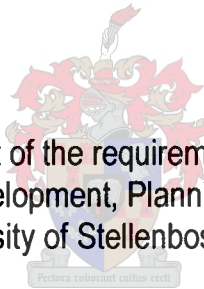


**INVESTIGATION OF SUSTAINABLE INDIGENOUS AGRICULTURAL PRACTICES:
A SYSTEMS APPROACH**

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Thesis submitted in partial fulfilment of the requirements for the degree of Master of
Philosophy in Sustainable Development, Planning and Management at the
University of Stellenbosch



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March 2007

DECLARATION

I the undersigned, hereby declare that the work contained in this thesis is my original work that I have not previously, in its entirety or in part, submitted it at any other University for a degree.

Signed:

Date: 1/03/2007

ABSTRACT

The overall objective of the study was to investigate and document IK (Indigenous Knowledge) in Swaziland from a systems perspective. A systems approach ensured that the reductionist nature of scientific theories and practices in social sciences did not become a limiting factor on the qualitative and explorative study. The study therefore covered a broad spectrum of IK including areas such as agricultural practices, food security, natural resource management, and values and beliefs. The study focused on identifying indigenous practices and on the interaction (link) between various elements of IK as a system to become sustainable.

Secondary and primary data was used to inform the study. Primary data was gathered through focus group discussions and in-depth interviews conducted in four geographic regions of the Kingdom of Swaziland in the Southern African region. Participants of focus group discussions and in-depth interviews were elderly male and female indigenous Swazi subsistent farmers who still practiced traditional agriculture. Participants were selected using the snowball technique and their ages ranged from 45 to 75 years and were all from peripheral areas. Their perceptions of Indigenous agricultural practices were not entirely positive.

The study was successful in harnessing valuable information from a wide spectrum including indigenous agricultural practices, indigenous knowledge systems, food security principles, and indigenous plants. It revealed that the major strengths of traditional agriculture are its affordability (sustainability) as opposed to the high cost of modern agriculture, environmental friendliness, and preference by indigenous farmers. The study found that indigenous knowledge was wearing out because it was no longer being used due to an alternative of modern ways. The study also found that the indigenous knowledge transmission was effective because it was a vocation rather than a theory. Indigenous knowledge was varied by agro-ecological regions. The study also identified areas of further research on specific indigenous knowledge to be pursued through experimental research.

Although the study did not focus on attitudes it revealed that transmission from one generation to the next was a result of respect for parents and society, and adherence to strong values. The absence of an alternative way of living (livelihood) was also found to enforce IK. Finally indigenous knowledge systems ensured food security and upheld the three principles of sustainability: environmental friendliness, social and economic equity, intergenerational and intra-generational equity. The study is brought to a close with recommendations on how the findings could be adapted into development initiatives.

OPSOMMING

Die oorhoofse doel van hierdie studie was om IK (Inheemse Kennis) in Swaziland uit 'n stelselsperspektief te ondersoek en te dokumenteer. 'n Stelselsbenadering het verseker dat die verlagingsaard van wetenskaplike teorieë en praktyke in die sosiale wetenskappe nie 'n beperkende faktor ten opsigte van dié kwalitatiewe en ondersoekende studie geword het nie. Die studie het derhalwe 'n breë spektrum IK gedek, insluitende terreine soos landboupraktyke, voedselsekureit, natuurlike hulpbronbestuur en waardes en opvattinge.

Sekondêre en primêre data is aangewend om die studie te verstewig. Primêre data is ingewin deur fokusgroep besprekings en in-diepte onderhoude wat in vier geografiese gebiede van die Koninkryk van Swaziland in die Suider Afrikaanse streek gevoer is. Deelnemers aan fokusgroep besprekings en in-diepte onderhoude het bestaan uit manlike en vroulike inheemse, Swazi selfversorgende boere wat steeds tradisionele landbou beoefen. Deelnemers is gekies deur toepassing van die sneeuhaal-aangroei tegniek, hulle ouderdomme het van 45 tot 75 jaar gewissel en hulle was uit al die bovermelde gebiede van die land afkomstig. Hulle persepsies van inheemse landboupraktyke was nie ten volle positief nie.

Die studie het daarin geslaag om waardevolle inligting uit 'n wye spektrum te bekom, insluitende landboupraktyke, inheemse kennisstelsels, voedselsekureit-beginsels en inheemse plante. Dit het getoon dat bekostigbaarheid die majeure sterkpunt van tradisionele landbou is in teenstelling met die hoë koste van moderne landbou, omgewingsvriendelikheid en voorkeure van inheemse boere. Die studie het bevind dat inheemse kennis besig was om minder te raak aangesien dit nie meer weens die alternatiewe van moderne metodes aangewend word nie. Die studie het ook bevind dat die oordrag van inheemse kennis doeltreffend was omdat dit 'n ambag eerder as 'n teorie blyk te wees. Inheemse kennis se aard was wisselend in agri-ekologiese streke. Voorts het die studie gebiede vir verdere navorsing op spesifieke inheemse kennis geïdentifiseer wat deur eksperimentele navorsing nagestreef kan word.

Hoewel die studie nie op gesindhede gefokus het nie, het dit getoon dat oordrag van een geslag na die volgende 'n gevolg was van agting vir ouers en die gemeenskap, en verkleefdheid aan sterk waardes. Daar is ook bevind dat IK verstewig word deur die afwesigheid van 'n alternatiewe lewenswyse. Ten slotte – inheemse kennisstelsels verseker voedselsekureit en handhaaf die drie beginsels van volhoubaarheid, te wete omgewingsvriendelikheid, sosiale en ekonomiese billikheid en inter- en intragenerasie regverdigheid. Die studie sluit af met aanbevelings oor hoe die bevindinge in ontwikkelingsinisiatiewe aangewend kan word.

DEDICATION

To the Almighty God who has granted me the favour and strength to complete this piece of work.

To all the indigenous people of the world whose traditions are threatened with extinction.

ACKNOWLEDGEMENTS

I wish to express my gratitude to all persons who supported my endeavour to conduct the study. First and foremost, my supervisor Professor Mark Swilling for his support and guidance while pursuing the study. His support both for course work and research made this enormous task lighter and bearable.

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LIST OF ACRONYMS

CSO	Central Statistics Office
FAO	Food and Agriculture Organisation
FGD	Focus Group Discussion
GDP	Gross Domestic Product
IK	Indigenous Knowledge
IKS	Indigenous Knowledge Systems
MOAC	Ministry of Agriculture and Cooperatives
SNL	Swazi National Land
TDL	Title Deed Land
WKS	Western Knowledge Systems
WVI	World Vision International

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CHAPTER I

1. INTRODUCTION

1.1.0 Background Setting

Food security is a central concern to the governments of developing countries. In the past, efforts to meet food requirements have centred on strategies that improve employment opportunities and agricultural productivity especially increased agricultural productivity and introduction of cash crops (Ogle & Grivetti, 1985a:193; Economic Planning Office, 1995:57-58). This has been done mainly through promotion of modern agriculture. Such policies in recent years were regarded as undisputed methods for raising the food security status of rural populations, yet food insecurity and poverty rates have continued to increase amongst this population.

It is recognized that increased food and fibre production have been observed in some areas due application of modern technologies such as mechanisation, increased chemical use, specialisation, and policies that favour modern methods and production maximization. These changes according to Brown (2004:59-98) and Weaver, Rock, and Kusterer (1997:135-148) have had positive effects to food security in modern societies and have reduced many risks in farming but they also induced significant costs. The loss of top soil, contamination of ground water, increased neglect of the living and working conditions for farm labourers, increasing cost of production, drastic narrowing of the food base and the disintegration of economic and social conditions in rural communities are some of the notable consequences of modern agriculture. The disintegration of economic and social conditions in rural communities has far reaching implications, one of which is the erosion of traditional farming practices which forms the basis of livelihood for most rural families.

Before the introduction of modern agricultural methods, traditional societies used farming methods that were suitable for local ecosystems. These traditional agricultural methods were informed by indigenous knowledge (IK) and have been developed over time around specific conditions of women and men through experience. According to Ogle and Grivetti (1985a), traditional agricultural methods ensured a wide variety of indigenous foods which permitted better food security status long before program

interventions based on modern agriculture were introduced. Indigenous knowledge on agriculture has not been developed instead it received disparagement. It was labelled primordial and unable to feed modern societies. While IK is being marginalized, modern agriculture which is built on Western knowledge systems (WKS) is made universal through the Western education system and modernity which is now entrenched in many cultures (Warren, Slikkerveer & Brokensha, 1995:35).

Moreover indigenous knowledge and its development in Swaziland is not sufficiently researched and documented. Inevitably indigenous knowledge has not been systematically recorded and is therefore threatened with extinction. Notwithstanding the serious erosion of indigenous knowledge over decades in many countries in Africa, they are still relevant for promoting sustainable development (Madeley, 2002:11). There is a notable increase in the recognition of the significance of indigenous knowledge in sustainable development in the developing world (Warren, 1991). Indigenous knowledge provides opportunities for environmental conservation, improvement of livelihoods and well-being of rural communities and is of benefit to national economies. There are also international treaties and emerging international norms which imply both legal and moral imperatives for harnessing IK.

Sustainability as an issue has therefore emerged from and to shape the challenges to meet the needs of increasing populations with fewer resources without compromising the ability of future generations to meet their own needs. Accordingly, finding more ways to use external and indigenous resources efficiently to achieve broader and more lasting impact has become more difficult and imperative. Agricultural and natural scientists have become increasingly concerned with identifying and promoting methods of cultivation that can protect and enhance nature's assets while continuing to produce to satisfy burgeoning populations. Thus exploration of indigenous knowledge to gather traditional agricultural practices, their perceived value to subsistent farmers and potential value for sustainable agricultural development served as the basis for this study.

1.2.0 Swaziland Country Profile

Swaziland is the second smallest country in Africa and the smallest country in the SADC region with a total land area of 17, 364.3 kilometres. It is located at the southeast corner of Africa and is bordered by Mozambique in the East and South Africa on the North, West and Southern sides. The population is culturally homogenous; 93% are ethnic Swazi, a Siswati (Nguni) speaking people of Bantu origin.

Swaziland has a projected population of 1, 267,000 for 2006 and a population density of 53.5 people per square kilometres (CSO, 1997:19), the vast majority (76%) of which live in rural areas and depend on small-scale agriculture for their economic livelihood. The country exhibits remarkable geographical variability with four major ecological regions. These regions divide the country into longitudinal north-south strips that descend in elevation from west to east before again ascending sharply near the boundary with Mozambique.

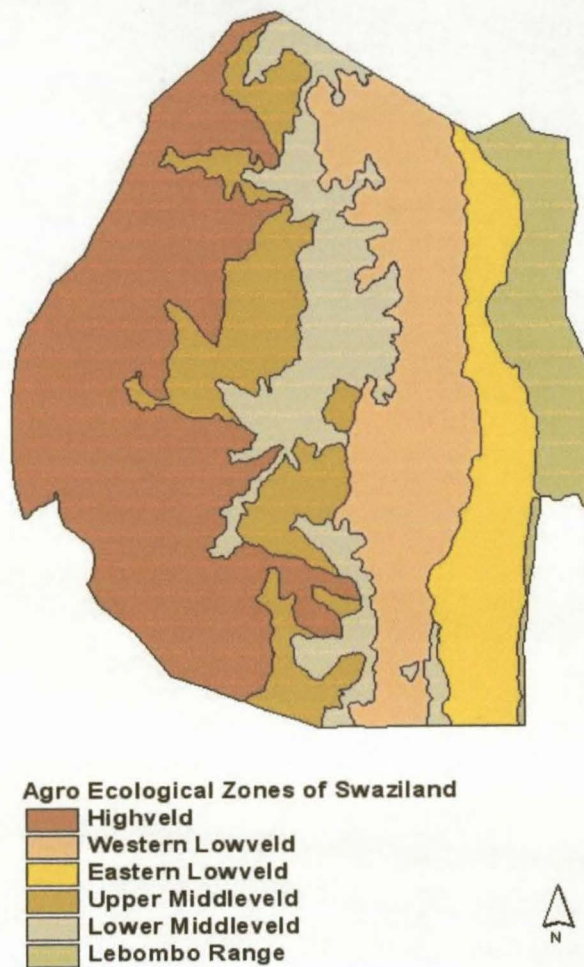
1.2.1 Ecological Regions of Swaziland

The **Highveld** is located on the western side of the country and covers 29% of the total land area. Its climate is temperate, humid, with mean temperature of 19 degrees Celsius. Frost is common during winter months of June to August. It has an average altitude of 1300 metres above sea level and the highest rainfall in Swaziland averaging 1250mm per year. Approximately 40% of the Highveld is characterized by bare, exposed gneiss or granite with the remainder by shallow soils often unsuitable for agriculture. Only 10% of the Highveld can be classified as good agricultural potential and only gentler slopes are utilized widely for maize cultivation. Grassy slopes provide grazing for livestock. Gradual overstocking has accelerated soil erosion and caused an increase in occurrence of sour grasses. Indigenous forests no longer characterize the Highveld but original vegetation has remained only in deep ravines or near steep outcrops, sheltered from bush fires and human exploitation (Ogle & Grivetti, 1985a:197; CSO, 1997: 3-7).

The **Middleveld** (Inkhabave) lies to the east of the Highveld and covers 26% of the total land area of the country. It varies in elevation from 1000 to 500 metres above sea level. The climate is subtropical and annual rainfall ranges from 1150mm in the wetter western regions to 750mm in the drier eastern side where the Middleveld joins the Lowveld. Middleveld soils are deep, fertile loams characteristically covered by moist, tall veld grasses. The Middleveld has been botanically disturbed more than all other ecological regions of Swaziland due to pressure on the land exerted by increased population density, intensive agricultural development, and rapid industrialization leaving little original vegetation. Trees, shrubs and aloe that once characterized the Middleveld are mostly found along the steep ravines slopes or rocky knolls. Recently introduced shrubs and trees have adapted well to Middleveld soils and climate (Ogle & Grivetti, 1985a:198; CSO, 1997: 3-7).

The **Lowveld** (Lihlandze) is the third ecological region and covers 37% of the total land area. It is a deciduous bush veld, gentle undulating with varying elevation from 500 to 100 metres. The Middleveld has a subtropical climate, humid and hot. Rainfall is unreliable and ranges from 500 to 890mm per year. Dry land cropping is risky and drought hazard is high. Low yields or total crop failure are common prospects for small scale farmers who, despite such risks continue to grow maize as their primary crop, while climatically suitable crops such as melons (*citrullus cucumis*) , groundnuts (*Arachis hypogoea*) and sorghum (*Sorghum vulgare*) are produced only by a minority. Soils in the Lowveld are more fertile than in other regions of Swaziland. Vegetation is more diverse than the other regions in Swaziland and is dominated by *acacia species*. The Lowveld has sweet grasses making the Lowveld suitable for cattle ranching. The indigenous Lowveld vegetation remains relatively undisturbed due to climatic constraints and subsequent lower population density (Ogle & Grivetti, 1985a:199; CSO, 1997: 3-7).

The **Lubombo Plateau** is the smallest of the four regions covering only 8% of the total land area and 5.6% of the total population. It borders coastal Mozambique and has an average altitude of 600 metres above sea level. The climate of the Lubombo Plateau is similar to that of the Middleveld. It consists of flat rocky exposures, interrupted only by steep slopes and deep river gorges. Botanically, the region has not been explored and indigenous forests and shrub lands are common (Ogle & Grivetti, 1985a:199; CSO, 1997: 3-7). **Figure 1** is the Map of Swaziland showing the four geographical regions.

Figure 1: Map of Swaziland Showing Agro-ecological Zones

1.2.2 Land Tenure

Swaziland has two major divisions in land use and type of ownership. These are (a) The Swazi Nation Land (SNL), which is communally owned by the Swazi people, and is held in trust for the nation by the INgwenyama (The King). Part of this land is administered by Chiefs who allocate it to individual Swazi households to be used for agriculture and home sites. The major activity under SNL is subsistence agriculture. (b) Title Deed land (TDL), which is individual tenure farms owned on freehold or concessions. Agriculture on TDL is commercial and highly mechanized including such sectors as forestry, sugar estates, citrus and ranching. 56% of the land is SNL and 25% is TDL. The rest is land in urban areas owned by the state. Of the total 17, 364 square kilometres land area, 11% is arable (CSO, 1997:1-25; CSO, 2003b:3).

1.2.3 The Socio Economic Status

Swaziland is classified as a lower middle income country. The economy of Swaziland is largely dependant on agriculture. Agriculture contributes about 12% of the Swaziland Gross Domestic Product (GDP) and is a primary source of livelihood for 70% of the population. Small scale farmers carry out agriculture at subsistent level reliant on rain fall for production rather than irrigation. Dependence on rainfall does not permit all year round farming as the rain falls from September to March (CSO, 2003:2-3). Although commercial agriculture on TDL remains crucial to the export growth and overall economic development in the country, increasing rural employment and income depends predominantly on the performance of agriculture on SNL (Economic Planning Office, 1995:103; Central Statistics Office, 2003b:3). Accordingly, government continues to concentrate resources on SNL farmers whilst ensuring that such support does not impact negatively on production on individual land tenure farmers.

More than 80% of the rural households also receive some form of remittance. This ability to rely on off-farm income is under threat, as the economy has not performed well in recent years. As off-farm income earning opportunities shrink, Swaziland's political harmony and economic progress depend increasingly on the ability of small-scale agriculture located on SNL to support rapidly growing population. Swaziland is also plagued by a high prevalence of HIV and AIDS (42.6%) which decreases labour productivity, erodes assets, and blocks the transfer of knowledge from one generation to the next (National multi-sectoral HIV and AIDS strategic plan 2006-2008).

The 1997 population census indicates that the population is increasing at 2.7% per annum. On this basis the number of people in the country will double over the next 25 years. It is expected that the demographic pressures accompanied by economic stagnation will accentuate already worrying poverty levels. Poverty levels have increased from 40% of the population in 1986 to 69% in 2004 despite government efforts to increase agricultural productivity through modern agricultural methods. Economic shocks and natural disasters have had a profound impact on the livelihoods of the people. This signifies the need to intensify the traditional farming sub-sector to improve food security, increase income-earning potential from off-farm sales, reduce poverty and boost employment. The support given to traditional agriculture will not make this an easy task (CSO, 1997:1-25).

1.3.0 Problem Statement

For about forty years modern farming methods dominated agricultural production. Recent studies (Mebratu, 1998: 493-496; Madeley, 2002; Brown, 2004:59-79; Mavimbela, 2004:60-75) indicate that there has been a shift from traditional agriculture to modern agriculture in most parts of the world. This shift was caused by the perception that traditional agriculture which is built on IKS is primitive, backwards and incapable of feeding many people. The focus on the desire to increase production and profitability led to the neglect of the environment. Consequently the environment incurred severe damage as a result of the modern farming methods.

The world is now looking for answers to the problems it faces and has turned to indigenous knowledge to learn how indigenous societies kept the ecosystems intact and yet were able to adequately feed their population for many centuries. Proponents of modern agriculture have come to recognize that traditional agriculture was sustainable and therefore the need now to develop sustainable agriculture. It is now generally accepted that IK has a potential to provide lessons that are of significance to the development of sustainable agriculture (Warren, 1990:10; Haverkort 1995:455; Norberg-Hodge *et al*, 2001:62). Indigenous knowledge systems however, are complex and should be studied holistically if they are not to be compromised. Regrettably, the systems perspective of IK is obscure in studies on IK in Swaziland.

Compounding the problem is that IK on agriculture specifically is rapidly being eroded due to denigration and the promotion of modern agriculture over traditional agriculture. The recent drought spell in Southern Africa created a break in the proper practice of traditional agriculture, hence a gap in the transference of skill to the younger generations.

There is a need to examine sustainability of indigenous knowledge on agriculture (traditional agriculture) by exploring the linkage between IK and farming practices and sustainable development. A systematic analysis and documentation of indigenous farming practices could provide valuable information for the development of sustainable agriculture and make a significant contribution to the sustainable development agenda. The study seeks to employ a systems approach to investigate IK on traditional agricultural practices in Swaziland. It is in this context that the study is being conducted, with the objective to identify principles, procedures and best practices on the sustainable use of IK to meet development goals.

1.4.0 Significance Of The Study

Literature on indigenous agricultural practices (traditional agriculture and IK) in Swaziland is scanty which brings the imperative for more research to be carried out in this area. Whilst not much has been done in this area, studies that were carried out on indigenous farming practices in Swaziland have not applied a systems approach. The complexity of IK coupled with the increasing complexities of agricultural and environmental issues make a systems approach essential in understanding these issues and dealing with them appropriately. The systems approach has gained recognition in developed countries but has received minimal attention in developing countries such as Swaziland (Goldsworthy & Penning de Vries, 1994:255).

The study is therefore important as it will holistically explore the principles underlying IK thereby making a contribution to existing literature on the subject. The significance of the study lies in documenting and therefore protecting IK from extinction. The study could identify cost-effective and sustainable mechanisms that are locally manageable and locally meaningful. It could also provide information important for sustainable agriculture by providing a better understanding of the complexities of sustainable development in its ecological and social diversity. In essence the study will contribute to the utilization of indigenous knowledge to meet sustainable development goals and will inform the development of sustainable agriculture and food security policies in Swaziland.

1.5.0 Purpose And Research Objectives

The purpose of the study was to investigate and document indigenous farming practices of households in remote rural communities in Swaziland, and to determine whether these practices can aid in the reform of modern systems and improvement of farming, consequently sustainable food and livelihood security in Swaziland.

The specific objectives of the research were as follows:

- i. To investigate and document indigenous knowledge on agricultural practices of rural households in remote communities in Swaziland.

- ii. To determine the values and beliefs on which traditional agricultural practices are based
- iii. To identify strengths and limitations of the IK on agricultural practices as they impact on human development and environment
- iv. To determine how specific traditional farming practices could be strengthened to promote sustainable development and livelihood security.

1.6.0 Clarification Of Concepts

According Mouton (1996:114-118) and Bless and Higson-Smith, (2000:31) concepts are the building blocks for theories and acquire meaning within a conceptual framework such as a theory or typology. The main function of concepts is to facilitate communication. Thus concepts must be defined clearly and in an agreed-upon way for them to be useful in research. This section provides the context of the study by defining five key concepts which have been used in the problem statement.

a) Food security

The Food and Agriculture Organisation of the United Nations (FAO) describes food security as the state when an individual, household, nation, region, or the world have physical and economic access to sufficient, safe and nutritious food to meet their dietary needs and food preferences for an active and healthy life at all times (Overseas Development Institute, 1997:1; Broca, 2002:6).

b) Indigenous Knowledge

Indigenous knowledge refers to traditional and local knowledge, unique to a particular culture or society, existing within and developed around specific conditions of women and men indigenous to a particular geographic area in contrast with knowledge generated within the international system of universities, research institutes and private firms (Warren, 1991:1). According to Flavier et al (2003:478) IK is the basis upon which society communicate and make decisions. It is dynamic and continually influenced by internal creativity and experimentation as well as by contact with external systems.

c) Traditional Agriculture

Traditional agriculture refers to agricultural production where technologies being used depend completely on local resources and has developed a wide range of site specific technologies embedded in the culture of the people in a certain area. Indigenous knowledge on agriculture is the knowledge of a certain farming population which reflects the experiences based on traditions and may include experience with modern technologies. This knowledge is far more than the technical methods and cultivation or animal rearing practices of farmers but it entails many kinds of insights, wisdom, perceptions, and practices related to people's resources and environments (Haverkort, 1995:455).

d) Modern Agriculture

Modern agriculture refers to crop and animal husbandry that requires and makes use of high technology, chemical fertilizers, high yielding seed varieties, irrigation, and labour-saving machinery. It is characterized by monocropping and environmental degradation (Madeley, 2002:27-30).

e) Sustainable Development

Sustainable development has been defined as "development that meets the needs of the present without compromising the potential of future generations to meet their own needs (World Commission on Environment and Development, 1987:7). It has also been defined as "improvement in the quality of life so far as it is possible within the boundaries of the carrying capacity of the ecosystem on which it is dependant" (IUCN, 1991:7). The former definition has been widely used in discussions about sustainable development. Sustainable development has now been fully accepted as multidimensional; encompassing economic, social, political, cultural, and environmental dimensions. Two ideas are fundamental to sustainable development; equity in both intra-generational and intergenerational terms.

f) Systems Approach

A system can be defined as a group of interconnected elements (or subsystems). The elements of a system can be molecules, organisms, machines or their parts, social entities or even abstract concepts. The interconnections, interaction or relations among elements may be expressed differently such as in surges of matter or energy, economic undertaking, or causal linkages (Gallopín, 2003:9). A system is therefore an integrated whole whose properties can not be reduced to that of smaller parts. Subsequently, a systems approach is a science of wholeness, a way of perceiving reality (Clayton & Radcliffe 1996:14-27; Capra, 1996:47).

