 22.2%	5 25.0%		
KSh.10001 to Ksh.20000	1 3.7%			
Total	27 100.0%	20 100.0%	10 100.0%	1 100.0%

Source: Field data

Table 8 indicates that out of 27 respondents who achieved primary education, 17 (i.e. 63%) earned a monthly income between Ksh 1,000 and 5,000 and only 6 (i.e. 22.2%) earned between Ksh 5,001 and 10,000. There were 20 respondents who achieved secondary education. Among them, 15 respondents (i.e. 75%) earned a monthly income ranging from Ksh 1,000 to 5,000 and only 5 respondents (i.e.25%) earned a monthly income ranging from Ksh 5,001 to 10,000. Thus, some differences were noticed among respondents both within and between categories of academic achievement. It was established, therefore, that there is no clear relationship between education and income levels. The implication is, that for the moment, the educational level achieved may not necessarily contribute to increased income levels.

4.1.2.3. Income and Family Size

The relationship between income and family size was also established, as shown in Table 9

Table 9: Relationship between Income and Family Size

Monthly income		Number of children in the family				
		None	1-5	6-10	11-15	16-20
Less than 1000	Count		2	2		
	% of Total		6.7%	9.5%		
KSh. 1000 to KSh. 5000	Count	1	24	13	3	1
	% of Total	100.0%	80.0%	61.9%	60.0%	100.0%
Ksh.5001 to KSh10000	Count		4	6	1	
	% of Total		13.3%	28.6%	20.0%	
KSh.10001 to Ksh.20000	Count				1	
	% of Total				20.0%	
Total	Count	1	30	21	5	1
	% of Total	100.0%	100.0%	100.0%	100.0%	100.0%

Source: Field data

Table 9 indicates that 24 out of 30 respondents had between 1-5 children, 13 out of 21 respondents had between 6-10 children and both groups earned a monthly income estimated between Ksh 1,000 and 5,000. It is within this same income bracket that a respondent having 19 children as well as one who had none were also found. Thus, regardless of the number of children in the family, it was observed that majority of respondents earned between Ksh 1,000 to 5,000. This imbalance between number of children in respondents' families and their monthly income also contributes to their vulnerability.

CHAPTER 5: QUALITATIVE ANALYSIS OF OPEN-ENDED QUESTIONS

In this section, farmers and key informants' responses to open ended questions of the interview schedules were analysed and summarized. The data gathered from the respondents were divided into three sub-headings, namely, Major Constraints to Livestock Production, Existing and Potential Economic Opportunities of Livestock Production and Farmers' Coping Mechanisms.

5.1. Major Constraints to Livestock Development

When asked to give their opinion about what they thought were the major constraints to livestock development in their respective divisions, 53 respondents out of 60 came up with different views, which are reflected in table 10.

Table 10: Major Constraints on Livestock Development in Nguni and Migwani Divisions (n=53)

Major Constraints	No of respondents who mentioned	% Frequency
Livestock diseases and pests	41	77.4
Inadequate pasture, limited grazing land	40	75.5
Long walking distances in search of water	12	22.6
Expensive drugs/poor veterinary services	11	20.8
Lack of capital to invest/low capital	6	11.3
Inadequate rain	4	7.5
Poor animals husbandry	2	3.8
Insecurity/frequent food shortage	2	3.8
Low market price	1	1.9

Sources: Field data.

Table 10 shows that 41 out of 53 respondents (77.4%) pointed out livestock diseases and pests as a major problem in livestock development. This is followed by inadequate pasture or limited grazing land (75.5%). Other important constraints are: long distances in search of water (22.6%), expensive drugs and poor veterinary services (20.8%) and lack of or low capital (11.3%) for investment in livestock production among others. The study findings suggest, therefore, that without adequate disease and pests control, the provision of veterinary services to farmers, water availability and the provision of adequate grazing land, the development of livestock sector is undermined.

These findings confirm what the African Union/Interafrican Bureau for Animal Resource (Rubyogo et al, 2003:10) outlined in their study conducted in Mwingi using different methods namely, focus group discussions and questionnaires. The study came up with the following as common problems faced by livestock keepers in the area of study: livestock morbidity and mortality due to disease and pests, inadequate fodder and water accessibility during prolonged drought periods.

Key informants suggested that diseases and pests constituted a major constraint on livestock development mainly because of the inaccessibility of veterinary services. It was established that the District Veterinary Office (DVO) had only three district-based veterinarians and nine Livestock Health Assistants (LHAs) heading the very large divisions (each division is about 1000km²). Thus, there was inadequacy of personnel and facilities to provide veterinary services to farmers in remote areas of the district. Furthermore, the rural economy is ill prepared to accommodate veterinary professional fees.

Key informants also suggested that scarcity of water was a result of recurrent drought periods as well as lack of efficient water catchment and harvesting techniques when the district benefited from good amounts of rains. The district has only one perennial river, the River Tana, which runs along the boundary with Embu and Tharaka-Nithi Districts. All other rivers in the district are seasonal. Also, the groundwater potential is low due to the low water table and low rainfall received (Office of the Vice President, 1997:17).

There exists also a lack of focus on adequate genetic improvement as far as livestock species are concerned. According to key informants, farmers continue to rear livestock adapted to the harsh climate of arid and semi-arid regions. Even when some farmers venture into rearing improved breeds (e.g. exotic breeds), the latter have no local markets according to key informants. Such a situation discourages those who are willing to adopt improved breeds, such as the Sahiwal. The latter is an exotic Zebu, which originates from the arid regions of India and Pakistan. It has been imported into Kenya and it is known for its adaptability in dry areas and its milk productivity of superior quality (Herlocker, 1999:75).

Key informants also suggested that inadequate and limited grazing land was a serious problem because most available land was mainly used for crop farming. Consequently, it was very common to find livestock grazing along the roads, especially the Nairobi-Mwingi-Garissa highway. Quite

often, speeding motorists knock down cattle, goats or donkeys resulting in losses to the farmers. Sometimes, livestock owners pay the motorists in case of any damage to the vehicles. In other instances, bitter disputes arise occasionally about cattle or goat straying into neighbours' farms and damaging crops.

Ignorance of farmers and lack of basic skills/knowledge of animal husbandry were also another problem identified by key informants. This was due to the absence of agricultural service extension and inadequate veterinary services. Thus, farmers were left to their own advice as far as animal husbandry was concerned.

