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ECONOMIC VALUATION OF COMMUNAL RANGELANDS IN THE EASTERN CAPE PROVINCE OF SOUTH AFRICA

GIFT GOMBAKOMBA

SUBMITTED IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE DEGREE OF MASTER OF SCIENCE IN AGRICULTURE (AGRICULTURAL ECONOMICS)

IN THE

FACULTY OF SCIENCE AND AGRICULTURE

DEPARTMENT OF AGRICULTURAL ECONOMICS AND EXTENSION

UNIVERSITY OF FORT HARE

ALICE

REPUBLIC OF SOUTH AFRICA

SUPERVISOR: PROF. G. C. G. FRASER

SUBMITTED: JANUARY 2008

DECLARATION

I, Gift Gombakomba, declare that this thesis and the work contained herein being submitted to the University of Fort Hare for the degree of Master of Science Agricultural Economics in the Faculty of Science and Agriculture, is my original work and that all the sources that I have used or quoted have been acknowledged by means of complete references. I also declare that this work has not been submitted to any other university in partial or entirety for the award of any degree.

Gift Gombakomba

Date 23 April 2008

DEDICATION

This work is dedicated to my lovely wife Lucy, daughter Natasha and son Gabriel for the love and support during my studies. To my kids, I challenge you to start working harder in pursuance of your educational endeavours that you surpass this level of study and quality of work. You are my best.

May the Almighty God, the Lord of grace bless you abundantly.

ACKNOWLEDGEMENTS

My foremost heart felt thanks and sincere gratitude goes to my promoter Prof. G.C.G. Fraser for his selfless assistance in my coming up with a thesis of this nature and quality. His encouragement, insightful comments, constructive criticism and mentorship during the research is highly appreciated.

I wish to thank the Kellogg Foundation for the funding that made my work possible. My gratitude also goes to the Department of Agricultural Economics and Extension, University of Fort Hare for offering me the opportunity to engage in this type of work as well as the Department of Agriculture (Eastern Cape) for providing some of the data that was used in this study.

Many other people also deserve special mention. Among them is the Patron of the Zimbabwe Presidential Scholarship Programme His Excellency President R.G. Mugabe, for awarding me the scholarship to study at Fort Hare. Special thanks go to my family, especially my wife, Lucy, without whose encouragement, this attainment would have been a foregone dream. Even with my continued absence from home, the fond memories of my children, Natasha and Gabriel, always encouraged and gave me reason to work harder all the times.

I would also wish to pay tribute to all the people that assisted in different ways throughout my work, among them is Dr. S. Dube, Mr. A.F. Bediako and my colleagues in the Department. Without the assistance of many other people not mentioned here, this study would not have been possible. Their kind help and support are greatly acknowledged.

Finally and most importantly, I wish to thank God the Heavenly Father whose grace and guidance was key for the completion of my study.

ABSTRACT

The exploitation and conversion of rangeland ecosystems is often explained by economists as being the result of an undervaluation of the goods and services provided by the rangelands. Undervaluation of rangelands may contribute to their mismanagement or their transformation to monoculture, such as livestock or gathering. Similarly, this may lead to inappropriate policy recommendations and prescriptions.

This study undertakes a valuation exercise in an effort to address causes of undervaluation. The objective of the study is to estimate the annual direct, indirect and non-use values per household of communal rangelands in the Eastern Cape Province, based on both primary and secondary data. The exercise incorporates the two major direct uses, both marketed and non-marketed, of rangelands - livestock and gathering. Contingent valuation method based on stated preferences by individual household was used to value the indirect and non-use values of the communal rangelands (e.g. erosion protection and burial sites). Data was collected using PRAs, structured questionnaires and interviews by trained enumerators.

The study shows that half of the households owned livestock, which is the main economic use of the rangelands and gathering of natural resources also made an economic contribution. Every household was involved in collection of range resources such as fuel wood, wild fruits, thatch grass, building poles, hunting, fishing make a significant contribution to the direct use values: in the case of gathering it shows that there is "hidden harvest" of many of the natural resources from the rangelands. Indirect and non-use values are shown to be important in the communal areas but are difficult to quantify; the results of these are based on qualitative analysis.

Keywords: *communal rangelands, demand curve, direct use values, indirect use values, individuals' preferences, non-use values, willingness-to-accept and willingness-to-pay.*

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ACRONYMS

CBNRM – Community Based Natural Resource Management

CPR – Common Property Resource

CV – Contingent Valuation

DEAT – Department of Environmental Affairs and Tourism.

DFA – Development Facilitation Act

IIED – International Institute for Environment and Development

ILRI – International Livestock Research Institute

OCA – Opportunity Cost Approach

PET – Potential evapotranspiration

RAMSAR - The Ramsar Convention is an international treaty for the conservation and sustainable utilization of wetlands, i.e. to stem the progressive encroachment on and loss of wetlands now and in the future, recognizing the fundamental ecological functions of wetlands and their economic, cultural, scientific, and recreational value.

SADT – South African Development Trust

TBVC – Transkei, Bophuthatswana, Venda and Ciskei

TEV – Total Economic Valuation

UNCED – United Nations Conference on Environment and Development

UNEP – United Nations Environment Programme

WTA – Willingness to Accept

WTP – Willingness to Pay

CHAPTER ONE

INTRODUCTION

"The things we cherish, admire, or respect are not always the things we are willing to pay for. Indeed, they may be cheapened by being associated with money. It is fair to say that the worth of the things we love is better measured by our unwillingness to pay for them" (Sagoff 1988: 68).

1.1 Background information

Rangelands are fundamentally large tracts of indigenous vegetation used to sustain livestock production. The framework in which the world's rangelands are viewed is hastily changing. Conflicts in natural resource management are escalating at an alarming rate, and there is invariable stress between what rangelands can provide and the numerous objectives that farmers have for them (Birch, 2000). The increasing demands on the world's rangelands have led to concern over the sustainability of rangeland uses and the effects on rangeland inhabitants and users.

According to Piirto (1997), rangelands are wild forage-producing areas under native and / or annual grasses used, inter alia, for livestock, wildlife and watershed maintenance. Areas often classified as rangelands are too wet, too dry, too rocky, too steep or too cold to farm or practice forestry (World Resource Institute 1986).

There is substantial variation in the rangelands of the world. Rangelands mediate between ecological sufficiencies to scarcity, whether the critical resource is measured in millimetres of rainfall or frost- free weeks (Brown *et al*., 1986). Rangelands/grasslands cover approximately 47% of the land areas of the whole world. The terms range and rangelands are most frequently used by livestock raisers.

The study on economic valuation of communal rangelands has been necessitated by the need to place monetary values on the communal rangelands' goods and services in the Eastern Cape Province of South Africa. Communal rangelands in South Africa take up almost 6 million hectares and are homes to roughly 2.4 million rural households (Shackleton *et al.,* 2001). The rangelands are used by poor rural communities, not only to for supporting livestock, but also for harvesting a wide range of natural resources. Table 1.1 shows the biome areas in South Africa.

Table 1.1: Biome Areas in South Africa

Biome	Area (km^2)
Forest	7 265
Fynbos	77 114
Grassland	336 544
Savannah	426 216
Karoo	380 220
Thicket	41 632
Total	**1 268 991**

Source: Adapted from DEAT (2005)

The communal rangelands are used by the poor rural communities, not only for supporting livestock, but also for harvesting many different natural resources. The use of these natural resources and general human disturbance has significantly affected the vegetation in communal savannahs, resulting in changes in species demography, land-cover, and invasion by alien plant species (Rodger and Twine, 2002) and vegetation homogenisation (Giannecchini, 2001). Understanding both the drivers and the consequences of vegetation change in communal rangelands is of great importance; as such changes have direct implications for the communities that depend on the natural environment for their livelihood.

Communal rangelands are very important sources of livestock feed in developing countries (ILRI, 1999). In the presence of high demand for livestock or livestock products, unrestricted access to the grazing lands may result in overexploitation of the scarcity rent of the resource would remain inappropriate.

One of the key tools that the Department of Agriculture needs to have at its disposal to be used in engagements with a number of stakeholders is information that makes the case for the communal rangelands based on the value of the ecosystem goods and services they provide.

Estimating the economic value of the communal rangelands' ecosystem goods and services is not an elementary calculation that will produce stable, absolute values that can be traded off against development, or used to compare its relevance to other factors in the production process. Natural resource accounts, for example, do provide relevant information on the values

of resource stocks and flows accounting to market or quasi-market, but need to be contextualised in the reality of a broader ecosystem and socio-economic system changes and gives meaning with caution in the face of fundamental uncertainty.

The proposed study would thus, take two points of departure:

- Economic valuation is not an absolute science, although it might seem to be. It is reductionist and, in general, overlooks the value of a system in its totality. Focusing on the value of components in the system does highlight the importance of these components, but need to be discussed and interpreted in the context of possible discontinuities in ecosystems operating in a nested hierarchy on different levels (de Wit and Blignaut, 2006). Such ecological thresholds and irreversibilities are often highly uncertain, prompting decision-makers to have a more flexible and cautious approach to communal rangeland management than one where economic values of goods and services are compared for their highest returns.
- Economic valuation is a powerful way to inform the importance of conserving and restoring landscape and ecosystems. Policymakers and planners base their decisions more on the impacts of change on people, than on the environment in its own right. This is true in a country where economic growth is a top priority, where a quarter of the population lives in abject poverty and where inequality is still on the increase.

Large areas of communal rangelands in South Africa are communally owned by the farmers for grazing domestic livestock and harvesting natural products such as fuel wood. The communal rangelands came into existence in the 1950s, when a policy of betterment, or villagisation was introduced. This was meant to control rangelands degradation in the communal areas. This policy redefined land use patterns by dividing areas into residential, arable and grazing lands (De Wet, 1995).

The great majority of land in the homelands is held under some form of communal tenure (Lahiff, 2000b). The other tenurial forms include freehold land held by individuals and groups, including church missions, state land, but this accounts for relatively small areas. Each individual user of the resource enjoys the full benefits of his/her use of the resource but bears only a fraction of the cost. As a result, the traditional uncontrolled and free grazing system in many developing countries has caused severe degradation of the grazing lands.

Since the creation of the African reserves in the late nineteenth and early twentieth centuries, most of their inhabitants have been able to obtain only a part of their livelihood from agriculture. Moll (1988:5) speaks of a general economic collapse in the reserves from about 1930, with a severe decline in maize yields and in numbers of sheep and cattle. Simkins (1981:262) took a similar position, but argued that the main drop in the per capita food output occurred only with massive influx of population to the homelands after 1955.

Access to land, even relatively small plots, forests or communal grazing allows households to maintain a diversified livelihood strategy that may include wage, employment, agricultural production (for consumption or sale) and keeping of livestock as a form investment, which together enhances their ability to obtain a livelihood under difficult conditions. Communal farmers keep livestock for many reasons, which include milk, meat, draught power and insurance, apart from income generation (Coertze, 1986). Farming enterprises range from livestock owners with small stock holdings for subsistence and cultural purpose to commercially oriented farmers with large cattle, sheep and goat holdings (Bembridge and Tapson, 1993). Communal grazing areas, both in South Africa and globally, are generally perceived to be degraded and unproductive, contributing little to the national economy.

Mooney and Ehrlich (1997), in Hawkins (2003), stated that humans depended on natural systems back as far as Plato, but the first modern publication that addressed this issue was Man and Nature by George Perkins Marsh in 1864. Marsh (1864) realised that the world's resources were finite and was aware of the importance of the natural systems to soil, water, climate, waste disposal and pest control. The first publication that dealt with ecosystems providing services to human society is *Man's Impact on the Global Environment* by the Study of Critical Environmental Problems in 1970.

One of the first papers discussing economic valuation of ecosystem services was *Proposed Practices for Economic Analysis of River Basins Projects* by the Committee on Water Resources in 1958 (Bingham *et al.,* 1995). Valuation of ecosystem continued throughout the following decades (de Groot *et al.,* 2002), but research and attention has expanded greatly since the publications helped the subject gain popularity.

Rural communities across the developing world depend greatly on indigenous natural resources, which act as a buffer against poverty (Twine *et al.,* 2003). These resources are used

for domestic purposes and to generate income. Some studies have attempted to value natural resources by calculating the total value traded, the worth of standing biomass, or the direct-use value (that is, the financial value of resources used domestically). Most surveys of this kind have been conducted in the tropical forest ecosystems of Southern America and Asia. Only recently has attention been paid to deriving direct-use values of resources in semi-arid savannahs in southern Africa. Savannah woodlands, covering more than one-third of South Africa's surface area, are home to 9.2 million rural people. These regions are marginal for agricultural activities, largely because of unpredictable rainfall, and are often remote and poorly serviced. Indigenous natural resources, therefore, play a vital role in the livelihoods of local communities. The natural resources, however, are coming under increasing pressure for reasons such as poverty, high human population densities, and the weakening of traditional authorities that have historically been responsible for the control of access to natural resources in these parts of the country (Shackleton *et al.,* 2001, Twine *et al.,* 2003)

Implementation of informed policies needs to address issues of equitable access and sustainable use of resources in the semi-arid rural areas. This is hampered in South Africa, however, because policy-makers do not know the value of the natural resources, or the potential loss of value through unsustainable harvesting. The economic and social worth of land-based strategies (including natural-resource harvesting) with regard to rural livelihoods in South Africa have not been fully appreciated, especially in terms of direct provisioning and as part of the 'rural safety net' (Ellis, 1998; May *et al*., 2000; Bryceson, 2002; Twine *et al.,* 2003).

The state of the communal rangelands has remained a topical issue in southern Africa for over three decades now (Dube, 2006). Tropical rainforests, wetlands and other biodiversity ecosystems, rangelands included continue to decline at an alarming rate. Underestimation of the value of the many goods and services provided by the rangelands and nature has been recognised as one of the major causes of the failure to protect and manage them in a sustainable manner (Lette and de Boo, 2002). There is an overall consensus that in decision-making procedures regarding the use of natural resources not only should the easily quantifiable costs and the benefits of the rangelands and nature be taken into account, but also those that are more difficult to determine: the intangible costs and benefits. This raises the need for proper valuation tools to quantify and visualise the multiple benefits and the costs of rangelands and nature areas.

The issue of proper valuation of ecosystem goods and services has been raised in international policy debates for many years, but only since the UNCED in Rio de Janeiro in 1992, have more significant initiatives in this field been developed. The issue of the “methodologies for proper valuation of the multiple benefits of forests and other natural ecosystems” was dealt with during the sessions of the International Panel on Forests including the rangelands commencing in 1996. Since 1997, the International Forum on Forest and Rangelands has continued the debate (Mitchell and Carson, 1989; Lette and de Boo, 2002; Verbic and Erker, 2007).

This study is intended to give an economic valuation of the communal rangelands in the Eastern Cape Province of South Africa and assist professionals that work in policy formulation and implementation in natural resources management to support effective decision-making processes on these issues.

Since money is a means of exchange, the amount of currency in exchange for a product or commodity became its value. If an individual is willing to pay R200 000 for a car, the R200 000 represents the ‘exchange value’. The buyer has the confidence that the car will provide him/her with a value (however determined) equal to R200 000. Likewise, the seller agrees and has confidence in the fact that R200 000 in currency will provide him/her with sufficient ability to acquire something else for R200 000 that will have equal, yet different; exchange value (however determined) than the car he is selling. There is nothing fundamental that is backing or that acts as surety for the currency in circulation except confidence and the ‘general agreement’.

Valuation is an attempt to put a monetary value on a certain asset, which can be tangible or intangible. When a commodity has a market, its value is reflected in the price for which the commodity is being exchanged. However, not all assets have markets for trading. Therefore, an asset that has economic value may not have a price. For example, in South Africa, surface water is indeed valuable but has no market and is therefore not priced. Drinking water, on the other hand, has a market and therefore has a price.

It should be noted at the outset that valuation has to do with economic value. What is economic value? According to Kaosa-ard (2002), economic values express only what an individual market participant is willing to pay another in free exchange for something else.

Valuation of the goods and services provided by rangelands and nature is needed because these areas are under great pressure and, in fact, are disappearing. Lack of knowledge and awareness of the total value of the goods and services provided by these natural resources will obscure the ecological and social impact of the conversion of rangelands into construction materials, infrastructure, industrial areas, houses or agriculture. Even when these impacts are understood, there is often a lack of financial resources for sustainable management of forests and nature areas. More information about the ecological, economic and social or cultural values of rangelands and nature areas, and the synergy between these values, is necessary in order to feed the public dialogue and to internalise these values as part of policy and decision-making (Lette and de Boo, 2002). Moreover, in many cases, those who derive benefits from the rangelands or from nature services, such as the owners of hotels or the visitors who enjoy nature, are not the ones who incur the costs and make the investments necessary to manage the rangeland properly. This means that the costs and benefits are not in the same hands. Proper valuation of all the goods and services provided by the rangelands or nature area can help understand the extent to which those who profit from the rangeland also bear the cost of managing it (Van der Lubbe, 2001).

1.2 Economic value of rangeland resources

- Economic valuation of rangelands is a process to assign quantitative and monetary values to goods and services provided by rangelands. This includes use of market prices for direct use resources as well as derived prices for other indirect uses and functions (e.g. flood control, groundwater recharge) of rangelands.
- Economic value of any good or service is measured in terms of what consumers are willing to pay for the commodity, less what it costs to supply the commodity. However, in the case of environmental goods and services such as rangeland ecosystems, the costs of supply are almost zero, so the consumers' willingness to pay for an environmental resource is also the net value of the resource.
- Economic valuation is recognition, quantification and valuation of multi-functionality of the rangeland services (Barbier *et al.,* 1997; Emerton, 1998; Pagiola *et al.,* 2004).

1.3 Causes of undervaluation

Despite the importance of the valuation of forests and nature, undervaluation was and still is the order of the day. It is therefore extremely important to understand the causes of undervaluation

because this may help policy and implementation-level decision-makers to tackle some of the problems related to undervaluation, such as deforestation (Barbier, 1989; Lette and de Boo, 2002).

Market failure has been identified as one of the major causes of undervaluation. When determining the economic value of a certain nature area, decision-makers usually only take into account the easily quantifiable financial costs and benefits related to goods and services traded on the market. However, there are numerous functions of nature for which markets malfunction, are distorted or simply do not exist (Barbier *et al.,* 1997; Emerton, 1998; Pagiola *et al.,* 2004). Economists refer to this as market failure. Markets only exist for some of the products of rangelands and nature, such as for timber, fuel wood and non-timber products. Even if markets exist, market prices for these goods may not reflect their real value, since markets can be distorted, for example by subsidies (which the researcher would call a policy failure)? Furthermore, the market price of a particular good may not reflect all the costs involved in producing that good. There may be benefits or costs enjoyed or borne by others not directly involved in the production of a good. Economists refer to these costs or benefits as externalities (Lette and de Boo, 2002).

Where markets fail, as in the case of the valuation of functions generated by rangelands, the government in principle can adjust and influence them in order to create an environment in which the long-term interests of society as a whole are better protected. However, there are numerous reasons why governments may fail to do this. The government may be influenced by powerful pressure groups. Secondly, it may find it difficult to obtain the right information. Thirdly, bureaucracy, inadequate use of power, corruption or lack of co-ordination may hamper the implementation of good intentions. This so-called policy failure also contributes to the undervaluation of forests and nature areas (Emerton, 1997; Angelsen and Kaimowitz, 1999; Lette and de Boo, 2002).

1.4 Problem statement

Communal rangelands are being neglected in most of the developing countries and are degrading at alarming levels. There are significant amounts of hidden harvests of natural resources from the communal rangelands. The degradation of communal rangelands is as a result of undervaluation of these areas. It is aimed that by the end of this study, a thorough

economic valuation of communal rangeland ecosystems would have been done and recommendations made on their sustainable use.

1.4.1 Description

An integrated, national approach to management was promoted to address the ecological degradation that has resulted from the unsustainable use of communal rangeland resources. There were two main types of activity: (1) communal rangeland valuation and (2) community well-being. Achievements were: (1) communal rangelands biodiversity assessment – this identified priorities and provided a baseline inventory; introduction of resource-based management regimes – these encouraged resource use to be more sustainable; economic evaluation of rangeland resources – this has helped raise local awareness and develop regional policies. (2) Health, education, food security, income and cultural values were enhanced. The project found it necessary to first tackle community well being and try to meet the immediate needs of people before addressing the conservation goals in the study areas.

All agricultural practices have an impact on the environment. Many consequences are borne involuntarily rather than chosen because no formal market trading takes place for ecosystem functions. These impacts, or externalities, may be quantified indirectly by assigning money values through a process called valuation, which informs agricultural production and policy decisions.

It is only when people bear the true economic costs of using natural resources, such as rangelands, will they have appropriate incentives to use them efficiently and minimize their degradation and losses. More recently, non-economists, too, have started to call for the use of economic valuation information to argue for conservation of communal rangelands (Lal, 2003).

1.5 Objectives

1.5.1 Main objective

The main objective is to determine the average direct, indirect and non-use value per household in the communal rangeland areas of the Eastern Cape of South Africa.

1.5.2 Sub Objectives

- To estimate individual value components related to different rangeland uses, to include livestock, wildlife and gathering.
- To estimate marketed and non-marketed use values of the communal rangelands.

1.6 Hypotheses

1. The use of communal rangelands in livestock production and natural resources gathering will result in substantial increases in the farmers' income.
2. The management of the communal rangelands will result in net positive and higher returns per household.
3. The level of economic dependence that the communal farmers receive from their different rangeland production systems determines their perception about the goods and services.

1.7 A statement of the limits to the project

The study is limited to communal rangelands in the Eastern Cape of South Africa. In the selected experimental sites, the researcher used fifty peasant farmers from each of the three chosen communities. This valuation is performed to get the perceptions of the farmers on how they value their communal rangelands. The total sample size from the three communities was 150 peasant farmers. The researcher is also going to adhere to those said operational sub-questions only due to financial constraints and limited study period of two years only.

1.8 Justification

Economic information is valuable to decision-makers trying to encourage efficient and sustainable use of communal rangelands. The type of economic value information needed will depend on use. Economic value information of communal rangelands is generally used in three broad ways: for advocacy purpose; when choosing between alternative uses; and when wanting developers to pay for externality costs of their activities on range ecosystems.

1.8.1 Economic valuation, its importance in rangeland management

• In the absence of a market, rangeland resources, particularly of indirect uses and non-marked services, are undervalued. Hence, if information on wide spectrum of rangeland values, even from alternate means, is incorporated into the policy decision-making process, this could provide powerful argument in support of rangeland conservation and alternate financings (Emerton, 1998; Barbier, *et al.,* 1997).

• Information on monetary value of resources, including rangelands, is heard with great enthusiasm and interest by public policy makers, and/or decision-makers. These are also the

reasons for frequent recommendations for Total Economic Value (TEV) in valuing the rangelands.

• Reliable and improved information on economic value of rangeland resources not only provides incentives for these values to be incorporated into decision-making processes, but it also assists in generating additional financing for conservation by identifying significant gainers (groups) of rangeland conservation.

• Economic valuation also provides information on how costs and benefits of rangeland conservation are distributed who gains and who loses, and by how much. This helps in identifying losers in conservation, to identify the gap that needs to be filled/compensated; and for the gainers, the potential to capture and redistribute some of this surplus-benefit of the rangelands conservation to the losers.

• A commonly suggested valuation technique for estimating value of rangelands in totality is a framework of Total Economic Value (TEV), which is a way to understand or recognise several components of rangeland products and functions in monetary value terms. However, it is not easy to apply the TEV framework in practice, which requires full range of information on ecological functions of the rangelands.

• If the Total Economic Value of rangeland resources is not feasible, then information on partial value of rangelands and/or partial impacts assessment of rangelands can also convey equally powerful information and messages for policy intervention in support of rangeland conservation (Barbier, *et al.,* 1997).

1.8.2 Basic concepts in economic value of rangeland ecosystem services

The term economic valuation means not only putting a monetary value to the natural resources like rangelands, but the full extent of economic valuation study involves following steps on resources valuation (Pagiola *et al.,* 2004), including identifying alternate financing mechanisms.

1. Identifying net benefits (costs) associated with new policy measures by expressing full range of costs and benefits associated with the conservation in monetary value (quantitative term).
2. Identifying the public good benefits (costs) versus private costs (benefits) of the resource conservation strategy.

3. Identifying the net benefits of the conservation (society, private).
4. Identifying losers and gainers of the intended policy changes.
5. Developing a self-sustaining modified financing mechanism for sustainable uses of the resources.

1.9 Research Outline

The study is comprised of six chapters. The first chapter introduces the research wherein the context, the problem addressed and the objectives of the study are discussed. In the second chapter, a presentation of the related literature is provided. The third chapter looks at background of study area to include policy issues, demographic information, vegetation, livestock information and income levels of the local people. Chapter four presents the theoretical and analytical framework, wherein the methodology used in the study is explained. This chapter also outlines how the theory is applied in the present study. Empirical results are discussed in chapter five. These are presented in four sections, the main emphasis of the chapter is the economic viability of the valuation techniques, but the results are also used to make comparisons on the most efficient techniques as well as whether the valuation techniques will be economically sustainable in the study area. The final chapter presents a summary of the research, the main findings/conclusions and the recommendations followed by a list of appendices at the end of the dissertation.