1.7.0 Scope Of The Study

The study was carried out in four Tinkhundla centres namely Maphalaleni, Dvokodvweni, Lubulini and Matsanjeni. Maphalaleni is located in the Highveld, Dvokodvweni is in the Middleveld, Lubulini is in the Lowveld and Matsanjeni is in Lubombo Plateau. Results of the study can be generalized to the regions in which the constituents are located subsequently to Swaziland. The study investigates and documents indigenous knowledge on agriculture as perceived by indigenous farmers from four political constituencies. In pursuing the purpose of the study, comparison of the traditional and modern systems of agriculture was unavoidable.

Basic Assumptions

The study was based on the assumption that participants in focus group discussions were better placed to provide reliable information regarding traditional farming practices and indigenous knowledge because they were exposed to such knowledge and practices.

1.8.0 Limitations Of The Study

The researcher would have preferred to include more constituencies from each geographic region, but due to limited time frame, the study concentrated on one constituent in each region. The study focused on the description of practices and the interrelationships between the IK on agriculture and sustainability but does not test the findings against scientific evidence for efficacy. However, more coverage of constituents in all four geographical regions was not a requirement since representation is not a prerequisite in qualitative research. While testing of findings would require experimental research which is outside the scope of this study, certain components of agriculture are based on scientific knowledge.

1.9.0 Conceptual Framework Of The Study

The basis of the study is the notion that indigenous people across the world lived in harmony with nature and recognized not only their dependency on the environment but that they are a part of the environment (Macy & Young-Brown, 2004:40-55). This notion evokes sustainability in a world threatened by food insecurity and unsustainable development (poverty and environmental crisis). There is essential knowledge among indigenous people that is threatened with extinction due to exclusion in modern

knowledge systems. Elderly people, men and women alike, indigenous to a specific area are custodians of IK which has been systematically acquired through accumulated experience, informal experiments and deep understanding of the environment in which they live (Warren, 1991). IK is dynamic and embedded within a complex system referred to as IKS and in order to fully capture and comprehend its significance for development, IK must be studied holistically within the larger system in which it exist.

Indigenous agricultural practices are embedded within a larger and complex indigenous knowledge system constituted by subsystems such as crop production, animal husbandry, environmental factors, values and beliefs, and others that are not covered in this study or are not known. These sub-systems have several other systems within themselves. For instance, crop husbandry occurs within the soil as a growth medium which in itself is a system and the belief and value system is a social system. These systems are connected and influence each other as they interact.

CONCEPTUAL FRAMEWORK OF INDIGENOUS KNOWLEDGE SYSTEMS ON AGRICULTURE

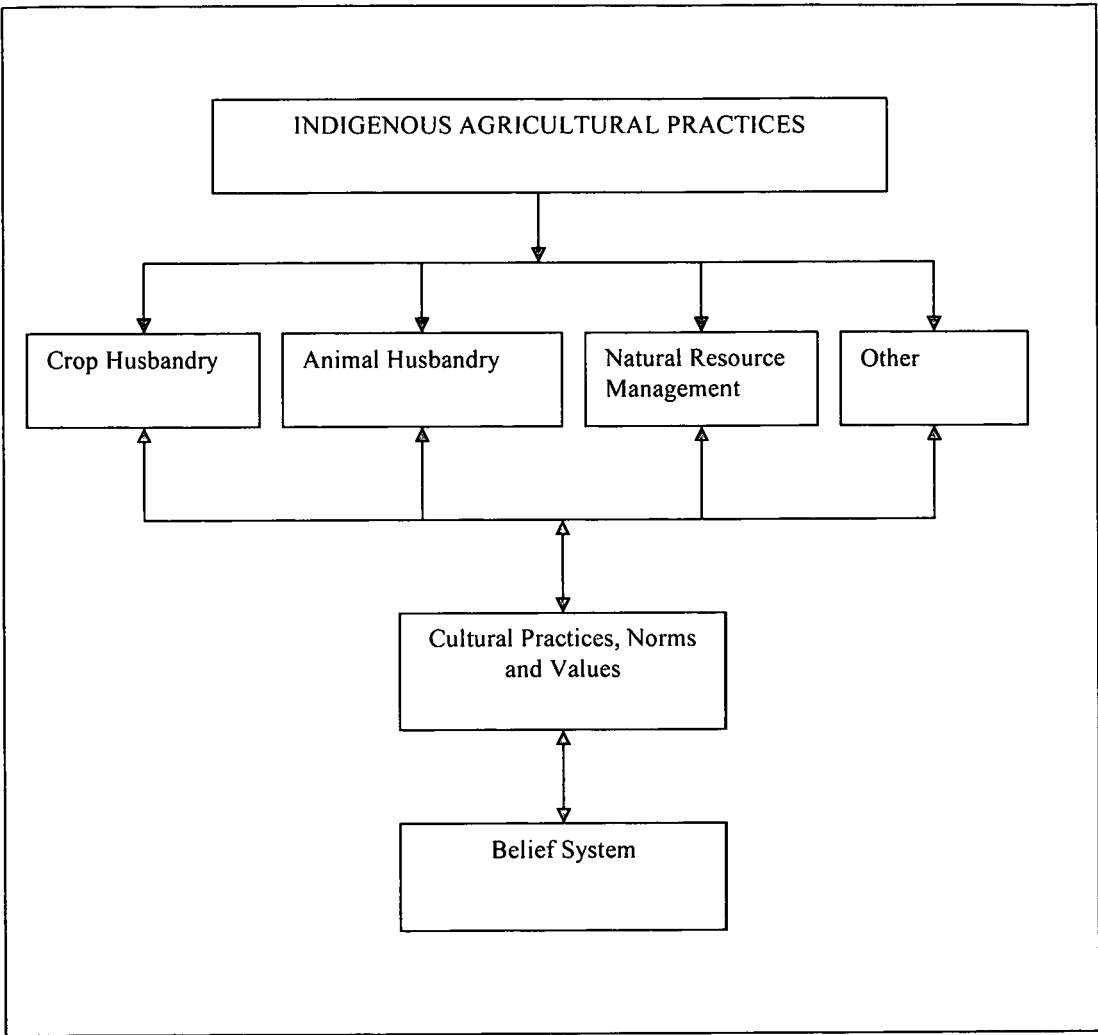


Figure 2: Conceptual Framework of Indigenous Knowledge Systems on Agricultural Practices

1.10.0 Chapter Summary

The forgoing chapter presented the background setting and the motivation of the research. The significant role that agriculture plays in the economy of Swaziland, the potential of traditional agriculture to provide a livelihood for the poor, and the need to protect and promote indigenous knowledge are presented to justify carrying out the research. The chapter also presents the research problem, the scope of the study and the conceptual framework on which the study is based. **Figure 3** presents the outline of the thesis and the contents of the chapters that follow.

OUTLINE OF THESIS AND CHAPTER CONTENTS

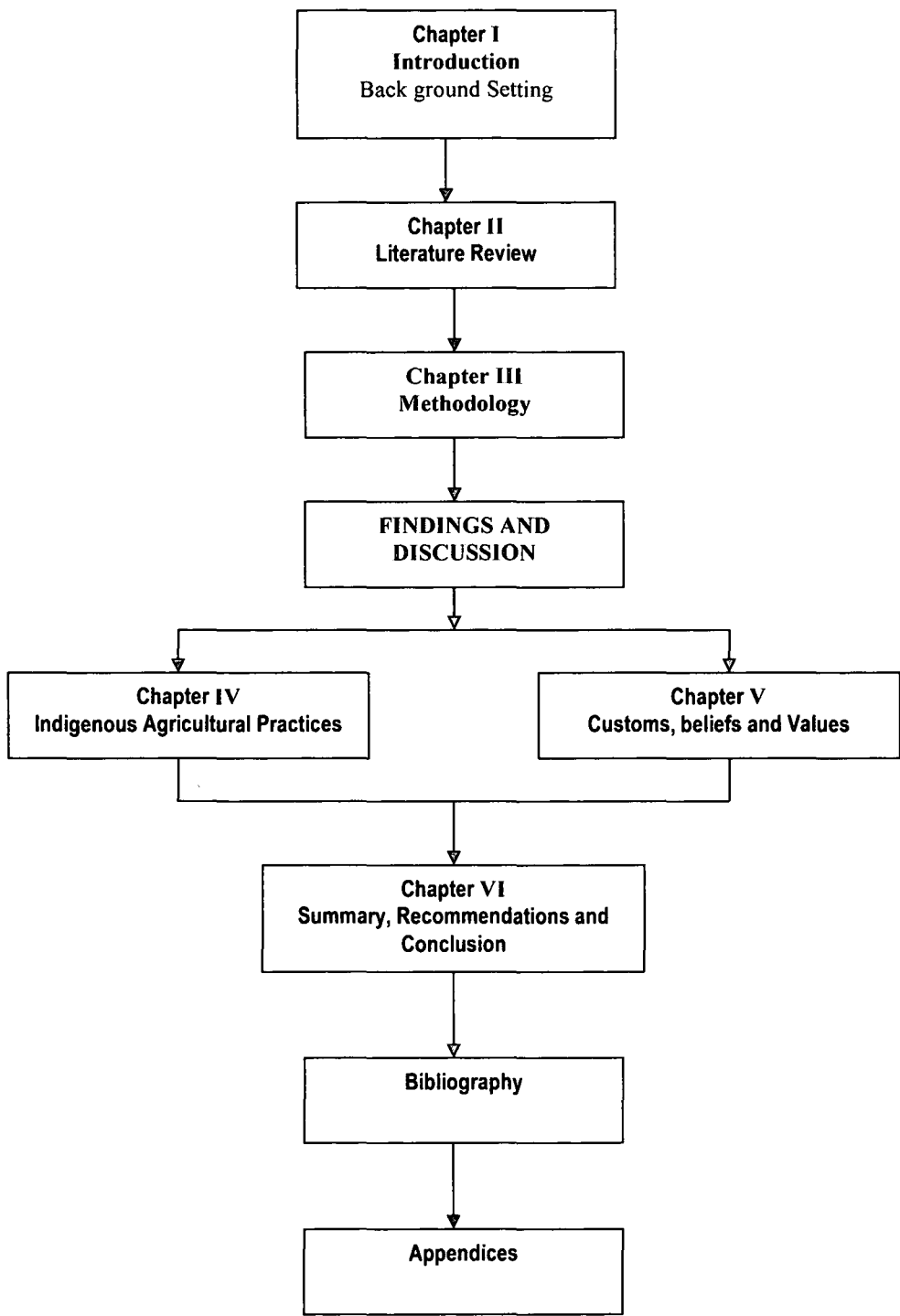


Figure 3: Outline of Thesis and Chapter Contents

CHAPTER II

2. LITERATURE REVIEW

2.1. Introduction

A review of the existing scholarship was carried out to determine how other scholars have investigated IK in relation to agricultural practices. This involved learning about how they theorized and conceptualized their findings (Mouton 2001:87). An interdisciplinary approach, as recommended by Bless and Higson-Smith (2000:22) was used in the review of literature because of the complex nature of IK. For example, traditional agricultural production always has some sociological, political or economical factors of relevance. For that reason, this chapter discusses literature on the systems theory, IK, traditional agriculture, food security and sustainable development.

2.2. The Basic Notion of the Systems Theory

According to Kotze and Kotze (1997:66), a fragmented development approach, one which focuses and addresses only one or a few variables is not appropriate to address the complexities of sustainable development. The nature of unsustainable development is complex and thus requires a holistic approach. Sustainable development requires a holistic approach due to the amount of variables. This implies understanding the local context in which development takes place.

According to Capra (1996:36-50), Cilliers (1998:20), and Clayton and Radcliffe (1996:49), any object or anything we do is connected in multiple ways to the environment, and ultimately to the rest of the world. These connections form a vast network that cannot be precisely captured through science because science is not able to accurately describe the truth of what exists. Hence there is always a discrepancy between the phenomenon and our description of a phenomenon. Science is therefore limited to approximate descriptions of reality.

The reductionist scientific method of investigation has limited our understanding of the world by perceiving reality in parts as opposed to a "web of life". Since everything is connected, all things must thus be studied as part of a network and the interaction it has with other parts. Bertalanffy (Capra,

1996:47) described the general systems theory as a science of 'wholeness'. Clayton and Radcliffe (1996:14-27) simply described the systems theory as a "way of perceiving reality". It is of significance to sciences concerned with organized wholes just as the probability theory is of significance for sciences concerned with chance events (Ludwig von Bertalanffy 1968 in Capra, 1996:36-50).

Because living systems are varied involving individual organisms and their parts, social systems, and ecosystems, the systems theory, according to Beralanffy (Capra, 1996:49), potentially offers an ideal conceptual framework for unifying various scientific disciplines that may be isolated and fragmented. "It provides a multidimensional framework in which information from different disciplines and domains can be integrated without being forced into one dimensional mapping. It entails considering the various agents interacting in the world as systems" (Clayton & Radcliffe, 1996:12). This takes into account applying general principles concerning systems to make deductions about likely and actual interactions between the systems under considerations. Systems theory is thus very much suited as a framework to investigate IKS.

A system is characterized by hierarchical structure, emergent properties, communication, control and a multi set of variables that interact (Clayton & Radcliffe, 1996:14-27) to name a few. Different systems exhibit different behaviour such as dynamic, adaptive, goal-seeking, self preserving, or evolutionary. Systems have subsystems which are component systems. IKS, as the name suggests, exhibits qualities of a system. For instance, it looks at nature as a dynamically interrelated whole. According to Macy and Young-Brown (2004:1-15), the systems theory view of reality and the ecological view are in confluence with IKS, traditions and ancient teachings of indigenous people, hence it is appropriate to use in the study of IKS.

By means of a summary, it is compelling to borrow Capra's concept that a systems approach commands a paradigm shift from the perception of parts to the perception of wholes, from a mechanistic/reductionist approach to a holistic approach. It is contextual thinking that says objects or organisms should be explained in terms of their environment because they are connected.

2.2.1 Systems Approaches for sustainable Agricultural Development

The simplest conceptualization of sustainable agriculture is provided by Crosson (Goldsworthy & Penning de Vries, 1994:4-8) who describes it as "a production system that can indefinitely meet

demands for food, fibre and fuel at socially acceptable economic and environmental costs." It refers to the ability of a farm to produce perpetually. From this description, it is clear that the ability of an agricultural system to become sustainable (continuously meet the demand for food) is a function of economic and environmental terms. Economic factors take into account the scarcity of resources and the ability of population to afford its food basket whilst environmental factors take into account the rate at which natural resource capital is used to produce sufficient food. Sustainability of a food system is also a function of food distribution.

This further means that any outside inputs employed for agriculture must be available indefinitely such that non-renewable resources are avoided. For example, nutrients are depleted from the soil through crop harvesting and the soil loses its fertility. Sustainable agriculture ensures that soil nutrients are replenished without using non renewable resources such as oil products or deforestation. Irrigation systems become sustainable if the rate of water usage does not exceed the rate of natural replenishment of the water source.

According Goldsworthy and Penning de vries (1994:10), evaluation of sustainability of a system requires that the system being studied be defined. In defining the system, the systems level should also be specified. Sustainability of an agricultural system may be measured by looking closely at its internal organisation, management and performance over time. Indicators of a healthy system include the rate of soil erosion or nutrient depletion, crop yield trends, pest and disease build up, and profitability.

2.3. What Is Indigenous Knowledge?

Indigenous knowledge refers to traditional and local knowledge, involving social, economical and environmental variables, unique to a particular culture or society, existing within and developed around specific conditions of women and men indigenous to a particular geographic area in contrast with knowledge generated within the international system of universities, research institutes and private firms (Warren, 1991:1). According to Flavier et al (2003:478) IK is the basis upon which society communicate and make decisions. It is dynamic and continually influenced by internal creativity and experimentation as well as by contact with external systems.

IK refers to the complex set of knowledge and technologies existing and developed around specific conditions of populations and communities indigenous to a particular geographic area. IK can also develop within communities descended from populations that inhabited the country at the time of conquest and imperialism. These populations, irrespective of their legal status retain some of, or their entire social, economic, cultural and political institutions. IK thus is dynamic constantly adapting to new conditions and technologies (Mundy & Compton, 1995:120).

2.3.1 Indigenous Knowledge and Agriculture in Swaziland

Research on traditional agricultural practices in Swaziland and Southern Africa in general is obscure. Two studies could be identified from the faculty of agriculture of the University of Swaziland and the literature cited in these studies is all external to Swaziland. The recent study was done by Musi of the University of Swaziland and it focused on coping with food and income insecurity of Swazi households. Dube and Musi (2002) carried out the most recent study focusing on the implications of IK for sustainable agricultural development. Both studies followed conventional research methods and did not use the systems approach in investigating IK. In addition, literature review in both studies is external to Swaziland and both studies recommended further investigation of IK in Swaziland.

A study closely related to the current investigation was conducted in Swaziland by Ogle and Grivetti (1985a) entitled *Legacy of the Chameleon: Edible Wild Plants in The Kingdom of Swaziland, a Cultural, Ecological, and Nutritional Survey*. This study, as the title suggests, focused on identifying the different types of wild plants, their use and dietary role and was wide in scope. To a large extent, Ogle and Grivett's (1985a) study is similar to the present investigation in that it covers a wide scope and discusses causal relationships amongst different components of the study. However there was no deliberate intention to use the systems perspective.

Other studies worth acknowledgement are by Magagula (2005) who looked at the role of sustainable indigenous crop production, and Mavimbela (2004) who specifically looked at IK on traditional food plants among rural women. Magagula (2005) and Mavimbela's (2004) are unpublished Bachelors and Masters thesis respectively.

It is worth noting that Swaziland government publications such as the Development Plan 1995/96 to 1997/98 produced by the Economic planning office, and SADC Short Term Measures to Revamp

Agricultural Production 2004-2006 produced by the Ministry of Agriculture and Cooperatives have been biased towards modern agriculture and have not been promoting indigenous agriculture because it is undermined. In other words, efforts to develop subsistent farmers have been dominated by introduction of new crops and agricultural methods. As is the case in the rest of the world, reference to traditional agriculture is often made when it is compared with modern agriculture, and where it is referred to as outdated, labour intensive, and unproductive (Goering, 2004:2; Yonge Nawe Environmental Action Group, 2005:1). Thorough research on why and how traditional agricultural practices were carried out and how they relate to the surrounding environment is rare and therefore the need for a holistic investigation.

Agriculture plays a significant role in the development of Swaziland and is one of the leading sectors in its contribution to GDP. Agriculture contributed 10.2 percent of the GDP in 1992/93, 12 percent in 1997 and has since stagnated. The growth of the sector can not be accounted for by increased production levels since production levels have levelled in recent years particularly on Swazi Nation Land (SNL). Swaziland has never been self sufficient in maize production and consumption needs have always been satisfied by imports (Economic Planning Office, 1995:55-58). For a country whose population is predominantly rural (76%) deriving livelihood from agriculture, sustainable development will come through significant advancement of this sector. A review of the development plan of Swaziland since independence reveals that the government has made efforts to develop its rural people through the Ministry of Agriculture and Cooperatives (MOAC) promoting modern agricultural technologies. However, such efforts seem not to have achieved the intended goal given that about a quarter of the population has been dependant on food aid in the last five years.

2.3.2 Research on IKS

Raza and Du Plessis, (2003:1) observe that conducting research on IKS offer challenges since concepts underlying them are not yet based on consensus. They note that, complexity on IKS research increases when IKS is combined with science hence the need to contextualize IKS within the research paradigm. Mebratu (1998:493-500) puts forward that the most important lesson to learn from IKS lies in their "holistic vision and the importance it attaches to nature. This conjecture by Mebratu (1998:493-500) is part of the reason the present study employs a systems perspective in studying traditional agriculture which in essence is indigenous knowledge on agriculture.

The interest in studying IKS around the world has increased significantly in the last decade. Much has been done (Warren, 1990) in recent years to put forth the importance of IK, defining IK, and calling for attention for its research. There is a consensus on the value of IK and that IK need to be documented urgently because it is in danger of extinction. Dutfield (2000) asserts that harnessing and protecting IK requires no justification. Koro (2005:44-46) captured views of traditional leaders indicating that IKS needed to be protected from being illegally acquired and exploited by outsiders without benefiting true owners. They pointed out the urgent need to ensure that IK is documented and not only transmitted orally from one generation to the next.

Haverkort (1995:455) argues that indigenous knowledge should not be treated as something that can be collected, frozen in models and expert systems, stored for future use by scientists or something that could be easily transplanted to other regions. His argument is not that IK should be recorded but that such knowledge is generated under specific cultural and ecological systems and must thus not be seen independent from these systems. It also represents a dynamic and changing process based on certain relatively stable paradigm.

In March 2004, representatives from 15 Universities in Southern Africa (including the University of Swaziland) and about ten research institutions in Southern Africa gathered for the purpose of sensitization, experience sharing, and capacity development on the relationship between IKS and development in Africa with a particular focus on SADC countries. Amongst the 12 issues that emerged as requiring to be addressed at national and regional levels, and requiring regional networking and partnerships were: the efficacy of IKS to sustainable development, lack of common research methodologies, Western orientation of curricula in SADC region which does not embrace IKS, and the lack of data base of IK and indigenous technologies (Dar Es Salaam Declaration, 2004:74) all of which are the underlying basis for the objectives of the study.

2.3.3 Indigenous Communication and Indigenous Knowledge

Most definitions, given in this study and other literature place emphasis on the accumulation of experience and its transference within a society from one generation to the next. Little attention has been paid to how this information is accumulated and shared within local societies and yet communication, according to Mundy and Compton (1995:112) is essential for the continuity and spread

of knowledge and the culture in which it is embedded. Every society has developed intricate ways to impart knowledge from one person to the next. This includes technical and non technical information of which indigenous agricultural practices is a part. The interface between IK and indigenous communication though seemingly ignored, plays a crucial role in the continuation of IK and culture.

Communication of indigenous information happened through folk media, folk drama, story telling, and interpersonal communication. The primary purpose of these media and channels however, may not have been communicative but they interacted to form a network which constitutes the information environment (Mundy and Compton 1995:113). Indigenous communication is the means by which culture is preserved, passed on from one generation to the next, and responds and adapts to new situations, thus it is an important aspect of culture. It is the demeaning and erosion of such indigenous communication systems by exogenous education systems that threatens the survival of indigenous knowledge.

Indigenous knowledge has stable and dynamic components. The dynamic component is derived from the stock of existing knowledge held in society which is recreated through communication from generation to generation. According to Richards (Mundy and Compton, 1995:120), this component stabilizes IK because it propagates the knowledge base of the society and serves to maintain the culture. The dynamic component arises through the generation of innovations and through the introduction of innovations external to the community. Indigenous knowledge is thus not static but it is dynamic, constantly changing and adapting to new conditions and technologies.

2.3.4 Sources of Indigenous Knowledge

According to Mundy and Compton (1995:117) and Haverkort (1995:457), the level of indigenous knowledge that one possesses varies greatly and is a function of age, gender, experience, profession and personality. Warren (1990) and Koro (2005) acknowledge that elderly people are custodians of indigenous knowledge. It is common to find that an individual may be highly skilled in midwifery but know very little about farming. The community however is able to recognize specific skills for which one is an expert and to hold him or her in high esteem with regard to that particular skill. Mundy and Compton (1995:117) state that experts are most likely to be opinion leaders in their specialties and are sought out for advice. For example, traditional healers, farmers, midwives etc. Because men and women often perform different tasks, knowledge can either be gender specific or held in common by both sexes. One

conducting research on IKS should be cognizant of this critical information and should take it into account. Information on indigenous farming practices in Swaziland is most likely to be found from the elderly of both sexes since farming is a joint activity for both women and man. Specific skills however could be different for men and women, as some chores are divided into gender roles.

2.4. Traditional Agriculture

Traditional agriculture very recently is perceived by reputable scholars (Madeley, 2002; Mebratu 1998:493-496) as the hope for Africa to reach the millennium development goals of poverty alleviation and food security for all. These scholars argue that modern agriculture has failed to achieve food security in the developing world but has increased disparities between the poor and the rich. Modern agriculture has also degraded the environment due to practices employed such as the use of chemicals, huge machinery, monocropping, and hybrid seeds. These two characteristics, inequality and environmental degradation make modern agriculture unsustainable. Traditional agriculture therefore remains the only hope to achieve sustainable development through sustainable agriculture (Norberg-Hodge *et al*, 2001:62).

There is a convergence of thought that there is value in traditional agriculture as it has been exploited by scientists of the green revolution as sources of genetic raw material but who paid no attention to the entire traditional agricultural system (Haverkort, 1995:455; Mebratu 1998:493-496; Norberg-Hodge *et al*, 2001:62)

Studies conducted recently in South Africa (Modi, 2003:677; Shava, 2000:1) and in Swaziland (Mavimbela, 2004:66-68; Dube & Musi, 2002) to determine knowledge of local people about indigenous crops and their use found that the knowledge of the community about the use of indigenous food was diminishing. Some of the reasons provided are the stigmatization of indigenous food plants, urbanization, formal education, changes in life style, and media influence. Indigenous food was looked down upon even though it provided the necessary nutrients. Modi (2003) found that farmers had a negative perception about indigenous crops and organic farming. Words such as poverty, black, archaic, ancestral, subsistence and wild were used by the farmers to describe indigenous crops. According to Modi (2003) the words used to describe organic farming had similar connotations to those used to refer to indigenous crops which associated organic farming to low social class and cultural norms. It is

important to note however that in descriptions of both terms farmers concurred that organic production is environmentally friendly and lends credence to food security. These studies are consistent with the findings highlighted earlier that IKS are resourceful for sustainable development though they are being degraded (Mebratu, 1998: 493-496; Norberg-Hodge *et al*, 2001:62).