The above-mentioned are some of the outstanding problems faced by livestock development sector pointed out by farmers and key informant respondents. They also suggested some solutions to the above-mentioned problems. Key informants emphasised on the need to enhance the accessibility of veterinary services. This means bringing veterinary services closer to the farmers but also facilitating services affordability. Offering training on animal husbandry while identifying and promoting livestock species that perform better in the area of study, would also help reducing expected animal losses during prolonged drought periods. Establishing locally community based processing institutions and improving marketing outlets would influence positively farmers and encourage them to invest more in livestock production.

In order to minimize the issue of lack of water, key informants suggested the increase of water supply in the district. Also, training farmers in techniques of water catchment and harvesting would help increasing the availability of water for both livestock and crop farming.

5.1.1. Problems Related to Livestock Selling

Respondents were also asked to identify common problems they encounter while selling their livestock. Forty-six out of 60 respondents highlighted the following problems as shown in table 11.

Table 11: Common problems encountered when selling livestock in both divisions (n=46)

Problems with livestock sales		
Problems encountered	No of respondents who mentioned	% Frequency
Low market Price	38	82.6
Council levies	12	26.1
Market place too far	7	15.2
Lack of Market	5	10.9
Quarantine	5	10.9
Regular fluctuations on price	5	10.9
Middle men exploitation	4	8.7

Source: Field data.

Low market prices scored the highest percentage (82.6%) as the most common problem encountered by respondents when selling their livestock. According to key informants, poor market systems contribute to the failure of livestock development in the area of study, in that most farmers sell their livestock during drought periods when livestock prices drop because the supply exceeds the demand. Hence, the buyers determine the price at the disadvantage of the farmers. These findings contradict Herlocker (1999:77) who states that because "the Kenya Meat Commission (KMC) and Kenya Co-operative Creameries (KCC) no longer enjoy the monopoly of processing and marketing of meat and milk, this has removed a major obstacle to increased livestock production and marketing." And that "marketing is now competitive and farmers are obtaining higher meat and milk prices, due to entry of other interested parties."

Council levies were also a common problem livestock traders encountered. According to Yacob Aklilu (2002:13), "Livestock are probably the most highly taxed agricultural commodity group in Kenya, Ethiopia and Sudan." For example, in Sudan, traders pay up to 20 categories of taxes between points of purchase and final exit. Traders in Ethiopia are also subjected to transit and varying sales taxes within the country. Kenyan livestock traders may not pay fees and taxes in as many places but the total amount is significant.

Respondents also talked about middlemen exploitation, quarantine, lack of market and price fluctuations as other problems faced by livestock traders. Yakub Aklilu also talks about the middlemen/women whom he describes as powerful groups, which play a lead role in determining the price of the day as they take advantage of the fact that there are no facilities for livestock to stay

overnight in the market. These middlemen/women are either butchers who slaughter stock on order or butcher who slaughter and wait for a buyer. For instance, middlemen form cartels at the Dagoretti terminal market in Nairobi. They buy cattle from the traders and sell the meat to the butcheries instead of the butchery owners buying the livestock directly from the traders.

Thus, livestock keepers found themselves in a weak position as regards determining the price of their products. Such a situation discourages farmers and constitutes a major constraint on livestock development in the area of study. Furthermore, it contributes to farmers' vulnerability in that their purchasing power is weakened. This is because they must pay council levies to be allowed to sell their animals, which they then sell at very cheaper prices for reasons discussed earlier. They end up losing more than they gain any benefits. Thus, they are trapped into the socio-economic effects of prolonged drought periods, which contribute to their vulnerability. Hence, there is need to abolish those cartels that take advantage of the above-described farmers' situation and exploit them. Both the reduction and regulation of council levies on livestock traders will also encourage farmers to sell their animals without fear of losses. The availability of slaughter houses may also help in providing adequate markets for livestock in times of crisis to avoid loss of animals due to lack of feeds.

5.1.2. Improvement of Livestock Production

When asked to talk about what needed to be done to improve livestock production, 46 out of 60 respondents gave the suggestions as shown in table 12 below:

Table 12: Techniques and Strategies needed to help improve livestock production in both divisions (n=46)

What needs to be done	No of respondents who mentioned	% Frequency
Training in animal husbandry and management	23	50.0
Drill bore holes/increase water points	16	34.8
Veterinary services near to the farmer	16	34.8
Regular application of medicine/vaccinate	15	32.6
Provide with loan to buy more animals	7	15.2
Constructions of dips	6	13.0
Avoid overstocking	6	13.0
Improve security	3	6.5

Source: Field data

Fifty percent of respondents said they needed training on animal husbandry and management, 34.8% suggested drilling boreholes, increasing water points and bringing veterinary services closer to the farmers, while 32.6% suggested the regular use of drugs and immunisation against common animal diseases. Training and awareness creation in livestock management may be instrumental not only in production, but it should also cover the livestock marketing continuum and agro-business exposure.

5.2. Existing and Potential Economic Opportunities of Livestock Production.

In the study area, livestock production is considered as a component of farming diversification strategy offering a range of products throughout the year. Besides its economic benefits, livestock production has also some cultural functions (e.g. payment of dowry, sacrifices, celebrations). To explore the economic opportunities of livestock production, livestock ownership in Nguni and Migwani divisions as well as means of acquisition, reasons for keeping livestock and the use of livestock products were analysed.

5.2.1. Livestock Ownership in Nguni and Migwani Divisions

Respondents were asked to specify the number and species of livestock they owned. Tables 13 and 14 illustrate the distribution of respondents by the number and type of livestock.

Table 13: Distribution of respondents by the number and types of livestock owned in Nguni division.

No of livestock	Cattle		Goats		Sheep		Donkey		Chicken		Others	
	Freq	%	Freq	%	Freq	%	Freq	%	Freq	%	Freq	%
None	4	13.3	-	-	29	96.7	2	6.7	1	3.3	29	96.7
1-5	13	43.3	4	13.3	1	3.3	25	83.3	5	16.7	1	3.3
6-10	6	20	13	43.3	-	-	3	10.0	9	30.0	-	-
11-15	3	10.0	5	16.7	-	-	-	-	2	6.7	-	-
16-20	3	10.0	3	10.0	-	-	-	-	5	16.7	-	-
21-25	-	-	-	-	-	-	-	-	2	6.7	-	-
26-30	-	-	-	-	-	-	-	-	3	10.0	-	-
>30	1	3.3	5	16.7	-	-	-	-	3	10.0	-	-
Total	30	100	30	100	30	100	30	100	30	100	30	100

Source: Field data

Table 14: Distribution of respondents by the number and type of livestock owned in Migwani division.