CHAPTER TWO

RELATED LITERATURE

2.1 Introduction

The related literature includes three areas: (a) review of policy issues regarding to use of communal rangelands, (b) communal rangelands in South Africa, in general, and (c) the economic valuation of communal rangelands processes and methods. The present review is limited to determinations of the mean annual direct, indirect and non-use values of the communal rangelands in the Eastern Cape Province of South Africa. Studies on private rangelands or private properties were excluded from this study.

2.2 Policy review

Many policies have either a direct impact on our behaviour through punitive measures (e.g. legislation that protects endangered species) or an indirect impact through positive incentives (e.g. tax rebates). Therefore, when striving to understand the current state of communal rangelands, or when planning the management of these rangelands in the future, it is important to consider the policy framework in which they exist.

2.2.1 Policy issues influencing communal rangelands

The term policy has many definitions. Simply defined, policy is a process through which community identifies objectives by making choices between alternatives (possibly in conflict with one another) and the ways and means of achieving these goals (Willis, 1998). Policy also represents an attempt to establish relevant research on a specific problem area and to define the new direction that decision-makers must follow to change it. It is not fixed, but continually evolves as new knowledge and experience is gained. Policies are evident at all levels of community, ranging from international policies, through national, provincial and district levels, down to institutional or organisational policies.

In 1994, the first fully democratic elections in post-apartheid South Africa ushered in a new era characterised by optimistic expectations that new political and economic systems would rectify social inequities that persisted under the previous segregated regimes. Such inequalities are felt most intensely in communal areas where access to natural resources still plays a vital role in the livelihoods of poverty-stricken households (Twine *et al.,* 2003b; Hasting-King, 2004). Although many communal rangeland communities have indeed undergone substantial political transformations since 1994, meaningful social and economic change has been much slower to

follow (Hasting-King, 2004). In general, the benefits that have accompanied the new post-apartheid democratic government have had little impact on villages located outside of more urbanized areas. Many communal areas continue to lack economic opportunities, access to basic health care, electricity and dependable water supplies.

Although the South African government is committed to developing communal services and infrastructure through various national programs, there is a substantial backlog and issues such as affordability of housing and services remain problematic. These issues are particularly worrisome in the light of increasing population pressures, which heighten the strain on already over-stressed social relations and natural environments (Twine *et al.,* 2003a).

Given the past decade's political shifts, South Africa presents an interesting and important opportunity for considering the implications of changes in institutional and structural factors affecting social and ecological well-being. In this dissertation, the researcher focuses on changes related to the availability and management of fuel wood, a key natural resource in communal South Africa. As in many other developing regions, a large portion of communal South African households depends upon a range of natural resources for basic living requirements (Griffin *et al.,* 1993; Shackleton and Shackleton, 2000). Even in communal areas where electricity is readily available, often over 90% of households use fuel wood as their primary energy source for cooking and heating due to the prohibitive costs of electricity and electrical appliances (Twine *et al.,* 2003a). In such cases, fuel wood is a key "common property resource" as it is normally gathered from communal rangelands surrounding the village.

2.2.2 Contributions of natural resources to rural livelihoods

Savannah communal rangelands cover more than one-third of South Africa and are home to 9.2 million rural people (Shackleton, 2000). Apartheid-era resettlement programmes, in which 75% of the black population was allocated 13% percent of the country's land, resulted in the degradation of communal rangelands in black "homeland" districts due to unsustainable agricultural development. In addition, deforestation has resulted from the excessive fuel wood harvesting driven by the energy demands of an impoverished, growing population (Department of Water Affairs and Forestry, 1996).

Although apartheid has been abolished, resource shortages persist in the former homeland areas where biomass represents a fundamental energy source and where political freedom has not substantially altered dire economic circumstances (Levin and Weiner, 1997).

Many communal households struggle to meet daily sustenance needs and cannot afford electricity for cooking and/or heating (e.g. Twine *et al.,* 2003a). In fact, South Africa's Department of Water Affairs and Forestry (1996) estimates that in 20 years, 1.5 million communal households will continue to be without electricity because of harsh economic circumstances. Estimates suggest that wood is the primary fuel source for over 17 million people, comprising 90% of rural households in South Africa (Shackleton and Shackleton, 2000). In the face of difficult economic conditions, common property resources bring substantial value to the household economy. Natural resources offer a financially inexpensive alternative to otherwise purchased goods (Twine *et al.,* 2003a), and present opportunities for poor communal households to generate income from trade in raw or processed natural products (Shackleton, 1996).

Since fuel wood is the primary, and often only, energy resource option for communal African households, local supplies are in high demand, often resulting in unsustainable harvesting. Mean annual per capita consumption of fuel wood in rural South Africa ranges from 491 kg to 1173 kg (Twine *et al*., 2003a). Overall, between 9 and 11 million tonnes of wood are used for fuel per year in South Africa, of which 6.6 million tonnes is estimated to be harvested from natural wood (Department of Water Affairs and Forestry, 1996). Logically, as the stock of close resources decline, harvesting takes additional time. In the early 1990s, the average time spent collecting wood was estimated at five hours per household per week (Department of Water Affairs and Forestry, 1996) compared to ten hours per week ten years later (Twine *et al.,* 2003a). Importantly, there are gender dimensions to resource collection; women typically collect the resources necessary for household sustenance and, therefore, pay the price in additional collection time (Department of Water Affairs and Forestry, 1996; Dovie *et al.,* 2004). Overall, it is clear that the state of communal rangeland resources in South Africa suggests an urgent need to create long-term institutional structures that support sustainable management (Department of Water Affairs and Forestry, 1996). Further, within these institutional structures, it is important to acknowledge that both gender and class shape natural resource access and dependence.

2.2.3 Traditional Management of Common Property Resources

The restoration of traditional common property resource (CPR) regimes are believed by some to be the most efficient means of returning effective control to the use of proximate natural resources.

However, the concepts of CPR, or more broadly Community-Based Natural Resource Management (CBNRM), also have critics who argue that although theoretically attractive, these common property strategies have proven less successful than anticipated (Campbell *et al.,* 2001). This lack of success is often attributed to ambiguities of authority and power struggles between state and local institutions, as well as the pressures of poverty that lead to unsustainable extraction rates of resources for sustenance (Campbell *et al.,* 2001; Twine *et al.,* 2003b).

These ambiguities and power struggles certainly characterise resource management regimes in many parts of post-apartheid South Africa. Campbell *et al*., (2001) argue that institutional breakdowns in common property resource management most frequently occur in communal rangeland areas and those ecological, social, and economic factors contribute to this phenomenon.

In South Africa, post-apartheid democracy has created new social relations, often resulting in the demise of community values and a rise of individualism and household-centred behaviours (Campbell *et al.,* 2001). Some contend this has led to a deterioration of traditional values and behaviour patterns, and declines in interpersonal cooperation (Twine, 2003b).

The communal villages in this study were created during the apartheid era, from the 1950s to the 1970s, when black South Africans were forcibly removed from land set aside for white settlement. The black South Africans were resettled in newly formed villages in black "homelands," with each village allocated common property of roughly 500-1000 hectares. These surrounding common property resources were to be used by village residents for grazing livestock, cultivating fields and harvesting natural resources. The boundaries of the village commons typically coincide with surveyed farm boundaries, but occasionally follow other landmarks or topographical features such as railway lines or streams. The natural resources within these village commons were, and still are, common property resources to be used by the

local community under the jurisdiction of the village headman, and ultimately, the local chief (Lahiff, 2000).

As noted, prior to democratic change in South Africa, local traditional authorities, each headed by a chief, controlled unallocated land used communally by villagers (King, 2005; Twine, 2005). As King pointed out, the traditional authorities became agents of "indirect-rule" by the colonial and apartheid governments, possibly having greater powers and authority over the land and its resources than was historically the case. Their legitimacy during the apartheid era was thus frequently challenged by villagers, particularly the youth. Nevertheless, they played an important role in regulating use of common property resources even as they became bureaucratised by the prevailing government (Twine, 2005). CPR management was achieved through various institutional mechanisms, such as issuing permits to harvest particular natural resources (such as poles), and enforcing taboos and laws by the application of fines or other forms of punishment (King, 2005). The chiefs were given a budget to employ tree "police," with this oversight acting to moderate human impact on the proximate resource base (Twine, 2005).

In contemporary South Africa, however, breakdowns in the traditional management of communal rangelands have been attributed to a decline in respect for traditional authorities by local constituents (Campbell *et al.,* 2001; Twine, 2005). Specifically, based on observations in ten rural villages, Twine *et al.,* (2003b) argued that residents perceive that respect for traditional authority has eroded with the introduction of democracy and freedom in post-apartheid South Africa. In addition, within these transitional contests, some traditional authorities have been partially integrated with formal governing bodies and are, therefore, vulnerable to political shifts. For example, the effectiveness of traditional authority in some areas of communal South Africa appears undermined by budget cuts by the national government that hampers enforcement of traditional regulations. In interviews, communal village residents described how budget cuts had reduced the chief's "tree police" from twenty to three persons, essentially disabling an effective "traditional" resource governance system. While villagers from a second community suggested that the democratic government should provide money to reinstate the chief's police force in order to enforce laws prohibiting the illegal harvesting of live trees (Twine *et al*., 2003b).

Another concern voiced by these villagers (Twine *et al.,* 2003b) and elsewhere in southern Africa (Cocks *et al.,* 2001; Nemarundwe, 2004), is that there is confusion over the roles and responsibilities of traditional authority figures. The introduction of democracy at the national

level has created a complex interface between traditional and modern authority structures, resulting in overlapping responsibilities and conflicting mandates (King, 2005). This is demonstrated most expressively in issues of land allocation and management. Nemarundwe (2004) illustrated that the disconnect between traditional and modern institutions in a story of a young man condemned by the modern village development committee for turning a common property area into his vegetable garden; the traditional leader had approved his action, justifying it as necessary to take care of his family.

In another case offered by Nemarundwe (2004), a man was determined to keep his field after his wife's death although traditional law would require that he return the land to his wife's family. The man quickly reported the situation to the Rural District Council officials, the Zimbabwean state's modern authority system, which ruled that the man was entitled to keep the land. Thus, this confusion allows the opportunity for residents to oscillate between two locally recognized authority systems. In this case, the poor relationship between the two authority systems was used to the landholder's advantage.

Finally, unclear boundaries between villages also add to confusion in regards to traditional authority and natural resource management. Disputes often arise over boundaries demarcating a village's woodland resource use area, which constantly shift over time and space (Nemarundwe, 2004). In the former homelands of South Africa, boundaries of village communal land were demarcated by the government when villages were created during the process of land reallocation and forced removals. This was done without participation by the local residents. In some instances, people lay claim to land falling under two adjacent villages while retaining allegiance to only one headman or chief. With regard to resource management, this is a difficult situation and community members have been documented to take advantage of this situation by extending their rights of access to woodland resources (Nemarundwe, 2004). Moreover, based on research in Zimbabwe, McGregor (1995) contends that national- level policies governing natural resources do little to ensure sustainable harvesting at the local level. This can be extrapolated to South Africa where national policies promote sustainable resource use although extraction within communal areas is likely unsustainable (Shackleton and Shackleton, 2000).

Of course, shifting institutional structures only affect the ways in which resource demand is met. Demand itself is the product of other forces, notably poverty. Since wood resources are often

viewed as “free,” requiring only extraction labour, these resources have become focal components of many emerging livelihood strategies, such as woodcarving (Campbell *et al.,* 2001). Many communal households have come to rely on a wide range of income- generating activities, some of which are acknowledged as socially or environmentally detrimental. Indeed, some resource collection activities are illegal by traditional rules governing woodland use, such as the cutting of live trees or the theft of wood harvested by others. In short, many “traditional” rules governing woodland use are ignored when fundamental concerns arise with regard to meeting household needs (Campbell *et al.,* 2001).

2.2.4 General environmental management

The Environment Conservation Act of 1989 represented the first attempt at holistic environmental management in South Africa. New bodies such as a Committee for Environmental Management and the Council for the Environment, the latter being advisory to the Director General: Environmental Affairs were established or given new statutory authorities. Among other roles, these bodies were to help co-ordinate environmental policies and decisions among ministries. At the same time, recognition was made of the fact that responsibilities for environmental matters, such as pollution control, were poorly spread among several ministries. Efforts to resolve these administrative problems largely halted because of the growing awareness that a new constitution for the nation was coming.

The Environment Conservation Act of 1989, as amended in 1992, allowed for interdicts and abatement notices to stop or deter environmental damage and pollution. Landowners could also receive compensation for restrictions imposed upon them to advance environmental management. Limited opportunities for aggrieved citizens to seek judicial relief on environmental matters were also instituted. However, requirements to gain “standing” remained restrictive (Rabie *et al*., 1996). Overall, Rabie *et al.* (1996) characterised environmental legislation through 1992 as enabling, but not requiring, executive actions to protect the environment in South Africa. This general statement was particularly true with regard to integrated environmental management and an environmental impact assessment process. Legally enforceable broad regulations were never promulgated (Preston *et al*., 1996).

2.3 Communal rangelands

Communal land covers about 13% of the land area of South Africa. From a legal point of view, ownership of this land is vested in the State, sometimes governed as a trust, such as the

Ingonyama Trust in KwaZulu Natal. From a practical point of view, these areas can be seen as communally owned and managed under a system of customary tenure normally administered through the chiefs. However, this system, like many others in South Africa, is in a state of instability and in some provinces, like Limpopo Province, much of the responsibility for land allocation and administration is being transferred to local government, (Von Maltitz *et al.,* 2002). This indicates a major shift in policy and process and is causing antagonism between traditional leaders, who feel threatened and disempowered, and voted Local Councillors, who believe that such steps are in line with current policy, for example Development Facilitation Act (DFA 1997), and will point to more co-ordinated land-use planning (Shackleton, 2000). Today the main result of these changes is a great deal of uncertainty on the ground (Shackleton, 2000). In terms of ownership, land reform policy realises that the land belongs to the people residing on it and legislation gives temporary protection to communities against expropriation of their land (Interim Protection of Informal Rights Bill, 1999). However, efforts to take this further and address full tenure rights in communal areas have been continually hindered, showing a lack of political will to deal with this problematic issue (Kepe *et al.,* 2001). Generally, people at local level still view traditional chiefs as the 'owners' of the land (Turner, 1999).

2.3.1 Communal rangelands as multiple-use commons

Most farmers now generally recognise that much of the livestock production on communal rangelands is multi-purpose in character and yields high rates of economic return per hectare when all its functions are approximately valued. The economic value of livestock output from communal herds in Africa is often much higher than that of commercial ranches (Pastoral Development Network, 1992; Scoones, 1995). In Botswana, communal area production per hectare is three times higher than per hectare returns on commercial ranches (De Ridder and Wagenaar, 1986).

These valuations are premised on:

- Conceptual shifts, which calculate values taking into account the procedures' objectives in the livelihood systems, which include consumption but also risk aversion, etc, situate livestock in the farming systems as a whole and, thus, include inputs to crop production such as manure and draught, and do not make restrictive assumptions about stocking rates.
- Methodological shifts, making use of data on not just marketed output, and using replacement and opportunity costs to estimate the value of milk, manure, draught, etc.

This study proposes a further shift, namely, that of seeing communal rangelands as multiple-use commons as in Edwards and Steins, 1996. This entails recognising that areas designated for grazing also provide resources for a variety of other purposes by groups other than simply livestock owners. These have mostly been analysed either as 'wild resources' (IIED, 1995), 'secondary products' (Shackleton, 1996), 'veld products' (Shackleton and Shackleton, 1997), 'non timber forest products' (Grimes *et al.,* 1994), 'the uncultivated sector' (Palmer, 1997), or 'savannah woodlands resources' (Campbell *et al*., 1997).

Separation of different resource uses in this manner has served a useful analytical purpose – that of facilitating clearly focused data collection in relation to hitherto 'hidden resources and values' (Cousins, 1999). However, in the real world, communal rangelands are used for livestock and other purposes, and a full economic evaluation calls for combining the values of the full range of resources and uses – and for examining the trade-offs as well as the complementarities between them (Arntzen, 1998). This kind of assessment is generally recognised as being necessary when wildlife and domestic livestock productions are considered as land-use options, these being potentially competitive uses. It is important in many areas, including land reform policy that this principle be extended to the full range of resource use (Shackleton, 1996). In addition, it may be appropriate to add the economic value of abiotic resources found on communal rangelands, for example, sand and clay for building or craft production.

Perhaps the greatest single factor responsible for shaping communal land-use was the Natives Land Act of 1913. This Act decreed that, based on racial classification, non-whites were not permitted to own, rent or sharecrop land in South Africa. Because of this Act, "millions of black people were forced to leave their ancestral lands and resettle in what quickly became over-crowded and environmentally degraded reserves" (Republic of South Africa, 1997).

Furthermore, under the Native Trust and Land Act, 1936, "black people lost even the right to purchase land in the reserves" (Republic of South Africa, 1997). The homelands were consolidated and enlarged following the establishment of the South African Development Trust (SADT) in 1936 (Republic of South Africa, 1997).

Current land-use patterns in the former Ciskei generally follow those established by the Betterment Schemes, which were recommended to prevent "land abuse" and to develop the

"Bantu" agricultural industry (Union of South Africa 1955). These schemes were introduced under Proclamation 31 of 1939, superseded by Proclamation 116 of 1949, and implemented after the release of the Tomlinson report (Union of South Africa, 1955). Through these schemes, land in the tribal areas was allocated for residential, grazing and cropping areas. The traditional settlement pattern, one of scattered rural dwellings over the landscape, was consolidated into more defined villages, while cropping and grazing areas were demarcated and fenced off. The reduction of livestock was also recommended in betterment areas.

The Transkei Agricultural Development Act, No. 10 of 1966, and the Ciskei Agricultural Development Act, No 14 of 1989 (Republic of Ciskei, 1989), were almost identical. The Ciskei Agricultural Development Act aimed to provide for the conservation of the soil, the veld and water sources, the improvement and control of livestock, the combating of weeds and invader plants and the development of agriculture generally in Ciskei (Lent *et al.,* 2000). Enforcement measures included expropriation of land or payment of penalties. It is unclear to what extent these measures were used.

Soil conservation schemes were to be established and maintained by the state and included provisions regarding:

- the carrying capacity of the land and the number of livestock that may be grazed thereon,
- demarcation of fencing, rotational grazing schemes and the restriction of the numbers of livestock to graze the paddocks,
- livestock improvement and the regulation of kinds of livestock deemed unsuitable,
- land-use allocation into arable, grazing and residential areas,
- limitations on the use of natural resources (e.g., cutting trees, grazing, etc.),
- the use of fire in rangeland,
- weed or invader plant eradication,
- subsidies for soil conservation, veld rehabilitation or stock reduction schemes on private land,
- restrictions on ploughing,
- prevention of salination and water logging of irrigated land,
- protection of cultivated soil against water and wind erosion, and
- protection of watercourses and rangelands.

The Green Paper of the Eastern Cape Provincial Department of Agriculture (Province of the Eastern Cape, 1997a) has as its objective to raise the level of agricultural production in the

former homelands, based on sustainable use of agricultural resources, through market orientated agricultural production and the assistance of resource-poor farmers. The main objective is to satisfy household food security. Livestock farmers are encouraged to accept droughts as natural phenomena and have low-risk management strategies, including stock reduction during droughts. Greater emphasis is placed on small-scale farming with appropriate technology research and extension. The use of marginal land is discouraged and rehabilitation programmes will be implemented at the cost of land users who are responsible for degradation. Security of tenure is seen as important to ensure productive and sustainable land-use. Appropriate livestock breeds, feedlotting and the introduction of game are proposed management alternatives. Sustainable range management is mentioned but not described.

Subsidies for soil conservation works (in accordance with the Conservation of Agricultural Resources Act, Number 43 of 1983) would be made available for emerging and communal farmers, if required.

The land redistribution policy of the Eastern Cape Provincial Government includes references to sustainable agricultural production, while ensuring food security and self-sufficiency (Province of the Eastern Cape, 1997b). Farms are to be planned and farm sizes depend on the agricultural production potential. The aim is to have privately owned farmland for full-time farming by previously disadvantaged people. Extension services will be made available to ensure sustainable land-use practices are used. It will be required of the lessee “to ensure that soil and ground erosion is combated”. Restrictions on animals are also provided for. How this is to be calculated is not made clear but will presumably depend on the livestock carrying capacity of the farm. Fire is also regulated.

2.3.2 What are rangeland goods and services?

Rangelands and the biological diversity contained within them provide a stream of goods and services, the continued delivery of which remains essential to economic prosperity and other aspects of welfare. In a broad sense, rangeland services refer to the range of conditions and processes through which natural ecosystems, and the species that they contain, help sustain and fulfil human life (Daily, 1997). These services regulate the production of rangeland goods, the natural products harvested or used by humans such as, *inter alia*, wild fruit and nuts, forage, timber, game, natural fibres and medicines. More importantly, particularly for those in less developed economies, rangeland services support life by regulating essential processes, such

as purification of air and water, pollination of crops, nutrient cycling, decomposition of wastes, and generation and renewal of soils. They also assist by moderating environmental conditions by stabilising climate, reducing the risk of extreme weather events, mitigating droughts and floods, and protecting soils from erosion.

2.3.3 The importance of rangelands

The prophet Isaiah observed “all flesh is grass”. Bennett (1986), cited in Pirrto (1997), stated that grasslands are among the most important of the world’s resources. Grasslands or rangelands provide food for livestock, habitat and food for wild animals, stabilise soils, contribute to soil development, provide us with recreational use areas, yield water for many purposes, provide environmental and landscape amenities, provide raw materials and energy and a multitude of uses. Use of public rangelands by livestock remains a significant economic enterprise. Bennett (1983), cited in Pirrto (1997) said, that raising livestock is not only an ecological activity, it is also an economic activity and thus decisions respecting stocking rates on privately owned are certain to be influenced by the short-run economic considerations as well as by long-run ecological considerations.

2.3.4 Important range management principles

Because of the diversity of goods and services derived from rangelands, their management and health are linked closely to economic well being of many communities. Range management is based on the concept of land stewardship and it is guided by ecological principles. The objectives of range management are limiting the harvest of grass and insuring a proper stocking rate.

2.3.5 Deteriorating rangelands conditions occurring in the world

According to Piirto (1997), examples of worldwide rangeland problems are erosion, desertification, overgrazing, and maintenance of hardwoods, rangeland pests and predation and deterioration of the wildlife habitat. These problems often result because of lack of information, inappropriate use of technology, ineffective rangeland practices, economic pressures and a lack of appropriate management. The World Resource Institute (1986) reported that range specialists identify the key underlying causes of these well-intentioned but repeated failures as the export of inappropriate technology and a remarkable failure to view the range community of plants, animals and the people as an integrated system. The international picture of deteriorating rangeland conditions often progressing to the point of desertification is

summarised in State of the World (1986). Rangelands made barren through misuse look much the same in west Texas and Sudan. They can be restored only by the people who dependent on it. Unfortunately, in many regions today, livestock herds and the biological productivity of grazing lands are on a collision course, a path that diminishes both human and ecological welfare (Daily, 1997; Pirrto, 1997).

Failure to place value on communal rangelands is something the great majority of people have always taken for granted. People have underestimated the importance of rangelands where these are communally owned because nobody is prepared to take the responsibility to manage them. This is different when compared to privately owned rangelands in that these are well looked after. Most privately owned rangelands are fenced and are divided into paddocks where their animals are grazed in a rotational system. This practice rests and resuscitates the paddocks. Land as a scarce resource is something people have to guard jealously if left to degrade and deteriorate, productivity will also cease (Ntshona, 2002; Twine *et al.,* 2003a).

2.3.6 Land tenure systems

The greatest proportion of land in the homelands is held under some form of communal tenure (Lahiff, 2000b). According to Arokoyo and Chikwendu (1993), land is the major productive resource and lack of control over it is a major limiting factor for productivity. For centuries, traditional land tenure systems in Africa have made many black people little more than temporary custodians of their land: existing legal systems pertaining to access and use restrict them from exercising full authority over their land; the State still holds the land in trust for the people (Arokoyo and Chikwendu, 1993).

Since the creation of the African reserves in the late nineteenth and early twentieth centuries, most of their inhabitants have been able to obtain only a part of their livelihood from agriculture. Alternative solutions have been proposed to solve this problem including privatisation, imposition and enforcement of use rules by external forces such as the government or state ownership of the resource (Wade, 1996). It is unlikely that natural resource questions can be solved by private landowners or government. The transaction costs of enforcing use rules, imposed on the community by an external force, is likely to be prohibitively high due to the high incentives of individual users to evade or the community members to agree against the use rules.

In the presence of collective action, institutional and organisational development, and the development of infrastructure, population pressure is more likely to have a positive impact on natural resources than in the absence of these developments (Pender, 1999). The success of public polices to improve natural resource management depends largely on the presence and effectiveness of the local level institutions and organisations (Rasmussen and Meinzen- Dick, 1995).

Community natural resource management is increasingly recognised as a viable alternative to privatisation or state ownership of the resource. As a result, local resource management institutions and organisations to enforce them are receiving greater attention (Rasmussen and Meinzen-Dick 1995; Baland and Platteau, 1996).