2.5. Sustainable Agriculture

A new term for agriculture called sustainable agriculture has emerged. Its main distinguishing factor from modern agriculture is that it attempts to avoid and address the weaknesses of modern agriculture. It is based on the principles of sustainability, that the present generation must meet their needs without compromising the potential of future generations to meet their own needs. Sustainable agriculture integrates three main goals; environmental health, economic profitability, and social and economic equity. Stewardship of natural and human resources, and a systems perspective are fundamental in understanding sustainability in agriculture (University of California, 2005:1; Bowler, 2002:205).

Stewardship of natural resources refers to the long term maintenance of land and water. A systems perspective of agriculture views the individual farm and its production, the local ecosystem, and communities living in and affected by the farm (social system) as part of the agricultural system. A systems approach provides the tools to explore the interconnections between farming and other aspects of the environment. It also implies interdisciplinary efforts in research and education with the inclusion of farmers, farm workers, consumers, policy makers, and researchers.

Sustainable Agricultural systems

The complexity of sustainable agriculture systems demands that work related to such systems should include many aspects such as the consumers' perspective, the total food system from production to consumption, the social implications of agriculture, and the role of women in agriculture. According to Edwards *et al* (1990:674), six basic requirements are crucial for sustainable agriculture:

- All farmers should have equitable access to land, credit, and agricultural information.
- Farmers, both women and man should have control over the maintenance and support of independent agriculture
- Methods used and developed for cultivation, food processing and storage should reduce the labour burden on women.
- There should be a high degree of diversification of species to maintain flexible cropping patterns.

- Soil fertility should be preserved without importing nutrients/inputs.
- There should be appropriate use of water and fuel resources.

Parr and colleagues (Edwards *et al*, 1990:674) suggested that the definitive intention of farmers in sustainable agriculture should be to 1) "Maintain or improve the resource base, 2) Protect the environment, 3) ensure profitability, 4) conserve energy, 5) increase productivity, 6) improve food quality and safety, and 6) create more viable socio-economic infrastructure for farms and rural communities". The US farm bill bears similar requirements as it describes Sustainable agriculture as a system of plant and animal production practices having a site and specific application that will, over the long term "1) satisfy human food and fibre needs; 2) enhance environmental quality and the natural resources base upon which the agricultural economy depends; 3) make the most efficient use of non-renewable resources and on-farm resources and integrate, where appropriate, natural biological cycles and controls; 4) sustain the economic viability of farm operations; 5) enhance the quality of life for farmers and society as a whole." (Van Calker *et al*, 2005:53-63)

Some inveterate characteristics of the search for sustainable agriculture are the need for interdisciplinary and collaborative approaches, a holistic or whole farm view, specificity of site, local adaptation, and a stable relation between production and consumption (Edwards *et al*, 1990:675).

Application of Indigenous Knowledge on Agriculture

Population explosion in the early 1900s led to the increase in the demand for food. Valuable agricultural land was used for housing. More valuable agricultural land was exploited as a response to the food shortages. The methods applied were not properly planned. Trees were cut down and large indigenous forests were destroyed for the sole purpose of providing food to human species. In the response to the hiking demand for food man was completely anthropocentric. The role of the thousands of tree species in the ecosystem was undermined if at all considered, as forests were destroyed around the world to make way for farming. Practices in agriculture extinguished a large number of plant species and by so doing extinguished other species that were dependent on them (Norton, 2003:463).

Industrialization and civilization influenced migration of a significant population to the cities. This meant that some people were no longer producers of food but became dependant on food produced by others (Diamond, 1998). More land was needed for construction of industries, modern settlements, offices,

schools and other uses. This exacerbated the exploitation of land to produce more food. Western influence through colonization influenced developing countries to adopt new ways of farming. The modern methods of farming promised high yields to farmers. Agricultural chemicals were introduced over a period of time to supplement natural means of food production. These chemicals were introduced with one focus; to increase production of food for humans without regard of the effect it has on the ecosystem. Chemical application suddenly became the main characteristic of modern agriculture. Over the years scientists have discovered the impact of agricultural chemicals on the environment and consequently on the human species. Ways that will promote food security without degradation on the environment are now being sought.

This section of literature review discusses how best food can be produced with little environmental impact. The statement "the application of knowledge rather than chemicals is the key to increasing food output on small farms in developing countries, mixed cropping has proven success as a strategy that can both produce the food that is needed immediately, and is sustainable" is affirmed through discussion of themes from a variety of literature.

Modern Agriculture /Chemical Farming

Modern agriculture has been glamorized over traditional agriculture with the latter dismissed by modernist as primitive, backward, and of very low productivity. Mono-cropping, chemical fertilizers, high yielding varieties, irrigation, and high mechanization characterize modern agriculture. Modern agriculture short circuited the evolution process of crops, and traditional systems of cultivation to adapt to local conditions. It encouraged farmers to believe that higher yield could be obtained with less effort by applying chemicals as opposed to application of knowledge that was encouraged by the traditional system. However the glamorized benefits of monoculture in terms of yield are misleading as increases are only in one crop, whereas mixed cropping gives a low yield of multiple crops but a high output of food (Madeley, 2002).

The impact of modern agriculture is well understood when discussed under three categories which are ecological, economic and social impact. The impacts of modern agriculture are well documented by Madeley (2002). The ecological impact of modern agriculture include the deterioration of soil health, increased soil and water pollution, and the disturbance in food chain due to excessive use of chemicals and techniques which destroy soil structure and surrounding environment. Monoculture leads to

development of new strains of pathogens and increases vulnerability to crop pests and disease outbreaks and to disease and drought. Other examples of ecological impact are high energy use due to high mechanization, inefficient use of nutrient and water usage, increased salination, loss of biodiversity due to dependency on hybrids, and non-sustainability and reduced food security.

The economic impact of modern agriculture include the dwindling productivity due to the decline in soil fertility, the high cost of production leading to low profits, high risk of failure due to monoculture and the outflow of capital from villages where food is produced to the cities. The social impact of modern agriculture is seen in the farmer overdependence on outside markets and exploitation by outside market forces, farmer dependency on seed companies for seeds, and farmer dependency on agro-chemicals leading to increased indebtedness and suicide by farmers. Another example of social impact is the high health risk created by low nutritious status of families resulting from the production of one type of crop and the lack of integration of plant and animal farming.

In lieu of the above limitations of modern agriculture, it is becoming increasingly clear that modern agriculture is failing to improve food security for the poor in developing countries. It has also become clearer that practices in modern agriculture have caused gross environmental degradation not to mention loss of biodiversity.

High and Low-external Input Systems

Pretty *et al* (2004) describe two types of agriculture in countries of the South using input as the key in the description, the high-external input (HEI) system and the low-external input (LEI) system of agriculture. The former is endowed with good soils and adequate supply of water, modern farm inputs, machinery and transport, access to marketing infrastructure, and agro-processing facilities and credit. The HEI is basically modern agriculture or chemical farming as it is also focused on monocrops and mono-animal enterprises. The LEI system on the other hand is all other agricultural and livelihood systems that are not part of the HEI system. LEI systems are located in dry lands, wetlands, uplands, near deserts, mountains and hills. Farming systems in the LEI systems are complex and diverse, and the yields can be low. Contrary to the HEI, LEI systems are usually remote from markets and infrastructure, located in fragile soils and may have low productivity.

The high-external input system as the name suggest, promotes greater use of inputs in specialized operations. The inputs such as nutrients and pesticides are unfortunately never used entirely by the intended crops and animals and some are lost to the environment contaminating water, food, fodder and the atmosphere (Pretty et al, undated). Further more HEI have other adverse impacts on the environment such as soil erosion and loss of biodiversity which if it were to be assessed would by far exceed the returns of HEI systems. These costs are latent to the ordinary farmer and the citizen who eventually pays for them.

According to Haverkort (1995:454), the low external input system of agriculture (LEISA) make optimal use of locally available natural and human resources, such as climate, landscape, soil, water, vegetation, local crops and animals, labour, local skills, and indigenous knowledge. Sustainability with LEISA is achieved if it is economically feasible, ecologically sound, culturally adapted, and socially just. The use of external inputs, such as mineral fertilizers, pesticides, hybrid seeds, machineries, and external advisers is not excluded, but is seen as complementary to the use of local resources and has to meet the four criteria of sustainability. Three sources of knowledge characterize LEISA; 1) Traditional agricultural practices 2) indigenous knowledge 3) scientific insights as developed in agro ecology.

The LEI system is an integrated system of agriculture employing knowledge rather than chemicals only. LEI systems promote incorporation of natural processes such as nutrient cycles, nitrogen fixation and pest-predator relationships. There is minimal use of external off farm inputs used with this system. Kraal manure and farm yard manure are used to increase nutrient capacity in the soil as well as improve the soil structure. Legumes are grown together with other crops or rotated in order to fix nitrogen in the soil. Green manuring is also used with LEI where a quick growing leguminous crop is incorporated in the soil when it reaches maximum foliage to increase the amount of nitrogen in the soil as well as the amount of organic matter in the soil. Water conservation where rain fall is unreliable is done through strategies such as mulching, water harvesting, and the use of semi-permeable stone contour lines and buds (Jules Pretty et al, undated).

The HEI system is a demonstration using the type and level of inputs used that chemical farming is not sustainable. The LEI system appears to be an integrated system in which minimum quantities of chemicals are used as inputs. The LEI system however provides evidence that the HEI system is not the best system and that a better system that will not only be eco-friendly but will also be cost effective.

Traditional Agriculture

The traditional systems of agriculture are the only "time-tested models of sustainable agriculture" (Norberg-Hodge et al, 2001:54). Farming practices within this system vary greatly from place to place but share similar principles depending on socio economic factors. They resemble the productivity, stability and sustainability of the surrounding ecosystem. Traditional systems often use numerous crops simultaneously or rotate them sequentially in a given field. Unlike modern agriculture traditional agriculture is characterized by intercropping or mixed farming and polyculture. The system provides a continuous supply of food as well as mitigates the risk of crop failure. The diversity of crops contributes to self reliance in fuel, fodder, fertilizer, medicine, and fibre (Norberg-Hodge *et al*, 2001).

Genetic diversity in traditional agriculture is often protected and nurtured. It depends on locally available nutrient intake as opposed to the infusion of fossil-fuel based inputs common with modern agriculture. Examples of local nutrient usage are the use of blue-green algae, kraal manure from livestock, and legumes as sources of nutrients. The diversity of plants and animals as a means of pest control is one way through which biodiversity is taken advantage of in the traditional farming system. Traditional farmers have also learnt over the centuries to develop and maintain vast networks of terraces to prevent soil erosion. The types of terraces vary from place to place as they are adapted and applied to varied locations.

The main feature of the traditional system of agriculture is that it has evolved over centuries to a wide range of factors unlike modern agriculture which respond mostly to markets and their preferences. Traditional agriculture tends to be integrated with the social bonds of the community which strengthens connections amongst members and to the earth (Norberg-Hodge *et al*, 2001). Where as distribution of produce in the modern system of agriculture is purely economical, distribution of produce within the traditional system of agriculture was highly localized, and based on a range of considerations such as social relations and ceremonies. The nature of the distribution system within the traditional system ensured that all members of society were food secured. One major critic that has been directed to traditional systems of agriculture is that of being labour intensive. However Norberg-Hodge *et al* (2001) reveals that farm work was carried out in a relaxed pace and in a spirit of celebration.

It is safe for one to say that the traditional agricultural system employs organic farming methods as it completely excludes chemical. The traditional system is ecologically friendly and cost effective. Pretty et al (undated) estimates that 1.4 billion people in the world depend upon this system for food security. Mixed cropping is at the centre of the traditional system. It therefore suffices to conclude that food security in developing countries can be improved by applying skills and knowledge used in traditional agriculture.

Mixed cropping

Mixed cropping is almost synonymous with traditional agriculture because of its significance in the production of food in traditional farming systems. It is a viable tool used in traditional agriculture and organic farming. Mixed cropping refers to "the growing of two or more plant species in the same field in the same year and, at least in part, at the same time" (Ramert, Lennartsson, and Davis, 2002:1). Mixed cropping has important strengths such as improvement of soil management and suppression of pests and diseases in which case it can be seen as performing different eco-services in the farm system. It permits an intensification of the farm system which results in increased overall productivity and biodiversity in cropped fields (Norberg-Hodge *et al* 2001).

The crops are usually of varying sizes and from different plant families and species. These crops when matured provide complete ground cover thus protecting the soil from erosion and conserving moisture in the soil. The crops are usually from different families thus they use different types and quantities of nutrients in the soil from varying depths in the soil. The root system of the plants also differs with legumes fixing nitrogen capability in some and others utilizing more micro- nutrients than others. The diversity in the composition and behaviour of the plants conserves soil structure and replenishes the soil with nutrients. It also makes the environment unfavourable for pests and diseases.

The food output from the different crops in a mixed crop stand is high. The yield per individual crop may be low but the total food output is high (Norberg-Hodge *et al*, 2001). Not only is the food output high but it is often a source of a variety of nutrients for families. For example, ground nuts, pumpkins, maize, and sweet potatoes from one field would be a source of plant proteins, starch, and a variety of vitamins through out an extended period in a year. This means that families appropriately practicing mixed cropping would remain food secured over a period of time. Food security refers to the availability of the right quantity of food of the right nutrient value to all people at all times. Mixed cropping provides food

output that is balanced and would rarely require supplementary crops from external sources. Seed used in mixed cropping are saved from previous harvests and are usually indigenous and well adapted to local conditions and so farmers require less cash to purchase farming inputs.

Mixed cropping is sustainable in that it does not compromise the quality of the soil and its ability to produce food in the future, neither is it dependant on non renewable external sources for nutrients. It is in many ways very friendly to the environment and in fact mixed cropping thrives to improve the soil structure. Since every input used in mixed farming is local and non-synthetic, mixed cropping is an organic farming technique.

Organic Farming

Organic farming is precisely defined as "a production system which avoids or largely excludes the use of synthetically compounded fertilizers, pesticides, growth regulators and livestock feed additives. To the maximum extent feasible, organic farming systems rely on crop rotations, crop residues, animal manures, legumes, green manures, off-farm organic wastes, and aspects of biological pest control to maintain soil productivity and tilth, supply plant nutrients and to control insects, weeds, and other pests" (Lampkin, 1999:5). To a larger extent this definition of organic farming can be summarized to the general understanding of organic farming which is farming without chemicals. The key concept in organic farming is the understanding of the soil as a living system that develops the activities of beneficial organisms.

Organic farming is increasingly becoming recognized as a potential solution to the many problems caused by modern agriculture in both developed and developing countries. The problems of modern agriculture have been discussed under the section on modern agriculture in this paper and would therefore not be elaborated upon in this section. There are quite a number of reasons that have led to the development of organic farming. These reasons in my view are not very different from those provided for the need to learn from traditional agriculture and promote mixed cropping. In fact mixed cropping can be classified under organic agriculture in lieu of the definition given above. The realization that finite natural resources need to be managed, the loss of natural habitat and biodiversity, the increasing demand of organic food, and the ever escalating cost of production in modern agriculture are some of the main reasons why organic farming has become important (Lampkin, 1999).

Organic farming also has a significant contribution to make in areas where chemical agriculture has failed. Some of the contributions as given by Lampkin (1999) include the preservation of soil structure, micro organisms and larger insects, and sustaining the ecological balance and developing biological processes to their optimum. Contrary to modern farming practices, organic farming is not a major drain to the earth's finite resources and it does not add to the latent cost of agriculture often born by society and not the farmers. As already implied in the definition, organic farming avoids rearing animals under intensive systems such as poultry and piggeries and using growth hormones. There are more similarities between organic farming and farming practices from traditional agriculture in particular mixed cropping. What organic farming seeks to achieve is achieved through mixed cropping.

Sustainability

Sustainability rests on the principle that we must meet the needs of the present without compromising the ability of future generations meeting their own needs (World Commission on Environment, 1987). From this understanding of sustainability one can deduce that stewardship of both natural and human resources is critical in sustainable agriculture. As already mentioned in what characterizes modern agriculture, Chemical farming, HEI systems, give it any name, working and living conditions of labourers are not considered with honesty. Most often farm labourers are paid low wages that are not worth the time and energy they invest in their labour. Further more farm labourers often live in very bad conditions on the farms often for months away from their families.

Efficient use of inputs is important in sustainable agriculture. However trends in modern agriculture reveal that returns from inputs and modern varieties are declining, implying that more inputs have to be used to maintain current levels of productivity. The fact that the cost of using HEI is very high coupled with the damage it has on the environment is evidence enough that it is not sustainable. Biotechnology and genetic modification in modern agriculture promises better opportunities to produce crops that are efficient users of nutrients and are resistant to pests and diseases but will continue to foster greater dependency on external resources and systems. Worse still, developing countries are highly unlikely to benefit from the new technology, as they are poorly endowed (Hobber, Velve and Abraham, 1990 in Pretty et al, undated) to afford it. Modern agriculture is heavily dependant on non-renewable energy sources and such dependency is not sustainable. The ability of future generations to meet their own needs is significantly decreased when the natural resource base such as soil and water are degraded by food production systems (University of California, 2005).

Traditional agriculture makes use of the ecological processes to maintain an environment conducive for production. Within the principles of traditional agriculture the earth is viewed as the source of life and is therefore revered and treated with great honour (Norberg-Hodge *et al*, 2001). Farming practices in traditional agriculture nurture the soil and promotes fertility rather than destroy the soil structure. A 'healthy' soil is a key component of sustainability as it will produce a healthy crop that has optimum vigour and less susceptible to pests. This agricultural system is sustainable as even to date about 1.4 billion people are estimated to derive their livelihood through this system (Pretty *et al*, undated).

The Way Forward, Application of Knowledge

According to Norberg-Hodge *et al* (2001) good practices of keeping land clean from weeds, knowledge of soils and their capabilities, the right time to sow and reap, and simplicity in water raising appliances are found amongst traditional farmers in India and in other parts of the world. Research in West Africa proved that small farmers and not agricultural experts trained in modern agriculture were largely responsible for most of the innovations in agriculture within the region in the past decade. Traditional farming systems which do not make use of chemicals but wisdom in agriculture gathered over centuries can produce more output and a wider range of harvested products. These systems which have constantly been ignored when it comes to agricultural development assistance have been able to provide food to about 1.4 billion people (Pretty, undated) who are directly dependant upon them.

HEI systems can not sustain the use of external resources nor produce them in their own economies. The alternative therefore for most poor countries to increase food production lies in learning from types of agricultural systems such as traditional agriculture where application of knowledge and not application of chemicals has successfully produced food. The success of mixed cropping in sustaining food production is a legacy to be adopted. Any other agricultural system that ignores this resource risks high failure. Observation and trial and error system is frequently the main source of innovation. Ecosystems produce a series of unique characteristics.

To summarize this section themes are discussed on modern agriculture, traditional agriculture, organic farming, and sustainability. The discussion in modern agriculture focuses on its problems in order to demonstrate that it is not a solution to improving production in small farms whilst discussions on the other themes bring the similarities in principles, practices and objectives. The meaning and discussion of

sustainability is used so as to reach a conclusion on the sustainability of some types of agriculture and agricultural practices. The discussion of the themes affirm that application of knowledge rather than chemicals should be the bases for increasing food output on small farms in developing countries.

2.6. FOOD SECURITY AS A CONCEPT

The quest for food security, the avoidance of hunger is as old as human society itself. As a concept, food security was initially observed in the 1970s mainly as a food problem, particularly that of a) ensuring production of adequate food supplies and b) maximizing stability in their flow. That view led to a focus on international measures to reduce price variability and finance additional costs of exceptional imports, and to self-sufficiency strategies at a national level. In 1974 the World Food Conference was held to commit countries in an effort to eradicate hunger and malnutrition. In 1983, Food Agricultural Organization (FAO) expanded its concept to include a third prong, securing access by vulnerable people to available supplies (Overseas Development Institute, 1997). In the early 1990s it was noted that households are not food secure if the available food is of low or poor nutritional value.

This was followed by the World Food Summit of 1996 that made a declaration on food security and drew and adopted a plan of action reaffirming the commitment of the international community to eradicate hunger and malnutrition affecting around one fifth of the world population. The nutritional value of food was therefore incorporated into the food security concept. The major focus became nutritional food security concentrating on the path of food from production to household and the income of households to purchase food. It also focused on the path of food to nutrition which simply was the utilization of food to provide for physiological needs. Household livelihood security became the focus in the late 1990s in which household actions and perceptions were emphasized (World Vision International, 2002). Adequate nutrition and food security are important outcomes of development; conversely they are vital contributors to the development process.

2.6.1 Definition of Food Security

Like the concept of sustainable development, food security has many definitions - about 200 (Overseas Development Institute, 1997:2). The broader definition of food security is reflected in the World Food Summit definition; "food security, at the individual, household, national, regional, and global levels [is

achieved] when all people, at all times, have physical and economic access to sufficient, safe and nutritious food to meet their dietary needs and food preferences for an active and healthy life" (Overseas Development Institute, 1997:1; Broca, 2006:6). According to Broca (2002:6), no country anywhere in the world is food secure on this definition and for that reason it represents an ideal. In defining food security the summit recognized poverty as a major cause of food insecurity and that sustainable progress in poverty eradication is critical to improving access to food, but noted that conflict, terrorism, corruption and environmental degradation also contribute significantly to food insecurity.

Paramount to understanding the concept of food security is the fact that the definition of food security defines a state where every person has food of adequate nutrition and of appropriate preference at all times. This state is hardly found anywhere in the world since poverty is a cause for concern around the globe. In discourses about food security therefore, the main issue is, what threatens food security and how can food security be achieved. The phrase food security is often used when in totality food insecurity is the issue. Food security is therefore an abstruse concept. It qualifies to be called a wicked problem. Below are five dimensions that are used to define food security.

2.6.2 Dimensions of Food Security

According to World Vision International (WVI) (2002:3) there are five known dimensions, and all five are key in understanding the current perception of the concept of food security. These are availability, stability, accessibility, utilization, and asset creation.

- Food **availability** refers to food that can be conveniently obtained or procured in adequate quantities at any given period.
- **Stability** of food supply refers to the lasting nature, reliability, and invariability of food supplies.
- **Accessibility** of food refers to the ease with which all people can obtain food from wherever it is available when it is needed.
- Food **utilization** refers to the practical and effective use of food by the body to meet its nutritional requirements.
- **Asset creation** refers to the accumulation of resources to meet basic needs of the (individual members) household at all times.

Although the five dimensions have been documented and accepted world over, there are still evolving critical dimensions such as acceptability as defined by preferences. Acceptability refers to the traditional conformity and familiarity of a people to a specific type of food. It refers to the extent to which people regard food favourably or receive as valid.

An individual, a family, a community or a country is said to be food secure if the five dimensions are applicable, that is when at all times they have physical and economic access to sufficient, safe and nutritious food to meet their dietary needs and food preferences for an active and healthy life. The five dimensions of food security are interwoven in that one affects the other. However the presence of one dimension does not guarantee effectiveness of any of the other dimensions but the absence or lack of one dimension brings about food insecurity (Broca, 2002:7).

The concept of food security as it has been expatiated in this section refers to a state where all people have adequate food of adequate nutritional value at all times. This state in fact is very difficult to attain because of the nature of the diverse issues affecting food security. Although the concept of food security is defined in positive terms, efforts to understand the concept and actions taken to reach a food secure status are normally done by studying food insecurity. Food insecurity is the direct opposite of food security.

2.7. What is Sustainability and why do we need Sustainable Development

2.7.1 The history of sustainable development

Historically, all mainstream conventional models and approaches of development disregarded the impact of economic activity on the environment (Weaver, Rock, and Kusterer, 1997:237). The environment was taken for granted over a prolonged period as a source of unlimited resources. It was seen as a separate entity removed from people that could be exploited. As a result the environment was manipulated and used to satisfy and meet basic needs of humans without regard for the damage caused. The earth's resources, various animal and plant species, and human life were placed under pressure by the population explosion which came at the same time as the industrial revolution. The industrial revolution brought in a new value system which had strong individualistic and materialistic norms, and these together with the disregard for the environment resulted in people losing touch with the environment (Parker, 2000:10).

Indigenous knowledge in developing countries was destroyed during the colonial era through imperialism. This led to the loss of information fundamental for the maintenance of local systems and conservation of the environment, consequently its replacement by western knowledge which was often not suitable for local conditions. The process of modernization continued to propagate cultural imperialism, further exerting pressure on the people that they became aware of its impact on the society and the environment. This realization brought awareness that high economic growth was much more costly.

The magnitude of the environmental impact became very clear around the 1980s when global concerns on environmental degradation received a priority in the development agenda. It became clear that the objective of high economic growth came at a very high price (Weaver *et al*, 1997; Parker 2000:11). According to Parker there was a debate on who was developed, the rich who destroyed the environment or the conventionally poor that caused less damage on the environment. The principle of unchecked growth brought about by modernization led to the discourse on sustainable development.