No of livestock	Cattle		Goats		Sheep		Donkey		Chicken		Others	
	Freq	%	Freq	%	Freq	%	Freq	%	Freq	%	Freq	%
None	10	33.3	7	23.3	29	96.7	10	33.3	1	3.3	29	96.7
1-5	15	50.0	9	30.0	1	3.3	20	66.7	10	33.3	1	3.3
6-10	5	16.7	9	30.0	-	-	-	-	7	23.3	-	-
11-15	-	-	3	10.0	-	-	-	-	2	6.7	-	-
16-20	-	-	2	6.7	-	-	-	-	3	10.0	-	-
21-25	-	-	-	-	-	-	-	-	2	6.7	-	-
26-30	-	-	-	-	-	-	-	-	2	6.7	-	-
>30	-	-	-	-	-	-	-	-	3	10.0	-	-
Total	30	100	30	100	30	100	30	100	30	100	30	100

In Nguni, 26 respondents out of 30 (i.e. 86.6%) owned cattle; whereas 20 respondents out of 30 (i.e. 66.7%) owned cattle in Migwani. All the respondents owned goats in Nguni, 43.4% having more than 10 goats, as compared to 16.7 in Migwani. Only 2 out of 30 respondents in Nguni did not possess a donkey, while in Migwani 10 out of 30 respondents did not own a donkey. Donkeys are more used as draught animals- fetching water and transporting other items (e.g. fire wood, charcoal). Hence, they are very useful to the farmers. About 70% of respondents in Nguni and 73.3% in Migwani owned between 1-20 chickens. Though both divisions are involved in livestock keeping, the above figures indicate that livestock population is slightly higher in Nguni than in Migwani. Thus, it is an indication that livestock are more important in more drought-stricken areas such as Nguni as compared to relatively wetter areas like Migwani, where, crop production remains farmers preferred livelihood activity despite the high probability of its poor performance especially when drought occurs.

5.2.2. Animals Acquisition

Investing in livestock production is one of the most important livelihood option farmers are involved in, along with crop production in their struggle to survive recurrent droughts in the study area. As stated by Bryceson (2000:23) "Poor people are increasingly struggling to reduce their vulnerability by diversifying their livelihoods within, and beyond, agriculture." The following table displays farmers' means of livestock acquisition.

Table 15: Means of animal acquisition

Means	Nguni Division		Migwani Division		Total	
	Frequency	Percent	Frequency	Percent	Frequency	Percent
Purchase	19	63.3	21	70.0	40	66.7
Inheritance	2	6.7	2	6.7	4	6.7
Bride-wealth	8	26.7	4	13.3	12	20.0
Gift			2	6.7	2	3.3
Exchange			1	3.3	1	1.7
Other	1	3.3			1	1.7
	30	100	30	100.0	60	100.0

Source: Field data

It was observed that in Nguni, 63.3% of the respondents acquired their livestock through purchase, 26.7% through bride-wealth and 6.7% through inheritance. Likewise, in Migwani, 70% of the respondents acquired their livestock through purchase, 13.3% through bride-wealth and 6.7% got them as a gift.

Earlier discussions indicated that the purchasing power of the majority of respondents (72%) was very low because of the low rate of their monthly income (i.e. Ksh 1,000-5,000). Yet, results in table 15 indicate that 66.7% of farmers got their livestock through purchase. Thus, despite having meagre resources, farmers invest in livestock keeping along with crop production. This is because they are aware of the benefits derived from livestock keeping, especially in times of crisis. It is implied, therefore, that livestock production is an economic opportunity which, if well managed and given adequate support, constitutes a key to reducing vulnerability among farmers.

5.2.3. Reasons for Keeping Livestock

To get a deeper understanding of the role played by livestock keeping in the area of study, farmers were asked to outline the reasons for keeping livestock. Table 16 displays some of the reasons suggested by farmers.

Table 16: Reasons for keeping livestock in Nguni and Migwani divisions.

Reasons	Nguni division (n=24)		Migwani division (n=25)	
	No of respondents who mentioned	Freq.%	No of respondents who mentioned	Freq.%
Provides animal products	11	45.8	21	84.0
Source of income	10	41.7	15	60.0
To sell livestock in case of need	8	33.3	3	12.0
Oxen ploughing	7	29.2	17	68.0
To sell and buy food	5	20.8	5	20.0
Security/ multiply faster	5	20.8	3	12.0
For paying dowry	5	20.8	3	12.0

Source: Field data

Comparing the two divisions, there were some differences in responses about the importance of keeping livestock among respondents as shown in Table 16. In Nguni, the percentages for different reasons given are relatively equally distributed (provides animal products 45.8%, source of income 41.7%, sell livestock in case of need 33.3% etc...). This is an indication that farmers rely on their livestock to satisfy all sorts of needs as they arise. Indeed, keeping livestock constitutes for them a living bank. In Migwani, reasons are skewed towards two main important areas, i.e. provision of animal products (84%) and oxen ploughing (68%). This implies that in Migwani, farmers do not entirely depend on their livestock. They have other sources of income (e.g. crops, fruits, small business etc...), livestock production being more integrated in the cropping system. Hence, it was established that livestock production plays a greater role in more drought-stricken areas than in relatively wetter areas. The above findings suggest that respondents in both divisions keep livestock for their various household needs especially in Nguni. However, the economic potential of livestock in terms of product value addition (e.g. dairy products, meat derived products, etc...) remains largely untapped. This is probably due to economic, social, political and cultural reasons that are complex in nature and need thorough investigation.

5.2.4. Use of Livestock Products

The following section gives more details about the use of livestock and their products in both divisions. It further highlights the importance of keeping livestock to farmers' livelihood.