Devolving the rights to local communities to manage resources, establish use rules and regulations and enforce the rules is only a necessary condition for successful community resources management. Sustainable resource management also requires the community rules and regulations be effectively observed (Turner *et al*., 1994; Swallow and Bromley, 1995). Therefore, identification of the factors that support or retard the development and effectiveness of local institutions and organizations becomes important. Land tenure may be defined as the terms and conditions on which land is held, used and transacted (Adams *et al.,* 1999). There are different types of land tenure systems, which are operational in the Eastern Cape Province, namely; communal, freehold, leasehold and quitrent land tenure systems. For the purposes of this study, much attention is going to be focused on communal tenure since this has direct bearing on the communal rangelands.

2.3.7 Communal land tenure

Communal land tenure is the form of land tenure where land is held by a group of people through shared rules, where their land administration systems are informed by and practiced in terms of shared values and customary systems (Amin and Van Schalkwyk, 1996). According to Depaah *et al.,* (2001), studies on communal land tenure systems in developing countries such as South Africa suggest that currently, communal land supports the majority of the rural population. Under a communal land tenure system, livestock and crop farming forms the backbone of the farmers' socio-economic and cultural values. It is, however, stated by Depaah *et al.,* (2001) that, due to a number of unregulated practices, land and other natural resources in communal areas are under threat of degradation.

Three different categories of land-use are allocated under communal land tenure, that is, residential, ploughing and grazing land. Lahiff, (2000) adds that all members of the community (counting tenants) have a right to residential land. This often includes enough land for homesteading, that is keeping small livestock and growing vegetables. Ploughing land is mostly reserved for the influential members of the community. By contrast, grazing land is owned communally. This shows that there is no equity in land use and access in communal areas. This elitist practice does not promote development. Communal land tenure has problems ranging from corruption, maladministration, nepotism and the inability to attract new farming skills due to the consideration of one's standing in the community.

2.3.8 The state of communal rangelands

The communal areas of South Africa are impoverished and overpopulated (Walker, 2002) and have been classified by agricultural officers as the most degraded land in South Africa (Hoffman and Todd, 2000). The stocking rates on communal rangelands are double or treble that of white commercial farms (Cousins, 1995). Communal land in South Africa is subject to a variety of tenure systems (Walker, 2002), but it has been argued that most South African communal land is now open-access rather than being managed as a common property, with decreasing commitment to natural resource management (Ainslie, 1998).

However, comparison between communal, commercial and protected rangelands indicates that not all communal rangelands are degraded. Some studies have found higher basal cover and more palatable grasses in communal rangelands while, others have shown little difference in soil erosion and herbage accumulation when communal rangelands are compared to commercial and protected rangelands (Shackleton, 1998). These results indicate that the need for communal rangeland management recommendations to be developed on a case-by case basis (Peden, 2005).

2.3.9 Utilisation of tree resources in the communal lands

Natural woody vegetation provides rural communities in the savannahs of the central lowveld with a wide range of resources, including fuel wood, poles for construction, poles for fences and animal pens, wood for carving utensils and implements, edible fruit, bark and roots for traditional medicine and leaves for livestock fodder (particularly for goats) (Twine *et al.,* 2003a). These resources are utilised for both domestic purposes and for generating income, and are widely

used even in high density rural settlements. Those communities that do not have the resources in their areas resort to buying from other communities. There is no fuel wood in Tsaba community and the farmers in this community buy the scarce resource from other communities.

Wood is still the major source of fuel for cooking and heating in rural South Africa (Giannecchini, 2001). The average household in the central lowveld uses in excess of three tonnes of fuel wood per annum (Dovie *et al.,* 2002). This wood is usually collected from the village commons by women, in bundles either on their heads or in wheelbarrows (Giannecchini, 2001). Indigenous wood is also used for poles to make fences and animal pens and in the construction of houses, both in the walls and roofing. Live stems are always cut for such poles (Banks *et al.,* 1996). Another use of indigenous wood is for carving domestic utensils (e.g. spoons and bowls), implements (e.g. axe and hoe handles) and ornaments. Wood carvings are used by most rural households (Twine *et al.,* 2003a). In addition to carving, indigenous wood is also used to manufacture furniture. Vast amounts of plant material, including tree bark and roots, are also used for traditional medicine in both rural and urban areas (Williams *et al.,* 2000). Finally, a wide range of indigenous edible fruit are used and are eaten fresh or dried, made into jam, or brewed into beer (marula beer) (Shackleton *et al.,* 2000). All of these resources are harvested from the vegetation on communal lands surrounding villages in the Eastern Cape region.

In the following section, the valuation of communal rangelands will be discussed. The researcher starts by explaining what economic valuation is and applicability of economics to environment. The tools that are used in economic valuation are also discussed, together with the types of valuation that are going to be used in this research. The livestock systems and livestock production in the communal rangelands are also discussed.

2.4 Valuation of communal rangelands

Economic valuation can be defined as the attempt to assign quantitative and monetary values to goods and services provided by environmental resources or systems, whether or not market prices are available to assist us. When market prices are not available (e.g. for flood control services, for disaster mitigation services, for erosion avoidance), the value is established by the willingness to pay for the good or service, whether or not people actually make any payment. A major problem in assessing the value of ecosystems arises when the services provided, such as climate change regulation or biodiversity conservation, benefit the global community.

There are at least two good reasons for evaluating rangeland services and goods:
1. In difficult financial times, it is not easy for government decision makers to spend taxpayers' money on environmental activities, especially if there is no broad support from the public. Rangeland valuation is a way to estimate ecosystem benefits to people and allows financial experts to carry out a Cost-Benefit activity, which might be in favour of environmental investment. Cost-Benefit analysis compares the benefits and costs to society of policies, programmes, or actions to protect or restore an ecosystem. It is therefore an important tool for environmental managers and decision makers to justify public spending on conservation activities and rangeland management (Lambert, 2003).

2. The other good reason is that people are not always aware of the values of rangelands. By giving objective evidence to sceptical managers and the public of the monetary and non-monetary benefits of rangelands, environmentalists will gain their support. Most people only care about what they love or what brings economic benefit to them. By helping citizens to improve their living conditions by using and selling rangeland goods and services, individuals will gain strong supporters for their cause (Turner, 1999; Lambert, 2003).

Economic valuation is but one of many ways to define and measure values. Other types of value (religious, social, cultural, global, intrinsic) are also important, but the economic value is the most important in most countries when decision makers have to make difficult choices about allocation of scarce government resources.

Economic valuation is not an easy and non-conflictive exercise. It often depends on human preferences. In other words, it depends on what people perceive as the (positive or negative) impact rangelands have on their well-being. In theory, the economic value of any good or service is measured in terms of what people are willing to pay for the commodity less what it costs to supply it. However, often, because they are perceived as common goods, people feel that they do not have to pay for rangeland products and services. In this case, the value is provided by the estimation of the willingness to pay, whether or not they actually make any payment (Freeman, 2003; Goulder and Kennedy, 1997).

2.4.1 Valuation tools

In recent decades, various valuation tools have been developed to estimate the monetary value of non-marketed goods and services. Munasinghe's (1992) classification of major value categories has proved to be a useful analytical tool to link value categories and their underlying environmental goods and services with specific valuation tools as shown in Table 2.1 and Figure 2.1. Only the most commonly used valuation tools are presented here.

Economic valuation is a process of quantifying the economic value of a particular change in the level of a good or service. A benefit of the economic valuation is that it provides a process that is grounded in the economic theory and information that can be used to evaluate the trade-offs that inevitably arise in environmental policy choices (Heal *et al*., 2004). By using universal measure (normally monetary to value changes), it allows a comparison of possible changes and hence facilitates a choice among them. The use of monetary measures (e.g. rand equivalent) for quantifying values is based on the assumption that individuals are willing to trade the change being valued for more or less of something else that can be represented by or bought with the measure (i.e. rands). It thus assumes that good being valued is in principle substitutable or replaceable by other goods and services (Heal *et al.,* 2004).

2.4.2 Quantifying rangeland values

The next question is how adequately to put a monetary value on rangeland products or services. The idea behind the evaluation of rangeland products and services is to show that, in some cases, maintaining the natural functions of the ecosystem as untouched as possible can be economically valuable and generate profit. Of course, to do so, one has to compare the price of the rangeland product originating from a well-preserved rangeland with the price of producing similar goods or services in an environmentally less friendly way: constructing irrigation schemes, promoting input-intensive agriculture, transforming lands into grazing fields. The key to this exercise is to internalise cost externalities (Emerton, 1998; Barbier, *et al.,* 1997).

The easiest way to do this would be to apply the market price method (the law of supply and demand) but this is unfortunately not always possible because for some rangeland products there is simply no market or because some rangeland values are intrinsically non-marketable. These market failures occur when markets do not reflect the full social cost or benefit of a good.

Table 2.1 Example of links between value category, functions and valuation tools

	USE VALUES		NON-USE VALUES		
Use	1. Direct use Value	2. Indirect Use Value	3. Option Use Value	4. Bequest Value	5. Existence Value
Functions	Wood products (timber, fuel) Non-wood products (food, medicine, genetic material) Educational, recreational and cultural uses Human habitat	Watershed protection Nutrient cycling Air pollution reduction Micro-climatic regulation Carbon storage	Possible future uses of goods and services mentioned in 1&2 (use values) by stakeholders	Possible future uses of goods and services mentioned in 1&2 (use values) by offspring of actual stakeholders	Biodiversity culture, heritage Benefits to stakeholders of only knowing of the existence of goods or services without using them
Valuation tools	**Tool to be used** Market Analysis Related goods Approaches Travel Cost method Contingent Valuation method Hedonic pricing	**Tool to be used** Restoration Cost Preventive Expenditure Production Function Approach Replacement Costs	**Tool to be used** Contingent Valuation Method	**Tool to be used** Contingent Valuation Method	**Tool to be used** Contingent Valuation Method

Adapted: (Lette and de Boo, 2002)

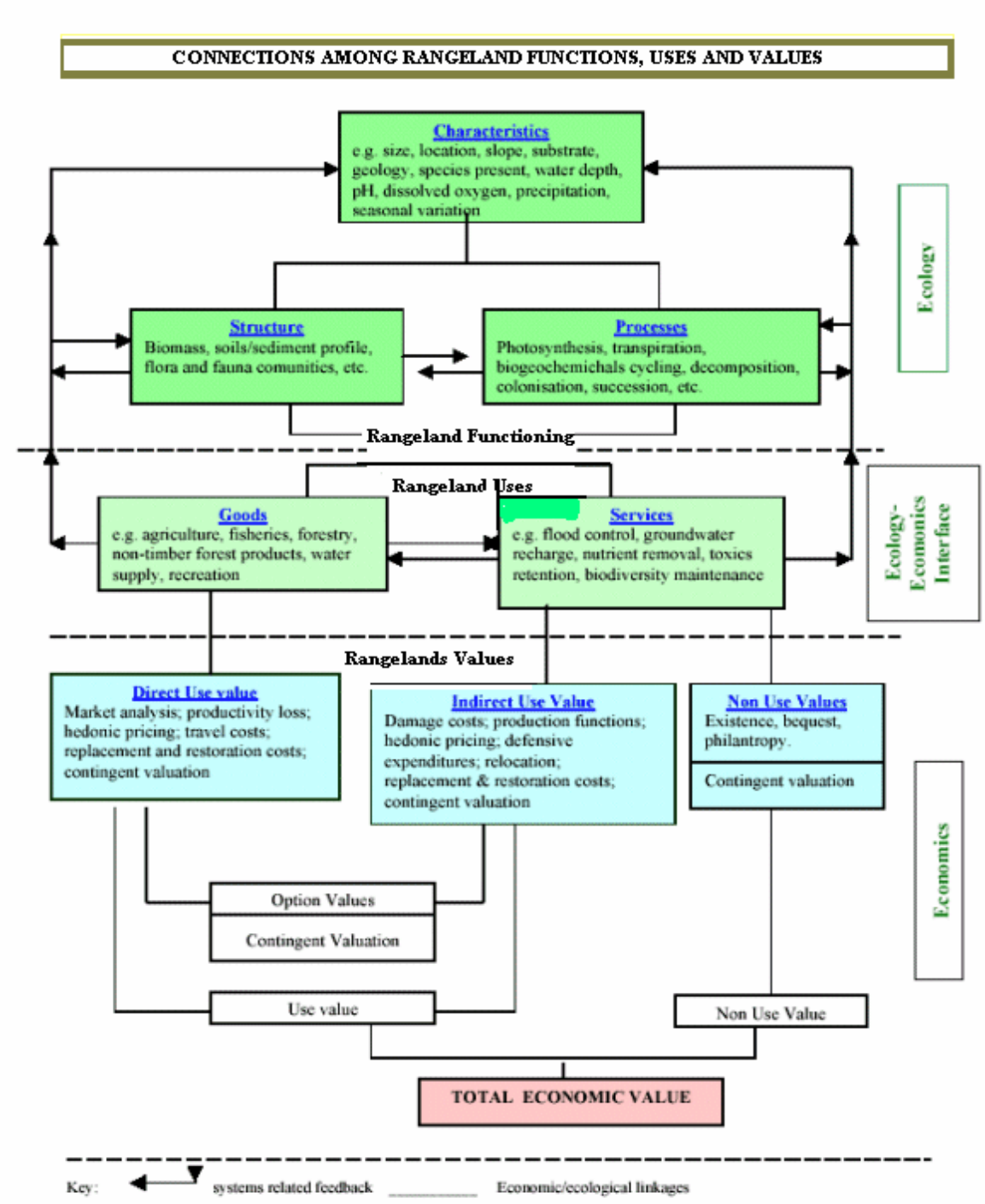

Figure 2.1 Connections among rangeland functions, uses and values.
Adapted from: Lambert (2003)

Market failures related to ecosystems include the fact that many rangelands (1) provide services that are public goods, (2) many rangeland services are affected by externalities and (3) property rights related to ecosystems and their services are often not clearly defined (Lambert, 2003).

Another limitation of the market price method is that it does not always automatically reflect the real value of a good. There are many cases where the actual willingness to pay is much higher than what the customer actually pays. However, several (non-perfect) methods have been devised to help quantify or give an order of magnitude for specific rangeland values (Barbier *et. al*, 1997).

Using these methods, Table 2.2, might seem complicated or very exhaustive for most economic neophytes. However, behind the apparent complication there is ample room for the application of common sense.

Economic and financial valuation is not a panacea. There are cases where:

- It should not be carried out. If the ecosystem that is being valued is, for example, a range site with a very rare and highly threatened endemic species and with little potential economic benefit to local people, it is evident that the environmental valuation should take precedence over any economic valuation. The cost of the loss of endemic species is much higher than the benefit derived from the collection of, say, a few bird eggs for a short period before the bird eventually becomes extinct. The same logic can be applied to religious values. In some countries, they are above all economic values.
- It should not be done in an exhaustive way. In most countries, it will be difficult to find qualified economists to carry out an in-depth economic valuation exercise but some of the methods proposed above can be used by non-economists. Sometimes, the economic benefits are so important to so many people that a rapid economic assessment would be enough to allow decision makers to take decisions. Protecting a rich costal ecosystem in which a large number of fishermen make a living against the destruction of mangroves for the construction of a road might not require an extensive evaluation (Lambert, 2003).

Table 2.2 Common quantitative evaluation methods.

Method	Applicable to…	Description and Importance	Constraints and limitations
Market Price Method	Direct use values, especially rangeland products.	The value is estimated from the price in commercial markets (law of supply and demand)	Market imperfections (subsidies, lack of transparency) and policy distort the market price.
Damage Cost Avoided, Replacement Cost or Substitute Cost Method	Indirect use values: coastal protection, avoided erosion, pollution control, water retention.	The value of organic pollutant or any other pollutant's removal can be estimated from the cost of building and running a water treatment plant (substitute cost). The value of flood control can be estimated from the damage if flooding would occur (damage cost avoided).	It is assumed that the cost of avoided damage or substitutes match the original benefit. But many external circumstances may change the value of the original expected benefit and the method may therefore lead to under- or over-estimates. Insurance companies are very interested in this method.
Hedonic Pricing Method	Some aspects of indirect use, future use and non-use values	This method is used when rangeland values influence the price of marketed goods. Clean air, large surface of water or aesthetic views will increase the price of houses or land.	This method only captures people's *willingness to* pay for perceived benefits. If people are not aware of the link between the environment attribute and the benefits to themselves, the value will not be reflected in the price. This method is very data intensive.
Contingent Valuation Method	Tourism and non-use values	This method asks people directly how much they would be willing to pay for specific environmental services. It is often the only way to estimate the Non-Use values. It is also referred to as a "stated preference method".	There are various sources of possible bias in the interview techniques. There is also controversy over whether people would actually pay the amounts stated in the interviews. It is the most controversial of the non-market valuation methods but is one of the only ways to assign monetary values to non-use values of ecosystems that do not involve market purchases.
Productivity Method	Specific rangeland goods and services: water, soil, humidity in the air.	Estimates the economic values for rangeland products or services that contribute to the production of commercially marketed goods	The methodology is straightforward and data requirements are limited but the method only works for some goods or services.

Adapted from Barbier, E.B., Acreman, M and Knowler D. (1997) and Lambert, A (2003

A partial or rapid economic valuation might be enough to show trends or give an overview of the situation and be a valuable input to the decision-making process. Of course, if decision makers do not care about the people they are making decisions for, there is nothing an evaluation exercise or the absence of an evaluation can do.

2.4.3 Types of valuation

According to Hawkins, (2003), there are two ways that something can be valuable: instrumentally or intrinsically. The instrumental (or utilitarian) means that something has value because it is useful to something else and intrinsic means that something has value in and of itself, not because something else deems it valuable. In the environmental philosophy, these two values can be ascribed from three different view points: ecocentric, biocentric or anthropocentric. In the ecocentric view point, ecosystem processes have intrinsic value while individual species have instrumental value. Biocentric holds that animals and plants have intrinsic value while non-living nature has the instrumental value. With anthropocentrism, only humans have intrinsic value, while everything else (i.e. nature) has instrumental value (Meffe and Carroll, 1997)

The economic approach to ecosystems is one of anthropocentric instrumentalism. Ecosystems and their services are valuable if they serve and satisfy human beings. Many environmentalists would immediately recoil at this thought, asserting that nature has intrinsic value. However, anthropocentric utilitarianism does not necessarily mean that ecosystems must be exploited and have no value in their natural state (Goulder and Kennedy, 1997). There is a range of values, many of which are presented by intrinsic rights proponents (Toman, 1997). It is important to realize that the economists' utilitarian values can, at least in theory, be measured and quantified, while intrinsic values cannot (Brown *et al.,* 1993).

The term value system; value and valuation have a range of meanings in different disciplines. In this study, the researcher will provide a practical synthesis of these concepts in order to address the issue of valuation of communal rangelands. The researcher wants to be clear about how he would use these terms throughout the analysis. According to Farber *et al.,* (2002), value systems refer to intrapsychic constellations of norms and perceptions that guide human judgement and action. Farber *et al.,* (2002), refer to the normative and moral frameworks people use to assign rights and necessity to their beliefs and actions but because of value system framework now people assign rights to things and activities, they also imply practical objectives

and actions. The researcher uses the term value to mean the contribution of an action or object to user-specified goals, objectives and conditions (Costanza, 2000). According to Farber *et al.* (2002), a specific value of that action or object is tightly coupled with a user's value system because the later determines the relative importance of an action or object to others within the perceived world. In the current context, communal rangeland valuation represents the process of expressing a value for communal rangelands goods or services (i.e. biodiversity, flood protection, recreational opportunity), thereby providing the opportunity for scientific observation and measurement.

Value can also be measured in terms of willingness to pay by all affected consumers for the relevant project benefit. The rationale for doing so derives from applied economic welfare analysis. This approach argues that economic welfare derives from preference satisfaction and that preference satisfaction is reflected by the consumer's willingness to pay. People have underestimated the importance of rangelands where these are communally owned. This is different in the private owned rangelands in that these are well looked after. Most of them are fenced and divided into paddocks where the animals are grazed in a rotational system. This practice will give rest the paddocks and give them time to recover.

Economic information is valuable to decision-makers trying to encourage efficient and sustainable use of communal rangelands. The type of economic value information needed will depend on what it will be used for. Communal range economic value information is generally used in three broad ways: for advocacy purpose; when choosing between alternative uses; and when wanting developers to pay for externality costs of their activities on range ecosystems (Scoones, 1992; Edwards and Abivardi, 1998).

The literature on communal rangelands is extensive but very little includes examinations of rangelands valuation. A few studies have attempted to estimate the costs of rangeland degradation. For example, UNEP (1992) cited in Arntzen (1998), estimated global and continental degradation and associated losses in income. Globally, income losses due to rangeland degradation are estimated to be in the region of US$7/ha (Arntzen, 1998:1). According to Cousins (1999), in recent years, environmental economists have elaborated on a number of concepts and methods for assessing the costs and benefits of human use of the natural environment. Much of this innovation has been motivated by a desire to provide economic arguments for biodiversity conservation (Edwards and Abivardi, 1998), but many of

the analytical tools which have emerged can also be used to understand, value and underpin policy advocacy for multiple rural livelihood strategies (IIED, 1995).

Economists divide values into two main categories: use and non-use values (Figure 2.2). Use values are derived from physical involvement with some aspects of an ecosystem. Economic values of communal rangelands can further be grouped into three categories, namely, direct-use values, indirect-use values and non-use values. Direct-use values are those that derive from human consumption, either directly (e.g. wild foods or building materials) or via livestock products (milk, meat, draught power, etc). Some may be marketed, but many are not. Many direct uses are consumptive but some (e.g. tourism) are not. Some resources have important indirect values, which arise from supporting humans or what humans directly use. Regulation and habitat functions, such as waste assimilation, photosynthesis, flood control or nutrient cycling would fall into this category (Adamowicz, 1991; Brown *et al.*, 1993; Edwards and Abivardi, 1998; Goulder and Kennedy, 1997).

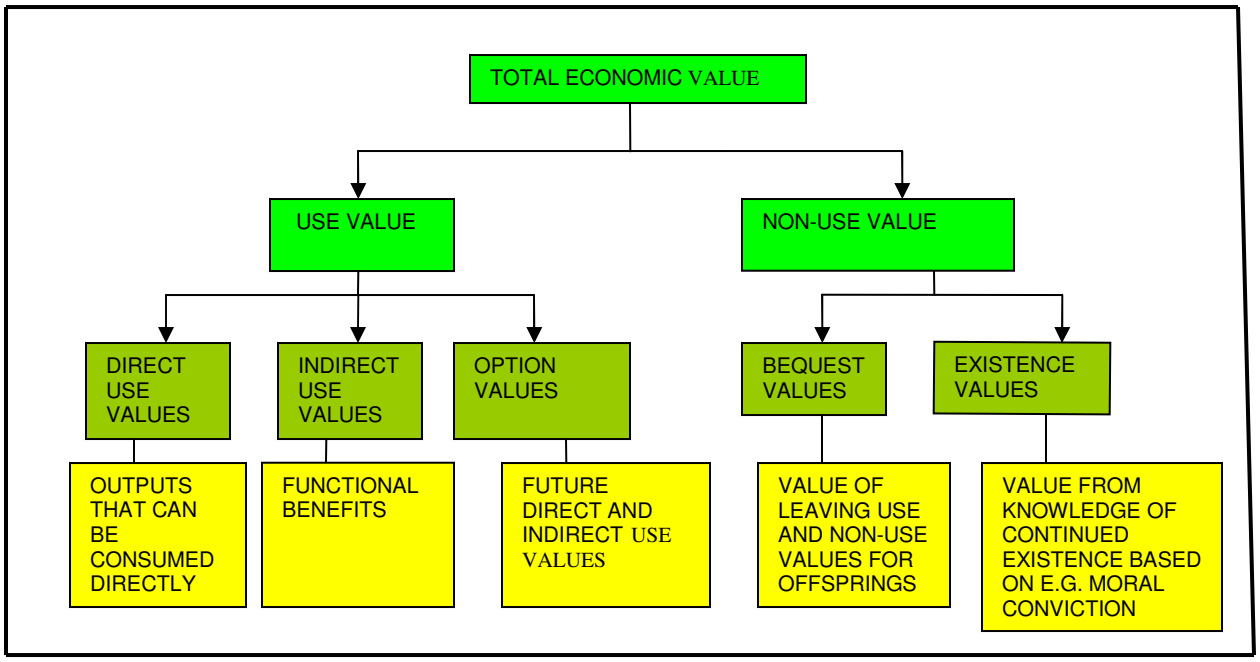

Figure 2.2 Types of values
Adapted from Edwards and Abivardi, 1998

Non-use values do not involve physical interaction. This includes existence, bequest and option values. Existence value (sometimes called passive use) is derived from the satisfaction of knowing that a certain species or ecosystem exists, even if it will never be seen or used.

Bequest value is satisfaction from being able to pass on environmental benefits to future generations (Adamowicz, 1991; Edwards and Abivardi, 1998). Option value pertains to the possible use of a resource in the future. This has to do with uncertainty and risk-aversion. An example is the preservation of tropical rain-forests because we may be able to find new medicines (Adamowicz, 1991; Brown *et al.*, 1993; Edwards and Abivardi, 1998; Goulder and Kennedy, 1997).