Since the debate on sustainable development emerged in 1979, sustainable development has remained a contestable concept. The most acceptable definition is given by the Brundtland commission which defines sustainable development as "development that meets the needs of the present without compromising the ability of future generations to meet their own needs" (Dresner, 2002:64-70). The Brundtland definition has been criticized to be too simple and vague and that it is subject to many interpretations. This definition however, identifies three crucial elements of sustainable development as meeting basic needs, recognizing environmental limits, and the principles of intergenerational and intra-generational equity. Sustainability and sustainable development are often used interchangeably (e.g. in Agenda 21) though there is a debate about whether sustainability is primarily about the environment or whether sustainable development is primarily about development.

2.7.2 Broad-based Sustainable Development

The principal goal of sustainable development is to improve human well-being and to provide an environment that permits people to reach their potential. According to Weaver, Rock and Kusterer (1997:13), four sub-goals are a prerequisite for broad-based sustainable development to occur. These are 1) a healthy growing economy; 2) equity in distribution of economic benefits; 3) effective governance

and respect for human rights and freedom; and 4) a political economy that preserves the environment. The multidimensional concept of broad-based sustainable development has come out of 40 years of experience in the development discipline, the last component to be added being the concern for environmental preservation.

In most developing countries, sub Saharan Africa in particular, more than 70% of the population live in rural areas. Agriculture accounts for about 29% of the gross domestic product and more than 70% of the population works in agriculture (Weaver *et al*, 1997:135). In Swaziland 60% of the population is rural and subsist on agriculture. Agriculture contributes 12 percent to the country's GDP. This analysis informs us that agriculture provides a livelihood and employs a significant number of people. Agriculture also provides food for the population. Since the population is predominantly rural it is clear that most people are engaged in traditional agriculture. Therefore, agriculture and specifically traditional agriculture plays a significant role in the economy of Swaziland.

Agriculture has a role to play in sustainable development. It must meet the growing demand for food without damaging rural ecosystems at the same time providing livelihoods for the majority of people and further provide critical raw materials and goods for processing and for export.

Lester Brown (2004) of the World Watch Institute conducted extensive research on environmental limits and publicized this concept from as early as the 1970s. Recently, Brown argues that the green revolution was deceptive because it generated significant environmental costs and has not been able to generate new food yields. As a result he predicts that global food shortages are imminent. Weaver *et al* (1997:144) agrees with Brown that world agricultural research has not produced remarkable innovations since the 1960s and that the original green revolution technologies and massive irrigation schemes had long term effects on soil and water contamination. Weaver *et al* (1997) however, does not view this to mean that there is no hope for future agricultural technology innovations particularly those that are environmentally friendly.

According to Weaver *et al* (1997), a growing body of research suggests that negative environmental outcomes in East Asia were not a result of intensification of small holder agriculture but rather failure of policy to account for damage done by chemical and water intensive agriculture. A similar research finding in East Africa demonstrates that considering the full cost of agricultural chemicals which includes

environmental cost of chemical use, it pays profit-maximizing small farmers more to shift to alternative and less polluting control technologies. These findings suggest that it may be possible in most places to generate high agricultural yields without the use of high polluting chemicals.

There are two forms of agriculture that do not make use of high polluting chemicals. These are traditional agriculture and organic agriculture. Since traditional agriculture did not make use of any form of artificial chemical, traditional agriculture was organic. Therefore, future agricultural research breakthroughs will have to come from lessons taken from traditional agriculture. Weaver *et al* (1997:145) argues that future innovations in agricultural research lie in genetic engineering technologies such as selecting varieties that are drought tolerant and that fix nitrogen in the soil. Research on traditional agriculture however, indicates that these ideas have existed before the green revolution. Traditional farmers grew varieties that were suitable for their own conditions and blended well with the ecosystem. Even the traditional methods used to grow these varieties were not destructive to the environment. Instead of reinventing the wheel economies based on rural agriculture like Swaziland should invest in promoting practices in traditional agriculture.

2.8. Chapter Summary

Thus far the literature reviewed revealed that traditional agriculture is embedded within IKS and that due to its broad and complex nature, IKS can best be studied through a systems approach. Traditional agriculture is explored against modern agriculture. It is argued that traditional agriculture has more to offer in the development of sustainable agriculture. The chapter also reviews literature on the systems theory, food security concept, and the concept of sustainable development.

CHAPTER III

3. RESEARCH DESIGN AND METHODOLOGY

3.1. Introduction

The procedures employed in this study are described in this chapter. Procedural information include the following: design of the study, target population of the study, subject selection, instruments, and data analysis.

3.2. Research Design

Research paradigms play an important role in science as much as they contribute to the reductionist nature of science when they become fixed and resist substantial change (Babbie, 2004:34). Paradigms however, can enhance one's understanding of the seemingly bizarre views of others who are operating from a different paradigm. One can also understand new perceptions and explanation of things if one steps from one paradigm to another. This study therefore, employed a systems approach as a way of perceiving indigenous knowledge and its dynamics. This was done in order to get an in-depth and holistic understanding and explanation of indigenous knowledge.

The study employed an approach in which the examination and analysis were performed on a logical and systematic basis, leading to a descriptive outline of the systems (Goldsworthy & Penning de Vries, 1994:255). Its strength is that it captures the interaction between systems and is based on the understanding that a system cannot be properly understood through ad hoc studies of its separate elements but the interrelationships among the components and the instability of the total environment in which a system operates creates a whole that is more complex than its individual parts. (Goldsworthy & Penning de Vries, 1994:255; Clayton & Redcliffe, 1996). The researcher possessed adequate knowledge and background on agriculture, social sciences, and the systems theory and was thus competent to use this multidimensional approach.

The nature of this study was qualitative because it produced descriptive data, using words and sentences to qualify and record information. (Nachmias & Nachmias, 1996:294; Brynard & Hanekom, 1997:29-30; Bless, Higson-Smith & Kagee, 2006:44). It sought to document indigenous

knowledge on agricultural practices as described by indigenous farmers and observed by the researcher and data collectors. The goal in qualitative research (Nachmias & Nachmias, 1996:294) is to collect data, formulate hypotheses based on the data, test the hypothesis and develop grounded theory, a process called analytic induction (Nachmias & Nachmias, 1996:294). The theory is called grounded theory because it arises out of and is directly relevant to the particular setting under study.

3.2.1 Target Population of the Study

The target population of this study were traditional farmers, who are indigenous men and women aged 50 years and above, whom are residents of the four selected constituencies located in the different regions of the country. They were targeted because they are believed to be custodians of IKS and could provide information required to accomplish the research objectives of the study.

3.2.2 Sampling procedures/ Selection Criteria/ Subject Selection

The study was carried out in Maphalaleni, Lubulini, Dvokodweni, and Matsanjeni constituencies (Tinkhundla). The constituencies were selected because they are rural, remote from western influence, and harbour traditional agriculture. Geographic and other practical considerations such as accessibility also played a significant role in the final selection of constituencies and choice of setting in this qualitative field research (Nachmias & Nachmias, 1996:287).

The Snowball technique of purposive sampling which, aims to locate information rich cases (and key informants) was used (Isaac & Michael, 1997:223). Key informants were requested to recommend individuals who were well knowledgeable about traditional agriculture. The process was repeated until the more knowledgeable ones were identified through repeated reference. According to Koro (2005), Warren (1990), and Ogle and Grivetti (1985a) elderly people are the custodians of IK. The sample population in this study was therefore biased towards the elderly people and traditional leaders (above 50 years of age) both men and women. They were interviewed using a semi-structured questionnaire and were requested to recommend elderly people who could participate in focus group discussions.

3.2.3 Instruments

A **semi-structured questionnaire** (Appendix A) comprising of open ended questions was designed following the study of available literature on IKS and traditional agriculture. This semi-structured questionnaire was used to interview key informants. A **questions guide** (Appendix B) comprising of

open ended questions was designed from the outcome of the key informants and was used to conduct focus group discussions. Both the facilitators guide and the questionnaire were piloted for reliability and validity with elderly people in a different area (Inkhundla).

3.2.4 Validity

Different experts were requested to check for content validity of the instruments. These were students in the Mphil programme in Sustainable Development Planning and Management at the University of Stellenbosch, postgraduate students in the faculty of agriculture in the University of Swaziland, and development practitioners in Swaziland working for World Vision.

3.3. Data Collection

For the best research results of the qualitative study, a plurality of data collection methods was used (Bless & Higson-Smith, 2000:105-109; Davids *et al*, 2005:174-175) and these were focus group discussions, key informant interviews, and observations. These methods of data collection are well suited for exploratory research. They allow for discovery of new aspects of the problem by exploring in detail the explanations provided by respondents. Focus group discussions are particularly suitable to collect data on IKS because they allow open discussions and sharing of opinions while providing deep understanding of the topic being studied.

3.3.1 Focus group discussions (FGD)

Two data collectors were trained on the use of focus group discussions as a tool for data collection. Training covered in-depth understanding of the purpose of the study and facilitating focus groups and recording information from focus group discussions. Data collectors were studying towards a degree in agricultural sciences at the University of Swaziland. Focus group discussions and note taking was conducted in the local language. Focus group discussions for men and women were jointly because the subject was not sensitive and thus women could participate freely.

The focus groups consisted of between five and eight respondents who were interviewed together. The data collectors facilitated the focus group discussions using a question guide. Focus groups were particularly important as they captured discussions on agreements and disagreements by the group which helped explore the topic further thereby producing a much deeper understanding of the problem

(Bless & Higson-Smith, 2000:110). In addition focus groups provided an opportunity for the respondents to learn from each other.

Each facilitator obtained permission from the FGD participants to take an audio recording of the discussions before the discussion started. There was no objection from participants to record the discussions since the topic was not a sensitive one. The facilitator then established a focus group discussion protocol together with the participants (Davids et al, 2005:13). The following protocol was recommended to participants:

- Siswati will be the only language used as the medium of communication
- All participants will be given an opportunity to voice out their views
- Participants are allowed to agree or disagree
- Minimise distractions such as side talks and answering cell phones
- Each focus group discussion will not last longer than 2 hours

By design only one focus group was interviewed per day. After each interview, the principal researcher met with each data collector to discuss the questions and responses. This not only allowed for the immediate translation of the responses but it also permitted the extraction of additional information about data collection method, correction of mistakes and interpretation of local language usage.

3.3.2 Key informant interviews

A semi-structured questionnaire was used to interview traditional leaders and elderly people who were knowledgeable on indigenous farming practices. The key informants were asked to provide their history in relation to traditional agriculture and in general, their way of life and how each one of them practices agriculture. Their homesteads were also observed and described in detail. Information collected provided a detailed and wider perspective of indigenous farming practices used by the key informants.

3.3.3 Observation

Observation as a data collection technique was used to observe farming practices that were visible in the community. The areas were recommended by Key informants and FGD as they were of interest to them. Comprehensive field notes and photographs were taken during observation. Observations were recorded immediately to avoid the possibility of distortion and unintentional misrepresentation. Notational

conventions such as quotation marks around recorded material were used to indicate exact recall as noted by Nachmias and Nachmias (1996:292).

3.3.4 Ethical considerations

A letter indicating the purpose of the research and specifying the kind of cooperation requested from participants (respondents) was written in SiSwati to serve as an introductory tool to the Indvuna YeNkhundla (Constituency headman) before data collection resumed. The findings of the study will be shared with the community after completion. This will be through community meetings in the community which will either be conducted by the researcher or an NGO working in the area.

3.4. Data Analysis

In-depth data analysis involved using appropriate techniques such as mind mapping to reduce the data, and organizing it into themes, patterns, trends, and relationships that are easier to understand. Interpretation of data involved extracting meaning and integrating views of other authors into something new such that the final product was not mere rewriting of existing knowledge but new knowledge drawn from findings and conclusion (Nachmias & Nachmias, 1996:294; Brynard & Hanekom, 1997:48-55; and Mouton, 2001:108-109).

Table 1 is an outline of the analysis plan indicating the analysis tools used to obtain meaning from data in order to reach each of the four objectives of this study. Data directly relating to objectives one and two are discussed in chapter four while data directly relating to objective three and four are discussed in chapter five.

Data was classified into main themes such as indigenous crop husbandry practices, animal husbandry practices, natural resource conservation and management practices, and indigenous values and beliefs. Some of the major themes were broken down further into sub-themes where it was deemed necessary to enhance understanding of the concepts. Under each theme or sub-theme (which are also perceived as systems or subsystems in this study), indigenous agricultural practices are described by means of narrative explanations. Further more, induction and deduction are applied to interpret the results, in particular how the themes or systems relate, one to the other and the significance of such relationships.

Table 1: Analysis Plan

Chapter	Objectives	Analysis Tool
IV	1. To investigate and document indigenous knowledge on farming practices of rural households in remote communities in Swaziland.	Classification, description and induction
IV	2. To identify strengths and limitations of the IKS on farming practices as they impact on the human and environment	Classification, description and induction
V	3. To determine the values and beliefs on which traditional farming practices are based	Description and induction
V	4. To determine how specific traditional farming practices could be strengthened to promote sustainable development and livelihood security	Deduction and induction

3.5. Chapter Summary

In this chapter the following were discussed: the design of the study, target population of the study, sampling procedure/ subject selection, data analysis and ethical considerations. The outline of instruments used was also discussed as well as their validity.

CHAPTER IV

4. FINDINGS AND DISCUSSION

4.1. Introduction

This chapter presents findings emanating from the study. Findings are grouped under themes and presented in the form of descriptions of indigeneous agricultural practices and indigenous knowledge in general. In order to form the basis linkage of the purpose of the study to findings, the specific objectives of the study are affirmed as to: i) investigate and document indigenous knowledge on agricultural practices of rural households in rural communities in Swaziland, ii) identify strengths and limitations of the IKS on farming practices as they impact on the human and environment, iii) determine the values and beliefs on which traditional farming practices are based, iv) determine how specific traditional agricultural practices could be strengthened to promote sustainable development and livelihood security. This chapter presents data largely to meet the first and second objectives.

4.1.1 Description of subjects

A total of four focus group discussions was conducted, one in each constituency; Maphalaleni, Lubulini, Dvokodweni, and Matsanjeni (Lubombo Plateau). The number of participants in each focus group ranged from five to nine. Two focus groups had one female participant, one focus group had three female participants and the last focus group had no female participant. All participants were subsistence farmers who were brought up by parents who were traditional farmers and they subsist on traditional agriculture themselves. Since the majority of participants were above 50 years of age (Table 2) and were indigenous Swazis most had been practicing indigenous agriculture for more than 30 years.

Table 2: Characteristics of Research Subjects

Age	Male	Female	literacy	Total
41 – 50	6	1	1	7
51 – 60	6	0	1	6
61 – 69	9	2	2	11
70 – 79	3	2	0	5
80 - 89	1	0	0	1
Totals	25	5	4	30

In-depth interviews were conducted with a total of five key informants, three men and two women. All participants were married according to Swazi law and custom. Two were from Maphalaleni ADP, and one from each of the other constituencies. One of the key informants in Maphalaleni also participated in the focus group discussions. Key informants were selected as information rich cases from their constituencies based on the criteria described in the methodology. Only one key informant was below the age of 50 (48 years) but was recommended because he is a respected traditional farmer in Lubulini.

To investigate and document indigenous knowledge on agricultural practices of rural households in remote communities in Swaziland

4.1.2 The Contextual meaning of Indigenous Knowledge

Participants were asked to describe what they understood by indigenous farming practices and by an indigenous Swazi. This was done in order to establish a common understanding of the concept which forms the basis of the study. In their responses participants indicated that they understood indigenous agriculture to mean a) Traditional farming "kulima ngesintfu" b) "to live and farm according to long-established ways that were used by our ancestors". Participants further defined an indigenous Swazi as "a native person who does everything in accordance with the Swazi culture and customs and who does not mix it with anything else". This conception was in line with the concept of the study.

4.2. Indigenous Agricultural Practices

Participants from four focus group discussions were asked to describe indigenous farming practices. They were allowed to describe agricultural practices as they were practiced by their parents and by any other indigenous person within their constituency. They were also asked to describe the indigenous agricultural practices they use today. The results from the discussion have been classified under different themes which, according to the conceptual framework are interdependent systems and these are crop husbandry, animal husbandry, natural resource management, and the social system.

4.2.1 Indigenous Crop Husbandry

Indigenous agricultural practices related to crop production are summarized in the following table (**table 3**). The table also shows the extent of spread and application of practices across the constituencies and subsequently across agro-ecological regions.

Table 3: Indigenous Crop Husbandry Practices

Type of Practice	Agricultural Practice	Extent of practice
Selection of cultivation site	"Emacele" steep slopes were selected for cultivation using a hand hoe "magejageja" because of a softer structure and fertility from leaves of trees which concentrated on slopes. This was in the Highveld before animal drought was introduced.	Practiced in the Highveld but is now very rare
Selection of cultivation site	Low lying areas were chosen because of the soft and moist ground and because of fertility. Dark loamy-clay soils are considered fertile.	Common
Land preparation	Apart from cutting trees to make way for cultivation land preparation was minimal since seeds were scattered on undisturbed ground and were then covered with soil using hoes. There was minimal tillage hence minimal disturbance of soil structure.	None existent
Land Preparation (Manuring)	Kraal manure is spread manually on the field before tilling the soil. Old kraal manure that has been mixed with cow urine over a long period in the kraal is used rather than fresh cow dung which burns the crop. Kraal manure is rich in plant nutrients, increases the organic matter content in the soil, and improves the water holding capacity of the soil.	Very common and widespread except in the Lowveld.
Land preparation	The field is cultivated after the first rain to incorporate crop residue into the soil so that it can rot and become part of organic matter "Kufuneka sigucule sijakumdzaka"	Very common and widespread
Mixed Cropping	Maize crop is intercropped with legumes (Bambara groundnuts, groundnuts and cowpeas) and cucurbits (pumpkins and melons) and sesame. Crop mix reduces total crop failure and increases food output.	Widespread and very common
Weeding	Weeds are removed from underneath the crop mainly using a hand hoe complemented with hands to pull out weeds close to maize stalk and roots. More soil is gathered above roots and around maize stalk. This anchors the plant and provides moisture around roots.	Very common and widespread
Fallowing	When a field loses fertility, judged by the crop output, it is left to lie fallow for a number of years. Grass and weeds grow in the field to restore the natural ecosystem which then regenerates soil fertility. Such fields are called "Ingcatfu" because they are similar to virgin land.	Widespread but rare due to smaller fields
Seed selection	Seed selection began from weeding where maize with thinner stalk was discarded in favour of bigger stalks. During harvesting of green mealies ("Ngelifutfo") only small and medium sized cobs would be harvested and bigger ones remained untouched. Bigger cobs (Sicwanga/sibhuluja lesidze) with large grain, more lines, completely covering the cob were selected for seeds. The top smaller part of the cob would be cut and would not be used as seeds.	Widespread and common

Participants from Maphalaleni located in the Highveld described an old traditional practice of cultivating steep slopes (emacele) using the traditional hoe (magejageja). The steep slopes were selected because they had a softer ground than relatively flat land in the same area. Softer ground made work easier for

the farmers. The slopes were also fertile from the leaves of the trees since forests in the Highveld concentrate around the slopes and gorges. Low lying areas however, were also used because of their fertility, moist and softer ground ("Bekulinywa etihoshini kungalinywa etaleni").

The criteria for selection of cultivation sites changed with the introduction of an ox-drawn plough. The solidity of the ground no longer played a significant role in selection of cultivation site. Fields were therefore brought closer to the homestead. Farmers started understanding the type of soil suitable for specific crops. For instance, they mentioned that sorghum grows well in sandy soils "elukhetseni" compared to maize. Fertility of the soil rather than solidity became an important criterion for site selection. The size of the cultivated area also increased with the introduction of ox-drawn ploughs. The introduction of ox-drawn ploughs did not replace the use of a hand hoe but both methods of cultivation were used.

In essence land preparation constituted bush clearing using bush knives. This is where virgin land was to be ploughed. Land clearing in the Lowveld, such as in Lubulini and Dvokodweni areas is the first step for virgin land and fallow land because of the dense vegetation. In the Highveld such as in Maphalaleni, trees and bushes are normally found in gorges and so land clearing is not as intense.

In all regions ploughing was done by broadcasting seeds and then using a traditional hoe (magejageja) to cover the seeds with soil. The original tool (magejageja) was made by iron smiths and was of great value to the people. The tool could be used to pay bridal price (emalobolo) which indicates that its value was placed at the same level with cattle. Over the years this tool has changed, and has become common but is still used for land preparation and weeding.

After the introduction of the ox-drawn plough farmers started to till the soil before planting and they began cultivating large fields that were closer to their homesteads. The planting pattern also changed as they started planting in straight lines. This was done using an ox-drawn plough that opened a straight furrow in which seeds were planted by women who came behind the span of oxen driven by men. The inter-row spacing was controlled by leaving two furrows between lines.

Mixed Cropping is one of the most important indigenous agricultural practices. This practice is common in all regions and is still practiced by many farmers. A wide range of crop mix is used. Maize is

intercropped with a wide range of pumpkins and melons, groundnuts, bambara groundnuts, cowpeas, sesame, and sweet-potatoes. Two to three crops are planted in the same field depending on the crop mix. For instance when sweet potatoes are planted, as the secondary crop no third crop was planted. In addition maize is always the primary crop and the secondary crop varies between the type of legume and pumpkins. Although the crop mix seems to vary with the agro-ecological zone the same family of crops is planted such as melons instead of pumpkins. The significance of legumes in the crop mix such as bambara groundnuts, and cowpeas is that they fix nitrogen in the soil because of *Rhizobium bacteria* found in their root system. The bambara groundnuts plant is also tolerant to drought, has high resistance to pests and diseases, and thrives in poor soil. **Table 4** shows the type and groups of crops grown by indigenous farmers.

Table 4: Types of Indigenous Crops Grown

Cereals	Tubers	Legumes	Cucurbit	Wild Leaf Vegetables
1. Maize (Umbila)	1. Sweet potatoes (Batata)	1. Bambara beans (tindlubu)	1. Sesame (Ludvonca)	1. Black jack (chuchuza)*
2. Sorghum (Emabele)	2. Ematabhane	2. Ground nuts (Emantongo mane)	2. Luhata	2. Okra (ligusha)*
3. Sweet sorghum (Imfe)		3. Mung beans (Tinhlumaya)	3. ematsanga	3. Pigweed (imbuya)*
		4. Mngomeni	4. lagenaria (emaselwa)	4. Bitter guard (inkhakha)
		5. Insambansa mba	5. Litjoti (melon)	
			6. lihwabha (water melon)	

*Black jack, Okra, and pigweed are leafy vegetables that are not planted but grow in fields as edible weeds.

The diverse type of crops grown coupled with a relatively high amount of rainfall ensured that the yield was high as could be drawn from the participants' statement "We used to cultivate a small area and the harvest would be great". The average yield that most farmers receive today is smaller due to the change in climate and the influence of modern farming.

Traditional agriculture as perceived by the focus group participants was simple and did not require a high level of crop management. This was evident from the statement “besifata besesiyambonya, siyashiya sitawubuya ngekutowuhlakula nekuvuna” captured from the focus groups which means: *after planting the seeds we left the fields and we would return to weed and then to harvest*. Since no tilling was done prior to planting farmers had to identify the germinating crop from the weeds when the crop was ready for weeding. Weeding was done using the same tool (magejageja) used for planting. Agriculture was completely dependant on the rain. Participants indicated that they often had more food because they received sufficient harvest (“Ungahlanyela nje bowati kutsi utawuvuna”).

Selection of seeds began during weeding and thinning, where plants with small stalks were thinned in favour of bigger stalks. During the harvesting of green mealies (lifutfo), small to medium cobs were harvested and bigger cobs (ticwangwa) were left untouched. During harvesting of dry maize bigger cobs with large grain, more lines, and with grains completely covering the cob to the top were selected as seeds. Cobs with purple coloured grains which were common with a certain traditional variety were also selected as seeds.

Post harvest practices

The maize and sorghum crops were harvested manually and carried in baskets. After the introduction of animal draught, a sledge (sihliphi sembila nemabele) was designed to carry the harvest home. The sledge was fitted with the baskets to avoid losing grain. Once within the homestead the harvest was stored on the maize crib (umsisi) for drying before shelling. The indigenous maize crib (umsisi) is not the same as the maize crib that is now common across the country called inyango.

Umsisi was elevated so that cattle and other livestock could not reach the stored crop. In the Low-veld the maize crib was constructed differently such that it looked like a small hut. It was short and fenced with small branches such that livestock could not pull out the maize. Both types were constructed with material sourced from within the village. No wires and nails were used. The indigenous maize crib in the Lowveld, though not directly exposed to the sun was well ventilated. In the high-veld the crop was directly exposed to the sun and wind because temperatures are normally lower compared to the Lowveld. The harvested crop (sorghum or Maize) remained in the crib for about three to four months or until it was dry enough to be shelled. This ensured that grains had very low moisture content before they were stored. Post-harvest indigenous practices are summarized in **table 5**.