Table 17: Uses of livestock production in both divisions (n=60)

Uses	No of respondents who mentioned	Percentage Frequency
Milk/eggs consumption	58	96.7
Animal traction	58	96.7
Social obligation	57	95.0
Milk/eggs selling	54	90.0
Manure	48	80.0
Others	25	41.7
Meat selling	22	36.7
Savings	9	15.0

Source: Field data

It emerged that consumption of livestock products and animal traction scored the highest percentage (96.7%). These results confirm what has been discussed in the above section, namely, the use of livestock to cater for various household needs. Note that only 36.7% reported about meat selling. Farmers prefer to sell the animals live instead of slaughtering the animals and selling the meat. Skea (1987:52) observed that: "The sale of goats for meat is very often dictated by the needs of the owner e.g. money for school fees, medical expenses, social obligations." However, even when farmers happen to sell live animals, it was interesting to note that they will choose those that are defective. Thus, in many cases the animals sold are old or young, therefore, unsuitable for the butcher. Consequently, this could explain partly the low price offered to farmers. Hence, if the potential of livestock sector are to be exploited to their maximum level, there is need of attitude change from farmers in the area of study. Thus, the selling of animals should not be dictated only by problems related to animals' old age and sickness or other socio-economic pressures that demand cash. Farmers should be exposed to agro-business principles that incorporate both production and marketing of quality products, which attract better prices.

When asked to give their opinion about livestock as an economic potential, key informants did not have much to say except that they all agree that the economic potential of livestock is yet to be fully understood and, consequently, yet to be fully exploited. This echoes Otula's statement dated a few

years ago:" Kenya still has the choice of utilising its vast and under-populated arid and semi-arid lands which have been falsely ignored during the last 25 years as untameable or wild. It is becoming clear that it is lack of technology and skilled manpower that resulted in this myth of the wastelands or hostile and inhabitable regions. It has become clear that our future socio-economic development depends on utilisation of these areas and this should be possible because the country has now developed not only the will but also the capability or potential to attain such a goal" (Otula, 1989:18-19). Otula's pronouncement remains true today as far as the economic potential of livestock in arid and semi-arid lands is concerned. It looks like although the manpower is available to carry out the development of arid and semi-arid lands, the most important element namely the political will has been adversely lacking to support the implementation. However, there is hope with the new NARC government that the livestock sub-sector in arid and semi-arid lands will be finally remembered and the development objective that is "to improve animal production and marketing" (GOK, 2003:87).

When asked if there were institutions that could help add value to livestock products, key informants cited the revival of Kenya Meat Commission (KMC). However, they added that KMC should be decentralised for better performance. They also talked about community-based honey processing and hides and skins processing institutions, which do not exist so far in the area of this study. Therefore, the creation or revival of such institutions in the area of study may constitute a step further towards unravelling great economic opportunities in the livestock sub-sector.

5.3. Farmers Coping Mechanisms

This section highlights coping mechanisms used by respondents to survive recurrent food crisis in the area of study.

5.3.1. Crop Production

One of the coping mechanisms used by the respondents is the production of different types of crops as a way of diversifying income and reducing vulnerability as illustrated in table 18

Table 18: Types of crops grown in Nguni and Migwani divisions.

Crops	Nguni (n=30)		Migwani (n=30)		Totals (n=60)	
	No of respondents who mentioned	% Freq.	No of respondents who mentioned	% Freq.	Tot of respondents who mentioned	% Freq.
Beans	6	20.0	29	96.7	35	58.3
Maize	27	90.0	30	100	57	95.0
Sorghum	24	80.0	11	36.7	35	58.3
Pigeon pea	13	43.3	22	73.3	35	58.3
Cow pea	28	93.3	18	60.0	46	76.
Others *	25	83.3	6	20.0	31	51.7

Source: Field data

**In Nguni, other crops mainly comprise green gram and millet while in Migwani, other crops are cassava, sweet potatoes, pumpkins and fruit tree crops (e.g. mangoes, avocado etc...)*

Comparing the two divisions, it was observed that farmers in Nguni grow more drought tolerant crops than in Migwani. Drought tolerant crops grown include cowpea (93.3%) and sorghum (80%). Beans are more grown in Migwani (96.7) as results of relatively higher and more reliable rainfall than Nguni Division. Despite the maize susceptibility to drought, it is equally significant crop among the farming community in Nguni (about 27 respondents i.e.90%). This situation might be contributing to farmers' vulnerability since drought is recurrent in the region. In Migwani, there is an increasing trend of embarking on high value crops such vegetables and fruit tree crops (20%) targeting growing towns of Migwani and Mwingi.

Given the fact that Mwingi district is a drought-prone area, farmers should be encouraged to grow more drought resistant crops as a way of reducing their vulnerability to drought and insuring food security. Growing cash crops also would help them increase their cash income.

5.3.2. Livestock Production as a Major Coping Strategy

Farmers were asked to talk about what they usually do to survive during times of food crisis caused by prolonged droughts. Table 19 outlines different strategies used by respondents in the area of study.

Table 19: Strategies used to avoid food crisis in Nguni (n=29)

Strategies used	No of respondents who mentioned	% Frequency
Depends on livestock or sell livestock	19	65.5
Food for work	16	55.2
Buy from local market	12	41.4
Casual labour/employment	10	34.5
Selling of charcoal	6	20.7
Seek assistance from in-laws/relatives	3	10.3
Small business	1	3.4

Source: Field data

To avoid a food crisis in case of poor harvest in Nguni, 65.5% of respondents talked about selling of livestock, 55.2 % pointed out food for work, which was organised by the German Technical Cooperation (GTZ-IFSP/E), 41.4% talked about buying food from local market. Casual labour (34.5%) was also used as a strategy to avoid food crisis

Table 20: Strategies used to avoid food crisis in Migwani (n=28)

Strategies used	No of respondents who mentioned	% Frequency
Depends on livestock or sell livestock	16	57.1
Selling of charcoal	12	42.9
Buy food from local market	11	39.3
Casual labour/employment	10	35.7
Food for work	6	21.4
Small business	5	17.9
Seek assistance from in-laws/relatives	4	14.3
Storing grains for later use	3	10.7

Source: Field data

In Migwani, as table 20 shows, 57.1 % of respondents talked about selling livestock, 42.9% burnt and sold charcoal, while 39.3 % talked about buying food from the local market. In both divisions

livestock sale scored the highest percentage as being the most common strategy used by respondents to avoid food crisis. Selling livestock provides them with money to buy foodstuff and take care of other household needs. These findings indicate that respondents in both divisions rely much more on their livestock than any other livelihood activity to survive the negative effects of drought (e.g. crop failure). Key informants mentioned that during times of food crisis, women undertook small business of vegetables and fruits bought from the nearest towns (e.g. Thika.). Reduction of number of meals per day (i.e. one meal per day taken late in the afternoon) was also a common strategy adopted in most families.