As cited by Cousins (1999), methods that are used to undertake valuation of these different dimensions of total economic value include marketed products by measuring prices and quantities sold, and deducting costs, including non-financial costs (e.g. own labour) sometimes termed 'derived demand'. Non-marketed products are valued through surrogate market valuations (substitute goods methods, barter values), or opportunity cost valuations. Indirect uses are measured using replacement costs of ecological service functions and non-use values are measured by contingent valuation (willingness to pay)

In the absence of markets which allocate definite monetary values (i.e. prices) to the resources, surrogate market or opportunity cost valuations, replacement costs and contingent valuations make much use of 'best-guess' estimates and range of simplifying assumptions (IIED, 1997). Nevertheless, they have been used to make very strong arguments for biodiversity conservation in Canada and elsewhere (Edwards and Abivardi, 1998)

During the Hidden Harvest project which was carried out by the International Institute for Environment and Development (IIED), the organisation developed an innovative methodology which combined Participatory Rural Appraisal (PRA) methods with those of environmental economics and conventional ecological research, and advocates for 'methodological complementarity'. The main focus is on local-level valuation which draws on the local people's indigenous knowledge and combines that with economic and ecological analysis. Indigenous knowledge is very important because many resource uses are site-specific and seasonal, vary between social and cultural ethnic groups, are often opportunistically or even illegally, are often marketed though informal market or consumed directly, or are valued for indirect use or non-use, and are institutionally mediated (IIED, 1997).

Valuing rangelands is not limited to valuing the economic and monetary benefits rangeland ecosystems can bring to humans. It is about attributing a value to all kinds of benefit to humans

and/or to nature, including religious values, social values, environmental values (biodiversity, climate change and intrinsic value), aesthetic values, economic values and any other. All values are good. The challenge is to set priorities according to local realities and for the benefit of both humans and nature. It requires an *ad hoc* approach (Cousins, 1999).

2.4.4 Livestock systems

According to Peden (2005), the objectives of communal rangeland users differ markedly from those of commercial farmers, and stocking rates make economic sense to the later. Livestock support multiple livelihood strategies and are used for milk, traction, bride-wealth, manure, ceremonial slaughter and transport (Peden, 2005). Livestock are commonly perceived as symbols of wealth and status (Cousins, 1995).

Figure 2.3: Cattle in the rangelands in Lashington community.

2.4.5 Livestock production and the valuation of non-marketed outputs in communal areas.

Low input, small-scale livestock husbandry remains a primary land use option in communal areas over most of southern Africa (Behnke, 1985; Cousins, 1994). Under circumstances of variable macro-economic policy, labour markets and changing environmental regimes, people adopt multiple livelihood strategies (Chambers, 1997; Cousins, 1999). Such strategies include livestock production in communal areas (Tapson, 1991), and the harvesting of natural resources

(Shackleton *et al.,* 2002). The formal cash income streams, most especially from non-agricultural sources, have also provided income to households, but often in combination with the land-based sources. Livestock production in communal rangelands has been noted to yield high economic returns (Barrett, 1992). Economic values could be higher than those for commercial ranches that rely on single purpose production, such as for beef. Low returns to livestock production in communal areas could be attributed to insufficient empirical case studies (Dahlberg, 1995), the use of conventional and sometimes inappropriate economic models to measure production and financial returns (Cousins, 1999), and failure to consider all uses. Recent studies (Campbell *et al.,* 1998; Shackleton *et al.,* 1999; Adams *et al.,* 2000) have attempted to place monetary values on non-marketed benefits from livestock in communal areas. These have resulted in the use of either different technique based on conventional commercial economic models, and thus only making use of data on marketed output, or calculating direct-use values associated with the producers' objective in a livelihood system (Cousins, 1999). The second option notably takes into account the value of products that are without formal markets, and giving way to attributing monetary value to direct-use values without using a derived—demand approach. It, however, is acknowledged that quantifying non-marketed outputs in monetary terms is difficult, and can be controversial. In spite of this, using direct-use values have been found to be flexible and appropriate (IIED, 1997; Edwards and Abivardi, 1998). Several valuation approaches have, however, been carried out on areas, such as on a per hectare basis (Scoones, 1992) and/or on individual animal basis. The lack of accounting of all uses in a multipurpose livelihood system potentially results in significant underestimation of livelihoods, and hence the need for drastic conceptual and methodological shifts. Households do depend on livestock for the milk and meat they provide, and many non-marketed outputs from cattle, such as for local transport of goods, (Scoones, 1992). Smaller animals such as goats and sheep are also kept for their meat, and the short-term monetary returns they generate on sale are enormous. Livestock provide opportunities for socio-cultural uses, and returns such as dung and draught power for crop cultivation (Barrett, 1992).

Thus all goods and services obtained from livestock by rural communities need to be investigated, and valued, yet few studies have done this (Shackleton *et al.,* 2001). Several studies have investigated the role and importance of livestock in communal areas in southern Africa (Cousins, 1996). Most focus has been on cattle and reasons why rural households maintain large numbers of cattle in the face of alarming levels of degradation. Some omissions from the South African studies to date include little consideration of the value of small stock; no

systematic analysis of the role of livestock in the livelihoods of non-owners; little estimation of costs associated with livestock production in communal areas; and little quantification of the total value of cattle and other livestock to households as the unit for livelihood analysis (Shackleton *et al.,* 1999b). In terms of the last, most studies have either not provided values for goods and services or, where given, these have been expressed as outputs from either the national herd or a herd of, for instance, 100 head (e.g. Barrett, 1992), or per animal unit, or as a value per hectare. This does not easily allow for comparison with other contributions to rural livelihoods. Furthermore, a herd-based approach assumes all cattle owners are using all livestock goods and services, which does not usually follow.

There are a number of broad conclusions or commonalities between the studies to date that characterise livestock production systems and their role in rural livelihoods, including:

- Few households, less than 30 per cent possess cattle (Vink, 1986; Smith, 1992; Cousins, 1996; Shackleton *et al*, 1999b), although there are exceptions (Tapson, 1990; Ainslie *et al.,* 1996). About 60 per cent of rural households in the former homelands own goats (SSA, 1999).
- Cattle ownership is highly skewed (Vink, 1986; Fischer, 1987; Hatch, 1996), with those households receiving higher off-farm income usually owning larger herds and accounting for a disproportionate percentage of the total number of cattle.
- Although, few households own cattle, the benefits are more widely distributed through a number of mechanisms, including bride wealth payments, loaning of animals, cooperative ploughing arrangements, meat and milk sharing, and hiring out and selling of goods and services. Thus, overall, cattle may have an important social and financial role in the community as a whole (Shackleton *et al.,* 1999).
- Livestock ownership and production in communal areas is multipurpose in character, with both cattle and goats, and at times sheep serving a greater diversity of functions than in a typical commercial production system. The primary objectives of herd owners are to maximise the yield of consumable products and services, as well as to increase the size of the household 'investment levels' for savings and security (Tapson, 1991).
- Poor households and owners of smaller herds appear to make greater use of a larger range of goods and services provided by livestock than households that are rich. Wealthier households tend to purchase or use more alternatives (e.g. tractor draught, pasteurised milk), which poorer households cannot afford (Shackleton *et al.,* 1999).
- The general external perception is that communal livestock systems are unproductive and with little off take. Direct comparisons of the productivity (in terms of calving rate or animal

growth rates) of communal systems and commercial systems usually and that production is lower in communal systems (Tapson, 1991), although not always when expressed on a per hectare basis rather than a per animal basis. Such comparisons ignore the range of products and benefits obtained by households in communal systems. When all goods and services are valued, communal systems often exhibit higher returns (Colvin, 1985; Barrett, 1992; Scoones, 1992; Hatch, 1996). Reproductive rates are lower in communal systems than private commercial systems. This is a reflection of the high proportion of male animals in communal herds required for draught power (Buchan, 1988) and density-dependent effects of high stocking rates (Shackleton *et al.,* 1999b).

- The higher values per hectare are not only a result of multiple goods and services from livestock, but also lower input costs (Hatch, 1996) leading to higher net returns on investment (Shackleton *et al.,* 1999). However, Campbell *et al.,* (1998) have argued that returns are less than optimal in communal areas. After modelling various scenarios, they suggest returns could be improved through adoption of a conservative tracking scenario, where stock densities are reduced and managed opportunistically relative to changes in climatic and economic factors, with both economic and ecological benefits.
- Studies across southern Africa reveal that the goods and services obtained from livestock are similar throughout, but that the relative importance of these may vary from place to place. These differences can be related to a number of factors, including agro-ecological conditions, herd size, alternative sources of income, or a combination of these (Hatch, 1996). For example, in semi-arid and arid areas, off take for sales tends to assume greater importance than goods for consumption because agriculture is less viable and because herd owners cannot rely on crop production for income and food security (Colvin, 1985).
- Owners' priorities change over time according to changes in livelihood strategies or household income, or in relation to drought cycles. For example, following a drought, the main objective may be to build the herd and owners may invest in purchasing animals. Any kind of off take will be negligible. As the herd grows, slaughtering and cash sales are likely to increase in frequency and importance (Barrett, 1992).
- Animal draught, although still important, is being used less as mechanised traction becomes more available and affordable (Shackleton *et al.,* 1999). This is influenced by the economic profile of the area, with the more remote and isolated rural areas relying on animal draught power to a greater extent than those where there is more disposable cash.

- Milk production, mainly for home consumption, is an important function in most areas, as is 'savings' in the form of animals that can be sold for emergency cash (Hatch, 1996; Shackleton *et al.,* 1999).
- The importance of culturally related functions such as lobola payments and ritual slaughtering varies between regions, but in all areas, these are of less significance than other more direct-use functions.
- Off take is generally perceived to be low (Hatch, 1996). However, this applies only in terms of sales through formal markets. Accounting for home slaughter, bride wealth payments, theft, local sales, etc indicates that off take is only slightly less than levels for private, commercial enterprises (Tapson, 1991; Shackleton *et al.,* 1999).
- Households owning both cattle and small stock capture a greater proportion of the total annual value 'available' than households that own either only one or the other, or do not own any (Shackleton *et al.,* 1999).

2.5 Indirect-use values of livestock

There is little doubt that the savings and cash uses of livestock are of significant importance, as written by Gandar and Bromberger (1984), Vink (1986), Fischer (1987) and Shackleton *et al.,* (1999). However, the importance of the savings value attached to livestock is not sufficiently reflected by assigning a financial value that is usually calculated using a function for mean growth rates of the household herd. Rural people repeatedly stress the significance of having livestock to sell when calamities befall a household, such as retrenchment, death of a breadwinner, divorce, etc (Shackleton *et al.*, 1999).

Additionally, non-owners have access to and are given products and services from livestock. This too is an important contribution to resource-poor households or those suffering temporary setbacks. They get meat, milk, dung and access to ploughing through kinship and neighbour relationships.

Savings play another role in terms of owners' and non-owners' perceptions of the use and value of livestock, namely security. Many households do not use several of the potential range of goods and services that livestock offer, yet they appreciate having the option to do so should the need arise. This is particularly apparent with regard to slaughter, sale and payment of *lobola*, i.e. many households never slaughter, sell, or use livestock to fulfil bride wealth obligations, but they would if the need arose. Thus, for many households the value of cattle for

these goods and services is a potential value rather than an actual value, but this potential value can be realised at any stage.

2.6 Land use planning: The value of ecosystem services in determining the fate of the landscape

An ecosystem may be maintained in a variety of forms from natural to semi-natural and to developed, depending on the function that society demands from it. The goods or services that can directly or indirectly fulfil human needs from a given ecosystem are termed “ecosystem services”. Although these services can be valuated in economic terms, many substantial ecosystem services provide less tangible social-cultural benefits. Because land-use decisions tend to be dominated by economic values (De Groot 2006), many ecosystem services that provide long-term value are being eliminated in exchange for short-term monetary gains.

According to Balmford *et al.,* (2002), due to the ecological complexity of natural and semi-natural ecosystems, it is hard to define the total value that can be derived through a given land-use. Thus, the value of ecosystem services for complex systems in nature is generally underestimated. Despite the general underestimation of ecosystem services values, Balmford *et al.,* (2002) concluded from their survey of 300 case studies that the benefit flows of an intact ecosystem outnumber those of a system by a factor of 100 to 1. For the purposes of this study, intact refers to an ecosystem that has not been significantly altered, maintaining a multi-functional use; a converted refers to a system that has been significantly altered from its natural state to be used for a single-function (i.e. cropland, industrial land, development). In their estimates, maintaining a global network of strictly protected reserves (intact ecosystems) would result in a net value of billions of dollars when compared with the land’s value had it been converted. With this considerable economic value, it seems illogical for policymakers and planners to not prioritize land-use options based on the value of all ecosystem services, rather than the short-term economic gain derived from only a few. Balmford *et al.,* (2002) suggest several reasons why land is continually being converted despite the many advantages of leaving the land intact. According to Justen (undated), currently, the market system favours land conversion by providing immediate private benefits for land conversion that outweigh the benefits of leaving these lands intact. If better incentives were given for maintaining intact systems, such as carbon and biodiversity credits or premium prices for products obtained from the intact ecosystem, the private sector’s desire to keep land intact could increase. In addition, land continues to be converted and damaged because governments intervene with subsidies that encourage land conversion. Should the criteria and dispersion of subsidies be shifted to

favour the development of land for the purpose of sustainable use of ecosystem services and goods, land-use may shift more in the direction of leaving lands intact. The development of policies favouring land-use planning based on ecosystem services are hindered due to a lack of information transfer to policy makers that defines and values all of the services for a given ecosystem. Perhaps if policy makers and the public were better informed of all the services and their values, decision-making might favour leaving a system intact more often than not.

The role of policymakers and planners in determining the best use for a given piece of land is crucial for the maintenance of a global reserve network. De Groot (2006) has developed a flow diagram for the use of ecosystem functions and valuation in land-use planning and decision-making (Fig. 2.4). With this method, ecosystem services supply one or more functions that hold a combination of ecological, socio-cultural, and economic values. These values compared for a variety of land-use options are incorporated with stakeholder participation to perform a cost-benefit analysis that determines the trade-off options of each land-use scenario. How any proposed landscape will be managed and any conflicts that a proposed landscape creates are incorporated into this analysis. A decision is then made based on the results on the analysis.

An ecosystem function is the ability of a natural process to fulfil human needs directly or indirectly. Ecosystem functions can be divided into five categories: regulatory, habitat, production, information and carrier, each with different valuation methods. Regulatory functions result in the maintenance of clean air, water and soil, while habitat functions maintain biodiversity. Regulatory and habitat functions are generally best described with an ecological value. Production function is one of the easiest functions to value as this function creates biomass for human use, providing a direct economic value.

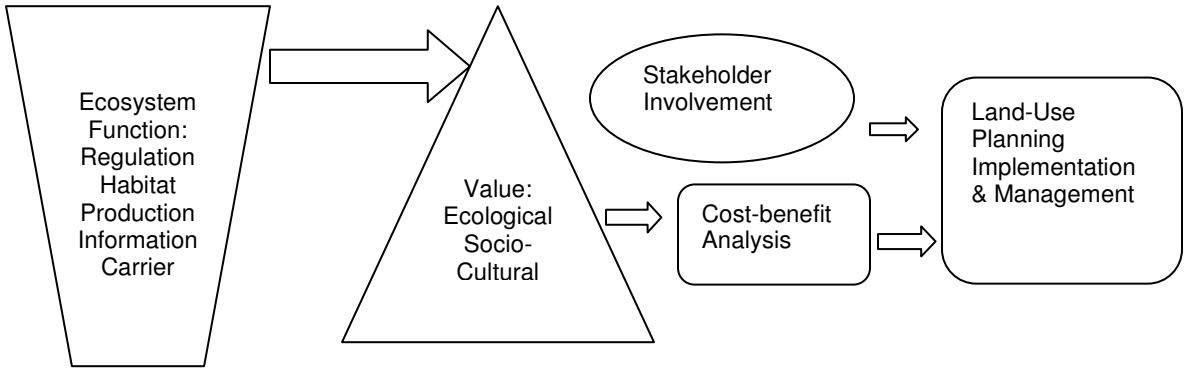

Figure 2.4 Function Analysis of Land-use planning.

Adopted from: De Groot's (2006)

The information function provided by an ecosystem relates to the enrichment and education that can be obtained from it. This is one of the functions more difficult to value as it involves socio-cultural valuation techniques based on individual preferences (Justen, undated).

However, this value may be the most influential to the success of a given ecosystem as it assesses the connection that a community has with the ecosystem. The fifth ecosystem function that is used in valuating an ecosystem in De Groot's function-analysis is the carrier function. The carrier function assesses the resilience of a landscape and refers to the ability of an ecosystem to be permanently changed without significant damage (i.e. roads, development); this function can have both an economic and ecological value.

The communal rangelands of the Eastern Cape, like everywhere, where land is owned communally are fast degrading due to overpopulation and mismanagement of these areas. People are getting fuel wood, thatch grass, traditional medicines, wild foods, building materials and grazing lands from these areas just to mention a few of the direct-use values that are provided by the communal rangelands. These practices are leading to the degradation of the communal rangelands. The depletion of vegetative material will impact negatively on the communal rangelands in that there will be no clean air for people to breath. This depletion of vegetative material will also lead to soil erosion, there will be no nutrient cycling in agricultural lands and no pollination of crops by wild species. Nutrient cycle and pollination of crops are some of the indirect-use values from the communal rangelands, hence, the desire to carry out an economic valuation exercise. Some communities are contemplating fencing their communal grazing areas and establishment of ranches as corrective management measure to curb the degradation of natural rangelands (Sebina and Duvel, 1999).

The study was stimulated by the desire to establish the annual direct and indirect-use value of communal rangelands in the Eastern Cape Province of South Africa through economic valuation processes. Most researchers have dwelt much on the direct -use value of the communal rangelands and very little has been established on the indirect-use value and nothing on non-use value has been done, which is the gist of the matter in this research work. Non-use values are an important component of total value for the communal rangelands. It is hoped that on completion of this work, the economic value of the communal rangelands is going to be

established and this can be used by policy-makers to make informed decisions at local and national level.

In this chapter the, writer reviewed literature on rangelands in general, tenure systems, uses of rangelands, communal rangelands in the Eastern Cape, valuation and land use planning of communal rangelands. Chapter three is going to focus on background to the study area.

CHAPTER THREE

BACKGROUND OF STUDY AREA

3.1 Introduction

The intent of this chapter is to set the stage by providing a description of the physical environment and the quality of the natural resources that are available to the farmers of Lashington, Magwiji and Tsaba communities. The researcher describes climate and rainfall patterns, topography and vegetation. The chapter serves to compare and contrast the three communities with regard to opportunities, constraints and options for the land-based livelihoods. This chapter is based largely on the literature and secondary sources, including surveys and related data collection carried out in the three communities.

A general brief overview of the whole of the Eastern Cape Province is done and then focused on the particular study sites. The area was a site of prolonged struggle between native peoples, principally Xhosa-speakers, and European colonists throughout the eighteen and nineteenth centuries, which saw the defeat and subjugation of the African chieftaincies and the loss of the majority of territory to white settlers. In the twentieth century, under policies of segregation and apartheid, the Eastern Cape was divided territorially into zones of 'white' occupation, which formed part of the Republic of South Africa, and the native reserves (later 'African homelands', or Bantustans) of Transkei and Ciskei, which for a time achieved the dubious status of 'independent republics'. The separation of people along racial lines, as in the rest of South Africa, was accompanied by massive forced removal of African, Indian and coloured people, widespread dispossession of land and other property, and severe curtailment of social, economic and political rights. The result was one of the most unequal societies in the world, with a relatively small white minority enjoying high standards of living and the great majority of the black population consigned to a life of extreme exploitation and poverty (May *et al.*, 2000: 26).

3.2 Study Area

The Eastern Cape Province officially came into being in 1994 when the political boundaries in South Africa were redrawn, and the country was subdivided into nine new provinces. Amalgamation of the East Cape and the Ciskei and Transkei homelands formed the Eastern Cape Province (Fig. 3.1). It consists of approximately 170 000 km^2, nearly 14% of the total area of South Africa.

Figure 3.1 Detailed Map of the Eastern Cape Province
Source: Adopted from www.ru.ac.za/contact/ecmap.htm

A division of the Eastern Cape into homogeneous agro-ecological zones does not yet exist. Diversity in climatic and topographic conditions found in the province makes such a subdivision difficult. Differences in scale and criteria used to identify agro-ecological zones in the various former political entities that make up the province do not assist integration of the available information. There are also gaps in the information available. For example, there is not yet a soil map for Transkei (van Averbeke *et al.,* 1995; Lent *et al.*, 2000).

3.2.1 Geology

Most of the rocks found in the Eastern Cape are sedimentary in origin. Sandstones, mudstones and quartzites of Ordovician to Devonian age outcrop in the coastal belt from Port Elizabeth to Grahamstown. The rest is covered by sandstones and mudstones of Permian to Triassic age, which are intruded by Jurassic-age dolerite dykes and sills (Truswell, 1977).

3.2.2 Topography

Generally, the topography of the Eastern Cape is steep. About a third of the province consists of mountain ranges with large differences in local relief. Plateaus with medium to large differences in local relief cover just over half of the area (53.3%). Only a small part consists of relatively level plains (11.0%) and river valleys (4.6%). The valleys are usually deeply incised and the occurrence of level land of alluvial origin is generally limited and localised (van Averbeke and de Lange, 1995). Broadly speaking, three altitude levels can be identified in the Eastern Cape.

The first level is the coastal plateau, with an altitude of 300-500 m. It is separated from the midland plateau by a mountain range. The midland plateau has an altitude of about 1000-1200m. A second mountain range separates the midland plateau from the highland plateau. The latter plateau has an altitude of about 1500 m. The most northern part of the province consists of a third mountain range, namely the Drakensberg Mountains. In the Eastern Cape, the highest Drakensberg mountain peaks reach an altitude of approximately 2500 m (van Averbeke and de Lange, 1995).

3.2.3 Climate

The Eastern Cape is a climatically diverse area, both in terms of rainfall and temperature. However, 85% of the province falls within the arid or semi-arid zones. Generally, rainfall increases from west to east, and coastal areas are wetter than inland areas. In most of the western half of the province, the mean annual rainfall is less than 400 mm. The eastern half of the Eastern Cape is much wetter and the coast of Transkei as well as the mountainous districts of Maclear and Mount Fletcher have a mean annual rainfall that exceeds 1000 mm. The Eastern Cape contains four rainfall zones. The northern and inland parts of the province experience summer rainfall (Heydorn and Tinley, 1980). The coastal areas of the Transkei and most areas south of a line running roughly east to west at the latitude of Umtata experience bimodal rainfall with early and late summer maxima. The coast on the extreme west receives year-round rainfall, while the headlands at Cape Recife and Cape St Francis are winter rainfall areas.

At a local level, rainfall is influenced by topography. Over very short distances orographic effects may cause differences of several hundred millimetres in the annual amount of rain received, adding to the climatic diversity of the province. Precipitation in the Eastern Cape occasionally occurs as hail, which may cause major damage to crops. The number of days with hail increases from less than one day per year in the southwest of the province to more than eight in

the northeast. Nearly all of the Eastern Cape is situated between 30° S and 34° S, ensuring high levels of irradiation during most of the year. Differences in potential evapotranspiration (PET) are caused mainly by differences in the degree of cloud cover (van Averbeke and de Lange, 1995). The areas of highest rainfall coincide with areas of lowest PET, and *vice-versa*. High rainfall areas along the Transkei coast have a PET of about 1 250 mm per annum. In the driest parts of the province PET may exceed 2 250 mm per annum (Davies and Day, 1986).

At a regional level, the duration of the frost period is probably the most important temperature-related agro-ecological factor. Generally, the duration of the frost period increases from south to north and follows increases in altitude. The eastern coastal strip is frost-free but in the north eastern mountains, frost may occur during a period of 120 days. In most of the Eastern Cape, water deficits are the main factor limiting plant growth. Low rainfall and high rates of potential evapotranspiration are the main cause.

3.2.4 Vegetation

There is no comprehensive study of the vegetation of the entire Eastern Cape Province, but Lubke *et al.*, (1986) classified much of it on a scale of 1:250 000. Their map is based on the 1:1 500 000 map of Acocks, (1953) and other early works. The work of Lubke *et al.,* (1986) was used by Low and Rebelo, (1998) to produce a 1:2 000 000 map of the vegetation of South Africa. This new map is available as an ARC/INFO database from the Department of Environmental Affairs and Tourism in South Africa.

The Grassland Biome covers 39.8% of the Eastern Cape, followed by the Nama Karoo (25.4%), Thicket (16.4%), Savannah (10.2%), Fynbos (6.0%), Forest (2.2%) and Succulent Karoo biomes (<0.1%) (Table 3.1). Combined, the Savannah, Grassland and Nama Karoo biomes cover 75.3% of the province, but only 5.5% of their total area is conserved (Low and Rebelo, 1998). The Fynbos Biome is best conserved with 67.1% of its total area conserved, followed by the Thicket (23.7%), Succulent Karoo (17.4%) and Forest biomes (15.8%) (Low and Rebelo, 1998).