Table 5: Indigenous Post harvest Practices

Type of Practice	Agricultural Practice	Extent of Practice
Drying	Maize and sorghum were stored in maize and sorghum cribs respectively. The sorghum crib had no roof to expose the crop to the sun for drying. The maize crib had a roof but was well ventilated to ensure drying. In the Highveld cribs were constructed so that they were highly elevated above ground to prevent livestock from accessing the crop while in the Lowveld where tall trees are scarce cribs were short and closed but well ventilated (See appendix) .	Widespread and very common
Grain storage	Maize and sorghum grain were stored in separate grain pits. Grain pits were constructed under cattle kraals, smeared with cow dung and burned to dry them up before grain is stored. They were rarely opened. Up to 45 x 75kg bags could be stored in one grain pit.	Widespread Facility has been replaced by metal tank
Seed storage	For maize seeds, leaves from the cobs were not completely peeled but were left attached to the cob and were used to hang it upside down on roof inside the traditional kitchen "edladleni" where they were exposed to smoke and eventually covered with sooth which prevented pests. Maize seeds were also stored in the grain pit where no pest could survive. Storing seeds in different places provided security against loss. Seeds for crops such as Bambara ground nuts and cucurbits were stored in clay pots "timbita" and sprinkled with aloe ash. The clay pots were then sealed with cow dung.	Widespread and common Widespread
Shelling	Maize was shelled by rubbing the maize cob on a stone with a hard and rough surface or by rubbing maize cobs against each other	Widespread and common practice
Threshing	A thick stick is used to beat the crop (maize cobs or bunches of sorghum) thereby detaching grain from the main stock. Another method was pulling/rolling a big log on top of the crop against the ground using a span of oxen.	Widespread and common practice Rare

Maize was shelled and sometimes threshed while sorghum was always threshed. Before shelling and threshing, the surface on which the grain would fall was swept and plastered with cow dung to avoid contamination with stones and dirt. Shelling was done by rubbing the grain attached to cobs on hard stones. Threshing was carried out by beating the cobs or bunch with a strong stick. The impact of the

stick removed the grain from the cob or main stock in case of sorghum. Another technique was that of spreading the bunches of sorghum on the ground and then let oxen pull a heavy log on top of the crop that was spread on the ground, in the process detaching the grain from the main stock. These practices are no longer common.

To preserve seeds maize is peeled and the leaves are not detached completely from the cob. The leaves are used to tie the maize so that it remains hanging in the traditional kitchen (edladleni). The traditional kitchen is a hut where fire is made at least twice a day. The smoke escapes through the thatched roof but the soot is trapped on the thatch. The maize is left to hang on the roof and is exposed to smoke every time fire is made in the kitchen. Eventually the seed turns black, as they remain covered by the soot. In this way the seeds are protected from pests such as the weevil.

Some seeds were also stored at the centre of the grain pit with the rest of the maize crop. The temperature in the grain pit is said to be higher than room temperature because there is no ventilation. The conditions in the grain pit are not conducive to sustain life of any pest as the weevil or any other did not survive in the grain pit (see the section on storage). Seeds for other crops such as the Bambara groundnuts, groundnuts, cowpeas, pumpkins, emaselwa, and melons were sun-dried and sometimes sprinkled with aloe ash and then stored in clay pots sealed with bark and cow dung. Both the grain pit and the clay pots were rarely opened. With experience, farmers estimated the size of seeds that were necessary to plant fields large enough to feed their families. The size of the clay pot (imbiba) then became the measure of the area that was supposed to be planted with legume or cucurbits to meet the needs of a family.

Vegetatively propagated indigenous crops such as sweet potatoes, ematabhane were left in the field only collected during the planting season. The leaves of sweet potatoes were buried in one shallow pit until the planting season when they were retrieved for planting. Small tubers for ematabhane were selected and set aside as seeds and were kept until they started sprouting.

The grain Pit

Maize grain and sorghum were stored in separate grain pits (engungwini). This was a pit dug in the kraal. The depth and width of the storage pit underground was measured using the height of the tallest man. The entrance was very small only to widen further down. The walls were plastered (smeared) with

cow dung. Grass was then burned inside the pit to ensure that the storage is dry and that the cow dung stuck to the walls. A stone and bark from the marula tree (ligcolo lemganu) was used as a lid. It is claimed that this particular buck does not rot easily and has high resistance to moisture. It was closed tight to avoid air entering into the pit and to prevent heat from escaping.

Soil from ant hills was used to cover the lid of the pit to prevent moisture seeping through. Soil from ant hills has a very high clay content which might prevent water percolation. When the storage was full of maize it was compulsory that cattle should sleep in the kraal every night. The pit (ingungu) was built under the kraal to take advantage of the heat caused by the piling dung on top as well as from the animals. Water from rain could not penetrate compacted cow dung into the storage thus preventing possible spoilage of the crop. However, prolonged rainfall was a threat to farmers and after prolonged rainfall the pits would be checked if they were still dry. The ingungu could not be easily identified. Maize stored could not be stolen even when there was war.

The facility was rarely opened and farmers indicated that at most it was once in three months and some would go for a year without being opened. A household usually had more than one pit spread within the kraal. Such was eaten during times when there was not enough food due to natural disasters such as hail storms and drought. When the need to draw maize or sorghum from the ingungu was confirmed by the elders, children and adults alike would be warned not to get close to the kraal. The covering stone was removed and the entrance was left opened for almost the whole day until the heat and gas had subsided. It is claimed that a person could die if he/she went into the storage prematurely and therefore no one entered into the pit before an insect was seen entering the pit, signalling that it was safe. The stored crop did not have any of the common pests today such as the weevil "Neligenga belingayi". Ingungu was improved by making a grass basket to line the walls.

Crops classified under the cucurbit such as the pumpkins and the melons were kept in the shade under the maize crib. They were to be protected from the sun and livestock (See appendix). Wild vegetable leaves were parboiled, dried then stored in clay pots and baskets to be used as relish during the dry season. Tubers were left in the field and dug only when they were to be consumed.

Preparation of indigenous food

It was gathered that traditionally, indigenous foods are either eaten raw without being cooked or they are boiled, steamed or roasted. E.g. groundnuts, sesame, and dry maize grain are roasted on shallow/flat clay pots (ludzengelo) whilst leafy vegetables are boiled. It is worth noting that plant legumes such as bambara groundnuts, groundnuts, mung beans etc. formed an essential part of the Swazi cuisine and they were a source of protein. Bambara groundnuts are rich in protein (16-25%DM) and carbohydrates (42-60%DM) with only 5-6% lipids (Norman, 1992). **Table 6** presents a list of indigenous food, its composition and the preparation method. Wild fruits were also eaten in between meals as snacks such as tincozi, ematfundvuluka, emanumbela etc.

Table 6: The Composition and Preparation of Indigenous Food

Name of dish	Type of meal	Cooking method	Ingredients
1. Sintjangabomi	Main meal	Steaming	Leafy vegetable (e.g. pumpkin leaves, <i>amaranthus</i>), premature pumpkins and green mealies
2. Sijabane	Main meal	Steaming	Leafy vegetable, ground green mealies and roasted and ground groundnuts.
3. Siphuphe	Main meal	Boiled	Bambara groundnuts or mung beans boiled and crushed
4. Insontfwane	Main meal	Boiling	Bambara groundnuts or cowpeas mixed with samp.
5. Sidvudvu	Main meal	Boiling	Pumpkin cooked and mixed with mealie meal
6. Incwancwa (Thin sour porridge)	Main meal	Boiling	Fermented wet mealie meal
7. Liphalishi (Porridge)	Main meal	Boiled and steamed	Mealie meal boiled and steamed.
8. Emantulwa	Main meal	Not cooked	Ripe fruits
9. Umbhidvo	Side dish/relish	Steaming	Vegetable leaves and water
10. Ticaba	Main meal	Boiling and roasting	Boiled maize and roasted groundnuts
11. Lukhotse	Main meal	Roasting	Dry maize grain and groundnuts
12. Sinkhwa sembila (Mealie bread)	Main meal	Steaming	Ground green mealies and wheat flour
13. Sweet potatoes	Main meal	Boiling	Boiled sweet potatoes

14. Emasi	Main meal	Steaming and fermentation	Sour milk mixed with porridge or ticabu
15. Ligusha	Relish	Boiling	Okra leaves, water and ash
16. Umbhonyo	Snack	Boiling	Bambara groundnuts boiled
17. Tinkhobe	Snack	Boiling	Dry maize grain boiled and salted. Sometimes mixed with groundnuts
18. Imbasha	Snack	Roasting	Dry maize grain
19. Tinceke	Snack	Boiling	Large pieces of boiled sweet pumpkin
20. L'futfo	Snack	Boiling	Green mealies
21. Ematabhane	Snack	Boiling	Boiled and salted tubers

4.2.2 Indigenous Animal Husbandry Practices

Indigenous farmers reared indigenous breeds of cattle (Nguni), goats, sheep (Imvu lemnyama), donkeys, and chickens. All animals had significant uses for which they were kept. The types of domesticated animals and their uses are presented in **Table 7** below.

Table 7: Types of Domesticated Animals and Their Uses

Name of livestock/ animal	Usefulness/importance of livestock or animal
1. Cattle (Tinkhomo)	▫ Used to provide milk, meat, draught power, pay dowry, blankets (siphuku) and leather ropes from the skin, enamel and indlelo from horn. The dung was used as floor polish and fuel.
2. Donkey (Timbongolo)	▫ Used to provide draught power and transportation
3. Goats (Timbuti)	▫ Used mainly for meat, blanket (sinokoti), Imbeleko and attire (sidziya) from the skin, and for ritual purposes. Bone from the front limbs were used as combs.
4. Sheep (Imvu lemnyama)	▫ Used to arrest lightning and for ritual purposes
5. Dogs (Tinja)	▫ Used for security and hunting
6. Chickens (Tinkhukhu)	▫ Reared under the free range system and used for the meat and eggs. Normally cooked for visitors and the head of the family.
7. Cats (emakati)	▫ Cats were used to keep away mice/rats

Cattle are the most important of all livestock and domesticated animals to indigenous subsistent farmers. They are used to provide draught power for agriculture, milk, sour-milk, and meat for food, manure as fertilizer, and the hide for traditional blankets, attires, and ropes. There were many other uses for by-

products such as the horn which was used as an enamel and the cow dung used for flooring. Not only were cattle important for providing food but they were used for ritual purposes as well.

The goat is the second most important type of livestock and domesticated animal because it has the second highest number of uses after the cow. The goat is used mainly for meat and its skin. The hide from goats is used to make traditional blankets called "sinokotfo" which is used by children, an attire for women "sidvwaba", mats for sleeping, and for sacrifices to ancestors. Goats are also important for ritual purposes during traditional weddings where a number of internal parts are used. By-products from goats included using the bones for combing hair.

The other types of livestock had few uses even though they were important. Sheep for example, were used for ritual purposes usually to arrest lightning. The black species was used as opposed to the recently introduced white breeds. The donkey was used for draught power and transport. The chicken was used mainly to provide relish and eggs while cats were used to control rats. Participants indicated that all the animals listed above are still used for the same purposes.

Table 8: Indigenous Animal Husbandry Practices

Type of Practice	Animal Husbandry Practice	Extent of Practice
General management	All livestock; cattle, goats and sheep is looked after by a group of boys who drives them to greener pastures in the morning and brings them home to the kraal in the evening daily. Livestock is counted and assessed daily.	Very widespread
Pasture management	Grazing land was communal and under the direct control of the Chief. The grazing land is subdivided into paddocks using natural physic such as rivers, depressions and mountains. Grazing was rotated in the paddocks depending on the condition of the pasture.	Common but most are now located on mountains and rotation is not practiced
Feed stock	Crop residue was left in the field after harvesting to provide feed to livestock. Feeding on crop residue usually maize stova was communal and was done orderly as the Chief announced when all fields had been harvested that all livestock could now be released to feed on stova at free range "Setingakhululwa tingene emahlangeni".	Very widespread
Pasture management	Pasture was burned annually to allow regeneration and growth of better pasture, and control of pests. Burning was done after the first rain and was sanctioned by community leaders for specific paddocks. Burning the pasture was communal as residents stood on guard to prevent the fire spreading to other	Common

	paddocks and getting out of hand.	
Pasture Management	Goats were released first to a pasture that was recently burned to graze on the re-growth. Goats browse on the grass and this was believed to stimulate growth of grass before cattle could be released to the paddock.	Common
	Cattle were occasionally taken for grazing very early in the morning whilst the grass was still wet with dew. Calves and heifers remain behind in a separate kraal. After about two to three hours of grazing, the cattle would be driven back home for milking. This practice was done to obtain more milk from lactating cows.	Widespread and is still common
Kusisa	A man with a large herd of cattle would divide his herd, keep part of his herd and leave some in custody (sisa) of another family in a different Chiefdom. This practice reduce stocking rate in one village and recapitalized a poor family.	Widespread

First and foremost grazing land in Swazi tradition is communal and grazing is controlled by the Chief or his council. The grazing land was subdivided into paddocks (emadlelo) using natural features such as rivers, depressions and mountains. There was always an area where owners of cattle were prohibited to take their livestock until the chief or his representative had approved that livestock can now be allowed to graze. The approval was dependant on the condition of grass in the other paddocks in the chiefdom. The system worked like rotational grazing. In winter when all homesteads have harvested, the Chief would release through approval, all livestock to feed on maize stock. Again all fields were open to all animals to feed on maize stova. Towards the end of winter, when thatch grass had been cut and the first rain had been received, the ranch would be burned.

Burning was done orderly and each paddock (lidlele) was burned once in three to five years to cause re-growth of fresh pasture and to control livestock pests and diseases. The chief through his runner would announce that a specific part of the grazing land was ready to be burnt and all men would assembly to guard the fire from escaping to other paddocks. This was meant to avoid hazards, as houses were constructed using grass but was also meant to avoid burning all grass and leaving no grass for the livestock to feed on. Different paddocks were burned annually but individual paddocks were not burnt every year which reduced the hazard of soil erosion. When the grass begins to germinate goats were released first to graze on the growing greens as it was believed that it hastened the growth process of the grass "timbuti tihlumisa luhlata". Only when the grass had grown to an acceptable level were the

people allowed to graze their animals. Failure to adhere to this norm was punishable by a fine which could be a goat or cow.

Cattle are taken for grazing early in the morning whilst the grass is still wet with morning dew. While the cows are out for morning grazing the calves are kept in a separate kraal and remain in the kraal until the rest of the cattle are brought back from morning grazing "setiphuma kuyodla imphunga". They are immediately milked by hand. Every lactating cow is trained by men to become accustomed to milking. This is done by driving the cow into a small pan and then tying the cow both hind legs with a leather rope before it became accustomed to being milked. Only after the cow had been milked would the calf be allowed to nurse from its mother. This is done so that the calves would not have too much milk to the point where they get diarrhoea.

Since cattle are very important, a family that did not have cattle was provided with cattle to look after. Though the family would not own the cattle, they received no payment for looking after them. Their benefit was that they used the cattle for agricultural purposes such as ploughing and manuring. Other benefits included using the milk, and using the cow dung for flooring huts. In the same way as cattle, goats would be given to a poor family which did not own goats or cattle to rear. Since goats were not milked and could not provide draft and kraal manure, the owner would in turn give the poor family a she goat to own which will then multiply. This practice of giving livestock to a family that did not own livestock is called "kuisa" and was a form of recapitalization of the poor.

4.3. Animal Pest and Disease Control

Specific plants were used to control livestock diseases and pests. The table below presents the indigenous names of the plants and their uses.

Table 9: Uses of Indigenous Plants in Animal Husbandry

Name of Plant/Remedy	Use of plant or Remedy
1. Lubozana	▫ Used to treat sores and blisters in the mouth of cattle
2. Stick	▫ Strike the animal directly on the infirmity e.g. hind quarters if the cow was limping.
3. Ash from snail	▫ Applied directly into the infected eye
4. Oil from hippopotamus	▫ Used to stimulate cattle breeding
Other plants: lihlindzafuku, litinta, liphakama, umnukelambita, Emafutsa enhlatfu.	

Participants mentioned that traditionally plants were used to treat livestock from diseases. They reckoned that this was common practice with their practice; however participants mentioned that with the introduction of modern farming they could not recall most of the mixtures that were used because they have not used them in a long time. They then made a list of plants that were ingredients such as lihlindzafuku, litinta, liphakama, umnukelambita all of which their scientific or English common names could not be determined. Lubozana, a tree that is not used for anything else except for medicinal purposes was used to treat blisters that developed in the mouth of cattle. Snails were used to treat infected eyes. The snails were burned and the ash cooled and applied in the eye. Oil from hippopotamus was used to stimulate breeding by smearing it on the vulva of cows.

4.4. Natural Resource Conservation and Management

Indigenous farmers conducted their activities in a manner consistent with their values. They had great respect for the environment which is called "imvelo" which when directly translated means nature. The practices described in this section were obtained from focus group discussions and key informant interviews. It was observed that women were less knowledgeable about natural resources management because their chores were limited to the home environment though some of the knowledge they hold was directly related to natural resource conservation and management.

For instance, women were aware that some trees were not used for firewood because they caused dysentery or brought a curse to the family. They also knew that birds that made their nests within the

compound of the homestead were not to be killed and eaten because they were believed to be friends of the family. It transpired also that family background influenced the level of knowledge that women hold on natural resource management. The following table (**Table 10**) presents practices that could be classified under natural resource conservation and management, and the extent to which they occur across the regions and are practiced.

Table 10: Indigenous Natural Resource Management

Type of Practice	Natural Resource Conservation/Management Practice	Extent of Practice
Soil fertility maintenance	Kraal manure is applied on the field as a natural fertilizer before tilling the soil. Old kraal manure that has been mixed with cow urine over a long period in the kraal is used rather than fresh cow dung which is said to burn the crop. Kraal manure is rich in plant nutrients, increases the organic matter content in the soil, and improves the water holding capacity of the soil.	Widespread and common
	Mixed cropping of cereals, legumes and cucurbits ensured adequate soil cover thereby preventing soil erosion, legumes fixed nitrogen.	Widespread and very common
Forest management	Trees that produce edible fruits are not used for anything else and are therefore not cut. When the bush is cleared to make way for fields valued trees are left standing.	Widespread and very common
	There are specific trees reserved for building houses, others for building kraals and others for general uses such as firewood. Rare trees such as sicitsamuti were used only for medicine.	Widespread and common
	Grasses such as the lukhwane, incobozi were cut only in winter for making baskets and mats. It is believed that if they are cut on summer there would not be enough rain.	Widespread and common
Range Management	The rangeland is divided into paddocks using natural features. These paddocks are burned once in three to five years to stimulate growth of fresh pasture and they are burned only when the grass has regenerated after the first substantial rainfall. This practice prevents burning the roots of grass consequently destroying the pasture.	Widespread and common
Wild life	Bird nests are not disturbed. Birds that make their nests on trees within homestead premises are not killed.	Widespread and very common
	Hunting was a communal activity controlled by the Chief. Hunting was done during September - October when most wild animals have given birth and their young ones have grown up. A man was supposed to kill only what is enough for his family and not more.	

Traditionally farmers apply kraal manure to the soil as a natural fertilizer. Kraal manure is mixed with urine over time in the kraal every evening as cattle are kept in kraals, a process that produces manure rich in plant nutrients. Boys have the responsibility of digging the mature manure in readiness for use during planting. Old kraal manure rather than fresh cow dung is used because fresh dung burns the crop and is not fertile. Kraal manure improves the soil structure by increasing the soil organic content, improving the water holding capacity of the soil, and providing a good medium for micro-organisms (Norman, 1992). It is therefore said that kraal manure feeds the soil and not the plant. This practice is very common in all regions of the country except in the Lowveld where the soils are very fertile and adding kraal manure would burn the crop.

The harvesting method is carried out such that maize and sorghum stalks are left in the field and only the cob with grain or sorghum bunch are removed from the field. Livestock is released to the fields after harvest and feeds on the softer part of the stalks and what remains is incorporated into the soil after the first rains. This practice adds organic matter into the soil thus improves soil fertility. This practice is still very common on SNL and practiced in all regions of Swaziland.

The traditional practice of mixed cropping, which entails planting tall crops such as maize and sorghum, together with pumpkins, melons, and legumes ensures optimal use of the field and promotes soil fertility too. Legumes fix nitrogen in the soil whilst pumpkins provide ground cover and prevent soil erosion. Mixed cropping also promotes biological control and ensures a balance of pests and their predators in the field. Mixed cropping is a widespread practice in all four Tinkhundla centres found in all regions of Swaziland.

Traditionally trees command a great deal of respect because of beliefs associated with specific trees. Traditionally trees that produce edible fruits are not used for anything else and therefore are not supposed to be cut. When the bush is cleared to make way for fields, trees that produce edible fruits and other bigger trees are left to remain standing even within the fields. These trees are valued for their fruits and are used to provide shade to men and women during weeding. When the trees lose their leaves they add organic matter in the soil. This practice is common in the Lowveld and Middleveld where there are more trees compared to the other regions.

Different tree species are used for different purposes. Some hard woods are used to build huts and kraals whilst others are reserved to build 'liguma' or 'lisangu'. There are trees such as the rain tree (sicitsamuti) that are not used at all. It is believed that if they are brought home, they would bring a curse to the family. Participants mentioned that they were cautious not to cut trees in the same area over a long period because they were aware that they were not the only ones who needed the logs. In addition, certain types of trees were cut more frequently than others such as 'Umhluma' (which means budding) because it grew faster from where it was cut. Certain types of trees were not cut because they were reserved for medicine e.g thamboti, and gcolokhulu for making baskets.

One other good traditional practice that demonstrates natural resource management by indigenous farmers is the restriction of cutting certain types of grasses such as lukhwane, umhlanga and incobozi to the winter season. It was believed that if these grasses are cut in summer it would not rain and as a result there would not be enough food. This belief is no longer held by many but the grasses are still cut only in winter. The grasses are used for making mats and baskets. Cutting grasses only once a year conserved them and ensured that there was enough in the next season for making more mats.

A sacred shrub called lusekwane is cut annually to be used in the incwala ceremony. Although it is claimed that the shrub grows faster from the point it has been cut, the shrub is not used for anything else other than for this annual ceremony. It is a serious offence to cut and use lusekwane for something else other than for the ritual purposes during the incwala ceremony. This belief protects the shrub from extinction and is still held widely by many people.

Natural resources management within the broader traditional agricultural system cuts across all other subsystems such as crop production, animal husbandry and the value and belief systems. For example, a wild rare bird called 'ligwalagwala' is reserved only for the Royal family members who use the feathers in their attire. In this way the rare bird is protected from being hunted by many people, which would hasten its extinction. The respect of the traditional value that non Royal family members do not wear feathers from this bird ensures that only a limited number of birds are killed. Another example is that the chief reserved some areas from grazing for certain periods to allow the regeneration of grass. In this way overgrazing, and consequently land degradation was avoided. This is a clear demonstration of the relationship between social system and nature conservation.

Kota (1999:3) records that we should not lose sight of the fact that while there are many indigenous practices that prove to be environmentally sound, there are those that were destructive to the environment done out of ignorance such as keeping a large head of cattle for status which led to overstocking consequently to rangeland degradation. Contrary to Kota's (1993:3) assertion, findings of this study reveal that though a large herd of cattle gave men status, the herd was not kept in the same community. Once one had a large herd of cattle, he divided the herd and gave some to a poor family or a relative in another community, a cultural practice called "Kusisa". It was also revealed in the focus groups that if one became too rich with a large head of cattle he was seen to be competing with the King for status and his livestock would be taken to the king and if he resisted he would be killed. The sisa culture has been adopted by the ministry of agriculture to form Sisa ranches. Further, the average number of cattle per household on SNL is less than the number on TDL and therefore it is more logical that overgrazing is more a result of population growth with more land taken for settlement and development.

The chief also had a responsibility to organize hunting as hunting was a communal activity. The chief would announce the day set for hunting and men would assemble for a hunting expedition and then set them off. Permission was also granted for a specific period. This happened once a year. Knopkries (tagila) and later dogs were used for hunting. According to participants it was no use to kill many animals because then it would be impossible to carry the meat home. The hunting expedition was around September-October when most animals had given birth. This ensured that pregnant animals and their young ones were not killed. It was also prohibited to sell meat from wild animals as this was seen as a waste. Hunting was done to provide meat for the family and was a luxury. Digression from the norm was punishable by a fine to the Chief.

4.5. Labour distribution

Understanding the division of labour within the Swazi household, as with most family farming situations is important in understanding the human resource base for agriculture. During the ploughing season one family would invite others from the same village to come and assist in ploughing and planting crops (bekumenywa lilima). Mazzucato and Niemeijer (2000:845) call these groups assembled for work "labour parties". The host would prepare traditional brew which would be a motivation for the neighbours to

come. Each member of the labour party was also provided a portion of the harvest for labour offered during post harvest activities. This gesture was seen as an appreciation "sibongo" rather than a reward.

The brew would be taken at the end of each day after work was completed but the harvest portion was given after the task was completed. According to focus group participants the reward could be anything that was valued by the people in the community and it was indicated that salt and sugar was adopted by some rural communities. It was estimated that about 20 people would constitute a labour party and would last for two to three days. Labour parties were not fixed in terms of number or the people that formed it.