When asked about what should be done to avoid food shortage, respondents in both divisions emphasised the need to use techniques that improve crop production such as terracing, planting high yielding varieties, irrigation and digging boreholes as shown in tables 21 and 22 below:

Table 21: Techniques and strategies suggested by respondents to avoid future food crisis in Nguni (n=28)

What should be done	No of Respondents who mentioned	% Frequency
Farm terracing /soil conservation	16	57.1
Plant high yielding varieties/early plan	10	35.7
Irrigation/dig bore holes	8	28.6
Services on good animal husbandry	7	25.0
Form self-help groups	7	25.0
Hardworking	7	25.0
Loans for small scale farmers	4	14.3
Relief food/seeking assistance	4	14.3
Storage of food during good harvest	3	10.7
Oxen ploughing	3	10.7
Provide drugs for the livestock	1	3.6
Agro-forestry (fruit production)	1	3.6

Source: Field data

Table 22: Techniques and Strategies suggested by respondents to avoid future food crisis in Migwani (n=27)

What should be done	No of respondents who mentioned	% Frequency
Plant high yielding crop varieties/	13	48.1
Farm terracing /soil conservation	12	44.4
Loans for small scale farmers	9	33.3
Irrigation/dig bore holes	6	22.2
Oxen ploughing	5	18.5
Relief food/seeking assistance	3	11.1
Provide drugs for the livestock	2	7.4
Storage of food during good harvest	2	7.4
Improved animal husbandry	1	3.7
Hardworking	1	3.7
Agro-forestry (fruit production)	1	3.7

Source: Field data

Tables 21 and 22 show that about 57.1% of respondents in Nguni and 48.1% in Migwani saw terracing their farms and use of high yielding varieties of crops, as the most important strategy to avoid future food crisis in the region. Other suggestions mainly focused on better management of crop production in both divisions.

The above information shows that although the respondents rely substantially on their livestock during hardships caused by the recurrent droughts in the region, their priority remains the improvement of crop production through the use of better techniques rather than the development of livestock production. This is probably because people in the area of study are not pastoralists per se, but agro-pastoralists who consider livestock production as supplement to crop production. The same trend of focusing on crops is also emphasised by development support, which is geared towards better crop production. For instance, GTZ/IFSP-E assisted farmers adopt better methods of crop production through seminars, workshops and provision of adequate seeds at affordable prices.

It is also a fact that arid and semi-arid regions are more suitable to livestock development than crop production. It is, therefore, necessary to promote and support livestock development. This could only be achieved if the livestock sector is equally given adequate support for its improvement and growth.

5.3.3. Other Income Generating Activities

Apart from crop and livestock farming, respondents were asked to identify other livelihood activities they were involved in and which constitute a source of income as shown in table 23.

Table 23: Other livelihood pursued by farmers in both divisions (n=52)

Other livelihood activities	No of respondents who mentioned	% Frequency
Small business	44	84.6
Casual worker	36	69.2
Carpentry/construction and building	13	25.0
Employment/self assistance	12	23.1
Charcoal burning	11	21.2
Fetching/selling water	4	7.7

Source: Field data

Concerning other livelihood activities pursued in the region, it was found that 84.6 % of respondents were involved in small business (e.g. fruits vegetable sales, kiosk/hotel), 69.2% did casual labour while 25 % were employed in carpentry or construction and building sectors. These findings indicate that farmers are increasingly involved in different livelihood activities with the aim of achieving livelihood security. However, some of these activities such as charcoal burning, fire wood selling; although they may contribute to generating income to households, they have a negative impact on the ecological environment and may also contribute in the long run to the desertification and the ever ending food stress in the region. Therefore, support to crop production alone constitutes a short- term solution to food crisis but not a sustainable strategy towards drought vulnerability reduction.

In their evaluation of livestock production contribution to livelihood security as compared to other livelihood activities carried out by farmers, key informants stated that livestock production remains the key coping strategy given the low economic power base of the farmers. They further explained that local casual employment generated meagre income, migration had no assurance of job acquisition, while food for work and relief food were not only unreliable but also distributed in small quantity. Key informants claimed that livestock production contributed 90% of livelihood security despite the natural calamities. This is probably an exaggerated figure meant to stress the importance of livestock keeping to the farmers' livelihood security. Key informants believed that its contribution was very substantial in that it formed the basis of some major investments such as

payment of school fees, building of house, purchase of land and payment of dowry among others. Rubyogo et al (2003:10) also established that at household level, the cash income derived from livestock keeping was estimated at 70 % of all cash income. Hence livestock were used as living banks.

5.4. Livestock as Financial Capital

Using the DFID's Sustainable Livelihood Framework (see p.23 of this document), livestock was analysed as both financial capital and social capital within the context of drought vulnerability.

Financial capital has been defined as the "financial resources which are available to people (whether savings, supplies of credit, or regular remittances or pensions) and which provide them with different livelihood options" (Carney, 1998:24). Therefore, given the fact that livestock are an important form of financial capital, the viability and benefits of livestock for livelihood security were explored.

5.4.1. Benefits derived from livestock keeping

There are a number of benefits that farmers derive from livestock keeping as shown in table 25:

Table 24: Benefits derived from livestock keeping (n=52)

Benefits to household	No of Respondents who mentioned	% Frequency
Provide food/school fees	37	71.2
A source of income/selling to get profit	31	59.6
Serves as security	8	15.4
Provides animal products	8	15.4
Multiply faster/more benefits	6	11.5
Oxen ploughing	5	9.6

Source: Field data

Concerning the benefits of livestock keeping to the household economy, respondents said that livestock keeping contributed the most to household income. 71.2% of respondents confirmed that they got foodstuff and school fees for their children from livestock sales whereas 59.6% considered livestock as a source of income to draw upon when needs arise. Thus, livestock keeping is of major importance to the economic security of households. However, more benefits could be drawn from livestock keeping if fully developed.