Table 3.1 Biome and Vegetation types of the Eastern Cape

Biome/Vegetation Type	Area (km^2)	Proportional area	Proportion conserved
Forest Biome	**3702**	**2.2**	**15.8**
Afromontane Forest	2795	1.6	7.1
Coastal Forest	907	0.6	8.7
Fynbos Biome	**10300**	**6.1**	**67.1**
Grassy Fynbos	6107	3.6	16.7
Mountain Fynbos	2317	1.4	49.3
S & SW Coastal	1876	1.1	1.1
Grass Biome	**67666**	**39.7**	**2.8**
Afro Mountain Grassland	405	0.2	0.0
Alti Mountain Grassland	2915	1.7	1.1
Coastal Grassland	2709	1.6	1.1
Dry Sandy Highveld	3321	1.9	0.0
Moist Cold Highveld	3682	2.2	0.1
Moist Upland Highveld	31884	18.7	0.2
NE Mountain Grassland	1809	1.1	0.0
SE Mountain Grassland	20670	12.1	0.4
Short Mistbelt Grassland	281	0.2	0.0
Nama Karoo Biome	**43361**	**25.4**	**2.0**
Central Lower Nama Karoo	17628	10.3	0.1
Eastern Mixed Nama Karoo	24428	14.3	1.9
Great Nama Karoo	1305	0.8	0.4
Savannah Biome	**17446**	**10.2**	**2.0**
Coastal Bush/Grassland	570	0.3	0.0
Eastern Torn Bushveld	9235	5.4	0.5
Subarid Torn Bushveld	7625	4.5	0.2
Coastal-Hinterland Bushveld	16	0.0	0.0
Succulent Karoo Biome	**23**	**0.0**	**17.4**
Little Succulent Karoo	23	0.0	17.4
Thicket Biome	**27988**	**16.4**	**23.8**
Dune Thicket	647	0.6	7.5
Mesic Succulent Thicket	1931	1.1	5.3
Spekboom	2387	1.4	0.5
Valley Thicket	14615	8.6	2.5
Xeric Succulent Thicket	8408	4.9	8.0
Total	**170496**	**100**	**2.6**

Source: Low and Rebelo, 1998

The vegetation in the Eastern Cape is diverse and transitional in nature. Twenty-nine of the 70 veld types in South Africa identified by Acocks, (1953) occur in the province (Low and Rebelo, 1998). This is more than in any other province in South Africa. Similarly, the Eastern Cape has the highest number of vegetation types (27 out of 68), as defined by Low and Rebelo, (1998). The transitional character of the vegetation in the Eastern Cape is exemplified by the Thicket

vegetation, which has elements of all the biomes (Lubke *et al*., 1986). It is found mostly in the larger river valleys.

After the Western Cape, which has 8 925 plant species, the Eastern Cape has the highest number of plant species (6 164), of any province in South Africa closely followed by 6 141 in KwaZulu-Natal (Low and Rebelo, 1998). One centre of plant species endemism, the Albany Centre, occurs entirely within the Eastern Cape Province, while portions of three other centres, namely the Eastern Mountain, Pondoland and Cape, also occur in the province (Cowling and Hilton Taylor, 1997).

Grasslands dominate the eastern half of the Eastern Cape and most of these (59%) are sour, i.e., the nutritional value declines substantially during winter. Sour grasslands occur mainly in the most eastern, wetter part of the province and cover 22.5% of its area. These are important grazing, forestry and tourism and water catchment areas (Low and Rebelo 1998).

Sweet grassveld occurs mainly in the drier, northern and central parts, covering 17.2% of the province. The sweetveld types are important for livestock grazing because of their good winter grazing value (Low and Rebelo, 1998). The Nama Karoo dominates the western half of the province. Nama Karoo is important for sheep and goat farming for the production of wool, mutton and mohair (Low and Rebelo, 1998). A small area of Succulent Karoo (23 km^2) occurs in the southwest of the province. Succulent Karoo is important for ostrich farming (Low and Rebelo, 1998). Thicket may be the most species-rich formation of woody vegetation in southern Africa (Everard, 1988). It is the biome of highest conservation value in the Eastern Cape and in most need of further research (Everard, 1987). Thicket is extremely important for goat farming (Low and Rebelo, 1998).

Of the savannah in the province, 97% is comprised in almost equal proportions of sub-humid savannah in the southeast and semi-arid savannah in the southern-central part (Low and Rebelo, 1998). Both vegetation types are important for livestock grazing. The bulk of the fynbos in the Eastern Cape occurs in the southwest. Generally, fynbos in the Eastern Cape is grassier than in the Western Cape. Fynbos areas are important water catchment, tourism and grazing areas (Low and Rebelo, 1998). Forests occur in scattered patches along the coast and inland, the largest being in the southwest. Forests are important sources of wood and medicinal plants (van Averbeke *et al.,* 1995; Low and Rebelo, 1998; Lent *et al.,* 2000).

3.2.5 Soils

Soil water availability is a key factor in plant growth in the Eastern Cape. The soils of the province have mainly acidic and rustic moisture regimes (Soil Survey Staff, 1975). The 600mm mean annual rainfall isohyet separates these two water regimes. In the northwest of the province, where mean annual rainfall is less than 400mm, soils are usually poorly developed and calcareous because of a lack of leaching. In the central part of the Eastern Cape, where the mean annual rainfall ranges from 400 to 600mm, the soils usually have a neutral reaction but lime may still be present in the subsoil. Here, duplex soils (abrupt increase in clay content from surface horizon to subsoil) and pseudo-duplex soils (gradual increase in clay content from surface horizon to subsoil) are common. Where mean annual rainfall exceeds 600mm, mainly along the coast and in the east, soils have surface horizons that react with acid. Low infiltration rates, soil compaction, phosphorus deficiency, shallow rooting depth, soil alkalinity in the west and acidity in the east are the main factors that limit the potential of Eastern Cape soils (Soil Survey Staff, 1975).

3.2.6 Hydrology and water resources

The relatively narrow coastal plain backed by mountain ranges has resulted in a large number of small coastal river systems with occasional larger river systems penetrating into the drier hinterland. These systems drain towards the southeast, into the Indian Ocean. A considerable part of the province lies within the Orange River basin and drains inland. The Eastern Cape has no natural freshwater lakes of significant size, although many estuaries have become enclosed, forming lagoons.

Surface run-off varies from less than 3% of rainfall in the northwest to more than 12% in the southeast and can be as high as 22% in the Winterberg Mountains. Surface run-off is more variable than rainfall and this variability increases with decreasing rainfall. Hebinck and Lent, (2007) stress the importance of taking into consideration the annual and seasonal variability of the run-off when estimating the water resources of an area.

This study was conducted in three different communities in the Eastern Cape Province of South Africa with different vegetation in the communal rangelands. This was done in order to compare and contrast the results from these areas. The chosen sites for this study were Lashington near Seymour under Valley bush, Magwiji under Sweet grassveld in Sterkspruit and Tsaba near East London under Forest and coastal thornveld.

3.3 Lashington Community

Lashington is located in the central part of the Eastern Cape. The community is in Seymour district, which is about 47 kilometres north-west of Fort Beaufort and 20 kilometres west of Balfour. The community is under the jurisdiction of Nkonkobe municipality. Lashington is 32°38´ South and 27°28´ East with the altitude of 828m above sea level. The servicing town is Fort Beaufort, which lies between the Keiskamma and Great Fish Rivers (Eastern Cape, 2006).

3.3.1 Rainfall

Rain is primarily of cyclonic origin from the cold fronts that sweep over the country or from high-pressure systems situated on the coastal that bring moist air from the sea (Lent, 2007). Since the rainfall is primarily cyclonic and orographic in nature, due to relief, the amount of rain received at a particular location depends mostly on its height above sea level and distance from the sea. In the Lashington area, altitude is clearly the major determinant of the spatial distribution of rainfall. At lower elevations, rainfall can be as low as 500mm per annum reaching a high of 1400mm in the Amathole Mountains at 1200m to 1500m above sea level.

3.3.2 Vegetation

The flora and vegetation of the Amathole Mountains is predominantly Afromontane in affinity but has elements of Cape flora and Southeast African endemics. It is part of a series of "'isolated' 'islands'" of related composition occurring only on the higher mountain range. This Afromontane flora is generally distinct from that of the surrounding lowlands and contains approximately 4000 vascular plant species, of which 75% are endemic to it. Many indigenous species of the plants that were there are no longer common in the area (Kirkman and Wilson, 1999, cited in Hebinck and Lent, 2007). This is because of the impact of alien invasive vegetation species on the grasslands, including the establishment of black wattle plantations in the area.

The other major type is sour grassveld (Dohne Sourveld), occurring on the plateaus and spurs. These are generally situated on older, nutrient poor soils (Hebinck and Lent, 2007). Rooi grass (*Themeda triandra*), wire grass (*Aristida junciformis*), sickle grass (*Pogonarthria sqarrosa*) and thatch grass (*Hyparrhenia hirta)* are common species. Other forbs and herbs include those of the genus *Watsonia* and wand flower (*Dierama pulcherrimum*).

The veld condition score for Lashington community is 77.1% meaning the land has standing trees and enough basal cover to stop run-off water. The total average grazing capacity is 2.6

AU/ha. The most common grass species are *Themeda trainda, Tristachya leucothrix, Heteropogon contotus* and *Miscanthedium capense.* The average estimated standing crop determined by Disc Pasture Meter is 2049kg/ha. The total average basal cover is 0.26cm and this is regarded as good cover (Sibanga, 2006).

3.4 Magwiji Community

Magwiji community is situated at the periphery of the Eastern Cape Province in the northern direction. It is under the Senqu municipality. This community is located 30°38′0″ South and 27°22′0″ East with the altitude of 1507m above sea level. This community is about 20km to the east of Sterkspruit town, which is centrally located and serves as the administrative and service centre. Sterkspruit town is situated near Herschel in the north-west of the Eastern Cape in the former homelands of Transkei. This district is surrounded by the Orange River, Free State, Lesotho and towns of Lady Grey and Barkley East. Sterkspruit town has a total population of about 165 000 people from 84 villages with Magwiji being included. There is little economic variation beyond a few commercial services located in the town (MPCC, 2004).

3.4.1 Climate

The summer rainfall averages 600mm per year. Temperatures vary between extremes of -8℃ and 39℃, with an average of 17℃.

3.4.3 Geology and soil

Dry, clayey, duplex soils (Sterkspruit, Swartland, Estcourt, Valsrivier and Kroonstad soil forms) are derived from Ecca Group sandstone, mudstone and shale, with occasional dolerite sills.

3.4.4 Vegetation

Grass species constantly present are White Buffalo grass (*Panicum coloratum),* Weeping Lovegrass (*Eragrostis curvula),* Fan Lovegrass (*E. plana, Setaria nigrirostris and Themeda triandra),* the latter often being dominant, but replaced by the two *Eragrostis* species when overgrazed. An indicator of the clay soil is Three-awn Rolling Grass (*Aristida bipartite),* which becomes prominent in severely degraded areas. A prominent feature of a large part of this vegetation type is the presence of species with Karoo affinity, such as the dwarf shrubs Bitter Karoo (*Pentzia globosa),* Bloublommetjie (*Felicia muricata),* Ghombos (*F. filifolia) and (Lycium cinereum),* the grasses (*Eragrostis obtuse),* Saltpan *Grass (Sporobolus ludwigii) and* Large

Carrotseed Grass (*Tragus racemosus),* and the geophytes Yellow Snakehead (*Bulbine narcissifolia).*

3.4.5 Economic Uses

Because of the droughty clay soils, this vegetation type is not normally ploughed, but is often heavily grazed by cattle and sheep.

3.4.6 Conservation Status

No official conservation areas occur within this type. This grassland is often severely overgrazed. Karoo species are often present on the dry clay soils - this is not interpreted as Karoo encroachment, but rather occupation of suitable habitat by Karoo elements.

3.4.7 Veld Condition Assessment

The average veld condition score is 77.1%. The total average grazing capacity is 17.7 Au/ha. Most common grass species are *cynodon dactylon*, *forbs* and *karriod.* The standing crop herbaceous vegetation is 1544kg/ha. The basal cover in Magwiji's rangelands is 0.89cm (Sibanga, 2006)

3.5 Tsaba Community

Tsaba community is found in the eastern part of the Eastern Cape Province. It falls under the Buffalo City municipality. The community is located $33^0$08'18" South and $27^0$29'38" East with the altitude of 176 m above sea level. Tsaba is around 47km from East London, which is on the Indian Ocean coast between Buffalo and Nahoon Rivers and is the second largest industrial centre in the Eastern Cape Province.

3.5.1 Climate and rainfall

Mean annual rainfall for Tsaba is between 600mm to 850mm. Tsaba community receives most of its rainfall during summer, but the influence of cold fronts sweeping the southern edge of the continent, predominantly a winter phenomenon, causes approximately 40% of the rain to fall in winter (van Averbeke and Bennett, 2007). Moderated by the Indian Ocean, the climate is frost-free. Mean daily minimum temperature is between 17 and 18^0C in January and about 10^0C in July, but extreme minimum temperatures as low as 3^0C have been recorded (Marais, 1975). Land and sea breezes commonly occur, but they may be superseded by westerly winds, which are described as persistent, strong and disagreeable (Marais, 1975). The climate is suitable for

year-round production of a range of crops, including selected sub-tropical fruits, of which pineapples are the most common.

Soils are generally shallow and often prone to water logging, especially those situated on level crests and valley bottoms. Cultivation occurs mainly on the valley slopes. Soils on the valley slopes usually show evidence of leaching, and have an acid reaction (van Averbeke and Bennett, 2007). The natural vegetation is dominated by Coastal Mixed Grassveld and Acacia Savannah, and the numerous steeply sloping river valleys are covered with Valley Bushveld. The use of natural vegetation mainly involves beef production. Around East London, dairy farming on planted pastures is common.

3.5.2 Vegetation

The vegetation biomes found in the region differ in their potential for livestock production because of their varying composition in terms of the proportion of the grasses, bushes and trees they contain and relative productivity of the various plant species for livestock production purposes (Lent, 2007). Particularly for the grasses, species composition is important and it forms the basis for a broad classification of grassland into sweetveld and sourveld.

There are several important characteristics associated with these two categories of veld, but in simple terms, sweetveld is a veld type which remains palatable and nutritious when mature, whereas *sourveld* provides palatable material only during the growing season (Tainton, 1999).

3.5.3 Veld Condition Assessment

The average veld condition score for Tsaba is 70.1% and the total average of grazing capacity is equal to 3.6 AU/ha. The most dominating species are *Themeda trianda; Forbs, Elionurus muticus* and *Hetropogon contortus.* The estimates for the standing crop determined using the Disc Pasture Metre averaged 1854kg/ha. The basal cover is averaged at 0.54cm, which is a good cover. Tree density (plants/ha), the total average is 1875 trees per hectare. Browsing capacity (goats/ha) is 0.3 ssu/ha. The stocking rate for the area is 3.3 ssu/ha (Sibanga, 2006).

This chapter tried to look at the background information to the study areas. Generally there are vast differences amongst the communities under the study. The three communities are situated in different ecological zones. There are differences in the amounts of rainfall received per annum, by each of the communities with Lashington receiving rainfall ranging from 500mm to

1400m, Magwiji gets an average rainfall of 600mm and Tsaba normally receives mean annual rainfall of 600mm to 850mm. The vegetations again are quite different with Lashington having much of the Afromontane flora with around 4000 vascular plant species and sour grassveld. Magwiji vegetation is predominantly made up of a wide variety of sweet grassveld. It was observed that vegetation Tsaba in was mainly comprised of grass, bush and tree species for livestock production. The following chapter is going to outline the methodology. The questionnaires failed to capture labour and time spent on chores; hence causing some limitations beyond the control of the researcher and had to resort to alternative methods to measure use and non-use values of the communal rangelands.

CHAPTER FOUR
METHODOLOGY

4.1 Introduction

This chapter outlines the methodology that was used in carrying out this study. Much interest is generated to establish the benefits that are gotten from the communal range ecosystems in Eastern Cape Province of South Africa. Knowing exactly what benefits do these range generate and their beneficiaries would be a great mileage. Another challenge would be to establish the benefits and to establish their distribution of these benefits and check whether they are sufficient to ensure that the rangelands will be sustainable. Economic valuation is one of the tools that can be used to assess the benefits of ecosystem sustainability as well as how these benefits are distributed among the stakeholders. Through an analysis of use and non-use values, people can begin to understand some of the forces, which may be threatening the existence of rangelands and other ecosystems.

Despite the increased publications on ecosystem goods and services, a systematic typology and comprehensive framework for integrated assessment and valuation of ecosystem functions remains elusive (De Groot *et al*., 2002). This study therefore is aimed to provide such an integrated framework, of which the main components were presented in Figure 4.1.

The first step was to identify the ecosystem/rangeland functions namely: regulation, habitat, production and information. These functions provide the goods and services which give the ecological values, socio-cultural values and economic values; and all these combined give total value. Total value influences decision making processes to determine policy options and management measures. Among the goods and services, the farmers gathered a lot of natural resources such fuel wood, wild fruits, medicinal plants, building poles, thatch grass, bush meat, fish and water from the rivers and dams. The farmers also browse and graze their livestock in the rangelands. All these were valued and policy recommendations were given.

4.2 Valuation methodologies

These are used to calculate compensable values for interim lost public uses. Valuation methodologies include several economic methods such as marketed methodologies, for example, market price and/or appraisal or non-marketed methodologies such as factor income, travel cost, hedonic pricing, contingent valuation, or unit values.

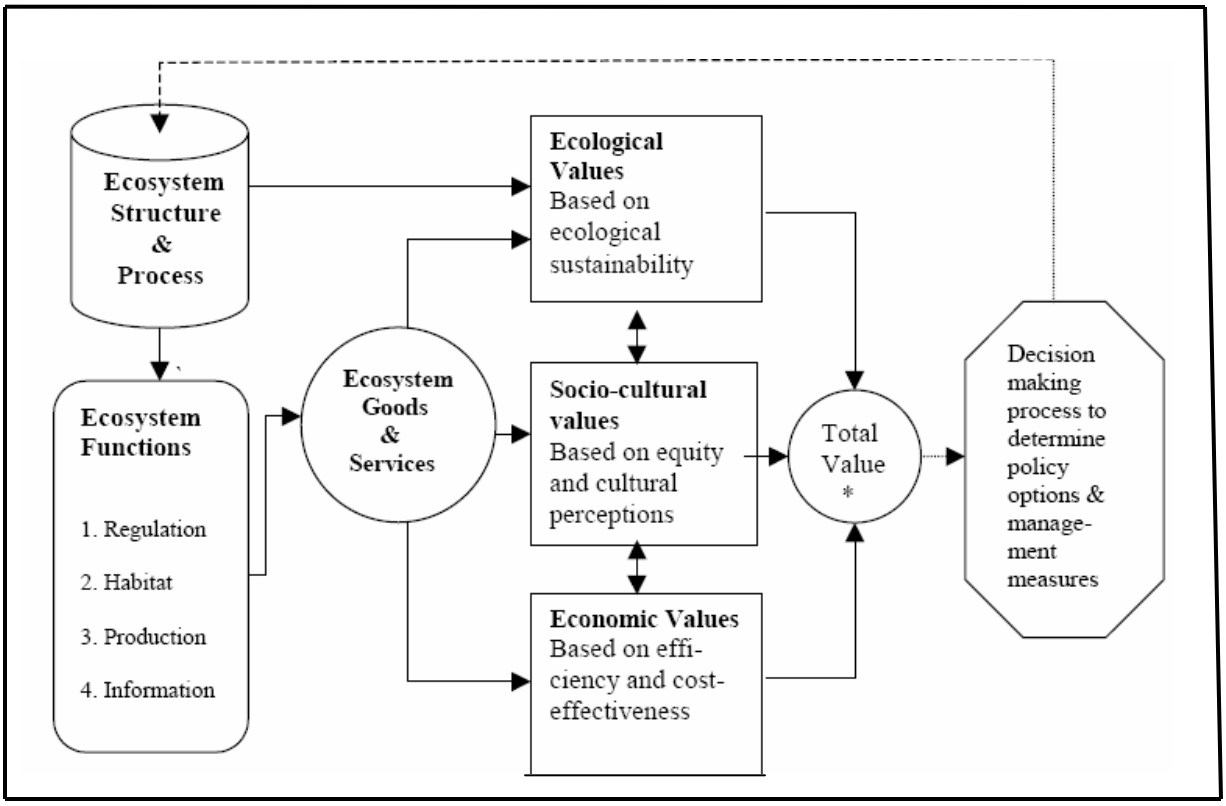

Figure 4.1 Framework for analysis of Integrated Assessment and Valuation of Ecosystem Functions, Goods and Services.
Adopted from: de Groot *et al.,* 2002.

4.3 Categories of value

Identifying an ecosystem's goods and services, determining who values those goods and services, and measuring these values is not always an easy and straightforward process. The goods and services may be tourism, hunting, timber, wild harvesting, wildlife habitat, watersheds, carbon sequestration, and genetic materials. Many of these goods and services may not be traded in open, commercial markets and therefore do not have market values (Working Draft Paper, 2006).

The concept of total economic value is now a well-established and useful framework for identifying various environmental values. The total economic value of an environmental asset such as a range ecosystem consists of both its use values and its non-use values. The ecosystem's use values in turn are made up of its direct use values, its indirect use values, and

its option values. The ecosystems non-use values include its bequest values and its existence values.

These values are can be shown as follows:

- TOTAL ECONOMIC VALUE = USE VALUES + NON-USE VALUE
- USE VALUES = DIRECT USE VALUES + INDIRECT USE VALUES + OPTION VALUES
- NON-USE VALUES = EXISTENCE VALUES + BEQUEST VALUES

Use values: These are values derived from actual use of goods or services. Uses may include indirect uses. For example, enjoying a television show about whales provides an indirect use value for the whales.

Direct use values: These are derived from direct use activities such as tourism, natural resource harvesting, and hunting. In some cases, these activities can be traded on a market and thus have a market value. In some cases, such as fuel wood and grazing livestock by local communities, the direct use may not be traded in markets and so the values will need to be estimated.

Indirect use values: These are derived from indirect uses such as watershed protection, climatic stabilisation and carbon sequestration. Other indirect natural services include habitats for insects that pollinate local crops or for raptors that control rodent populations. Indirect use values are often widely dispersed and rarely traded in open markets.

Option values: These are derived from the option of using an environmental asset sometime in the future. These future uses may be either direct or indirect and may include the future value of environmental information. Future environmental information is often cited as particularly important for biodiversity as untested genes may provide future inputs into agricultural, pharmaceutical or cosmetic products.

Non-use values: Two common types of non-use values are bequest values and existence values.

Bequest values: These are types of non-use value, which people have for an environmental asset. It refers to the value derived from knowing that others benefit from an environmental asset.

Existence values: These are another type of non-use value, which reflect the value of knowing that an environmental asset, such as a tropical rainforest, exists even though one is unlikely to visit it or use it in any other way. Though significant in many cases, such values are particularly difficult to quantify.

Though terminology varies somewhat, valuation studies generally attempt to quantify use values and non-use values, especially those values which are not traded in open markets. A typical presentation on valuation categories that were used in this study are shown in figure 4.2.

Both stocks and flows of natural systems are objects of assigned values. These assigned values are context-specific, that is, they depend upon social preferences and individuals' economic status. Some categories of economic values apply most to the structure, or stocks, of the system as is the case for direct use, option and non-use (existence, stewardship, bequest and intrinsic) values; the third category, indirect use values (ecosystem services or function values) generally applies to flows. The total economic value of a natural system is the sum total of all use values (direct, indirect and option) and non-use values (Barbier, 2000).

4.4 Household sampling

The basic objective of the sample design was to obtain a representative cross section of households on which to base inferences about environmental changes. One hundred and fifty households were sampled from the survey area (Lashington, Magwiji and Tsaba). The personal interviews were carried out in February and March 2007. The data was collected from the field interviews by the researcher and was taken to University of Fort Hare for entry and analysis.

A sample size of 50 households was used in each of the three study sites and a standardised questionnaire was administered on them. The sample size of 50 households was used because it is representative in all the three communities and is more than the 10% statistically agreed representation. Lashington has 254 households, Magwiji has 288 and Tsaba has 145 households.

4.5 Data Collection

Information on (i) livestock goods and services, (ii) outputs and inputs, and (iii) unit costs of products were collected largely through structured and semi-structured interviews using questionnaires. These were uniformly carried out on a household basis. The same survey tools were also used by Bernard in 1994. In households where it was difficult to isolate a respondent, a collective household interview was conducted. Additionally, interviews with the farmers were combined with simple participatory rural appraisal (PRA) tools such as matrix ranking, seasonal calendars and product flow diagrams to simplify data collection.