In winter women had the responsibility to cut grass and they did this in groups. These groups became a social occasion for women. During this time women shared domestic woes and experiences and older women ceased the opportunity to advise newly married women (bomakoti) in how married women should conduct themselves. This went a long way in solving potential domestic disputes. The following table (Table 11) shows the distribution of activity by gender.

Table 11: Labour Distribution by Gender and frequency of performing task

Female Chores	Frequency	Male Chores	Frequency
▣ Ploughing	Summer	▣ Ploughing	Summer
▣ Planting	Summer	▣ Applying manure	Summer
▣ Weeding	Summer (daily)	▣ Planting	Summer
▣ Harvesting	Winter only	▣ Weeding	Summer (daily)
▣ Cutting thatch grass	Winter only	▣ Harvesting	Winter
▣ Cutting grass for mats	Winter only	▣ Cutting logs	Winter
▣ Making mats	Winter	▣ Building huts	Usually in winter
▣ (Kusindza)	Regularly	▣ Building Kraals	Winter
▣ Collecting firewood	Regularly	▣ Fencing	Winter
▣ Fetching water	Daily	▣ Training Oxen	Winter
▣ Food preparation	Daily	▣ Shelling/threshing	Winter
▣ Cooking	Daily	▣ Winnowing	Winter
▣ Shelling/threshing	Winter	▣ Building Maize Crip	Winter
▣ Winnowing	Winter	▣ Digging grain pit	Winter
		▣ Heading cattle	Daily

Agricultural activities were taken seriously by indigenous people because they were a source of livelihood and there was no other means through which sufficient food could be obtained above and beyond farming. Agricultural chores were divided according to sex. Heavier tasks such as ploughing fields, digging grain pits, erecting maize crib, building kraals were reserved for men only while lighter but protracted tasks such as fetching water, food preparation, cooking, kusindza, and cutting grass were reserved solely for women. Ploughing, planting, weeding, harvesting, shelling/threshing, and storage were joint tasks, again because of the significance of food production. Moreover weeding and shelling were prolonged and became burdensome on women.

Although not directly gathered from data, it can be brought forward that women face much heavier workload than men since they typically looked after children and did home chores and farm work. If one were to consider consumption of leisure women are worse off because men consume more leisure. This finding would then agree with Broca (2002:23) that overall women face much heavier workload than men but not agricultural work.

4.6. The Relationship Between Religion and Traditional Farming Practices

Participants in focus group discussions were asked to describe their beliefs and their religious practices and to explain why they believed and carried them out. They were allowed to describe indigenous beliefs and practices that were held and carried out by their parents. **Table 12** presents the religious practices and the extent to which they are still practiced today.

Table 12: Indigenous Religious Practices

Type of belief/practice	Religious belief/practice	Extent of Practice
Offerings/Prayer	Traditional beer is brewed and offered to the ancestors before planting to request for a good harvest. After post harvest agricultural activities, beer is brewed, a beast is slaughtered to offer thanks to the ancestors. This was done in order to perpetually receive good yield.	Widespread but not a common practice anymore
Religious	"Mvelinchat", the one who was there before everything else is the Swazi traditional god. He has the power to give rain and harvest. Only young children and very old men and women could see or hear him. All men and women prayed to him in times of drought and it rained.	Common belief but not practiced
Religious	Ancestors watch over their families and have the power to prosper them or destroy them through a curse if they are not	Widespread belief and commonly held

	happy with one member of the family or the clan. They have the power because they are closer to God "Mvelinchanti". Elders communicate to them and offer sacrifices of brew and meat (goat/cow).	practice
Value	The earth is treated with respect because it provides food. It is not tilled when someone has just died.	Widespread value
Values	Elderly people are respected by children and adults alike and they also respect each other. Elderly people also consider themselves young in reverence of their parents and ancestors. Their homesteads do not belong to them but to their parents even if they are dead.	Widespread and common practice
Value	Respect for adults brings success. Respect for adults is seen in humility and living according to the norms and values of your family "Ngangikholelwa emyalweni yenhlonipho".	Widespread and very common

According to focus group participants and key informants, indigenous Swazi farmers believe in a pre-existent God called "Mvelinchanti". The name "Mvelinchanti" is a siSwati name which means pre-existent. They believed that their dead relatives normally called ancestors "emadloti" were closer to God and could act as a mediator between men and God. They believe that since ancestors have lived amongst them before, they have their interest and could therefore communicate to God on their behalf favourably. They also believe that ancestors have the power to bring fortune or a curse to a family or society depending on the conduct of members of a family or community. People who become ancestors are normally heroes or people who were esteemed while they were alive. Ancestors are therefore revered by indigenous Swazi people, a belief that is commonly held across the regions of Swaziland.

In order to remain in a favourable relationship with ancestors, indigenous people occasionally offer sacrifices of traditional brew, cattle and goat. A big bull is normally given special treatment, in that it was neither beaten nor used for draught power, was reserved for the ancestors. The offerings were done before harvest to ask for a favourable harvest and after post-harvest agricultural activities were completed to express gratitude. This practice is also carried out outside the farming system such as to bring fortune to family members and to drive away evil spirits. Since ancestors once lived amongst the people, it is believed that they carried their likes and dislikes with them and for that reason they have to be honoured by living as they lived. This belief ensured that traditional practices carried out by great grand parents, grand parents, and parents are carried out by the next generation.

The deepest value common amongst all Swazi indigenous people is respect. According to participants respect means reverence or high regard for the elderly people. The word respect "inhlonipho" is commonly used amongst all Swazi people. Someone who is sensible, regards people older than him/herself, and adheres to Swazi norms and values, is said to be respectful. Respect is the highest value held by the Swazi people. One of the participants said "inkholo yemaSwati yinhlonipho" which means "religion for indigenous Swazi people is respect". A key informant from Maphalaleni said "I respected my parents because I believed they had my interest at heart". The key informant further stated that even after she had been married and moved to a different place she still applied what her parents taught her.

It is expected that there are a number of norms related to the traditional agricultural system but the outcome of focus group discussions provided one. If, whilst ploughing, planting, or weeding the traditional hoe accidentally hit each other to make a noise, the group would be dismissed and would not return for work that day. People who were planting or weeding worked quite a distance away from each other and would come close to each other as the allocated work portion "indzima" was nearing completion. Since it was not common for hoes to knock against each other "kungakhala inkhubazana", it was believed that it was a bad omen, so they had to dismiss. According to focus group participants this norm was later used to dismiss the group if they had worked for a long time (Seyikhalile inkhubazane).

4.7. Traditional Land Tenure

The traditional land tenure system is called Swazi Nation Land (SNL). It is communally owned by the Swazi people and the King holds it nationally in trust for the Nation. At community level the Chiefs represent the King and are in charge. They have authority to allocate land to individual households for home plots and for farming. The arable land is open to grazing land in winter. All other land is held as communal grazing land and communal forests. Holdings on SNL are relatively secured but the security is dependant on the conduct of the tenant.

It was through the authority vested on the chief that he could control community members. Tenants who overlooked rules and the code of conduct were fined by the chief and his council or risk being removed from the Chieftdom. Since the chief had power to remove a tenant from his Chieftdom, he was respected and the code of conduct was easy to enforce. The Chief worked with a council which advised him on the decision he made and which also ensured that he conducted himself justly.

4.8. The Value of Traditional Agricultural Systems

In order to determine the value of indigenous agricultural systems participants in focus groups were asked to give their perceptions of the traditional agricultural system and the modern agricultural system. They were specifically asked to give the advantages and disadvantages of both agricultural systems. Their responses have been synthesized into the sections that follow beginning with the advantages of traditional agriculture presented in **table 13**.

Table 13: Advantages of Traditional Agriculture

The Value of traditional agriculture
<ul style="list-style-type: none"> ▫ Agricultural inputs such as seeds and manure are not bought but they are kept from previous crop or obtained from relatives and neighbours (bowendzela). ▫ Indigenous agricultural practices such as application of kraal manure maintained soil fertility and guaranteed good harvest. ▫ The diversity of crops planted guaranteed farmers of food and healthy diet for their families as opposed to one type of crop. . E.g. "Sijabane, sintjangabomi* netitselo taphansi". ▫ Indigenous agriculture used natural processes such as fallowing and manuring but made no use of chemicals which was environmentally friendly. ▫ Indigenous crop varieties and animal species are well adapted to local conditions and could thus tolerate drought and resist pests and diseases that are common with modern agriculture.* ▫ Indigenous food crops are of preferred and high quality in terms of appearance and taste by indigenous people. ▫ Indigenous agriculture was embedded within a social system that ensured that community members provided social security for each other. Eg. The culture of kusisa, kwetfula, and kwendzela. ▫ High rainfall is associated with indigenous agriculture and high yield.

Note: *The reason why indigenous varieties are said to be resistant to modern diseases may be because usually they were planted in mixed crop stand which may prevent diseases and pests spreading rapidly.

*Sintjangabom is a mixture of tender pumpkins, green mealies, and salted groundnuts which provide vitamins, starch and proteins. *Sijabane is a mixture of leaf vegetables and green mealies. *Insoftwana is a mixture of porridge and jugo beans which provide protein and starch.

One of the major advantages of indigenous agriculture was that agricultural inputs were not bought but kept from the previous harvest or obtained from relatives and neighbours. Seeds could be obtained from relatives in other chiefdoms (bowendzela) a practice that also ensured development of varieties. Manure

was obtained from neighbours and relatives in the same village. This was an advantage because no form of cash was necessary for one to be able to farm. The culture of kusisa (where a poor family was given cattle to rear on behalf of the owner) recapitalized the poor family and provided manure and draught to a family that would otherwise have no draught and manure for planting. The culture of kwetfula (giving a portion of yield to the chief) and kuhlehla (families worked on the Chief's fields) provided food to orphans and elderly who did not have food. In this way social security was established.

Another major advantage of indigenous agriculture is that it made use of natural processes which are environmentally friendly and sustainable as opposed to using chemicals. Agricultural practices such as applying kraal manure to the soil improved the soil structure. Kraal manure contains plant nutrients, increases organic matter content, and remains in the soil longer. Fallowing allowed idle fields to regenerate fertility through the natural process.

The fact that indigenous varieties had been used by the local people for a longer period indicates that such varieties were well adapted to the soil and climatic conditions. The adaptation improved from year to year as farmers consistently used the same varieties and compared their performance with those from relatives from other areas. Taste and preference of the people played a significant role in the selection of the varieties hence indigenous farmers prefer them to modern varieties. The recent exploitation of IKS for varieties (Warren, 1990) supports this notion.

Farmers attributed good health and longlife to a healthy diet of indigenous food "Bebaphila sikhatsi lesidze bazebangaboni emhlweni ngenca yekukhula ngoba bekudliwa kudla lokunemphilo" which means that *most people lived longer than today because they ate good food and people died because they were very old and had become blind. It was not common for children to die.* Additionally participants associated indigenous agriculture with adequate rainfall and high yields. They recall that when traditional agriculture was widely practiced there used to be plenty of rainfall and food.

The disadvantages of traditional agriculture are summarized in **table 14**.

Table 14: Disadvantages of Traditional Agriculture

Disadvantages of Traditional Agricultural systems
<ul style="list-style-type: none"> ▪ Indigenous agricultural practices were laborious ▫ Indigenous maize varieties take longer to mature ▫ The culture that work had to stop once hoes hit each other whilst weeding or ploughing was prone to abuse by lazy people. ▪ Small land area is cultivated only to feed the family ▫ Shortage of kraal manure due to population expansion ▫ Young boys spent most of their time heading cattle ▫ The culture of terminating a family which owned a large number of livestock and taking all their livestock through the chief to the King was bad.

The major disadvantage of indigenous agriculture according to the participants was that it was labour intensive due to a lack of mechanization. To meet this challenge neighbours would work in groups forming "lilima" - what Mazzacato and Niemeijer (2000) calls "labour parties". Labour parties made laborious tasks easier to accomplish as they worked while they enjoyed traditional brew and socializing. Everyone who was part of a labour party was given a portion of the harvest as appreciation "Sibongo". The use of labour practices is nonetheless, diminishing because children have to go to school and most adults are now employed.

The other disadvantage of indigenous agriculture was the late maturing varieties. Late maturing varieties are a disadvantage because they require well distributed rainfall over the farming season or they become prone to drought. Another implication of this disadvantage is that of delayed harvest making the period without food lengthy.

Another disadvantage was that due to the absence of mechanization a small land area was cultivated compared to modern agriculture. The small size of the cultivated area implies that indigenous agriculture could feed adequately the farming family and assist unfortunate neighbours but not more. Indigenous agriculture is therefore perceived not suitable to feed a large number of none farming families. Indigenous agriculture is well suited to feed farming families. With the increase in the population, some

modern practices will have to be adapted. Farmers also raised a concern that as young boys they spent most of their time away from home heading cattle - "Besigcilateka ngekuhlala ngekwelusa"- and they viewed this as too difficult for their children to do.

Table 15 presents a short list of advantages of modern agriculture as an outcome of this study.

Table 15: Advantages of Modern Agriculture

The Advantages of Modern Agricultural Systems
<ul style="list-style-type: none"> ▫ Modern agricultural methods produce high yield of one type of food crop E.g. Maize. ▫ High mechanization makes agricultural tasks less laborious e.g. large fields can be ploughed by one person over a short period using a tractor. ▫ Hybrid varieties mature earlier than indigenous varieties

Three advantages of modern agriculture were given by participants and these were the fact that monocropping produced a high yield of a single crop, mechanization hastened completion of tasks, and that hybrid varieties introduced with modern agriculture matured earlier than indigenous varieties. Earlier maturing varieties evade unreliable rainfall and make harvested grain available earlier. Disadvantages of modern agriculture are presented in **Table 16** which follows:

Table 16: Disadvantages of Modern Agriculture

Disadvantages of Modern Agricultural Systems
<ul style="list-style-type: none"> ▫ The practice of mono-cropping produces only one type of crop which means you have less food. ▫ Agricultural inputs for modern agriculture are bought rather than obtained from the farming environment e.g. seeds, fertilizers, and pesticides. ▫ The cost of hiring a tractor and purchasing of farm inputs makes the cost of practicing modern agriculture high. ▫ Modern farming methods destroy the structure of the soil either through the fertilizers or the pesticides. ("Umhlabatsi uyahhunguleka") ▫ There are many pests and diseases associated with modern agriculture.

- There are frequent drought spells that are associated with modern agriculture.
- Modern agricultural produce is less preferred by indigenous Swazi farmers. It is said to be light and spoils easily. ("Kulula nje kungatsi ngumoya").

Seven disadvantages of modern agriculture were provided by farmers. The major disadvantages were the high cost of agricultural inputs which have to be bought every farming season, the damage of the soil structure and subsequent loss of soil fertility, and the high intensity of pests and diseases that characterise modern agriculture. Other disadvantages were monocropping and less preference of modern produce by indigenous people. Monocropping, which is one major characteristic of modern farming, is a disadvantage because it produces only one type of crop which does not mean you have food. In cases where the only type of crop produced can not fetch good value from the market, as is the case in rural communities, it does not mean one has food which results in food insecurity.

4.9. Food security

Findings from all four focus group discussions held with indigenous Swazi farmers revealed that most families were food secured because they had adequate food throughout the year. They grew a wide variety of crops for instance maize, bambara groundnuts, pumpkins, sesame, ematabhane etc. and used edible weeds such as ligusha and imbuya as green vegetables that provided a healthy and balanced diet for their families throughout the year.

They had storage facilities (ingungu) where they kept maize and sorghum grains safe from pests and thieves. These facilities varied in size as there were ones for regular use and others for difficult times and usually the grandfather was in charge of bigger grain pits. Participants recalled storing 45 x 70kg bags of maize grain in one grain pit. The grain pit was overseen by the grandfather in the family and would be opened when no more grain was available in the homestead.

Families that for some reason did not have enough harvest would help other families by providing labour for post harvest activities and would be given portions of grain. Helping several homesteads would provide them with enough grain to last until the next harvest. Old aged people had food reserves in the Chief's Kraal. There were two major meals taken per day, the first one in the morning and the second one in the late afternoon. The two meals were separated by snacks such as 'emahewu', 'imbasha', and

wild fruits. The food had more fibre and took longer to digest because “it was real food” (besidla ekuseni sizesiyowudla ntsambamba singalambi). The table (table 17) below is a list of wild fruits that were used as a snack in between meals by adults and children.

Table 17: Indigenous Wild Fruits That Were Used By Indigenous Swazi Families

Swazi Indigenous Wild Fruits		
▫ Emantulwa (<i>vanguera spp</i>)	▫ Umfomfo (far-far tree)	▫ Inongo African potato
▫ Ematfundvuluka	▫ Emakhiwa (Cape fig)	▫ Inyenye
▫ Gcumgcum	▫ Ematelemba	▫ Lisundvu
▫ Tincozi (water berry)	▫ Ematfundvuluka (natal plum)	▫ Intfombe
▫ Tineyi	▫ Tincwambi	▫ Tifokolovu
▫ Tinganu (Marula)	▫ Emahlala	▫ Lisundvu
▫ Umkhwakhwa (sirvennos medascariensis)	▫ Emanumbela (<i>Bequertisdendron anglophyta</i>)	▫
▫ Emahala (<i>Aloe saponaria</i>)		
▫ Umvutfwamini	▫ Bugugujane/bukhwebeletane	▫ Inkhokhokho

Farmers recalled that everything was done in order and with respect for ancestors (ancestors have the power to bring curses such as drought or hunger and death) and the chief. Farming was purely subsistent and not commercial which made it easier for homesteads to share their produce with those who did not have. Sharing food with the poor and unfortunate was admired because it gave men prestige.

Focus group participants recalled that even when most families practiced traditional agriculture, there were hard times when natural disasters had hit them hard such as locust and drought. One of their coping mechanisms was to visit relatives who lived in distant chiefdoms that were less affected or were not affected by the disaster at all.

4.10. Chapter Summary

The preceding chapter presented indigenous knowledge on agricultural practices as perceived by indigenous farmers who participated in focus group discussions and as key informants. The information

presented is wide, spanning several disciplines and is presented under different themes using descriptions and tables. These themes form part of the sub-systems and elements that make up indigenous knowledge. The extent of the practice of indigenous agricultural practices in the tinkhundla centres is stated with each practice. Advantages and disadvantages of traditional agriculture and modern agriculture are also presented in this chapter to provide a comparison of the two systems and the value that indigenous farmers attribute to traditional agriculture.

CHAPTER V

5.0 SOCIAL ORGANIZATION WITHIN THE TRADITIONAL AGRICULTURAL SYSTEM

5.1 Introduction

This chapter explores the indigenous social system in an endeavour to attain objectives three and four, which are: iii) to determine the values and beliefs on which traditional agricultural practices are based and iv) to determine how specific traditional farming practices could be strengthened to promote sustainable food and livelihood security.

The main aim of this section of the study was to understand the social organisation within the traditional agricultural system by capturing every day practices, rituals, values, and actions (way of life) of the indigenous people within the selected constituencies of Swaziland whose main livelihood is traditional agriculture. In strictly ethnographic studies, the descriptions of daily activities as well as signs and symbols used are based on protracted observations and interaction with the people. In this study, however, due to time constraints this information was obtained through limited observation and in-depth interviews.

Key informants were recommended by focus group participants following the snowball technique. A total of six in-depth interviews were conducted with key informants. In this chapter however, only two narratives designated as key informant number one (male) and key informant number two (female) are recorded in order to contain the length of the chapter. A synthesis of all six interviews is presented in the other sections that follow.

5.2.0 Key informant number one

Mr. Magagula is the son of Magagula. He was raised in Lavumisa, a vast rural Chiefdom found in the South of the Kingdom of Swaziland and neighbouring Ngwavuma and Pongola from South Africa. In fact many families in this Chiefdom have relatives who reside on the South African side. When driving from the South African side one marvels at the large and green irrigated sugarcane farms with water from the Jozini Dam. However, immediately after crossing the border post, at Nsalitje or Lavumisa (Golela from South African Side) one is struck by a vast area of dry savanna bushveld. The temperatures are very high averaging 32 degrees in summer. The area is known for its relatively high temperatures, low

rainfall, fertile soils, and remoteness from civilization. Lavumisa comprises four constituencies one of which is Lubulini INkhundla. The other three are Sigwe, Somntongo, and Matsanjeni.

Magagula stems from Lubulini INkhundla having been born and raised in the area by his father who earned a living through farming. Magagula is 48 years old but is respected by community members for his knowledge in agriculture. Magagula speaks perfect SiSwati and does not use a single English word in his conversation, an indication that he is uneducated in the western knowledge systems. He is the last born in a family of one girl and three boys all of whom have passed away in the last ten years including his parents. He looks after three of his brothers' wives and his own wife, and a total of eighteen children. He subsists through farming combining indigenous agriculture with modern agriculture.

Whilst growing up the most common form of livelihood in the area was traditional agriculture. He recalls that when they began to experience frequent drought almost every year, most families started looking for other forms of livelihood such as going to South African mines and neighbouring sugar Estates in Swaziland. Magagula himself recalls that he worked for two years in the sugar estates after the devastating drought in 1992 when his crop dried up in the field and his cattle died.

When he was a little lad, young boys of his age were awakened by their father early in the morning around three to four o'clock in the morning to start their daily chores. They all slept together in one hut on traditional mats (emacansi) using soft skins from goats (sinokotfo) as blankets. Adults used skin from cows (Siphuku) as blankets. As young boys, they preferred to arise before their father did because they would be chastised for waking up late. Magagula together with his brothers prepared the span of oxen (babophela) and seeds to be used for planting. With experience they learned that they had to do most of the preparation the previous day. As soon as his father was up, they all set off for the fields to plant. Some women came with them in the fields while others remained and prepared breakfast which they later brought to the field. Women brought food for them in the form of 'emahewu', a fermented traditional mealie meal drink when they were already in the field.

"I would hold the rope ahead of the oxen; my father would hold the plough and my elder brother would drive the oxen using a long tough but flexible leather rope (Siswebhu). Women followed by applying maize seeds in the furrows behind the plough. These positions were changed as we each began to master each position, but my Father would not lead the oxen since this was the first position for one to

learn. We would work until about eight o'clock and return home. The oxen would be released from the yoke to join the other head, which at this time would be back from the first grazing session (setibuya kuyodla imphunga). If we worked longer hours, my father would drive the oxen to the best rangeland for grazing; take them to the river to drink before sending them to join the rest of the head. Before setting off to head the cattle, we milked the cows and only then did we release calves and heifers to nurse from their mothers. We quickly had 'emahewu' and rushed to the rangeland. This was where we were away from adults and could experiment with many things but being careful not to be seen because then we would be heavily punished. The next day would be the same until we finished planting and started weeding."

Weeding in the Swazi subsistence farming system is done jointly by men and women. Mr Magagula elaborated how this system was administered in his family as quoted next. "Even during weeding we arose very early. We had to be able to see the weed so the moon or the morning star illuminated the fields. We worked until noon when the temperature reached its highs (naseliphakama lilanga sekushisa). When we got home we rested for a while, ate some food and did other chores. Sometimes we returned to the field to weed particularly because we had to make sure that the weed does not overcome the crop."

The weeding process is quite cumbersome in the Swazi subsistence farming method since some crops are grown in the same field at the same season. Mr. Magagula gave the following insight about what sort of crops and how they were grown in his family. "We planted several crops; maize, sorghum, pumpkins, water melons, bambara groundnuts, sesame, mung beans and many others. We mixed these in the field. Usually maize and sorghum will be mixed with water melons, pumpkins, and groundnuts."

The selection and allocation of a time frame for engaging in farming activities in the Swazi subsistence system is mainly determined through the use of seasons and not months as Mr Magagula elaborated in the following excerpt. "Winter was a time of celebration because there was less work. The major tasks were harvesting, shelling, winnowing, and maize storage. But, we also had to rebuild the kraal. These tasks needed to be done within a short space of time otherwise they became cumbersome (bowulula lomsebenti mane nje kutsi bowubamnyenti lomsebenti). Different dates were set during which we would assist each other in harvesting, shelling and winnowing. You find that one family would brew some beer (kuphiswa tjwala lobubovu) and neighbours would come to work while they enjoyed the brew. So there

was a great deal of interaction. In a few days, about three days, we would have finished shelling and winnowing and then we would move to another homestead and do the same. Some homesteads were big and so they did not need help."

The end of a seasons work in Swazi history was always marked by communal and or family celebrations. Mr. Magagula described how these celebrations commenced. "When the work was done families that had livestock would slaughter a big ox each and invite neighbours to a feast. The elderly people in the village communicated when each one was to slaughter a beast so that a feast was enjoyed jointly and there was an interval of at least two weeks. Slaughtering was a way of expressing gratitude to the ancestors for the harvest but also one became respected if he slaughtered a large beast to celebrate a good harvest with his neighbours. If you have a lot of food and people come to ask for food from you, you feel proud as a man, and so they used to come to ask for food from me."

For the animal husbandry part of the Swazi subsistence system, cattle were reared for draught power and also for paying dowry. Key informant number one, had this to say about this aspect. "My elder brothers contributed towards paying dowry for me because my parents died when I was young. So when I became of age I got married and I built my own homestead. I did this because I had been brought up the right way. Others who were brought up differently from us either because they were spoiled by their parents or lived with relatives somewhere were not privileged to learn as much as we did and may not survive through farming. I have not been working for the last 10 years but I take good care of my family and that of my late brothers and still people come to ask for food from my family."