5.5. Livestock as Social Capital

Social capital has been defined as the "features of social organisation, such as trust, norms and networks that can improve the efficiency of society by coordinated actions" (Putnam, 1993:61). Of the five capital assets upon which a household's livelihood is based, social capital is recognised as being the most difficult to measure (Attanasio and Szekely, 1999:48). Empirically, the measurement of social capital has proved difficult for two reasons. First, social capital is dynamic and therefore subject to change and secondly, expectations of assistance from relatives, community groups etc may not materialise when put to test. For example, although individuals may join a group with the notion of future benefit, these gains may not accrue. Therefore, it is difficult to separate beliefs from reality when attempting to measure social capital. However, the study took a narrower, but perhaps more realistic view of the nature of social capital within many communities as those informal institutions that a person may draw upon in times of crisis. Thus, social capital was examined via the level of access to institutions rather than by the level of associational activity or membership in groups.

Table 25: Institutions that provide help in times of crisis.

	Nguni		Migwani		Total	
	Frequency	Percent	Frequency	Percent	Frequency	Percent
Churches	5	16.7	4	13.3	9	15.0
Close relative/clans	13	43.3	2	6.7	15	25.0
Self help groups	12	40.0	24	80.0	36	60.0
Total	30	100	30	100	60	100

Source: Field data

These findings show that respondents do not have many alternatives from where to get help. However, self-help groups (e.g. Myethya groups) play an important role in the area of study. These are mainly women who come together and assist each other in different ways. For instance, a Mwethya (self-help group) of seven women in Migwani contributed each 50Ksh per week. At the end of the month, they had 1,400 Ksh, which they used to buy a goat. The goat was kept by one member of the group for its reproduction. Whenever the goat had young kids, they were distributed to members of the Mwethya. This process continued until each member of the Mwethya got her own goat and started rearing it. When the goat in which they invested became very old, it was sold and the money used as a start for other investment. It was also established that these Mwethya groups afford to buy livestock mainly during drought when the price drops because of excess supply of livestock in the market. They usually buy younger animals at cheap price. The above is an example of how livestock functions as social capital.

To further evaluate how livestock functioned as social capital, the means by which livestock were acquired were examined. As shown in table 15 above, the majority of respondents purchased the animals in their possession. Approximately 20.0% got them as bride-wealth, which refers to those animals received by the bride and /or her family upon marriage. Alternatively, 6.7% of respondents inherited animals, principally cattle from immediate family members. Livestock also contributed to the social ties within a community through borrowing, sharing and lending of animals. These were some of the forms in which livestock were used to cement social networks among community members. Therefore, improving livestock production would contribute to improved social capital and mutual support.

Respondents were also involved in a ranking exercise of the above-mentioned institutions and other institutions in terms of their level of accessibility. Respondents were told to rank these institutions on a scale of 1 to 10 where rank 1 referred to the institution that was most accessible and rank 10 for the least accessible. To obtain the overall rank of each institution, an average of the various ranks accorded to each institution was computed. Thus, the institution which got the smallest mean (i.e. close to 1) was ranked number one, meaning most accessible and one that got the highest mean (i.e. close to 10) was ranked the least accessible.

Table 26: Ranking of the institutions that provide help to respondents

Ranking institutions that provide help to respondents			
Institutions	Mean	Std. Deviation	Ranks
Close relatives	2.96	1.93	1
The Government	3.07	1.82	2
NGOs	3.45	2.44	3
Distant relatives	3.96	1.85	4
Friends/neighbours	5.04	1.70	5
Church/mosque	5.09	2.10	6
Self-help group	5.85	2.64	7
Community	7.17	1.58	8
The rich	8.28	1.98	9
Customery leadership	8.73	1.83	10

Source: Field data

It was established that respondents could easily seek help from their close relatives before turning towards the government and NGOs in that order. Ranking close relatives as number one shows that the social fabric in rural areas is still viable. However, the syndrome of dependency perpetrated by institutions in the name of humanitarian assistance, working in collaboration with the government

might not only destroy the above social fabric, but also the spirit of self-help groups that have been ranked among the least accessible institutions. The latter have been ranked so simply because they are not empowered so as to play their role more effectively within the community.

5.6. Summary of Chapter Five

Farmers in Mwingi district practice both crop and livestock farming with greater emphasis on the former. The contribution of livestock production to drought vulnerability reduction is especially felt during prolonged periods of drought. Farmers sell their livestock and livestock products in order to buy foodstuff. Livestock keeping is also considered as a living bank, which assists farmers in catering for various needs of their households (e.g. payment of school fees, hospital bills, dowry, and other social obligations). However, livestock production is faced with major constraints that handicap its development. These are namely, pests and diseases, scarcity of water, poor market systems, limited grazing land, lack of basic skills in animal husbandry and inadequate veterinary services among others. This situation is further compounded by the fact that government policies are not supportive to the sector. Consequently, the economic potential of livestock production in the area of study is yet to be fully developed. Improving and developing the livestock sector along with crop farming especially, drought tolerant crops constitute a right path towards drought vulnerability reduction and farmers' livelihood sustainability. .

CHAPTER 6: INFERENCE ANALYSIS OF FIELD DATA

6.1. Inferential Statistics

The ultimate purpose of research is to be able to generalize the results from samples to populations. In most cases, hypothesis-testing techniques are used as a basis for generalizing from the sample to the population. The researcher used inferential statistical procedures, which denote relationships between or among variables. The correlation coefficient (Spearman's Rho) was used to determine the magnitude of the relationship between the variables under study, namely livestock production and vulnerability reduction.

6.2. Hypothesis Testing

There was only one hypothesis to be tested and it sought to explore the correlation between livestock production and vulnerability reduction. The types and number of livestock measured livestock production. Vulnerability reduction was measured by the number of income- or food-generating strategies such as petty trade, shamba, firewood/charcoal business, casual labour and livestock sales. To determine the relationship between livestock production and vulnerability reduction, a spearman correlation analysis was conducted between types/number of livestock and total number of income generating activities as shown in table 28:

Table 27: Spearman's Rho Correlations

Correlations: Spearman's rho		Livestock Production	
		Types of livestock kept	Total Number of Livestock Kept
Vulnerability Reduction (total number of income generating activities)	Cor. Coefficient	0.431	0.387
	Sig. (2-tailed)	0.017	0.053
	N	60	60

* Correlation is significant at the .05 level (2-tailed).