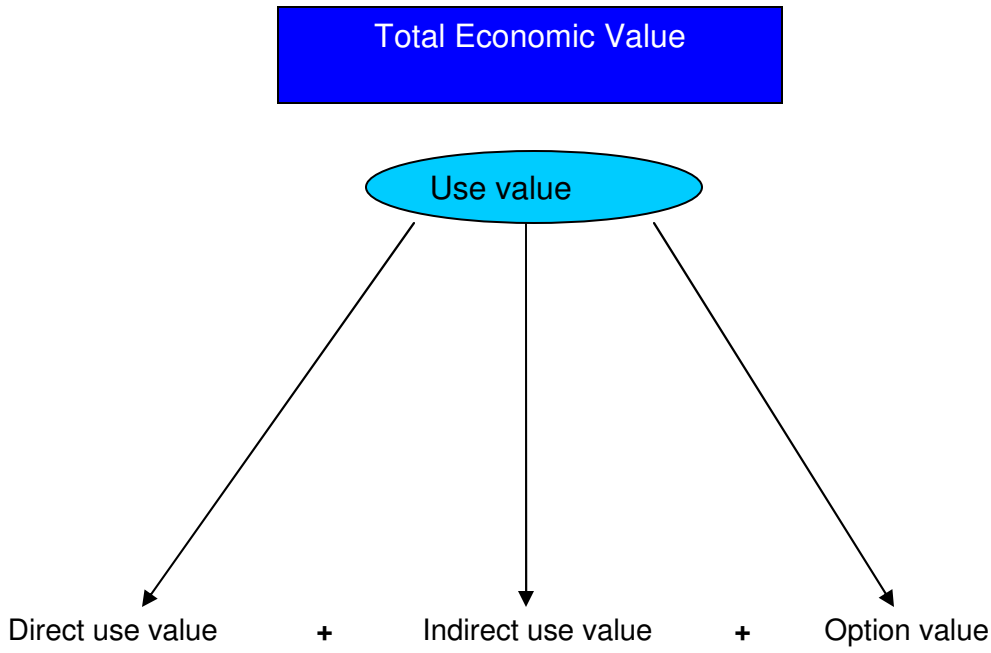

Figure 4.2 Categories of economic values of ecosystems and available valuation approaches.

Notes: Household production function models. Replacement cost is in brackets because its use in ecosystems valuation in many cases is problematic.

Source: Based on Barbier (2000)

The quantities and direct-use values of the livestock goods and services were calculated on a per household basis for user households only and scaled across the entire sample in relation to the frequency of use and calculated averages. Monetary values were calculated in South African rands. The livestock products were measured using community standards such as bowls which in some cases; for example, cow dung and meat, were weighed. There was emphasis on daily, weekly and monthly consumptions in the context of the various climatic seasons. The monetary values of products were then computed from known and existing prices quoted in the villages as was used by Dovie *et al.* (2006). In the cases where it was difficult to assign a price to a resource because it was not traded in the village, prices from the closest local community and town markets were used. The value of products per household was calculated from equations (1) and (2).

$$V_{prd} = p_i q_j \ldots \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots \quad (1)$$

Where V_{prd} is the value of the i^{th} resource consumed by the $_j{}^{th}$ household, p_i the unit price of the $_i{}^{th}$ resource, and q_j the quantity of the $_i{}^{th}$ resource consumed by the $_j{}^{th}$ household.

If n is the number of all households then

$$V_{allprds} = \sum_{i=1}^{k}\sum_{j=1}^{n} p_i q_j \ldots\ldots\ldots\ldots\ldots\ldots\ldots \quad (2)$$

Where $V_{allprds}$ is the value of all products consumed by all households; and *k* the total number of all resources.

Values were calculated for the benefits derived at various stages of production, consumption and sales, taking into account the production cost. The weight of cow dung was derived from Shackleton *et al*. (1999); for example, one pick-up vehicle holds 300kg of dung; one wheelbarrow holds 40kg, and one 80kg bag holds 35kg. One pick-up load of dung was selling at R74.06; one wheelbarrow load was R10.79, and one 80kg bag sold at R6.47, values were

adjusted to 2007 values, using the inflation rate. An average unit of weight of cow dung was calculated to cost R0.22/kg.

Total weighted value = ∑ *(allocated weight × number of households)…* (3).

To determine the value of the communal rangelands and the consequent impact of overgrazing on the environment, data was obtained from various sources. The main technique of data collection was through survey that was conducted on 150 households in three communities. The pre-test of the questionnaire covered 15 households. The communities under investigation lie within the communal rangelands; they comprise both livestock keepers and non-livestock keepers. Local farmers surrounding, University of Fort Hare and undergraduate students from the university assisted in administering the pre-test survey. The enumerators were trained in both English and local language versions of the questionnaire. In the training, the enumerators were asked to translate the English version into the local language version and into the English version to check consistency of information flow. The survey was undertaken following reconnaissance visits to the villages, focus group, village leader and household meetings and after conversations with various people who were well versed with the localities. Below is a photograph (Fig. 4.2) that was taken during the initial participatory rural appraisal meetings with the communities.

Figure 4.3 Photograph showing community members during PRA sessions

The questionnaires focused on areas such as determining the extent of dependence of the farmers on the communal rangelands for obtaining products such as pasture for their livestock, water, fuel wood and better sanitation. The questionnaires also determined the extent to which farmers use the environmental facility for survival and assessing their attitudes towards the

causes of degradation. Other questions focus on the land use, time allocation, household production activities, and household socio-economic variables. Regarding the income generated by the household from harvesting rangeland products, information was obtained from their expenditures and valuation of the products they consume. The most important data was on the quality and quantity of products derived directly or indirectly from the rangelands. Price data on the rangelands products was obtained from a number of sources including interviews with farmers, shop owners, household and community leaders. Livestock income was estimated from farm gate prices of products such as milk, beef, and hides, and it was based on the yields.

A separate interview was conducted with the local community leaders. It was focusing on issues pertaining to the general agricultural patterns, markets and prices of commodities sold, community history and migration patterns, rangelands-related cultural issues and details concerning their livestock production practices.

4. 6 Valuation Methods Used in the Study and Analysis

Many values are theoretically biased. Valuation methods play a big part in what people get from the natural world and why they want it to be preserved. However, only a small portion has any sort of presence in economic markets. When land use decisions and policies are being made, usually only the economic values are taken into consideration, and the other values are undervalued or ignored. For this reason, great effort has been made to put a rand amount on the values that are not represented in the markets (Hawkins, 2003).

The contingent valuation method and direct market valuation were used in this study to value the direct, indirect and non-use values of the rangelands. Contingent valuation is a survey-based economic technique for the valuation of non-market resources, typically environmental services. While these resources do give people utility, certain aspects of them do not have a market value (price) as they are not directly sold for example, people receive benefit from a beautiful view of a mountain, but it would be difficult to value. Contingent valuation surveys are one technique, which is used to measure these aspects.

According to Ahlheim and Fror (2003), technically speaking, if the researcher wants to assess the benefits agriculture creates for society one has to measure the change in social welfare (or social well-being) caused by agricultural activities. In a democratic society, the concept of social welfare has to be based on individual welfare or utility. Therefore, the economic valuation of

agricultural activities aimed at the assessment of the change in social welfare, which must be filtered out of the preferences of all individuals affected by these activities. An economic valuation analysis then consists of two steps: in the first step, the individual utility changes resulting from agricultural activities have to be assessed and in the second step, they have to be aggregated to obtain the resulting change in social welfare. The first step is known as the identification problem while the second step is the aggregation problem of economic valuation. This is illustrated in the figure 4.2.

Neo-classical welfare theory implies that the value of some good or service is equal to the utility it creates for man, i.e. to the change in utility it causes. It is clear that such a change in well-being cannot be measured in utility units, since such units are neither uniquely defined nor empirically observable. The obvious measuring rod is, of course, money. If utility change caused by agricultural activities is measured in monetary terms, the respective amount can serve as a basis for potential compensation payment for farmers (Ahlheim and Fror, 2003).

The contingent valuation method (CVM) has been used to value many different goods, most commonly aesthetic and environmental improvements and recreational activities (Carson *et al.,* 1996, Van Kootem and Bulte 2000, cited in Bartlett *et. al.,* 2002). The CVM uses surveys to elicit information about maximum amount an individual would be willing to pay (WTP) for an amenity or the minimum amount an individual would be willing to accept (WTA) to forgo consumption of an amenity. CVM analysis examines this trade-off in light of an individual's underlying utility function (u). Following An (2000), a person's WTP for an amenity, offered at a fixed level, is defined as the dollar amount Y that equalises two indirect utilities such that V_1 (I - Y/Z, ε) = V_0 (I/Z, ε) where, V_1 and V_0 are individual's indirect utility with and without the amenity, respectively, I is the individual's disposable income, Z is a vector of observed demographic and other characteristics, and ε is a scalar variable representing unobserved personal characteristics. Given the assumption that V_1 is monotonically increasing in u for any fixed (Z, ε), an inverse utility function exists such that U (V_1 (u/Z, ε); = u for all u ≥ 0. WTP can then be expressed as Y = 1 – U (V_0 (I/Z, ε); Z, ε). Using CVM, Y, Z, and I can be elicited from members of a selected population and their WTP assessed by econometric techniques.

While the majority of contingent valuation studies have attempted to value non-market goods, contingent valuation has also been used to value goods traded in markets (Harrison 1989, Kahneman and Knetsch 1992, cited in Bartlett *et. al.,* 2002) or quasi-markets. Although

contingent valuation was originally designed to elicit estimates of use value, recently the emphasis has been on eliciting non-use values, such as existence values and bequest values (Bartlett *et al.,* 2002)

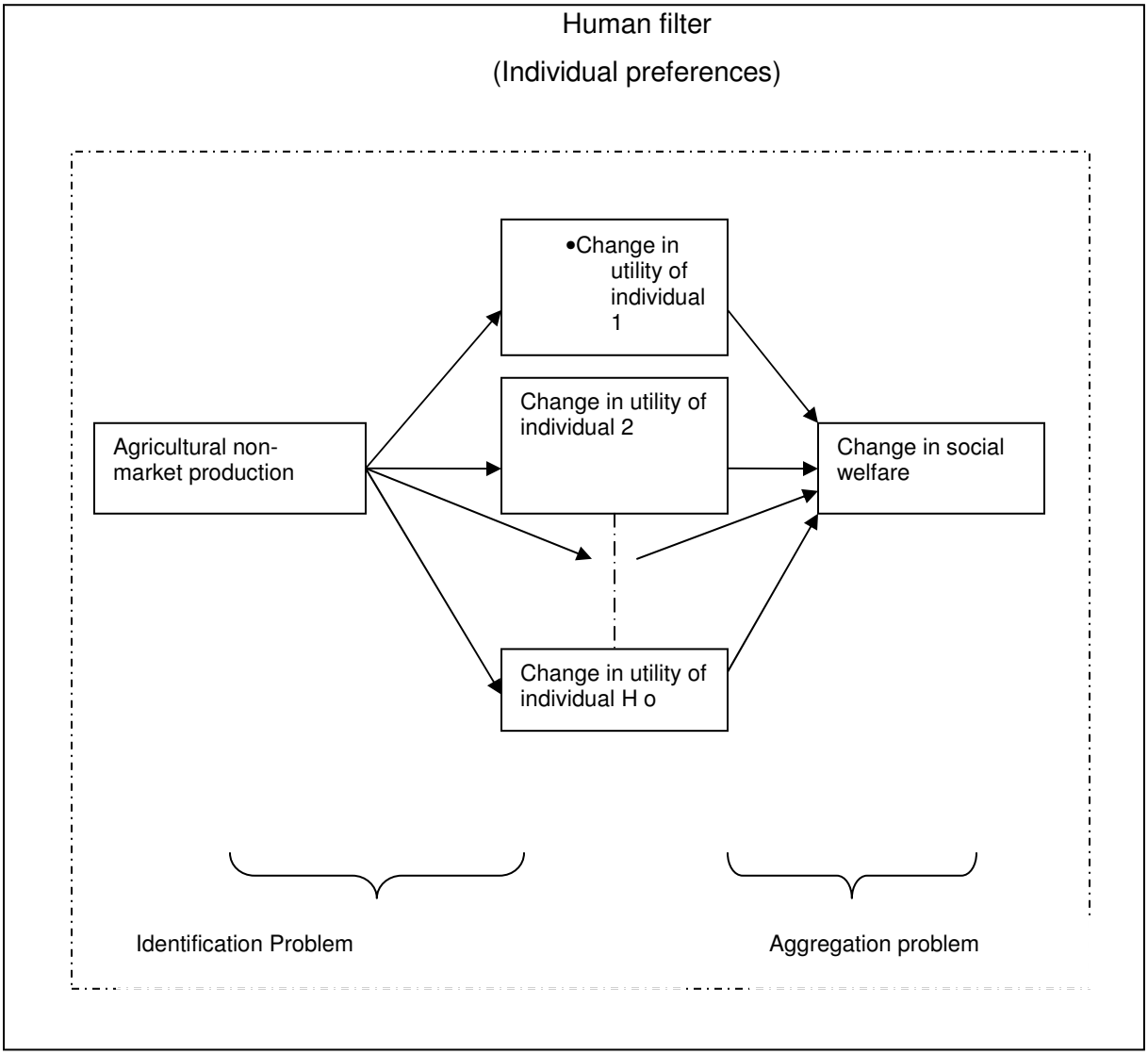

Figure 4.4 The structure of an economic valuation analysis
Adopted from Ahlheim and Fror (2003)

Contingent valuation is not without its weaknesses in being able to elicit a person's WTP or WTA. The methodology suffers from the same potential biases that are prevalent in survey research, such as interviewer bias or non-response bias. The two major concerns with CVM are hypothetical bias and strategic bias. Some researchers contend that a fundamental difference

exists between the way an individual makes a hypothetical decision and an actual decision (Neill *et al.,* 1994). Hypothetical bias results from the inability of respondents accurately to predict how they would behave in if a market were created (Bishop and Heberlein, 1990). Respondents' understanding of the circumstance or amenity they are asked to value may be limited or imprecise. Individuals may find it difficult to express their value for or feelings about, an amenity in monetary terms. If respondents rely on a starting bid price presented in the Contingent Value Method (CVM) instruments as an indication of what the value of the amenity should be, starting-point bias can result (Bishop and Heberlein, 1990).

The desire intentionally to mislead the researcher in order to influence policy has been termed strategic bias (Bartlett *et. al.,* 2002). Individuals may express an unrealistically high willingness to pay (WTP) if they believe they will not actually have to make the payment, yet believe they can influence the desirable supply of the amenity in question by giving a high value. Conversely, they may understate the true value if they think it will decrease the amount they have to pay (Bishop and Heberlein, 1990).

Contingent Value Method (CVM) is dependent upon primary data gathered through phone or mail surveys, and the data collection expense is high. Face-to-face interviews were used in this research but observations made were that the responses given in many of the instances were biased. If the respondent felt that the interview has some benefits in the name of rewards then one will be tempted to give little or more information depending on the question. The same will apply again if the respondent feels there is a penalty that is coming with the question. To arrest the bias all answers that given were not at face value. A thorough study of all the answers and their trends was done. Given the expense of generating these values, indexing values determined at a point in time appear to be the only possible way of updating values.

Economic theory was based on premise that individuals have preferences for different market and non-market goods. These preferences had a degree of substitutability; if the quantity of one good was reduced, the quantity of a different good could be increased as either willingness to pay, the maximum amount a person would be willing to pay for an increment of a good, or willingness to accept, the minimum amount a person would require as compensation for the loss an increment of a good (Freeman, 2003).

Stated preference methods, again, drew values from responses to hypothetical questions. The main method this for was contingent valuation, which was widely used and widely discussed. Contingent valuation directly asked individuals about the values they place on environmental services via a survey or questionnaire. It was quite useful in that it could be used to value a wide array of services, and for some such as existence values, it was the method possible. However, this flexibility also leads to methodological challenges and questions of bias and reliability (Bishop and Heberlein 1990; Hoevenagel 1994b).

The survey design is very important. The first step was to define the population whose values were be measured, such as tourists, hunters, or community members. Then, as with all surveys, a sound sampling strategy was designed (Bishop and Heberlein 1990). Next, a questionnaire itself was written. In order to obtain realistic values, the respondents had a good understanding of the ecosystem services or environmental quality changes they were to be asked about, of the hypothetical method of payment (i.e. taxes, licenses, fees), and of the social context of payment. Ideally, these hypothetical situations were realistic, but also neutral. The goal was that these values expressed by the respondents were those held for the ecosystem service, and do not reflect other issues, such as dissatisfaction with tax rates (Bishop and Heberlein 1990; Hoevenagel 1994b)

Once the respondents understand the hypothetical situation, they were asked valuation questions. There are several options for the question format. One is the referendum format where a person is asked if they would be willing to pay X rands for a policy, programme, or environmental improvements but direct open-ended questions was used because it allowed respondents to come up with their own amount they would be willing to pay, without any starting point provided by practitioners. This format is often seen as less reliable, because it is difficult for respondents to come up with a realistic value out of the blue. The contingent ranking methods was also used, respondents were asked to rank alternatives of environmental quality and services without placing monetary values on them. This was done because many of the farmers in the study areas are not gainfully employed meaning they do not have a regular salary.

As was alluded to previously, there were some issues surrounding contingent valuation. One is the validity of responses. Would respondents actual pay the amount they say they would? Some might even give a value of zero; because they felt they should not have to pay for something,

they felt they have a right to (Freeman 2003). Most people are unfamiliar with ecosystem services, and even more unfamiliar with placing monetary value on them, so answers were more of a guess than their true willingness to pay (Hoevenagel 1994). There were no market values to test the validity of contingent valuation responses, but there were some indirect methods available.

The potential for biased answers was another issue. There were four main sources of bias: sampling design, incentives to misrepresent willingness to pay values, implied value cues, and scenario misspecification (Hoevenagel 1994b). Sampling design referred to issues of representative samples and no responses that were common to all surveys. There were several biases that could result from respondents' incentives to misrepresent their willingness to pay. One was strategic bias, where respondents provided misleading answers to serve their own purposes. These purposes included the fear that fees would actually be assessed, and so would give low values, or the feeling that the values would promote a desired service or policy, and so would provide high values (Bishop and Heberlein 1990). Two other incentive biases were interviewer bias, where misleading answers were given to please the interviewer, and social-desirability bias, where a respondent gave an answer they think would make them look good. Most of these biases could be overcome with careful survey design, question format selection, and result analysis.

The second problem is that many grassland values were not directly reflected in market prices. This was true for all environmental functions, for resources harvested for own use by households, for most recreation and water transport services and for all non-use values. In this study, questions were posed to individuals about their willingness to pay (WTP) an amount of money for an accomplishment of the change described, or about what monetary compensation they required to accept change. Real monetary transactions do not take place. The respondents were asked whether they were willing to pay a certain amount of money for the non-marketed goods and services. They were simply requested to respond either "YES" or "NO" to the question. A hypothetical value was attached to some of the environmental resources. More willingness to pay for the environmental service implied environmental degradation.

The welfare loss was also estimated by asking respondents to compare the present environmental condition with that of the past ten years. Problems of recall and bias in response were experienced here but they were not significant enough to affect the results. The

opportunity cost approach (OCA) was considered to analyse the time the households allocate to moving to grazing lands. Opportunity costs are defined as the benefit foregone by using a scarce resource for one purpose instead of using it for its next best alternative use (Gittinger 1982, cited in Okwi and Kaija, 2000). As long as the household was using optimal and positive quantities of land in its grazing activities, a decline in grassland availability resulted in a decline in household benefits because of a decrease in household profits. The cost the household bore equals the change in profits because of the change in access to grazing land. This was based on the premise that the members of the households spend more time moving to the grazing areas and therefore cost to their welfare.

In the study, the value of grassland degradation was determined from indicators such as access to grazing land, water and associated products. These indicators were categorised into use and non-use values. The use values include the values to individuals in the form of pasture, fuel wood, food, water, clean air and timber for building while the non-use value were in terms of the satisfaction people derive from knowing that the asset exists or from their desire to conserve the environment for future generations.

The application of valuation methods Table 4.1 was taken from Hawkins, (2003). Common methods were the methods that had been used most often for a particular function in the literature; possible methods were methods that were not used often but potentially could be. DM= direct market, AC= avoided cost, RC= replacement cost, FI= factor income, TC= travel cost, HP= hedonic pricing, CV= contingent valuation, and GV= group valuation. All of these functions have bequest value, so for space sake bequest has not been written in each cell. It was possible that all have existence value, as well, but the researcher had put existence value with functions that made the most sense to have existence value.

The Hidden Harvest project undertaken by the International Institute for Environment and Development (IIED) had developed an innovative methodology, which combines Participatory Rural Appraisal (PRA) methods with those of environmental economics and conventional ecological research, and argued for "methodological complementarity". The chief focus was on local-level valuation, which draws on local people's knowledge and combined this with economic and ecological analysis. Local knowledge was crucial because many resource uses were site-specific and seasonal, vary between social groups, were often used opportunistically

or even illegally, were often marketed though informal markets or consumed directly, or were valued for indirect uses or non-use, and were institutionally mediated (IIED 1997).

Table 4.1 The relationship between functions, values, and valuation methods.

ECOSYSTEM FUNCTION	VALUES	COMMON METHODS	POSSIBLE METHODS
REGULATION FUNCTIONS			
Gas regulation	Indirect use	AC	RC, FI, CV, GV
Climate regulation	Indirect use	AC	RC, FI, CV, GV
Disturbance prevention	Indirect use	AC, RC, CV	FI, HP, GV
Water regulation	Indirect use	FI, AC, DM	RC, HP, GV
Water supply	Indirect use	DM, RC	AC, FI, TC, HP, CV, GV
Soil retention	Indirect use	AC, RC	FI, HP, CV, GV
Soil formation	Indirect use	AC	RC, FI, CV, GV
Nutrient regulation	Indirect use	RC	AC, FI, CV, GV
Waste treatment	Indirect use	RC, CV	AC, FI, HP, GV
Pollination	Indirect use	RC, FI, AC	DM, CV, GV
Biological control	Indirect use	RC, FI, DM	AC,CV,GV
HABITAT FUNCTIONS			
Refugium function	Indirect use, existence value	DM, CV	RC, FI, HP, GV
Nursery function	Indirect use	DM	AC, RC, FI, HP, CV, GV
PRODUCTION FUNCTIONS			
Food	Direct consumptive use, option value	DM, FI, CV	RC, GV
Raw materials	Direct consumptive use, option value	DM, FI, CV	RC, GV
Genetic resources	Direct consumptive, use, option value	DM, FI	RC, CV, GV
Medicinal resources	Direct consumptive use, option value	DM, FI	AC, RC, CV, GV
Ornamental resources	Direct consumptive use	DM, FI	RC, HP, CV, GV
INFORMATION FUNCTIONS			
Aesthetic information	Direct non-consumptive use, existence value	HP	RC, TC, CV, GV
Recreation	Direct non-consumptive use, existence value	DM, CV, FI, TC, HP	RC
Cultural and artistic information	Direct non-consumptive use	CV	DM, FI, TC, HP, GV
Spiritual and historic information	Direct non-consumptive use, existence value	CV	TC, HP, GV
Science and education	Direct non-consumptive use	DM	FI,TC,CV,GV

Source: Hawkins 2003

In this study, the researcher shortly reviewed the principles of economic valuation and then turned to a thorough discussion of the advantages and disadvantages of the most important assessment methods used in the write-up. The researcher distinguished between direct and indirect valuation techniques where the indirect methods have shown to be for the assessment of use values of non-marketed goods only. For the assessment of the total value of non-market goods direct methods like the Contingent Valuation Method (CVM) for a comprehensive valuation for the valuation of single attributes was used. Participatory valuation techniques might lead to results that are more sophisticated but they violate the postulate of preference independence.

CHAPTER FIVE

RESULTS

5.1 Introduction

In this chapter, a summary of results is given. Secondly, a comparative analysis of the results by community is done. The policy implications of the findings are also given. Finally, conclusions and recommendations are made at the end of the chapter.

The economic valuation of communal rangelands was done using market price analysis, this technique that was also employed by Dovie *et al.,* (2006). Contingent valuation analysis was used to measure how the respondents value their rangelands though to a limited extent because the farmers in the communities are not employed and they do not have regular incomes. The researcher started by having a general assessment of the socio-economic status of the farmers in all the three study sites. Generally, the communities are composed of farmers who are not gainfully employed and they depend largely on government grants for their up keep.

A total of 150 farmers from three communities participated in the economic valuation of communal rangelands. The participants' socio-demographic characteristics included age, household size and household income. An explanation of each of the characteristics is given.

5.2 Socio-demographic characteristics of study population

Table 5.1 Socio-demographic characteristics of Lashington, Magwiji and Tsaba *respondents*

Variable	Number	Minimum	Maximum	Mean	Std Deviation
LASHINGTON					
Age	50	18	89	54.02	18.376
HH size	50	1	17	6.92	2.884
HH income	50	0	28800	11587.20	8574.55
MAGWIJI					
Age	50	17	89	57.04	17.432
HH size	50	1	15	7.00	3.258
HH income	50	0	21600	6588.8	6247.80
TSABA					
Age	50	18	87	55.30	15.608
HH size	50	1	17	6.40	3.344
HH income	50	0	21600	7886.40	6711.64

Notes: 1. Age is measured in years.

2. Household size is measured by number of people permanently staying at a homestead
3. Income is measured in rands per annum.

5.2.1 Age

Half of the households (50%) are male-headed in all the three study sites. The age range for the respondents in Lashington was 18 to 89 years; this gave a mean age of 54.04 years. The standard deviation was 18.376 meaning that there is a large spread between the minimum and maximum age. In Magwiji the age range was 17 to 89 years, with a mean age of 57.04 years and a standard deviation of 17.432, meaning there is big difference between the young and the old. Respondents in Tsaba had a range between 18 and 87, giving an average of 55.30 years and a standard deviation of 15.608 years. Age of people has an influence on how people perceive and evaluate communal rangelands. Young farmers were more willing to pay for the use of the communal rangelands than the old farmers even though they are not getting a regular income.