5.3.0 Key Informant Number two

Mrs. Khumalo originates from a small village called Esifeni found within the boundaries of Maphalaleni Inkhundla. She moved to Mcengeni community at the age of 21 when she got married to her late husband 54 years ago and has been living in Mcengeni ever since. She is now 75 years old and she confidently tells how she has managed to spend all her life in her marriage home. Mrs. Khumalo is the first and eldest of three wives all of whom live in one compound. She was asked to describe her daily life.

"From the time I could walk and talk I was always with my mother and my sisters." Traditionally young girls learn about life from woman older than them which include their mothers and aunts

(emantfombatana afundza kutiphatsa kahle kulamanye lamadzala kanye nakubomake nabo Anti). They spend time 'egumeni' where they get most of the lessons just like men spend time and get their lessons from 'esangweni'. These two places are like schools where young girls and boys are groomed separately. "So whatever I was taught 'egumeni' I would put to practice until I was grown up enough to get married. (Ngangenta wonkhe umsebenti wasekhaya lowentiwa ngumuntfu wesifazane) I did all daily chores that women do. Together with my sisters, I collected water, made the fire, cooked, gathered fire wood, and cut grass."

Mrs. Khumalo elaborated on the duties set aside for females in the traditional Swazi economic system, "Being girls we got involved in planting, weeding, and harvesting. As we carried out daily chores we were learning the details. I clearly recall that when we were told that something is done in a particular way we were supposed to listen without questioning, it was disrespectful to ask why, like it has become common today that children ask for reasons for everything and have no respect for adults (njengalabantwana balomuhla lesebangahloniphi labatsi kunani). For instance I was not supposed to use the left hand when giving something to anybody because it is disrespectful. We were severely thrashed if we ever did something against what we were taught. So by doing we learnt many things."

"By the time I got married I already knew most home chores. The elderly women including my mother and aunties (labadzala balakhaya bomake nabo anti) would observe the proficiency with which I did home chores like cooking porridge and cleaning my house but also how I conducted myself. I came to know that there are types of trees that are not used for firewood because they bring a curse in the family (tiletsa sicitfo)."

"Back then we were disciplined. We took time before we involved ourselves with boys (single men are called boys regardless of the age) because we were sternly warned against boys. We were taught that boys can be very bad and therefore we needed time to satisfy ourselves that a boy was disciplined and well groomed before we committed into a relationship. Also once you were in a relationship you were to report to your elder sister or cousin at home who would then let other girls know so that if the man started approaching someone else in the village they would not consent because of you. So usually the first man you went into a relationship with would marry you. My late husband was the only man I fell in love with. He was my first and my last man. When I left home I said I committed myself to him and that is what I have done to this day because I still live with my in-laws."

"When I got married I had to put into practice what I learned from home. A good wife is hard working so I had to work hard. I did all I could to make sure that our home was good. I did not think about going back home because they had told me that I was going to face challenges. So I would arise in the morning around four, but that is estimation because I used the cocks' crow as my watch. When it crows the first time I would know that it was about time to arise. I got to learn that the first cock crow is weak but the second crow is strong and loud, so I know its time to arise. It sometimes happened that I arose later than my husband but normally when he arose I would have made the fire and started cooking (nabavuka ngisuke sengibeke libhodo etiko) sour porridge for breakfast. I immediately started my daily chores like sweeping the yard. I do this only around the kitchen (lidladla) and my hut because boys sweep around theirs too. Sometimes I would fetch water first if there was no water in the kitchen."

"When the food was ready I served my husband first and then the children. Then I would cook food that we ate anytime we felt hungry like 'emahewu'. We always had to keep 'emahewu' available. So we cooked soft porridge and fermented it to 'emahewu' but we also mixed it with sour porridge that remained in the morning. I started preparing ingredients for the food I would cook in the evening. This involved 'kuketsa tindlumbu netinhlumaya', which means removing chaff from juko beans and mung beans. When I completed this process, I went for the grinding stone to grind maize into maize flour even though later we used a hand operated grinding machine (ibhethali). By the time I finished it was time for me to cook supper. We made sure that we ate before it was dark."

"Depending on the season, I sometimes started doing hand work like making mats immediately after serving breakfast and fetching water." Hand work is done mainly in winter because there is less work to be done after we had completed the shelling of maize. "I also went to cut thatch grass together with other women in winter. Other winter chores were varied for example, maintaining our huts by replastering (kubhadza tindlu) and revamping the thatch roof was done if there was a need."

"In summer there is more work. I normally arise early as I stated earlier, and prepare breakfast the same way and then head for the fields where we planted maize, sorghum, ematabhane, umhlata, mungbeans, sesame, sweet potatoes and many other crops. We used to use the hand hoe called 'magejageja' for ploughing all fields but when we started using oxen and an ox-drawn plough we combined both. Usually small fields (tivandzi) were planted by hand. Unlike what we do now we used to broadcast seeds on a

small portion and then cover them with soil using the hoe. So we had to be in the field very early in the morning planting jointly with men and older boys since the younger ones had to look after cattle."

"When we began to use the oxen to plough, men ploughed ahead with a span of oxen and we followed planting in the furrows behind. This made work easier and faster. Usually we returned home in the morning on time to send cattle away but sometimes we returned when the sun began to be hot like during weeding. Upon reaching home I had to start preparing ingredients for supper after resting for a while."

"The man is the head of the household so he gives instructions on the activities to be done at home and I do as I am told. If I have an idea or a plan about anything I inform him first and he gives permission to go ahead. We respect each other and I take my place as a wife and he as a husband."

"My family is big so we always could manage our fields well but other families needed assistance and we helped them. We did not need to be paid because that is how we had been raised. It was normal for us and the family that we assisted to offer a gift, but it was not compulsory for them to give us something. We cultivated the land so that we had food to eat and not to sell. We had surplus that we shared with other families but we did not to sell food. We lived in peace with our neighbours and we understood that we needed each other. Our traditional belief ensured that there was peace in our Chieftdom."

"There were not many diseases so we normally treated sick people for dysentery using plants such as ludvonca, umkhuhla, indodemnyama and umncozi. We followed the same practice for livestock where we boiled roots and leaves of plants such as lichamu and imfulo and gave it to livestock to drink and they would get well. Some times these plants did not work when something was wrong in the family and then the elders spoke to the ancestors calling them by name and asked for remedies to the problems we faced and they were solved."

5.4.0 A Synthesis Of Typical Annual Activities For An Indigenous Household

This section is a synthesis of descriptions of the social setting in which the traditional agricultural system functioned.

5.4.1 Summer Activities

The man, who is the head of the household, begins his day as early as five o'clock in the morning when he arises to assess the condition of cattle in the kraal. He counts the number of the cattle to ascertain if they were all brought home the previous evening. It was the responsibility of boys to look after cattle so the head of the household must arise before the boys are up for they would drive the cattle for grazing before he has assessed them and then he will not know the condition of his cattle. Young boys would then drive the cattle for early grazing ("Batikhokha tiyodla imphunga"). Immediately the man prepares tools to work in the fields with older boys. In summer the men would prepare the oxen for ploughing ("uyabophela nebafana"). His wife(s) would at this time be ready to join the men in the fields.

The woman (wife/s), under normal circumstances is the first to arise in the household as she arises between one to two hours before the man arises. The morning stars as well as the activity of chickens were used to determine the time. "Ngivuka naselikhala kwesibili licudze" *meaning I get up when the cock crows for the second time*. "If the sky is clear I will know once I see the star called Likhwetl that it was time for me to arise". Her first task is to prepare food that would be eaten whilst in the fields. The second star called 'Indvosi' which is the last one to appear in the morning is an indication that I could dish the food since it was time to start off for the fields. By the time the man is ready to go to the fields, the food would be ready. The type of food cooked was sour porridge or a full meal like ticabu nemasi (sour milk and ground maize). She carries the food with the girls to the fields. Sometimes other girls would already be in the fields by the time the food was ready.

The men and the able women would spend about four to five hours in the field ploughing. They ploughed maize fields using a span of oxen. Whilst the men ploughed, the women followed behind planting seeds in furrows opened by the plough. For other crops such as tindlubu and emathapha a hoe was used. The planting period lasted for about two months because planting was staggered. Staggering the planting period ensured that weeding was also spread across the same period therefore reducing the demand of labour all at once. The same amount of time spent ploughing in the morning would be spent weeding when the maize, sorghum or other crops were ready for weeding. Weeding was done daily until it was completed in all fields.

Sometimes the women would collect fire wood before they returned home, but sometimes they would get home and pick containers to fetch water. However, water was fetched by young ladies and by newly

married women “bomakoti”. The women also divided the chores amongst themselves. For instance some remained home cooking, whilst others were weeding or went to fetch water.

Upon getting home the men released the oxen to join the other cattle that were released earlier. The men would then be given food or a snack such as emahewu by the women. If the man took alcohol they would then drink traditional brew (emahewu labovu) and take a nap under the shade. During this time the women would be preparing ingredients for food that will be cooked for supper. After about two hours the men returns to the fields to plough and plant with hoes where there were gaps. It was common to knock off around midday during weeding time because weeding had to be completed early enough before it affected the crop. In Maphalaleni where the average temperature is low compared to the other constituencies, the men prepared hot water for bathing before they retired to bed.

5.4.2 Winter Activities

The winter season is not as busy as the farming season and is a time of celebrations and feasting. In winter the women prepare baskets and mats “emakhenya” and make more traditional brew. The brew is normally given to the people (labour parties) who would come to assist the families in their activities. Labour parties did not have fixed membership and moved from one household to the other if they needed assistance. Larger families did not require assistance as they were able to complete their agricultural activities faster than smaller families. It was for this reason that most men became polygamist.

The major activities in winter are cutting logs, building the maize crib, shelling, raising the kraal, and fencing the fields. The logs are used for building the crib and raising the kraal, a task solely reserved for men. Women cut thatch grass, collect fire wood, repair liguma, and repair huts (kuyabhadvwa).

Shelling the maize or sorghum is done jointly by men and women in the household. A group of people from the village may join the family to hasten the process. Threshing sorghum was done in the evening when the temperature was low. The brew enhanced the activity as people enjoyed themselves. After the produce is ready for storage small portions of the harvest was given to those who had come to assist the family with the food.

The feasting in winter is a function of celebration, unifying family members and paying respect to ancestors. A bull was slaughtered to appreciate and offer to the ancestors. Offerings however were not restricted to winter as some families made offerings at the beginning of summer or at the beginning of winter but at least once a year. This activity, it is claimed made peace with the ancestors and if not carried out there were bad things that became common in the family.

5.4.3 Transmission of Indigenous knowledge on farming practices from one generation to the next

Discussions from focus groups and the responses from key informants indicate that young boys and girls were taught by older women and men respectively on relevant gender roles from a tender age. They were frequently taught verbally in 'egumeni' and 'esangweni'. These classes were formal in that the subjects and the instructors varied and they were meant to give young boys and girls life skills. According to participants the subjects were comprehensive but only relevant to prepare children for the next stages in their lives. So children of different ages were taught different subjects at different levels. In addition the elderly people monitored the performance of the young children against the norms and values.

It can be deduced from the data and is stated by key informants that skills and knowledge on traditional agriculture were acquired from parents, grandparents or relatives. The skills were acquired through practice as children were involved in agricultural activity from a young age until they were adults. Both key informants and focus group participants stated that they worked with their parents in the field and at home. One key informant was quoted saying "Besibophela nabomkhulu munye abesembili abambe intsambo, munye abambe likhuba lomunye ashaye" which means *as a young boy we used to plough with a span of oxen together with my grandfather, I would hold the rope and lead the Oxen, another one would hold the plough, and the other would drive the oxen with a stick*".

According to one key informant, children who were brought up in an environment where they were not working, lacked the skills and the know-how of performing agricultural tasks and home chores ("Uma bekangasebenti lakhaya ukhula angati lutfo"). The informant narrated how a young relative was sent to go and stay with a distant relative because she stayed all by herself. Upon her return about five years later, they discovered that she could not perform most of the tasks that others her age performed.

Children were not given an option to do something outside the societal norms but were compelled to work particularly at a younger age. They were even chastised if they showed signs of laziness as stated that “besingancengcwa nawulala kakhulu nje wawuva ngesiswebhu ekuseni ubabatse uvika ngesinokotfo singene” meaning *they were chastised heavily right from their sleep if as young men they arose later than their father*. They were also told about lazy and unsuccessful people who were an embarrassment to their parents. Rebuttal of instruction from parents or the elderly was disrespectful and unacceptable. Respect of the elderly was and remains one of the most important values of the Swazi people. Disrespect to parents was also known to bring a curse to the perpetrator and was therefore undesirable to all sensible people. The perceived consequences of disrespect therefore enforced adherence to norms and values. It ensured that indigenous knowledge was conveyed from one generation to the next.

5.4.4 How the change in farming practices came about.

Generally, the encroachment of modernization brought about change in the practice of agriculture. Specifically, the education system and agricultural extension workers were singled out as key role players in the introduction of modern agriculture. It was gathered from focus group discussions that some participants who were lucky to be sent to school first came to know about modern agriculture when they got to school. A key informant said “...in 1965 men who were agricultural extension officers (Balimisi) came to the village and taught us about development and about new ways of farming. We were told that hybrid seeds (tinhlanyelo tesilungu) produced higher yield, that we should use fertilizers. They showed us how to apply artificial fertilizers and plant hybrid seeds. As a result of the influence from agricultural extension workers our farming methods changed and this was the beginning of hunger (Kwagucuka kulima sanganelwa yindlala)”. It is also a well documented fact (Warren, 1991) that the modern system of education is in contrast with the indigenous knowledge system.

5.4.5 Sustainability of Indigenous Agricultural Practices

There are three crucial elements of sustainable development as meeting the basic needs, recognizing environmental limits, and the principle of intergenerational equity. These three elements are used to describe the sustainability of the traditional agricultural system as per the perceptions of the indigenous farmers who participated in the study. First and foremost is the ability of the agricultural system to meet basic needs. It is inferred from the data that traditional agriculture required a family to have labour and

farming skills to be able to produce food. Its main purpose was to provide food for consumption. According to participants there were more cases where they had enough food than when they ran short of food. Several factors contributed to sustainability, the most significant being that neither land nor farming inputs were purchased.

The farming system was mixed which permitted crop production and animal production to thrive in the same environment. Food in the traditional system was therefore a product of the crop production and animal husbandry systems. Mixed farming also ensured complementarities within the agricultural system. Traction provided by cattle ensured that more land was ploughed and cow dung was used to improve fertility in soils among other things. This mix also ensured a diverse diet for the people as milk and meat was obtained from cattle while maize, leaf vegetables and legumes were obtained from crops, ensuring a balanced diet for the indigenous farmer. Mixed cropping further ensured a diverse produce of crops further strengthening the nutritional values in the diet and guarding against shocks.

The absence of chemicals and heavy machinery in traditional agriculture indicates a less environmentally degrading system. Traditional agricultural practices described by participants seem to be in sink with the communities. This is made evident by the management practices that were identified in this investigation. Generally findings agree with Warren (1991) that traditional agriculture was inspired by nature.

It was the finding of this study that agricultural knowledge was transmitted from one generation to the next through verbal instruction and vocation, and among villagers through practice and observing while assisting each other. Such vital knowledge was accessible to all citizens without having to pay. The social system that existed encouraged people to give to those who did not have to the point of recapitalizing them through 'kuisa' thus promoting equity. Further, land and other natural resources were shared equally amongst communities under the leadership of the chief.

It is common knowledge that traditional agriculture was reliant on rainfall and therefore did not make use of irrigation. This makes the system prone to drought and, in fact it was gathered that the recent drought has caused suffering to farmers because they do not irrigate.

According to Edwards *et al* (1990) six basic requirements are crucial for sustainable agriculture and these are equitable access to land, credit and agricultural information, control over the maintenance and support of independent agriculture shared by both men and women, reduced labour on women, a high degree of diversification of crops, maintenance of soil fertility without importing nutrients, and the appropriate use of water and fuel resources. Looking at the findings discussed above, traditional agriculture meets this criteria to some extent. The traditional system was able to meet demands for food, fibre and fuel at a socially acceptable economic and environmental costs.

5.4.6 Indigenous Agriculture and Food Security

Traditionally every indigenous Swazi has access to land through SNL and have access to inputs such as seeds through the traditional seed preservation method and bartering method (kwendzela). Agriculture is the major form of livelihood and farmers traditionally place value on the land as it is also strongly linked to the ancestors for example; when a community member is dead the soil is not tilled and no ploughing or weeding is expected to take place. Findings from this study have revealed that methods for cultivation, food processing and storage did not place the burden any more on women than on men, though food preparation rested solely on women. Farming is traditionally a joint activity of which the head of the household is in charge.

Indigenous agriculture was able to meet demands for food, fibre and fuel at socially acceptable economic and environmental costs. Information gathered from focus group discussions reveal that there was a reliable replenishment of nutrients in the soil through the use of kraal manure which not only added nutrients but also improved the soil structure. This study has also confirmed that traditional agriculture made use of a diverse species employing cropping patterns that preserved soil fertility without importing nutrients else where save for the use of kraal manure in the Highveld and Middleveld. Earlier cropping patterns in the Highveld however, revealed that the practice could have caused serious soil erosion. The practice of leaving some fields fallow for a specific period could have prevented serious soil erosion from occurring as vegetation such as grass covered the fields and regenerated the fertility of the field over time.

There was a good use of a combination of resistant varieties, selected indigenous plants, and biological control of pests and diseases which prevented the build up of pests. All these factors together ensured that yield trends were socially acceptable to the local people and production of food was perpetual. This

is clearly captured from Maphalaleni in which participants associated the introduction of modern agriculture with the beginning of hunger reflected in the statement "Kwashintja indlela yekulima Sangenelwa yindlala".

The data collected provided a very diverse type of food crops grown and collected from the wild paying great respect for their values and beliefs which ensured good management of natural resources. The diversity in the type of crops provided a healthy diet. Legumes which are normally a good source of protein were a significant part of the diet used almost in every main meal, mixed with maize and greens which provided starch and vitamins respectively. Snacks as presented in Table 6 also added several micro nutrients to the diet.

The entire practice of traditional agriculture within an indigenous social system enabled various members of households to have adequate amounts of food that they preferred. Farm inputs such as seeds were affordable because they were preserved from the harvest, sourced from neighbours and relatives, and from the wild e.g. 'Umhlata' seeds were sourced from the wild. Homesteads without cattle would have part of their fields ploughed by those with oxen. Although this meant that families without livestock planted later than families with livestock, there were smaller fields that were already planted by hand. What is noteworthy is that there was no cost of farm inputs hence inadequate farm inputs was not a common impediment to food security. Seeds were stored in separate storage areas which guarded against potential disasters.

Traditional agriculture is characterized by mixed farming in which crop-production and animal husbandry complement each other. The traditional homestead is a complete farming system within the Chieftdom which is a larger agricultural system. When there was a shortage of food for some families due to poor production and other factors, those who had produced enough provided food to them at no cost. The culture of 'kuisa' ensured asset creation for the poor. Families would develop strong relationships that they could count on each other in the future thus establishing a social security system. A country or community where people have adequate nutrition and of appropriate preferences at all times is, according to FAO (2004) food secured (Overseas Development Institute, 1997:1).

Based on the findings of this study, indigenous agriculture meets the criteria for a sustainable agricultural system as described by Edwards *et al* (1990:674) and the United States farm bill. It is thus safe to

conclude that Swazi indigenous agriculture was sustainable. However this was with the social system (value and belief) intact and functioning. As soon as the social system was disturbed either by introduction of other knowledge and value systems such as the Western knowledge system or by abruptly moving some elements on which the social system was dependant for instance preserving seeds and reliable rainfall, the system began to breakdown. Hence it cannot be said that the traditional agricultural system can provide food security in all societies.

Although the indigenous agricultural system is breaking down, it has not completely collapsed judging from the extent of application of IK in agriculture that exists to day amongst the indigenous Swazi people. It remains that with the increase of a non food producing population, indigenous agriculture would not feed the population of the world without adaptation because it did not develop under such conditions. The condition under which indigenous agriculture was developed was on the basis that every family produces food and that agricultural production was for subsistence. This is reflected in the culture of sharing with those who would attempt to plant but were unfortunate to reap inadequate food.

Implications for poverty and food insecurity reduction

The intention of this section is to provide considerations that should guide the design of agricultural policies and other policies aimed at improving food security for the rural population. It is to provide insights on how traditional agricultural practices can be useful in sustainable agricultural development.

The study has revealed the need to document indigenous knowledge and has made a contribution to the documentation of indigenous knowledge. Application of indigenous knowledge is paramount if indigenous knowledge is to benefit sustainable agricultural development. Using successful indigenous farmers to jointly promote good traditional agricultural practices with government extension workers at community level will enhance the process of achieving food security. This idea also makes use of the principle of community participation in problem solving and decision making.

Since one characteristic of poverty is that it is rural (Broca, 2002) most indigenous farmers practicing traditional agriculture can not afford to purchase modern agricultural technologies in adequate amount such as farm inputs and farm machinery, and the fact that most of the food insecure people in the world are found in developing countries with low national budgets to afford transformation of agriculture

through modern technologies. Agricultural research should therefore be contextualised into local ecological and social systems. Effective agricultural practices such as the use of kraal manure, fallowing and range management practices should be promoted. The methods to be promoted should be affordable to the poor and should mimic the traditional agricultural system. There is therefore a dire need to focus more research and development on traditional agriculture

5.5.0 Chapter Summary

The preceding chapter presented an overview of the social setting of a traditional agricultural system. It presented a limited description of typical agricultural activities within a Swazi traditional setting. The chapter also provides conclusions drawn from common themes emanating from a broader perspective of the agricultural system such as transmission of indigenous knowledge, food security status, and sustainability.

CHAPTER VI

6 SUMMARY, CONCLUSION AND RECOMMENDATIONS

6.1 Introduction

This chapter presents an interpretation of the findings, the summary of the study and the conclusions and recommendations. The summary of the study covers aspects such as the purpose of the study, methodology employed, and the summary of findings.

6.1.1 Purpose and objectives of the study

The purpose of the study was to investigate and document indigenous knowledge on indigenous agricultural practices from selected rural communities in Swaziland, and to determine whether these practices can aid in the reform of modern agricultural systems to promote sustainable food and livelihood security in Swaziland. The specific objectives of the study were to I) To investigate and document indigenous knowledge on agricultural practices of rural households in rural communities in Swaziland II) To determine the values and beliefs on which traditional agricultural practices are based III) To identify strengths and limitations of IK on farming practices as they impact on the human and natural environment IV) To determine how specific traditional farming practices could be strengthened to promote sustainable food and livelihood security.

6.1.2 Methodology

The exploratory and descriptive study exploited focus group discussions, key informant interviews and observations to collect data from four Tinkhundla centres located in four ecological regions of Swaziland. A total of four focus group discussions and five key informant interviews were employed to collect data. At least one focus group discussion and key informant interview was conducted in each Inkhundla. Participants were recommended by community leaders based on their knowledge and practice of traditional agriculture who in turn recommended key informants from focus groups. Question guides with open ended questions were used to lead discussions in focus groups and to interview key informants. The questions guides were validated by development practitioners working for World Vision and Masters degree students at the University of Stellenbosch. The questionnaire was piloted in Kwaluseni Inkhudla which was excluded from the study. Data collected was qualitative and was analyzed by organizing it

into themes and relationships that are easier to understand. Interpretation of data involved extracting meaning and integrating views of other authors.

6.2.0 Summary of Findings

The study captured a wide range of indigenous agricultural practices. Some of the practices complement each other and are all components of the traditional agricultural system. The traditional agricultural system comprises of mixed farming, is subsistence oriented, and is located on SNL. It is widely practiced across the four Tinkhundla located in the four ecological regions of the country.

6.2.1 Crop Husbandry

Indigenous crop production practices were identified on selection of cultivation site, land preparation, maintenance of soil fertility, and seed selection. Most of the practices are still used by farmers in all Tinkhundla areas except for the cultivation on steep slope which was done in Maphalaleni ADP and has become extinct. The use of kraal manure, crop residue and fallowing to maintain and improve soil fertility is consistent with sustainable and organic agriculture. These practices are recommended for promotion and adoption amongst farmers included within the modern agricultural system. The use of kraal manure for improving crop production demonstrates the positive interaction of the crop-production and animal husbandry systems.

The study identified indigenous techniques of seed selection, preservation, and storage. Traditionally seed selection started from thinning through harvesting to storage. The practice and criteria to select seeds is an outcome of the study and has been described. The traditional process ensured that subsistent farmers have adequate seeds to plant every year without having to pay for seeds. It also ensured development of varieties adapted to local conditions. Seed preservation also made use of technologies available within the environment of the farmers without additional cost and pollution to the environment. The techniques on seed selection, preservation, and storage are recommended for adoption and improvement of sustainable agriculture.