** Correlation is significant at the .01 level (2-tailed).

The correlation coefficient between types of livestock kept and vulnerability reduction is 0.431 with $p= 0.017$ and the correlation coefficient between total number of livestock kept and vulnerability reduction is 0.387 with $p= 0.053$. According to the statistics in the table above, there is a significant relationship between livestock production and vulnerability reduction. This means that keeping livestock, but more importantly keeping different species of livestock has a positive impact on

drought vulnerability reduction. Livestock can provide an asset base for poor households through accumulation of stock.

Livestock, particularly small stock such as goats and poultry, can be sold to make cash available when necessary. For instance, in Nguni, 65% of farmers confirmed that they cope with severe drought by selling their livestock. They would start off by selling their chickens, then goats and finally cattle, depending on drought severity. The same observation was made in Migwani. Thus, different species of livestock were found to be as a convertible asset available and easily traded in order to make payments for health care, schooling, food and other household requirements. Although many products were sold, milk, meat and eggs were also consumed at home and were important sources of nutrition, particularly for children.

Moreover, livestock production increased household food security by spreading farm risk through diversification, and by creating employment opportunities, both on and off the farm. For instance, the lump sum derived from livestock sales provided farmers with a considerable initial capital investment for other productive activities such as, tea kiosks and small business. In many areas, household land size diminishes with each generation and many families survive on small plots. Effective use of livestock enhances their productivity in that livestock are fed crop residues, and their manure returned to the soil to maintain fertility.

Family labour is an important asset for poor households and livestock increase the returns to household labour. The elderly and young who are not fit to work in the field can tend livestock, and the use of draft power can free labour for other household activities. Because most farm work is seasonal, livestock are managed to make good use of household labour in off-peak times. Livestock also contribute to the social ties within a community through borrowing, sharing and lending of animals.

These above-mentioned factors contribute to the overall increase of farm productivity and subsequently enhance farmers' coping mechanisms towards drought vulnerability reduction. Hence, the hypothesis of the study was not rejected because it confirms that keeping a number of different species of livestock does contribute to livelihood security, and consequently reduces drought vulnerability among farmers.

CHAPTER 7: SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

This section provides a summary of key findings and the conclusions drawn from the findings established in this study on the contribution of livestock to drought vulnerability reduction in Mwingi district. This section also provides appropriate recommendations that aim at promoting and supporting more effectively the livestock sector as an economic opportunity. Finally, areas for further research are mentioned. This chapter is divided into three sub-heading, namely summary of findings, policy recommendations and areas of further research.

6.1. Summary of Findings

This study revolved around the idea of finding out the contribution of livestock as a major coping mechanism to drought vulnerability reduction. Taking into consideration the socio-economic characteristics of the respondents, it was established that the low level of educational achievement (most respondents went up to primary level), the low level of monthly income (ranging between Ksh 1000 and 5000) as well as the big size of respondents' families (average six children per family) were among factors that contributed to their vulnerability to recurrent droughts. The study also established that the livestock sector was not a prerogative of men in the area of study. Women played an important role in livestock keeping, especially small stock (poultry and goats). Furthermore, although all respondents were farmers, it was found that some farmers were venturing into other livelihood activities in order to diversify their income sources and reduce their vulnerability to recurrent droughts.

It was also established that the majority of farmers rely on their livestock to survive the effects of drought as compared to other livelihood activities. Selling livestock and livestock products constituted their primary source of income in that it not only provided them with money to buy food in times of crisis, but it also constituted a living bank for all other households needs such as payment of school fees/hospital bills/dowry and other social and financial needs. According to Rubyogo et al (2002:10)" at household level, the cash income derived from livestock keeping in Mwingi district is estimated at 70% of all cash income."

ALRMP (2000:3) also established that livestock keeping is the backbone of the livelihood systems, supporting the economic, social and subsistence needs of people living in arid and semi-arid areas.

Thus, it is apparent that livestock keeping is of major importance to economic security in the area of study but also in the country at large.

However, it was also established that selling of animals took place mainly during drought periods. It was in most cases dictated by problems related to animals' health (e.g. old age, sickness) or other economic pressures that demanded cash urgently. Selling of animals of low quality during the period when supply exceeded demand justifies partly the low price offered to farmers.

It was also established that although farmers do enjoy the benefits secured from livestock keeping, their priority remained the improvement of crop farming rather than livestock production in terms of development. Farmers have adopted new farming techniques, which improve crop production such as, terracing, irrigation, use of drought tolerant seeds among others. This finding was interpreted as a cultural fact whereby respondents practiced both crop farming and livestock keeping with greater emphasis on the former. However, they were also encouraged by the fact that, most financial and technical support from both the Government and other development partners was geared towards crop farming. Nonetheless, it was established that if given enough financial support, majority of farmers were ready to invest in livestock keeping, especially in Nguni division.

Apart from crop and livestock farming, it was found that in order to enhance their income, respondents were involved in other livelihood activities such as charcoal burning, small business, firewood and water selling among others. These activities were described as short-term solutions to food crisis generated by prolonged periods of drought.

The study also highlighted the major constraints that were a serious handicap in the livestock sector development. These were mainly, diseases and pests, scarcity of water, poor market systems, limited grazing land, lack of basic skills in animal husbandry, and inadequate veterinary services among others. It was also found that majority of farmers continued to rear indigenous livestock species that are adapted but with low yield.

Concerning the economic potential of livestock keeping, it was found that it remained largely untapped. For instance, institutions that were specialised in processing livestock products were inexistent in both divisions. Farmers still talk about KMC, which has been inoperative for a long

time. Although there are plans to revive KMC, it was the wish of key informants that it should be decentralised for efficient and better accessibility to farmers.

Finally, the study explored a few ways in which livestock production functioned as both financial and social capital. Livestock ownership was considered as a source of income to draw upon when needs arise. It was found that livestock were used to cement social networks through borrowing, sharing and lending of animals. They were offered as gifts, payment of dowry or sacrifice during religious cults.