5.2.2 Household size

The overall mean household size was 6.92 for Lashington, 7 for Magwiji and 6.4 for Tsaba. Generally there was not much difference in the household sizes for the communities. There was correlation between the household size and the amount of resources used ($P < 0.001$). The standard deviation for the household size for Lashington was 2.884. This is quite small showing that there was no big difference in number of people per household. For Magwiji and Tsaba, the standard deviations were relatively small meaning that the number of people per household in these communities was more or less the same.

5.2.3 Household income

The mean household income level was highest in Lashington, with R11587.2 followed by Tsaba with R7886.4 and then Magwiji with R6588.8. The high household income in Lashington can be attributed to many economic activities including wool production, crop production and wattle pole sales. In Tsaba there are livestock sales and Magwiji mostly subsistence farming.

There was almost equal distribution of respondents according to sex in all the communities. In Lashington and Tsaba, the distribution was 50% females and 50% males, while it was 54%

females and 46% males in Magwiji. The valuation exercise had a balanced representation in terms of female and male farmers.

5.3 Livestock Ownership

Animals under consideration here are cattle, goats and sheep. These domesticated animals dependent heavily on the rangelands. Of the 150 households in the sample, 80% held cattle, 46% held goats and 36% held sheep in Lashington, 66% held cattle, 44% held goats and 34% held sheep in Magwiji and 72% held cattle and 56% held goats in Tsaba. There is no sheep in Tsaba community. Figure 5.1 shows the livestock ownership in the three communities under study. The figures given for the percentage of households holding the various types of livestock refer the entire sample.

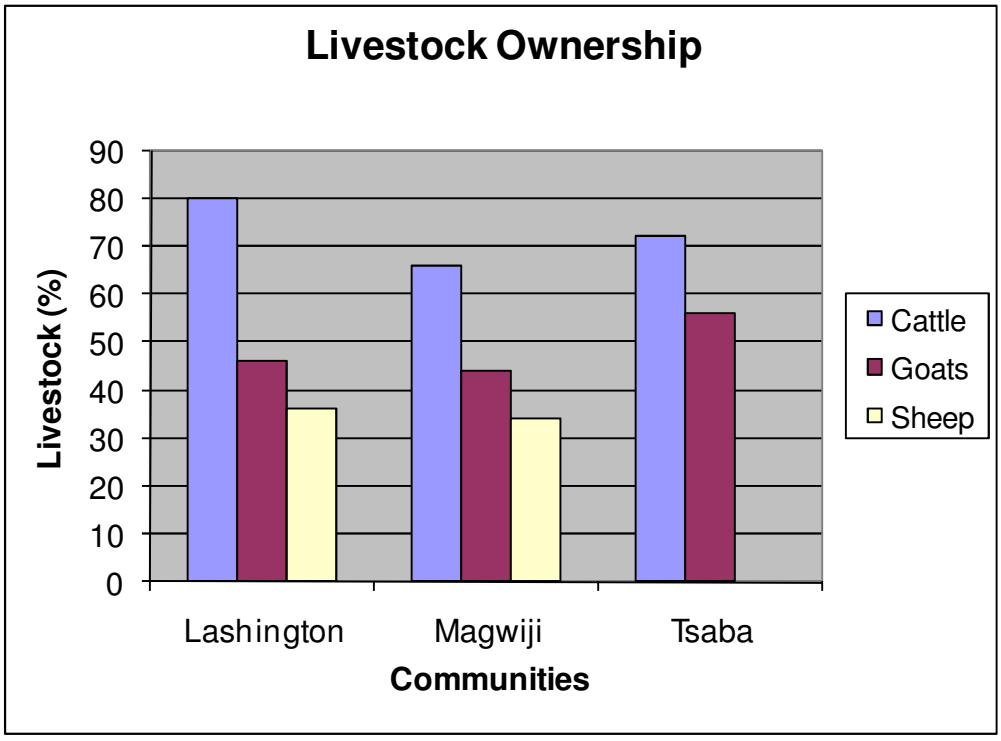

Figure 5.1 Bar graph of Livestock Ownership by Percentage

5.3.1 Livestock trends in Eastern Cape

Table 5.2 summarises livestock numbers for August 2003 and May 2004 respectively, in the whole of the Eastern Cape Province.

Table 5.2 Number of domesticated animals in Eastern Cape Province

Animal	August 2003 (thousand)	May 2004 (thousand)	% change
Cattle	3083	3115	+1.04
Sheep	8323	8302	-0.25
Goats	2951	3001	+1.69

Livestock Units

Source: Adopted from National Livestock Statistics - August 2004.

During the period August 2003 and May 2004 there was a slight increase in cattle and goat population in the whole of Eastern Cape Province and a decrease in sheep population. The figures in the table include commercial farmers, and their turnover is about 20% for cattle. The commercial farmers do sell their cattle and other small stock but they also observe the breeding rates so that there are no great changes in the numbers. The observation made with most of the communal farmers was that the number of domesticated animals remained almost constant, possibly due to keeping of the recommended carrying capacities of range areas. This suggests that there were few sales and little slaughtering of the animals especially with communal farmers, hence no structural change may be occurring in the herd composition, possibly reflecting social and environmental considerations. Generally, small stock is cheaper and easier to keep and goats perform better than cattle on degraded land.

Cattle numbers ranged from one to 69 animals per cattle owning household, one to 80 for goats and one to 230 for sheep. The highest cattle and goat owing households were found in Magwiji community with sheep being highest in Lashington community. Many farmers keep animals for different purposes as is shown in Table 5.3, with differences between communities and within countries.

In KwaZulu-Natal, Tapson, (1991) found that social functions of cattle were of paramount importance. According to Arntzen, (1998), in Botswana, livestock is a major attractive rural activity, and therefore livestock tend to be kept for accumulation and for provision of a flow of outputs such as meat and milk. Many large-scale farmers benefit from economies of scale and are less susceptible to droughts. There is therefore reluctance to sell animals from the smaller herds (Fidzani, 1993, in Arntzen, 1998).

Table 5.3 Use functions of livestock in communal areas of Eastern Cape

Animal	Primary Output	Secondary Output
Cattle	Sales/cash, meat	Draught power, manure, milk, savings/capital accumulation, social functions
Goats	Sales/cash, meat	Milk, savings/capital accumulation, social functions
Sheep	Sales/cash, meat	Wool, *pelts,* savings/capital accumulation, social functions
Wildlife	Meat, hunting, *recreation*	*Skins, skulls, trophies*

Source: Adapted from Arntzen, 1998.

Note: Output in italics have not been captured in this valuation

Small stock gives important additional and alternative outputs. In the Eastern Cape Province, goats and sheep are kept mainly for meat and sales. Farmers also keep sheep for wool. They also perform comparable social and savings functions. Wildlife in the communal rangelands is an important source of meat for the low-income groups and offer recreational services for other population groups. Presently, the main wildlife utilisation in the communal rangelands is consumptive. However, in Lashington and Magwiji communities, there are large dams, which are mainly used for fishing and boating activities. There is high prevalence in the consumption of bush meat in these two communities.

The researcher reviewed and estimated the value/household of the most important outputs of domesticated animals. Fifty-four percent of the households in Lashington community owned livestock (cattle, goats and sheep). Of the livestock owning households, 80% owned cattle only, 46% owned goats only, 36% owned sheep only and 18% owned all three. The figures given for the percentages of the households holding the various types of livestock refer to the entire sample in the three communities. Cattle numbers ranged between 1 and 41 animals per cattle owning household, 1 to 58 for goats and 1 to 83 for sheep. Livestock numbers for Lashington community for the past ten years from 1998 to 2007 are shown in Appendix 2. Generally, there is an increase in the livestock numbers for the period under review, though fluctuation could be seen in the cattle herd size in the year 2002 and 2004. The animals reduced from 1 760 to 1 692, i.e. 3.9%, and then rose to 1 984 in 2005, an increase of about 14.7%. For goats, there was a small drop of around 5.5% in the numbers in 2004 and a pronounced decrease in the numbers is recorded in 2007, when there is a sharp fall from 1 226 to 890, which represents

27.4% of the animals. There were fluctuations for all the years in the flock size but a sharp drop was noticed in 2007, when numbers drastically reduced to 1 017 from 1 343, a decrease of 326 animals, and this represent 24.3% of the total flock for the previous year (Fig. 5.2).

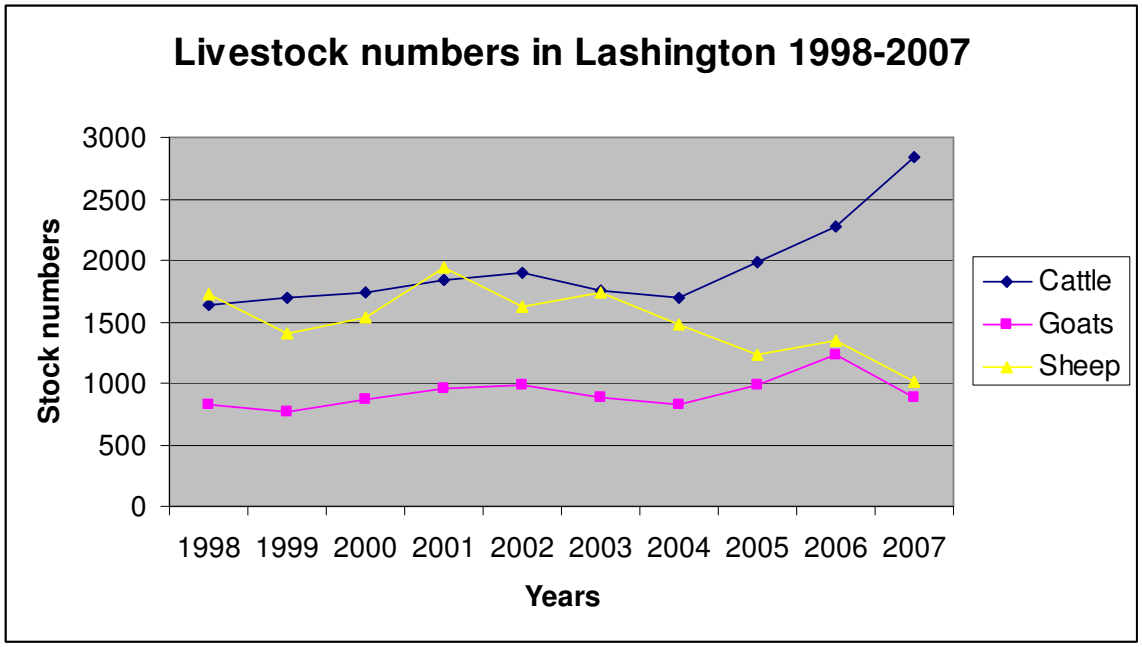

Figure 5.2 Trends in changes in livestock numbers from 1998 to 2007 in Lashington community

Source: Stock inspectors' records, Lashington, Seymour

In Magwiji community, 48% of the households have livestock namely, cattle, goats and sheep. Sixty-six percent owned cattle only, 44% owned goats only and 34% owned sheep. Cattle numbers in this community ranged from 1 to 49 among cattle owning households, 1 to 80 for goats and 1 to 100 for sheep. Eight percent owned all, i.e. cattle, goats and sheep. The livestock numbers from 1998 to 2007 are shown in Appendix 2. Noteworthy is the general increase in the goat numbers which gradually rose from 1998 to 2002 when there was a drop from 1003 to 935 in 2003 and a sudden rise again to 1098 in the subsequent year. The indicated decrease in the number is attributed to home slaughters and sales of the animals. The herd size of cattle rose markedly from 1998 to 2001 when the trend started fluctuating for the years 2002 to 2005. There was a decrease from 798 to 628 in 2002, which represented 21.3% and an increase from 628 to 745 in 2003, which is 18.6%. There was a slight decrease again in 2004 when numbers reduced to 700 and further drop to 668 in 2005. The numbers then increased sharply from 664 to 784 and then to 838 from the period 2005 to 2007, this

represented 18.1% and 6.9% respectively. The flock numbers for sheep declined in the year 2000 to 497 from 518 in 1999 and rose gradually to a high of 940 in 2007. Wool production as a way of generating more income became more important in the recent years; hence the increase in sheep numbers (Appendix, Fig. 5.3).

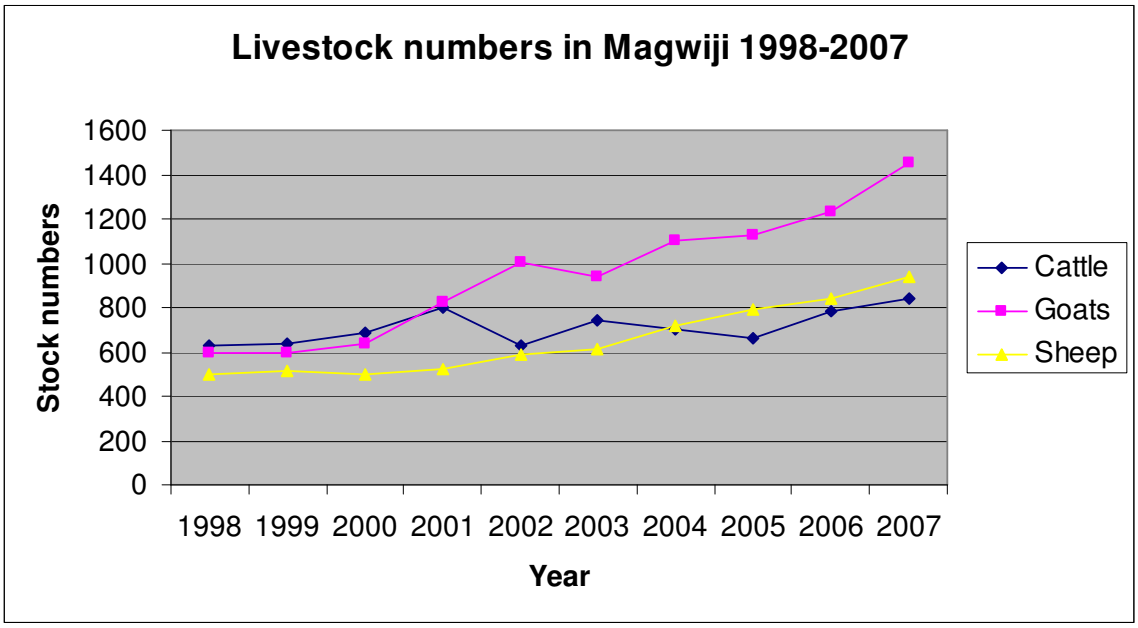

Figure 5.3 Changes in numbers of cattle, goats and sheep from 1998 to 2007 in Magwiji
Source: Stock inspectors' records, Magwiji, Sterkspruit

In Tsaba community, 64% of the households had livestock (cattle and goats) while 36% did not own any. Those households with livestock, 76% owned cattle only, 56% goats only, and another 48% owned both. There are no sheep in Tsaba community. This is attributed to the vegetation and the type of pasture in that area which is not palatable for sheep. Cattle and goat numbers were the same; they ranged from 1 to 31 per owning household. There was a significant increase in goat numbers for all the years, saved for 2006 and 2007 when there was a conspicuous decrease. Numbers dropped from 372 to 362 in 2006 and further dropped to 271 in 2007. The drop in 2007 represented 25.1%. This fall in goat numbers is caused by the slaughters for home consumption and sales in a bid to raise income for school fees and capital for other home needs. Herd size drastically decreased to a low of 178 cattle in the year 2000 (Appendix 2, Fig. 5.4). This was a result of a major cattle auction sale in the area in the year 2000; which led to this sharp drop. After 2000, there was an observable upward trend in the cattle figures until 2007 again when another major decrease was recorded from 350 in 2006 to

266 in 2007. This drop expressed as a percentage is 24%. Again, farmers are selling the animals to raise capital for home projects and school fees. Another reason for this fall is the need to rebuild the herd so the farmers would be getting rid of the old animals.

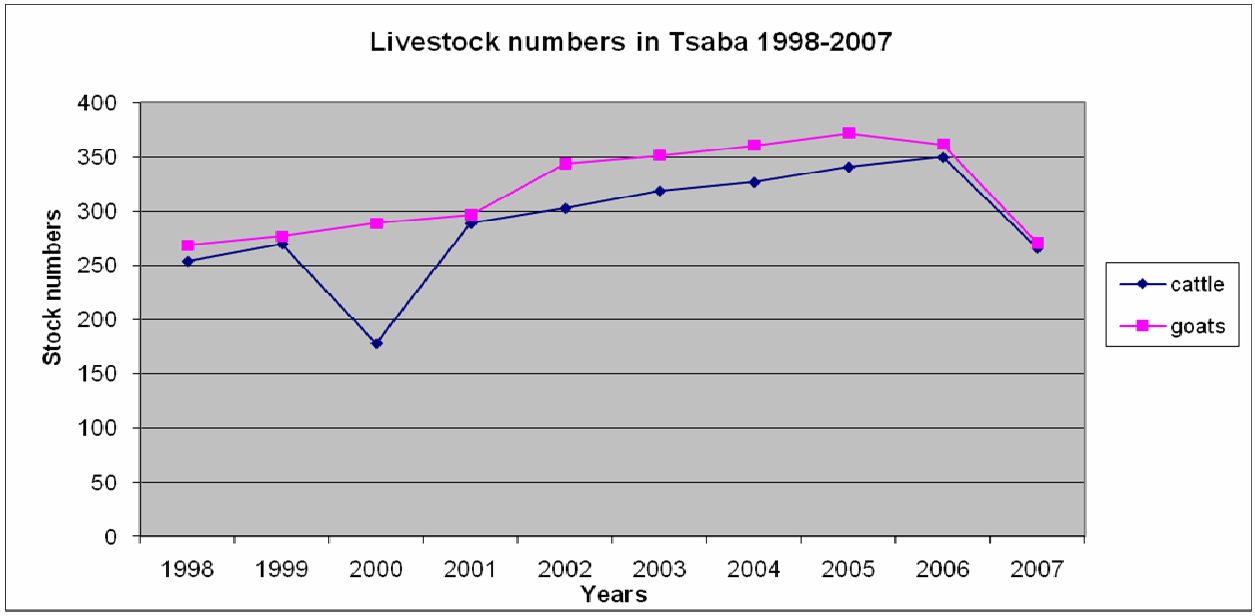

Figure 5.4: The number of cattle and goats from 1998 to 2007 in Tsaba community

Source: Stock inspectors' records, Tsaba, Tsholomnqa

The value of the livestock was determined by the formula: Direct value = price X quantity/ V_{prd} = p_iq_j of each of type of livestock. The values were then added to get the total value for the livestock. The farm gate price of each type of livestock was considered per community. The annual gross value for goods and services rendered by cattle, goats and sheep to stock owning and non-owning households in Lashington was estimated at R5277.85 and Magwiji was R4552.57. The annual gross value for goods and services came from cattle and goats only for Tsaba and was R5094.68 per household (Table 5.4).The benefits to non-livestock owning households were estimated at R277.85 for Lashington, R252.57 for Magwiji and R294.68 for Tsaba per household (Table 5.4).

Using cattle for milk was the most useful benefit to cattle owning households (Table 5.5), followed by cash sales and savings in Lashington, in Magwiji cattle were kept to cultivate arable fields followed by cash sales and in Tsaba cattle were kept mostly for cash sales and ceremonies. In Lashington and Magwiji, sheep were reared, mainly for wool and meat. There were no sheep in Tsaba community. Goats in all the communities were mostly used for household consumption and slaughtering for ceremonies in the three communities (Table 5.5).

Table 5.4 Gross direct-use values as associated with cattle, goats and sheep per household in Lashington, Magwiji and Tsaba Communities

ITEM	GROSS VALUE (R)		
	LASHINGTON	**MAGWIJI**	**TSABA**
Cattle	3500	3000	4000
Goats	700	600	800
Sheep	800	700	0
Non-stockowners	277.85	252.57	294.68
TOTAL	**5277.8**	**4552.57**	**5094.68**

Using the formula: Direct value = price X quantity/ $V_{prd} = p_i q_j$ the gross values were determined. The farm gate prices for the livestock differ with community, for example the farm gate price for cattle in Tsaba was R4000, R3500 in Lashington and R3000 in Magwiji. The farm gate prices farm prices for the small stock also differ community by community.

Table 5.5 Ranking of important benefits of livestock to households

Livestock	Benefits	Wt of 1st most	Wt of 2nd most	Wt of 3rd most	Total Wt
LASHINGTON					
Cattle	Milk	29	12	8	49
	Sales	16	9	7	32
Goats	Meat	48	2	0	50
	Ceremonies	17	11	9	37
Sheep	Wool	44	3	1	48
	Meat	16	13	5	34
MAGWIJI					
Cattle	Cultivation	21	6	5	32
	Live sales	18	9	2	29
Goats	Meat	45	3	1	49
	Ceremonies	19	10	3	32
Sheep	Wool	32	12	4	48
	Meat	19	11	6	36
TSABA					
Cattle	Cash sales	33	9	3	45
	Ceremonies	21	7	4	32
Goats	Meat	46	3	1	50
	Ceremonies	24	10	3	37

Key: Wt-stands for weight

The most common reasons for slaughtering cattle in the three communities, Lashington, Magwiji and Tsaba were for ceremonial purposes, for example, ritual ceremonies (thanksgiving to the ancestors), and meat for home consumption (Table 5.6). Goats and sheep in Lashington and Magwiji and goats only in Tsaba were slaughtered mainly for meat and ceremonial functions (Table 5.6).

Table 5.6 Reasons attributed to the slaughtering of livestock by households

Livestock	Reason	Wt of 1st most important	Wt of 2nd most	Total Wt
LASHINGTON				
Cattle	Ceremonies	27	9	36
	Meat	14	7	21
Goats	Meat	35	7	42
	Ceremonies	23	5	28
Sheep	Ceremonies	33	16	49
	Meat	13	9	22
MAGWIJI				
Cattle	Ceremonies	17	5	22
	Consumption	11	7	18
Goats	Meat	15	4	19
	Ceremonies	10	3	13
Sheep	Meat	12	6	18
	Ceremonies	8	3	11
TSABA				
Cattle	Ceremonies	27	9	36
	Sold for cash	2	1	3
Goats	Meat	38	7	45
	Ceremonies	17	8	25

Key: Wt-stands for weight

5.4 Values of goods and services from cattle

Monetary values for milk, meat for consumption and manure contributed the three highest values of the gross direct-use values of goods and services rendered by cattle (Table 5.7), to cattle owning households in the three communities under study. In Lashington ten households produced milk that was valued at R1825. Ten of the households represent 20% of the sample size and sharing the value equally amongst the households, each household would get R365. In Magwiji, there were eight households producing milk and this represents 16% of the sample size. The total value for milk was R4760, sharing it amongst member households then, each

household would get R761.6. For Tsaba, 15 households produced milk that had value of 1221.82 and each household could get R366.55. The same happened with other goods and services. Gifts from livestock owning households to non-owning households were pivotal to both (Table 5.8), either (i) as surpluses and/or (ii) ways of keeping good social relationships. Many families in the samples got sizeable quantities and values, of meat as gifts and bought from other cattle owning and non-owning households, for example in Lashington non-owing families got any average of 17±15kg valued at R191.89±136.7, in Magwiji non-owning families got 15±13kg valued at R152.21±128.84 and Tsaba it was 6±11 valued R68.98±51.77. Owning families got far more gifts than non-owning families, for example in Lashington families got 46.43kg valued at R551.08±513.78, in Magwiji they got 45±39kg valued at R491.8±456.57 and in Tsaba families got 42±39kg valued at R537.38±500.8. It can be concluded that sharing was very high among owning households.

Buying of meat seemed was more common amongst non-owning families as compared with owning families because they did have the resource. Most cattle owning households took their cattle to the range and collected them using family labour and it is during this activity that a lot more activities could also be taking place such as collection of fuel wood, wild fruit and so forth, hence it was very difficult to cost the labour and allocate time spent on each of the activities, thus gross values only were considered.

5.5 Individual goods and services from cattle

Most of cattle owning households had milking cows, and the majority of them consumed all milk produced, with small amounts given or sold to neighbours. The values of milk and meat consumed directly by cattle owners were estimated (Table 5.7). Cattle owning households exchanged meat as gifts among themselves. Cattle owning households used dung as manure and shared with neighbours in large quantities (Table 5.7). Animals were sold and slaughtered for purchasing of household items and capital for trading and more often for ritual ceremonies and celebrations. Live cattle sold for R3500 in Lashington, R3000 in Magwiji and R4000 in Tsaba. A number of households purchased and slaughtered animals for funerals, Easter and Christmas holidays.