Traditional agricultural practices are labour intensive due to the absence of mechanization and mainly depend on family members to provide labour. The development of the ox-drawn plough was a milestone in traditional agriculture as it reduced the labour burden on farming families and increased the size of

land ploughed. However, the introduction of schools has further taken away labour from the traditional farming system further enfeebling individual families from producing enough food for themselves.

Mixed cropping which comprises planting a diverse type of crops on the same field was found in all four Tinkhundla to play a significant role in food security of indigenous people. The primary crops in the mixed crop stand are sorghum and maize while the secondary crops are pumpkins, melons, groundnuts, bambara groundnuts, mung beans, mngomeni, insambansamba, sesame, ematabhane and ematsapha. This type of cropping system conserves the soil structure, improves soil fertility and discourages development of a large number of pests. Due to the diverse produce of a diverse family of crops, mixed cropping was found to increase chances of a balanced diet amongst the subsistent farmers. Mixed cropping is also recommended for promotion amongst indigenous farmers.

Findings on traditional post harvest handling included drying (through exposure to sun and wind) and temporal storage of maize and sorghum crops on three types of maize cribs (inyango, umsis, and Inkalanga), shelling using stones, threshing using stick and logs pulled by livestock, and winnowing using wind. These practices do not require finance from the farmer but require labour from the family. They are also environmentally friendly and are accordingly recommended for use by subsistent farmers. However, shelling and threshing can become protracted thus labour parties are used traditionally to hasten the process. With the change in the social system brought about by modernization, the practice of labour parties will need to be developed to provide the necessary labour to smaller families. This case is a clear demonstration of the positive interaction between the social system and the production/processing system as part of the larger indigenous agricultural system.

Three types of technologies used in traditional agriculture were identified and these are the hoe, maize/sorghum cribs, and the grain pit. These technologies are used in all four Tinkhundla areas, exploited locally available material, are integrated into the social (value) system, and most were environmentally friendly. The grain pit (Ingungu) was identified as one of the best technologies produced by indigenous agriculture with the potential for development. It is a storage facility of maize and sorghum dug underneath kraals to keep food safe from enemies but also to guard against disaster such as drought and fire. It uses heat generated from cattle and manure to prevent pests from attacking grain thus eliminates the use of chemicals such as the weevil tablet. The technologies are subjects for experimental research to prove their efficacy.

Aloe ash was used as a form of pesticide to protect legume seeds which were stored in clay pots. Aloe is found in abundance in all regions in Swaziland except in the Highveld where, though not in abundance, it is readily available. It is also used as a cooking ingredient for okra, making it safe for use as a pesticide.

The indigenous agricultural system had a strong influence on the type of food eaten and the nutrition of indigenous farmers. Mixed farming ensured that meat, milk and sour milk form part of the diet, mixed cropping ensured availability of a variety of crops of different nutritional value. Maize (mealie meal) forms a major part of the diet. Sorghum used to form a major part of the diet in the Lowveld where rainfall is less and was well adapted. It is not clear what brought about the change but promotion of maize by extension workers may be the reason. The traditional diet is healthy, mostly comprised of a legume (bambara groundnut, groundnut, mungbeans, mngomeni) and maize or maize products. Green leaf vegetables and pumpkins are common in mid-summer and winter. The use of seasonal crops supplementing them with wild fruits played a significant role in food security amongst the people. The study identified preparation methods and composition of traditional foods.

6.2.2 Animal husbandry

Cattle were identified as the most important animal to farmers followed by goats as they have traditional intrinsic value to their owners. Cattle are used intensively in the life of an indigenous Swazi, they provided draught power for ploughing, provided food, blankets, traditional attire, manure, and were used for rituals. Goats also provided the same benefits to farmers, except for draught power. Donkeys were used for draught power and transportation, chickens for meat and eggs and dogs for hunting. Sheep were not popular but they were used mostly for rituals and arresting lightning. A single farmer did not own all five types of livestock but an average of three including chickens.

Indigenous animal husbandry practices were identified and were classified under general management, pasture management, and recapitalization of the poor (kusisa). One animal husbandry practice identified is that of driving cows to graze early (kukhokha tinkhomo impunga) and bringing them for milking before nursing calves. It was identified to have a potential to benefit subsistence farmers and development of sustainable agriculture. This practice (kutikhokha imphunga) is recommended for experimental research.

Another practice identified is that of Kusisa in which man with a large head of livestock would give part of his livestock of either goats or cattle to a family that did not own livestock. In return the family used the cattle to plough and feed his family but they did not own the livestock. The family could give part of his harvest in exchange for a cow. With goats the family was rewarded with a female goat. This culture of kusisa created assets for the poor but also controlled stocking rates. Kusisa is an indigenous practice that was developed within the traditional social system and can be adopted and developed for the emerging modern agricultural and social systems in rural communities. It is another demonstration of the link between the social system and the agricultural system.

In terms of treatment of livestock, a tree called lubozana was used to treat blisters in the mouth of cattle, oil hippotamus was used to stimulate breeding, and ash from snails was used to treat infected eyes. All three remedies are recommended for experimental research.

6.2.3 Natural resources conservation and management

The study successfully identified indigenous practices that conserved the environment. These were across disciplines and were classified under soil fertility maintenance, forest management, pasture management and wild life conservation. Generally agricultural practices within the traditional agricultural system are in line with the local ecosystem. These practices are enforced through the social system which is well integrated with the traditional agricultural system. The extinct practice of cultivating steep slopes at Maphalaleni was the only practice that was perceived to pose a significant threat to the environment through soil erosion. While the study acknowledges that the traditional practices conserved nature it can not be said that they can be effective if practice outside the social system. In fact, the problems faced by subsistent farmers are a result of imbalances that have been brought about by introduction of other elements into the traditional system such as modern agriculture and WKS.

6.2.4 Relationship between religion and traditional agricultural practices

The study identified religious practices that are related to agricultural practices. These were rituals and offerings to ancestors to request for a good harvest, to celebrate a good harvest, to ask for rain, and to chase away curses and evil spirits. The study also identified reverence for ancestors, respect for the elderly and the earth (soil) to be amongst the deepest values of the Swazi social system that supported traditional agriculture. It was inferred that the indigenous agricultural system was strongly dependant on the values and beliefs of the people for success and propagation.

6.2.5 The value of traditional agriculture

Indigenous farmers placed more value on traditional agriculture than on modern agriculture. More advantages of traditional agriculture were provided by indigenous subsistence farmers than disadvantages. On the other hand indigenous subsistent farmers provided more disadvantages of modern agriculture than advantages. The value placed on traditional agriculture is a function of the cost of inputs and the amount of food produced. Most indigenous farmers cannot afford farm inputs hence they can not have the full benefit of the modern system. The scarcity of rainfall and subsequent poor yield has contributed significantly to perception by indigenous farmers. The preference for traditional varieties and food produced thereof over modern varieties is another factor that contributed to high rating of traditional agriculture. It is worth noting that though traditional agriculture was preferred over modern agriculture, there are aspects of traditional agriculture that were undesirable that participants needed to replace with modern agricultural practices such as ploughing using a tractor.

6.2.6 Transmission of indigenous Knowledge

The study found that transmission of indigenous knowledge on agriculture from one generation to the other was through verbal communication and vocation. Verbal communication was formal in that specific information was communicated with the intention to teach and at an opportune time. Participants in focus group discussions and key informants all stated that they learned indigenous agricultural practices from their parents and they practiced agriculture from a young age under the instruction of their parents and elder siblings.

The study also found that religious beliefs and values played a significant role in the application and transmission of indigenous knowledge. These were the reverence of the ancestors and respect for the elderly and leaders of the community. Instructions from the elderly were carried out without questions. Further more, the absence of alternative ways of livelihood and values ensured application of knowledge hence propagation of IK.

6.3.0 Food security

The study infers from the findings that the indigenous agricultural system could produce a food secured community provided other factors such as the amount of rainfall and global temperatures remain constant. But since climate change is a reality and was asserted by participants, irrigation is a necessary adaptation for sustainable livelihoods particularly in the Lowveld and middle veld (Lubulini and

Dvokodvweni). This can be attributed to this quote “Kwatjintja kulima sangenelwa yindlala” meaning *when the farming method changed we started facing hunger*.

6.4.0 Sustainability

Indigenous farmers could produce perpetually under the traditional agricultural system. Farmers were able to sustain themselves from ploughing up to consumption. Traditional agriculture is rain-fed, farmers planted using simple tools, used seeds preserved from the previous harvest and obtained from neighbours and villagers. They planted traditional cultivars of diverse types of crops and used organic manure to maintain the fertility of their fields. Because they practiced mixed cropping they conserved soil fertility, provided a diverse type of crops and ensured a balanced diet. Their storage facility was also efficient because it was free from grain storage pests (“ligenga belingayi”). The setting of the storage facilities protected spoilage and theft. Grain that was spoiled (according to modern agriculture) was used to prepare a special type of meal called “sancoti” and “sipata”. Traditional agriculture was a vocation for all family members hence the family provided labour for agricultural production in a manner acceptable to family members. In addition the social system provided a security system against shocks that could cause food insecurity.

6.5.0 CONCLUSION

Paradigms can enhance one’s understanding of the seemingly bizarre views of others who are operating from a different paradigm. Through a systems perception of traditional agriculture, new forces that are critical to take into account in sustainable agricultural development are revealed. The aptness of traditional agriculture to indigenous farmers rest on its benefits such as conservation of soil fertility, affordability of farm inputs, production of diversified crops and resistance to drought and pests, consequently sustainability. Because of its sustainability as a system, traditional agriculture can significantly contribute to alleviate poverty and food insecurity in Swaziland where the population is significantly rural, albeit with adaptation into the modern social system which, in some areas has significantly affected the land tenure system on SNL.

Indigenous agriculture performed well under conditions that were determined/ controlled by the broader indigenous knowledge system. Indigenous agriculture was mindful of the natural resources at the disposal of indigenous people. The crop production system and the animal husbandry systems

complemented each other with regard to maintaining the natural resource and providing food to indigenous people. The social system comprising of subsystems such as the value and belief system provided a check and balance ensuring that indigenous agriculture was sustainable. In fact the practice of indigenous agriculture can be said to have existed within an indigenous social system which strongly supported it.

The lesson is that whilst we can learn good practices, we must also understand the conditions under which the indigenous practices thrived so that we can develop similar conditions or new systems to provide the necessary support for any change or improvements made. This implies a holistic understanding of the IKS and the conditions under which they were successful which are very important in the conservation, promotion and development of indigenous knowledge. Since traditional agriculture thrived because of the social system which enforced it, promotion and protection of IK should take into account the changes and development that have occurred in the social system today such as the alternative value and belief systems and livelihood systems that have been brought up by modernization.

Finally it is the conclusion of this study that local people know a great deal about their environment in which they have lived for generations. They have, over generations, developed farming practices and cultural values which form the basis of their livelihoods that were inspired by nature and match their ecosystems. Such wisdom has been accumulated over long periods and transferred from one generation to the next through instruction and vocation. Contrary to the notion that IK is incapable of meeting rapid economic growth, the growth of the economy in Swaziland seems to be dependant on the performance of subsistence farmers who practice traditional agriculture based on IK.

6.6.0 IMPLICATIONS AND RECOMMENDATIONS

- a) Various factors contribute to the loss of indigenous knowledge on farming and its replacement by modern agriculture even where it is unnecessary and can be avoided. For example, promotion of modern fertilizers and hybrid seeds over kraal manure and indigenous seeds respectively have contributed to food insecurity in rural communities where indigenous people live since they can not afford to buy farm inputs. Indigenous farming practices must therefore be promoted and not denigrated by agricultural extension workers. This may warrant training of agricultural extension workers to integrate IKS with the modern farming system.

- b) Based on the findings of the study the pit grain storage was safer to use. Though it did not make use of chemicals, pests were not a threat to food stored in grain pits. When carefully constructed the grain pit could possibly outsmart the metal storage tank used in modern agriculture which is costly and also the chances that maize stored in it will be attacked by pests are high. It is recommended that this storage method could be exploited for development of a better storage facility that will not require the use of pesticides such as the weevil tablet that is very toxic and is prone to abuse to commit suicide in Swaziland. Indigenous grain storage methods in Nigeria were found to be more superior to metal grain storage tanks when considering size of harvest and cost (Warren, 1990).
- c) Indigenous maize varieties are preferred by indigenous farmers especially women because they claim food such as porridge cooked from indigenous varieties tastes and looks better. It was the finding of this study that mealie meal from indigenous varieties is said to be used in smaller amounts than hybrid varieties (imphumphu yembila wesintfu iyashuba). If this assertion by indigenous farmers is true, it has a significant implication to the value of the total yield because then a smaller yield of the indigenous varieties could last longer than the same amount of yield from hybrid maize variety. It is recommended that these claims be investigated through experimental research.
- d) IK should be encouraged particularly for subsistent farmers who can not afford inputs for modern agriculture. Other practices should be adapted to local conditions such as the use of maize stova and other crop residues to improve soil fertility, as opposed to adoption. There is no doubt that modern agriculture has not been successful in feeding the poor in Swaziland. Modern agriculture should complement rather than compete with indigenous agriculture.
- e) Indigenous food crops and preparation methods should be promoted as food security is strengthened with the used of indigenous practices.
- f) Rather than encouraging the use of hybrid seeds, preservation of indigenous seeds from previous harvest should be promoted in particular by subsistent farmers in the rural areas in order to reduce the cost of agricultural inputs.
- g) Documentation of IK is a means of protecting IK but not the end. IK must be documented and propagated through training and practice as well as with documented trails in order to define a

methodology for terms of reference. Value must be created for indigenous crops to stimulate production. The government, NGOs and the private sector should jointly stimulate the market for indigenous foods in order to motivate farmers to grow indigenous crops. The tourism industry and the retail industry have the highest potential from the private sector.

- h) For IK to be preserved and transmitted to the younger generation, it must be included in the education system and must be practiced. For it to be included in the education system it must be well documented and adapted to the current social system. IK such as how indigenous crops are grown and prepared should be promoted by being incorporated into the school curriculum in order to inculcate it into the youth.
- i) In-depth studies (experimental) on IKS in Swaziland should be conducted to provide a source of innovation for sustainable agricultural development. The following is recommended:
 - i. Investigate and test, through experimental research the possibility of using aloe ash for pest control in seeds.
 - ii. Investigate and test, through experimental research, the efficacy of the traditional grain storage pit
 - iii. Investigate and test through experimental research the claim that umhluma regenerates quickly after being cut and the potential to produce this indigenous tree to meet wood demand.
 - iv. Investigate and test the effectiveness of using Lubozana to treat oral blisters in livestock.
- j) Traditionally people did not pay rates to Chiefs but provided labour to plant and weed fields in the Chief's kraal. The produce from these fields were used to feed orphans and very old people from the Chiefdom who would otherwise have no one to look after. In addition, households would contribute a certain portion of their harvest to the Chief's Kraal. From all this produce, food would be prepared for visitors in the Chiefs Kraal since there were always people who needed to see the Chief's council or the Chief. The SNL tenure system enforced adherence to traditional values. It is recommended that this principle be adopted in light of the high poverty rate and high number of orphans in the country.

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APPENDICES

APPENDIX A



Figure 4: Pumpkins stored on the earth floor inside a thatched hut. Alternatively pumpkins were stored under the maize crib. Where it is cool for longevity and safe from livestock.



Figure 5: A picture showing the traditional maize crib at Maphalaleni in the Highveld. It was elevated so that livestock could not reach the stored crop. There is no roof. This maize crib however was built using nails.



Figure 6: Maize stored inside a Maize Crib in Maphalaleni. The Crib does not have a roof and the maize is exposed to the sun.

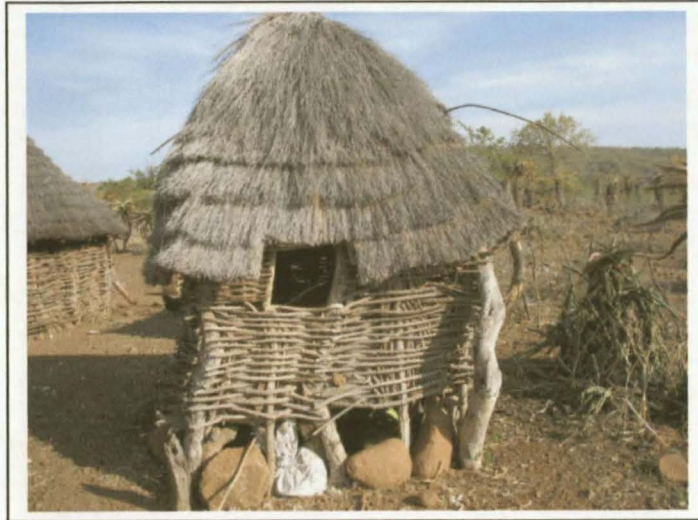


Figure 7: A different traditional design of the maize crib from Lubulini in the Lowveld of Swaziland. The maize crib is short and thatched. The crib is built with local material only.



Figure 8: Pumpkin seeds being dried using heat from the sun. After drying these seeds are kept safe for planting in the next season. Only seeds from big and tasty pumpkin heads are saved for planting

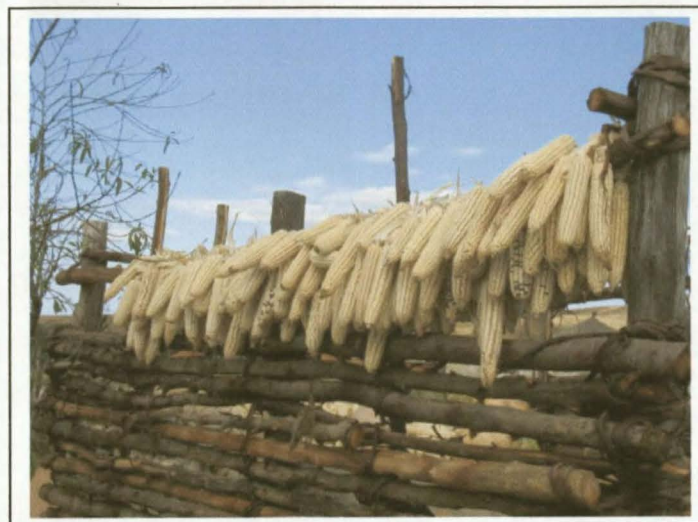


Figure 9: Maize cobs hanging on top of maize crib for initial drying before being moved into Edladleni (traditional kitchen). These seeds were reserved for planting in the next season by a farmer in Maphalaleni. Only bigger cobs are selected for seeds.



Figure 10: A grinding stone used to grind maize and sorghum into mealie meal.

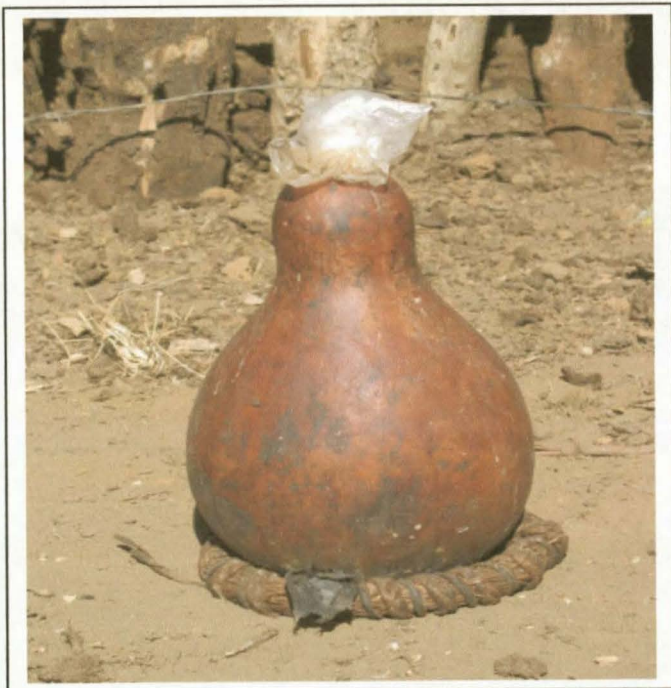


Figure 11: 'Ingula', a traditional container used for milk storage and fermentation into sour milk.

APPENDIX B

LETTER OF INTRODUCTION FOR FACILITATORS TO FOCUS GROUP PARTICIPANTS

My name is Mmiso Dlamini. I am conducting research about indigenous knowledge on agriculture (Indigenous farming practices) and how they have been sustained to meet the needs of one generation and the next. My colleagues are here to assist me with the recording. You have been selected to participate in the focus groups because of your valuable knowledge on traditional agriculture. I would like to thank you for availing yourself.

I will be asking you some questions related to your knowledge of traditional agriculture and its significance to you. The information you provide will be useful to preserve indigenous knowledge and could be used to improve modern and sustainable agriculture.

Participation in the focus groups is voluntary, and you can choose not to take part. All the information you give will be confidential, we will be recording the conversations that will be used to prepare general reports, but will not include any specific names. There will be no way to identify that you are the one who gave this information. Once again thank you for participation.

In order to achieve the objectives of this meeting we request that we observe the following ground rules:

Ground rules

1. Participation is compulsory for every member of the FGD
2. Participants to respond to questions read by the facilitator
3. There is no wrong or right answer (All perceptions must be shared)
4. If you have a cell phone please switch it off.
5. The whole exercise will not take more than 2hrs.

APPENDIX C**FOCUS GROUP GUIDELINE**

Name of Focus group:		
Name of community:		
Date and time focus group was conducted:	Date:	Time:
Place of meeting:		
Name of facilitator:		
Name of recorder:		

INDIGENOUS KNOWLEDGE AND FARMING PRACTICES

1. What do you understand by indigenous/ What does the word indigenous mean to you?
2. Describe what you consider indigenous in your community?
3. Who are the indigenous people in your community? Why do you consider them indigenous?
4. What do you consider to be unique/different amongst indigenous people? Why?
5. Describe the indigenous farming methods/ describe how the indigenous people farm? (Probe for crop and animal husbandry).
6. Describe the pros and cons of indigenous methods.
7. Describe the pros and cons of modern methods you know.
8. Describe the activities under indigenous farming methods.
9. Describe the activities under modern farming methods.
10. Name the indigenous crops grown by indigenous people. What other crops (fruits or vegetables) were/are collected and eaten by indigenous people?
11. What is the value of the crops? (E.g. medicinal, spiritual, nutritional, etc.)?
12. Name the indigenous animals reared by indigenous people.
13. What value do the indigenous people place in their animals (e.g. medicinal, spiritual, nutritional, etc.)?
14. Do you practice indigenous farming? Why or why not?
15. What is the relationship between the indigenous farming methods and the indigenous religious beliefs?
16. Describe the relationship between the indigenous farming methods and sustainability.

APPENDIX D

KEY INFORMANT INTERVIEW GUIDELINE

Name of Key informant:		
Name of community:		
Date and time of interview:	Date:	Time:
Place of meeting:		
Name of facilitator:		
Name of recorder:		
Record information from recorder:		

KEY INFORMANT

1. Describe your normal life (daily activities) from the beginning of the year to the end of the year.
2. What is your traditional belief/religion? What is the significance of your traditional belief/religion in your life?
3. How does your traditional belief/religion influence your daily activities?
4. What agricultural activities do you engage in from the beginning of the year to the end of the year (Describe your farming diary)? How do you perform each task the way you perform it and why? <i>(Be sure to identify indigenous farming practices)</i>
5. How does your traditional belief/religion influence your agricultural practices?
6. How do you take care of the natural environment (soil, water, grass/forest/trees, and air?)
7. How have the agricultural practices been carried on from one generation to the next?
8. What has changed in the way you and other farmers in your community carry out their farming?
Thank the informant for the answers and move to the next section
9. I would like to see your homestead, your farm land, and the equipment you use for farming. Would you please allow me to see them and take pictures as well?

APPENDIX E

SAMPLE RECORD SHEET

FOCUS GROUP DISCUSSION PARTICIPANTS IN DVOKODVWENI INKHUNDLA

Date : July 28, 2006
Time : 10:20 am
Facilitator : Russell Dlamini
Recorder : Martin Masilela

Participant Code	Gender	Age	Description
Map. Participant no. 1	Male	70	A man born and raised in Lubombo by a farther who was a farmer. He still practices traditional agriculture to live.
Dvoko. (Khushweni) participant no. 1	Male	52	A man born and raised in Lubombo by a farther who was a farmer. Still practices traditional agriculture
Dvoko. (Khushweni) participant no. 2	Male	61	A man born and raised in Lubombo by a farther who was a farmer. He still practices traditional agriculture to live.
Dvoko. (Ntandweni) participant no. 3	Female	72	A man born and raised in Lubombo by a farther who was a farmer. He still practices traditional agriculture to live.
Dvoko. (Lawini) participant no. 4	Male	67	A man born and raised in Lubombo by a farther who was a farmer. He still practices traditional agriculture to live.
Dvoko. (Mampempeni) participant no. 5	Male	69	A man born and raised in Lubombo by a farther who was a farmer. He still practices traditional agriculture to live.
Dvokodvweni participant no. 6	Male	66	Was born and raised in Hhohho before he moved to Dvokodvweni. He practices traditional agriculture mixed with modern agriculture.
Dvoko. (Ntandweni) participant no. 7	Male	52	A man born and raised in Lubombo by a farther who was a farmer. He still practices traditional agriculture to live.
Hlane	Male		