Livestock keeping in Mwingi district has been neglected despite its important contribution to livelihood security as demonstrated by the findings of this study. Yet, it remains true that none other than livestock keeping constitutes perhaps the right path towards achieving food security and sustainable livelihood in the area of study. This is because livestock keeping is more suitable in Mwingi district than crop farming. Thus, since farmers in Mwingi practice mixed-farming (i.e. livestock and crop farming), there is much equally needed support in both sectors.

6.2. Policy Recommendations

It is recommended that the Ministry of Livestock and Fishery Development ensure effective access to veterinary services, which are relevant to farmers' social, economic and productive livestock systems.

Water accessibility for livestock consumption is mandatory. There should be a deliberate effort to improve access to water through user-friendly water harvesting techniques such as earth pans and sub-surface water, among others.

Market barriers such as high council levies, inadequate linkages between farmers and consumers of their animal products due to middle men exploitation, inefficient livestock owners' organisations, contribute to less profitable livestock enterprises. Therefore, improving livestock marketing systems will certainly improve farmers' livelihoods and coping mechanisms.

The potential of livestock development in semi-arid lands is enormous and needs to be further exploited. The optimisation of livestock production will greatly contribute to farmers' livelihood improvement and capacity to withstand drought effects.

Women and children play major roles in livestock production while men are more involved in marketing animals and subsequently in controlling resources derived from livestock enterprises. Therefore, a deliberate effort should be made to train both male and female farmers on animal husbandry and gender equity.

6.3. Areas for Further Research

An evaluation of other coping mechanisms such as bee farming, charcoal burning, casual labour and sand harvesting among others, should be carried out in order to find out their impact on livelihood security in Mwingi district. It would be interesting to carry out an environmental impact assessment of some of the coping mechanisms, which might be detrimental to the environment. An impact assessment of GTZ/IFSP-E programme on food security in Mwingi would also be an important area of research.

An analysis of farmers' perceptions about sustainable livelihood should also be carried out in order to understand and incorporate farmers' opinion and realities in development plans.

Finally, an exploration of animal species which may impact positively on the livelihood of very poor farmers, particularly female-headed households, would also be an interesting area of study.

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ANNEXES

1. Interview Schedules for Farmers

Introduction

I am S.Abelo Leonie. Currently, I am pursuing a master's degree in sociology specialising in Disaster Management. Hence I am conducting a study to find out the contribution of livestock production to drought vulnerability reduction. Therefore, I would like to collect information about the above-mentioned subject. Your collaboration through answering a questionnaire given to you will be very much appreciated and helpful. I promise you that all information collected from you will be treated with total confidentiality.

A) Respondent Demographics.

1. Which division do you come from? Nguni () Migwani ()
2. Gender? Male () Female ()
3. Number of years of schooling completed?years
4. What is your marital status? Single (), Married (), Divorced (), Widowed ()
Separated ()
5. How many children do you have in your family?children.
6. What is your occupational status?
7. How much do you earn per month from all sources.....Kshs

B) Crop Production

8. Do you farm? Yes () No ()
9. If yes, what type of crops do you grow? (Tick all that apply) Beans () Maize ()
sorghum () pigeon pea () cow pea () Others () specify.

10. How would you describe the trends of crop harvesting over the last two years (2002- 2003) in Mwingi district?

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11. In case of poor harvest, what do you do to avoid food crisis?.....

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12. Are there people or institutions that provide help in case of prolonged drought?

Yes () No (). If yes, which ones?.....

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13. How would you rank these institutions in terms of assistance provision? Close relatives ()
) ; distant relatives () ; NGOs () ; friends/neighbours () ; the rich () ; the Government ()
church/mosque () ; community () ; self-help group () , customary leadership ()

14. Are there any problems that you encounter when you seek access to the above-mentioned institutions? Yes () No (). If yes, specify which ones.....

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15. What do you think should be done to avoid food shortage in your division?

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C) Livestock Production

16. Do you own animals? Yes () No ()

17. How did you acquire them? Purchase (), Inheritance (), Bride-wealth ()
Loan (), Gift (), Exchange (), Other () specify.

18. What types of animals do you keep? (Tick all that apply) Cattle (), Goats (), Sheep (),
chickens () Donkey (), Others () specify.

19. Currently how many animals do you own? Fill in the table below:

	Types of Livestock					
Number of livestock owned	Cattle	Goats	Sheep	Donkey	Chickens	Others

20. How would you describe livestock keeping compared to crop production in your Division?

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21. In which one do you invest most: livestock or crop production? Explain why.

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22. In your opinion, which of the two yields more benefits to your household economy? List those benefits.....

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23. Is it important for you to keep Livestock? Yes () No () Give your reasons.

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24. Specify the use of livestock products:

Meat consumption? (), Meat selling (), Milk/eggs selling (), Milk/eggs consumption (),
Manure (), Saving (), Animal traction (), Social obligation ()
Others () specify.

25. Concerning livestock products selling, which period of the year does this occur?

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26. What are the major reasons behind livestock products selling?

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27. Are there any problems encountered with livestock sales? Which ones?

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28. What do you think are the major constraints to livestock development?

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29. What needs to be done to improve livestock production?

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D) Other Livelihood Activities

30. What are the main livelihood activities farmers pursue in your division?

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31. Which ones are you involved in? Livestock related (), Fruit/Vegetables sales () casual labour (), Firewood/charcoal (), Business (), Employment (), Kiosk/Hotel (), others, specify,.....

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32. Which period of the year do you carry out these activities? Planting season (),
Harvesting season (), Raining season (), Drought season (), Throughout the year ().

33. Is it necessary for you to diversify livelihood activities? Yes () No ()

If yes, explain why.....

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34. Rank those livelihood activities that are most important to your household economy.

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2. Interview Guide for Key Informants

1. What are the major coping strategies used by farmers to survive recurrent drought in Mwingi district?

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2. In your opinion, why do farmers seem to invest more in crop farming than livestock?

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3. Explain the motives behind livestock keeping.....

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4. How would you evaluate the contribution of livestock production to livelihood security compared to other livelihood activities carried out by farmers?

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5. What is your opinion about livestock sector as an economic potential?

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6. What is the role played by Government and other Institutions in livestock sector?

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7. Are there institutions that could help add value to livestock products? Which ones?

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8. What do you think are the major constraints to livestock development?

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9. What do you suggest as measures to improve and maximize livestock development?

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