Table 5.7 Gross direct-uses, and traded values of cattle benefits by households (HHs) in Lashington, Magwiji and Tsaba Communities

Benefit Status	Goods and Services	Site	Total value from	Number of HHs	Proportion of owning	Value to all HHs (R)
Direct-use value	Milk	LA	1825	10	20	365
		MG	4760	8	16	761.6
		TS	1221.82	15	30	366.55
	Meat (own use)	LA	1731.6	10	20	364.32
		MG	1730.2	11	22	380.64
		TS	1680	11	22	369.6
	Meat (gift)	LA	520.63	6	12	62.48
		MG	491.8	6	12	59.02
		TS	517.59	6	17	87.99
	Manure (own use)	LA	331.03	3	6	19.86
		MG	312.69	3	6	18.76
		TS	351.08	4	8	28.09
	Manure (gift)	LA	19.11	3	6	1.15
		MG	18.05	3	6	1.08
		TS	19.11	4	8	1.53
Traded values	Meat sales	LA	34.10	5	10	3.41
		MG	33.21	4	8	2.66
		TS	34.10	6	12	4.09
	Live animal sales	LA	3851.21	5	10	385.12
		MG	2993.3	4	8	239.46
		TS	3016.67	24	48	1448
	Ceremonial live sales	LA	3500	2	4	140
		MG	3000	1	2	60
		TS	3600	1	2	72

Table 5.8 Mean (± S.E.) quantity and value, of meat received as gift and bought from other cattle owners by cattle owning and non-owning households (HH)

Item	Quantity of meat per non-owning HH (kg)	Value of meat per non-owning HH (R)	Quantity of meat per other owning HH (kg)	Value of meat per other owning HH (R)
LASHINGTON				
Gifts	17±15	191.89±136.7	46±43	551.08±513.78
Bought	7.5±5.2	73.83±16.36	7.3±5.0	64.55±44.07
MAGWIJI				
Gifts	15±13	152.21±128.84	45±39	491.8±456.57
Bought	5.5±3.2	40.98±14.21	5.3±3.0	32.21±12.87
TSABA				
Gifts	6±11	168.98±151.77	42±39	537.38±500.8
Bought	3.5±1.2	60.13±30.22	3.3±1.0	49.32±2885

5.6 Value of goods and services from goats

Meat and cash from live sales of goats were valued monetarily (Table 5.9). The gross direct value of goods and services was R700 in Lashington, R600 in Magwiji and R800 in Tsaba per goat owning household. A total of 251 goats were recorded across the sampled households, at a mean of 5.02±10.98 goats per owning household in Lashington. Magwiji had 373 goats, at a mean of 7.46±15.6 and Tsaba recorded 244 goats with a mean of 4.88±7.07.

5.7 Individual goods and services from goats

Meat from slaughtered goats was measured in kilograms and valued (Table 5.9). In Lashington, the cost of live animals ranged from R600 to R700, and an average 21 kg animal sold at R650. The cost of live animals ranged from R600 to R650, an average 18 kg animal sold at R625, in Tsaba the cost ranged from R800 to R900, and an average 25 kg animal sold at R850. Goat owning households in the three communities sold live animals to relatives and friends in order to raise money for projects and to pay school fees and accumulate wealth to acquire large stock (e.g. cattle). However, there were many households who did not sell their animals because (i) the animals were meant for own consumption, (ii) the animals were fewer and were left to reproduce and (iii) were also a form insurance.

In Lashington for example, there were 23 families that kept goats for consumption and this can translate to 46%. Forty-six percent of R307.43, which is the beneficiary value, equals to R141.42. The same calculations could be done for gifts, live sales and applies to sheep. Large amounts of goat meat were consumed in Magwiji, followed by Tsaba and then Lashington. Magwiji had the largest flock of goats; this was so because the vegetation that favoured rearing of goats. The idea of rearing of goats greatly reduced the expenses families were bound to meet if it meant buying the meat from the butcheries.

Sheep in Lashington and Magwiji are predominantly kept for two main purposes namely wool and meat. When it comes to meat that culture of sharing is being witnessed even with sheep meat. There high consumption of sheep meat to the owning households as compared to non-owning households who are highly depend on gifts and in most cases they buy. The farmers could as well as sell their live sheep in the same neighbourhood.

Table 5.9 Direct-use value of goods and services from goats in Lashington, Magwiji and Tsaba in 2007

Status	Products	Number of households		Value per household	
		n	(%)	Beneficiary HHs (R)	All HHs (R)
LASHINGTON					
Consumed	Meat (own use)	23	46	307.43	141.42
	Meat gift	27	54	37.22	20.09
Traded	Live sales	2	4	700	28
MAGWIJI					
Consumed	Meat (own use)	36	72	290.4	209.09
	Meat gift	13	26	35.16	9.14
Traded	Live sales	3	6	600	36
TSABA					
Consumed	Meat (own use)	34	68	395.4	268.87
	Meat gift	24	48	45.16	21.68
Traded	Live sales	11	22	800	176

Table 5.10 Direct-use value of goods and services from sheep in Lashington and Magwiji in 2007

Status	Products	Number of households		Value per household	
		n	(%)	Beneficiary HHs (R)	All HHs (R)
LASHINGTON					
Consumed	Meat (own use)	12	24	407.72	97.85
	Meat gift	13	26	35	4.55
Traded	Live sales	18	36	800	288
MAGWIJI					
Consumed	Meat (own use)	18	36	390.2	140.47
	Meat gift	11	22	30	6.6
Traded	Live sales	23	46	700	322

5.8 Value of goods and services from sheep

Meat and cash from live sales of sheep were valued monetarily (Table 5.10). The gross direct value of goods and services was R800 in Lashington and R700 in Magwiji per sheep owning household. A total of 618 goats were recorded across the sampled households, at a mean of 12.36±22 sheep per owning household in Lashington. Magwiji had 477 sheep, at a mean of 9.84±21.5.

5.9 Individual goods and services from sheep

Sales of sheep were slightly higher than home slaughter. The cost for sheep was ranging from R750 to R800 in Lashington and R700 to R750 in Magwiji. Sheep are treated in the same way to goats, that is similar calculations were used to estimate the use values.

5.10 Non-livestock owning households

Households that did not own any livestock received benefits of gifts or cheap goods and services from livestock owning households. Using animals for milk and sales in Lashington, ploughing in Magwiji and cash sales in Tsaba were the most valued benefits representing 56% of the total direct-use value to non-owning households. The value of milk consumed, contributed over 22%, followed by the value of meat (18.7%) in all the communities. Of the total value of the benefits enjoyed per non-owning household, most were freely obtained with no return payment.

The most important reason for not owning livestock was the lack of money (59% of households), followed by the lack of herders, and because most animals had been lost in the last drought in 1992. Most households (84%) wanted to own livestock. For those who wanted to own livestock, 68% preferred cattle, 11% goats, 8% sheep in Lashington and Magwiji and the rest were indecisive. Reasons for the preference were provision of: (i) meat, (ii) milk, (iii) traction power, (iv) sales for cash income, (v) future savings, and (vi) transport. Forty-eight percent of the non-owning households had no idea as to how they could acquire animals. Only 14% of non-livestock, owning households bought milk from cattle owners and another 29% received milk as a gift. Forty-four percent of the non-livestock owning households collected and used dung from stockowners' kraals for floor surfacing in dwellings at no cost.

The farmers' livelihoods do not only depend on the livestock that they kept but also on the gathering of natural resources from the rangelands. It was quite evident that there was a lot of tapping of natural resources by the farmers in the three communities. The valuation of these resources was done to calculate per capita consumption per household. The resources were classified as direct, indirect and non-use values, which were further divided into option and existence values. Eight resources were considered for this study under direct-use values, five indirect-use values, four option values and five existence values.

5.11 Household natural resource use

In the three study sites, it is quite evident that there is over exploitation of natural resources by the people. More than 90% of the respondents said they were relying on their communal rangelands for the provision of natural resources. The most common natural resources from communal rangelands are fuel wood, wild fruits, medicinal plants, thatch grass, building materials, bush meat, fish and water. It was observed that in some instances, when there is no tap water, the farmers resort to the use of dam or river water.

The survey showed that the majority of the households in the communal areas of the Eastern Cape Province used many natural resources from the communal rangelands. The most commonly used indigenous natural resources and products in the three communities included fuel wood, wild fruits, medicinal plants, thatch grass, building poles and water. Some households also engage in fishing and hunting activities especially those that are male headed. The 150 households regularly used fuel wood and wild fruits. Averaged annual household natural resources usage was significantly higher in Lashington than in the other two

communities, for fuel wood ($P < 0.01$), wild fruits ($P < 0.01$), medicinal plants ($P < 0.05$), and thatch grass ($P < 0.05$) (Table 5.11). The harvesting of wild fruit was both significantly higher in Magwiji community ($P < 0.05$), while the usage of medicinal plants was both significantly ($P < 0.05$) and considerably lower in this community than Tsaba and Lashington. Annual community use of natural resources was calculated using mean household usage rates. The household numbers for 2006/2007 given by the extension officers in the Department of Agriculture, were as follows: Lashington (254), Magwiji (288) and Tsaba (145)

Table 5.11 Percentages of households using natural resources

RESOURCE	COMMUNITY			MEAN
	LASHINGTON	MAGWIJI	TSABA	
Fuel wood	98	84	94	92
Wild fruits	80	78	66	73.3
Medicinal plants	68	78	62	69.3
Thatch grass	90	44	62	65.3
Building poles	90	36	70	65.3
Water	100	22	13	45
Bush meat	32	12	4	16
Fish	19	24	0	14.3

The majority of the respondents in Magwiji and Tsaba communities indicated declining availability of fuel wood and building poles over the past 14 years. This is attributed to indiscriminate cutting down of trees and over-harvesting, which had resulted in increased distance travelled in search of these scarce commodities and, therefore, additional time spent in obtaining these resources. A good example is that a head-load of fuel wood (35kg) that previously took two hours to collect now has a mean collection time of four hours. This adds up to a total of 520 hours a year spent on collecting fuel wood alone (that is, about 130 head-loads). The availability of wild fruits, medicinal plants, thatch grass and bush meat was generally regarded as sufficient, although these varied from year to year mainly due to rainfall. In Lashington community, the farmers have no problems with fuel wood and building poles because of the black wattle thickets and they are even complaining of the trees infesting communal rangelands.

5.12 Direct-use values

All the products in Table 5.13 were traded locally, which enabled the researcher to calculate the direct-use values. The annual total direct-use worth of utilised natural resources, averaged across all the households, was R3408.04 per household and this could translate to R456.43 per person (Table 5.13). The largest value was from fuel wood, wild fruit, medicinal plants, thatch grass and building poles, with the remaining resources making relatively insignificant contributions. Total annual value per community ranged from R1491.34 per household (that is, R233.14 per person) in Tsaba, to R3175.8 per household (R463.19 per person) in Magwiji. The Lashington value was R5556.78 per household (R672.95 per person).

Table 5.12 Mean annual household consumption of natural resources, averaged across all households sampled within the community

RESOURCE	COMMUNITY			MEAN
	LASHINGTON	MAGWIJI	TSABA	
Fuel wood (kg)	5192±3200	2315±1840	1714±0151	3074
Wild fruits (kg)	129.7±103.6	182.6±161.6	91.1±88.5	134.5
Medicinal plants (kg)	97.2±61.9	79.2±43.6	93.9±94.9	90.1
Building poles	130.9±113.7	69.9±85.3	52.6±71.2	84.4
Thatch grass (bundles)	2249.5±35.1	1919.6±36.9	443.3±36.5	1537.47
Bush meat (kg)	0.8±1.0	2.9±2.1	0.3±0.6	1.3
Fish (kg)	0.7±0.9	5.0±6.8	0.0±0.1	1.9

5.13 Direct-use Value

In common with the findings of other studies in South Africa and indeed in equivalent biomes elsewhere in the developing world, this study revealed that rural households made extensive use of a wide range of natural resources. On average, the 150 households interviewed used all of the rangeland products investigated. All households used twig and grass hand brushes, and wild fruits and herbs. More than ninety percent used wood for fuel and dwelling construction, as well as bush meat, thatch grass and medicinal plants. Not all differences in the quantities of the eight types of rangeland products used in the three communities were significant, and certainly, no trend from the most to the least developed community was apparent.

Table 5.13 Mean direct-use values of natural resources per household.

RESOURCE	COMMUNITY			MEAN
	LASHINGTON	MAGWIJI	TSABA	
Fuel wood	864(124.86)	564(74.86)	494(77.19)	641(92.30)
Wild fruits	161.88(23.39)	85.2(12.17)	57.84(9.04)	101.64(14.87)
Medicinal plants	160.8(23.24)	92.2(13.17)	94.2(14.72)	115.73(17.04)
Building poles	1912.6(146.33)	142(35.5)	332(51.98)	795.53(77.94)
Thatch grass	2249.5(325.07)	1919.6(274.23)	443.3(69.27)	1537.47(222.86)
Bush meat	152(21.97)	300(42.86)	70(10.94)	174(25.26)
Fish	56(8.09)	72.80(10.4)	0(0)	42.67(6.16)
TOTAL (R)	**5556.78(672.95)**	**3175.8(463.19)**	**1491.34(233.14)**	**3408.04(456.43)**

Note: Numbers in brackets are mean per capita in South African rands

Four products accounted for 75.4% of the total value of all products. These were fuel wood, thatch grass, wild fruits and medicinal plants that contributed 23.1, 18.6, 16.9 and 16.8 percent of the total value respectively. The mean total annual direct use value of all products used per person was estimated to be R456.43, which as shown in Table 5.13, is substantially lower than equivalent estimates derived elsewhere in the country. The reasons for such substantial variations in these values are not clear. Suggestions gleaned from discussions and literature, (Watson *et al.,* 2001; Shackleton, 2005), are that they may be related to differences in (a) degree of degradation, (b) type and abundance of species, (c) population densities, and (d) proximity to major towns and transport routes. A comparative assessment of these aspects in these respective study areas should be pursued.

All respondents claimed that the supply of thatch grass for thatching and weaving was inadequate. The availability of fruit and mushrooms, and wood for fuel, dwelling construction, fencing and household utensils, was viewed as inadequate by more than half of those interviewed. Most households interviewed had resided in their communities for over twenty years. All respondents claimed that medicinal plants had declined significantly during the past five to ten years. More than half of them were of the opinion that the following products had also declined over this period: wood for fuel, dwelling construction, fencing and household utensils; mushrooms and twigs for hand brushes.

Figure.5.5 Fuel wood collection.

This picture was taken from Magwiji community and the boy did not collect fuel wood only (personal communication) but also collected cactus pears from the rangeland. To begin with, there are enormous problems in measuring the quantity of labour inputs. For example, fire wood collection is sometimes opportunistic (especially when involving collection for daily cooking and heating) and sometimes planned (e.g. when collecting for a major use such as beer brewing). In the later case, time taken is a rough measure of labour input. In the former case, where firewood is collected on the way back from work in the fields, time taken has a little conceptual meaning because no additional time has been used for this task, and yet the collection activity still has value. Furthermore, in a multicollector household, getting such data from a questionnaire is difficult. Similar problems affect almost all resource uses (Campbell and Luckert, 2002).

5.14 Indirect and non-use value: Regulating and supporting services of communal rangelands

Information gained from both the household interviews and group meetings clearly showed that farmers in the three study areas were generally very aware of and highly prized the indirect and non-use value of their rangelands. Their responses regarding the ecological services were categorised as follows: under indirect-use values were erosion protection; flood control; habitat support; nutrient recycling and pollution control or carbon sequestration and fresh air. The non-use values were further classified into two groups namely: option values and existence values. Under option, values were extractive and tourism; leisure; pharmaceutical and industrial application, on the other hand under existence values were aesthetic; bequest; cultural heritage

and scientific developments. However, it was very difficult to quantify the indirect and the non-use values the farmers valued them a lot. Without exception, the matrix ranking and willingness to pay exercises revealed that erosion protection was the most highly prized of these services though they could not put fixed amount to it. While rangelands were generally highly regarded for providing fresh air, their role in the carbon sequestration was less understood and consequently was consistently accorded the lowest ranking.

In the Lashington community, 98% of the respondents said erosion protection was important. Ninety-six percent of the farmers said flood control was important, 86% said habitat support was important, 88% said nutrient recycling was important and 66% said pollution control and carbon sequestration was important. Their responses regarding non-uses were as follows: under option values 82% for extractive and tourism, 66% for leisure, 84% for pharmaceutical and 80% for industrial application. Under existence values the analysed scores were as follows: 92% for aesthetic; 90% for bequest; 96% for culture; 92% for heritage and 84% for scientific. The importance of trees in providing meeting places and shade were generally the most highly valued of these services. The scientific and recreation value were generally the least appreciated.

In Magwiji community, the majority of the farmers showed a very good understanding and valuation of their communal rangelands. The results from the analysis showed that 98% put a lot of importance on erosion protection; 100% said flood control was vital in their area; 94% showed that habitat support was crucial in their lives. They urged that wildlife, since it provided them with bush meat, they cannot let the rangelands become depleted. Seventy percent said they get humus for their fields and gardens from the range and 66% placed value on pollution control and carbon sequestration. As mentioned in the preceding paragraphs, pollution control and carbon sequestration scored low meaning it was not very important according to the farmers. Under option values, the scores were as follows: 92% for extractive and tourism. According to them, many outsiders were coming to do fishing and boating on the dam in their area. 90% were interested in site viewing and sometimes go for picnics in the rangelands. 86% said pharmaceutical was important and 54% placed value on industrial application. There are many peaches in Magwiji and the 54% of the farmers would be happy to have an industrial establishment to have a ready market for their fruits. For existence values, they were rated as important and the analysed scores were as follows: 88% for aesthetic, bequest and heritage; 90% for culture and 64% for scientific. The farmers respected their gravesites and are saying

they cannot sell their gravesites for anything and they are prepared to remain staying in the same area to keep their graves. This showed how the farmers culturally value their dead and buried relatives.

The farmers in Tsaba community were not different from the other farmers in Lashington and Magwiji communities. The indirect-use values were rated important and were valued as follows: 98% for erosion protection and habitat support; 90% for flood control and nutrient recycling. The least value of 78% was placed on pollution control and carbon sequestration. Option values had following scores: 92% for extractive and tourism and pharmaceutical; 88% for leisure and 86% for industrial application. For existence values highly prized were aesthetic and bequest which had a high score of 100% each; culture had 98%; heritage 96% and scientific had 86%.

In addition to products and services that are directly harvested or provided by these ecosystems, communal rangelands of the Eastern Cape, as is the case with other communal rangelands, have a range of critical environmental functions that sustain human life. Some of the major services provided by communal rangeland ecosystems are:

• Carbon sequestration: The importance of the vast dry areas is increasingly recognised, despite the relatively low carbon sink per ha. Interestingly land degradation caused mainly by overgrazing can have both negative and positive impacts on the carbon storage capacity of dry areas, and depends on the amount of rainfall. With increasing aridity there is a shift from bush encroachment to loss of vegetation cover.

• Erosion control: The ground vegetation cover has an important role in preventing dust storms in areas vulnerable to desertification. In the most arid areas, land degradation leads to a reduction in vegetation cover;

• Ground-water storage (drought control): The water storage capacity of predominantly sandy soils in dry areas is poor and groundwater recharge low (below 1mm/year);

• Habitat for species breeding and nursery: This function is closely linked to biodiversity maintenance

• Soil fertility regeneration: The nutrient recycling process is determined by biochemical and physical processes and depends on biomass production and microorganisms.

• Pollination services to crops and other plants: This function is closely linked to maintenance of pollinator populations.

Among the indirect use values or ecosystem service values measured for the study area were carbon sequestration, protection from erosion, and value as a wildlife refuge. These values were roughly calculated using benefits transfer from more detailed work that has been done on them in Bushbuckridge by Shackleton *et al.,* (2000). The calculations made in that study were adjusted to reflect the different productivity, cover values and species mixes in the study areas. The main indirect use value was the annual net change in carbon sequestration, at R700, 0000. Protection from wind erosion, measured as annual production losses averted, was valued at R430, 000. The value of the study area in protecting wildlife which disperses and is used elsewhere, i.e. the wildlife refuge value, was estimated at R15, 000 per annum. The value for groundwater recharge was estimated to be negligible.

These environmental functions often referred to as regulating and supporting services have not been valued in communal rangelands of Eastern Cape or South Africa, though they are fundamental ecological and human well-being.

5.14.1 Social and cultural values

*"*Thank you for having the courage to put a monetary value on our ancestral lands" Statement made by the Chairman of Magwiji community following a presentation on the economic value of their communal rangelands.

The statement above refers to resource economists' and local communities' different perceptions of values. To develop interventions that support local livelihoods and increase the value of key resources, it is important to take note of local community values. These are embedded in the cultural practices and indigenous knowledge systems associated with the use of local natural resources. These cultural and spiritual values expressed in local practices, beliefs and norms are often referred to as social capital.

In some cases indigenous knowledge, which is part of a community's social capital, can be regarded as a commodity where intellectual property rights are considered and thus can be aggregated in economic terms. The use of Access and Benefit Sharing and Intellectual Property Rights framework provides an opportunity for demonstrating the economic benefits associated with indigenous knowledge. For example in 2002, South Africa's Council for Scientific and Industrial Research signed a benefit-sharing agreement with the South African Council on the licensing and sale of the *Hoodia* appetite suppressant drugs. The agreement acknowledges the San peoples' prior intellectual property rights to the *Hoodia* as an appetite suppressant.

There are other potential opportunities for similar benefit-sharing agreements. During the development of the South African National Biodiversity Strategy and Action Plan the local communities in Lashington, Magwiji and Tsaba communities demonstrated a wealth of indigenous knowledge with regards to biodiversity, especially medicinal plants found in their locality.

This study in the Eastern Cape Province thus seeks to identify cultural values and norms as valuable assets that are worth protecting. These assets could be developed by the local communities for sustainable management of the rangeland resources by tapping into the social and human capital that lies in the resource users themselves; the women that harvest plant resources and the men that work with livestock and wildlife.

These cultural practices could have a value in reducing rangeland degradation and the consequent erosion of the ecosystem asset base. Where such cultural practices exist, it might be easier for people at a local community level to change their behaviour in order to address human-induced threats to biodiversity (Cousin 1999).

Communities are likely to participate actively and effectively when they employ familiar methods of managing natural resources (Dovie *et al*., 2006). The cultural practices and norms illustrate the value that local people place on specific resources. Here the study focuses on the practices relevant to the natural resources, which are pivotal to the livelihoods of the communities in Lashington, Magwiji and Tsaba communities. In the Eastern Cape, examples of these values were found in taboos, which have been noted by some conservationists as resulting in the protection of certain species and hence contributing to conservation. The taboos do not just relate to the environment: they cover all aspects of life in the communities, the croplands and the cattlepost. Management (including monitoring) of veld products has always been important in the lives of people of the Eastern Cape, whether done consciously or not. Their adaptations, local beliefs and their taboos have always protected the environment within which they lived (Shackleton *et al.,* 1999). Such practices can even affect trade in products that are protected by local taboos, implying the seriousness with which development programmes need to consider local cultures and practices.

The community of Magwiji spoke of certain rituals where plant resources were used, which shows the value of these resources to social and individual wellbeing. These included the use of plants for cleansing widows, pregnant women and newborn babies.

- A woman who has had a miscarriage is smeared with a mixture of cow dung and a plant known as *Mogato* under her feet.
- *Sekanama* is used for cleansing a widow before she can remarry or be with another man.

5.14.2 Indigenous or traditional knowledge

Using their indigenous knowledge, communities in Lashington and Tsaba have environmental markers for noting when to harvest various veld products, as well as the health of the ecosystem. Examples identified by Twine (2005) for key livelihood resources of communities in the Eastern Cape include;

- The winter season signals the harvesting period for Devil's Claw plants.
- When plant species like umbrella thorn (*Acacia tortilis*) and silver leaf (*Termilia sericea*) shed leaves, it signals the harvesting season for Devil's Claw.
- Thatch grass is cut when *Acacia erioloba* (camel thorn) blossoms.
- Wild melons are ripe and ready for harvesting in the height of summer.
- The communities under study also state that when trees produce a lot of wax it signals a drought.

Examples of other taboos and cultural practices related to ecosystem goods and services are listed in Figure 5.5.

The study carried out by (Shackleton *et al.,* 2001) further indicates that the difference in the traditional or indigenous knowledge held by men and women in Bushbuckridge influences access to natural resources. Women have more knowledge about plant resources key to subsistence livelihoods, whereas men are more knowledgeable about wildlife and cattle which have made it into the mainstream economic activities and are thus supported by strong national policies and economic incentives. The knowledge that women have and the resources that are central to their livelihoods are communally owned and subject to open access while the men's livelihood resources and knowledge they possess is subject to men's exclusive ownership of cattle and membership of a local wildlife trust.

• People are prohibited from collecting firewood in the village.

• During summer/ ploughing season people were not supposed to cut down thorny trees, e.g. m*ongana* and *mokgalo*. This is believed to prevent harsh and stormy rains, which could destroy crops.

• Children are not allowed to go harvesting alone without the guidance of parents.

Apart from the danger of wild animals, this was a way of making sure that they do not harvest unripe products thus causing unnecessary damage to the environment.

• Trees were not cut during flowering times. This was to allow the trees to produce seeds and allow future germination.

• *Mokgalo* was a protected tree and to cut it one had to seek permission from the chief.

• Bulls were not slaughtered during ploughing season. They were only slaughtered during winter and this was done with the permission from the chief.

• *Makatane* were not to be thrown, as it was believed this action would attract lion and other predators to the settlement

• Thatching grass was only harvested during winter. This was to allow formation of the seeds.

• The cutting of primary tubers from Devil's Claw (*Harpogophytum procumbes*) when harvesting the plant is prohibited. Local residents believe that if the primary tube is cut in the harvesting process, the patient who uses it will not heal. The protection of the primary tuber has benefits for conservation as it promotes regeneration of the plant.

• It is against tradition to cut the base of thatch grass during harvesting; again this practice promotes re-growth and thus avoids the build up of sand dunes in the drier areas. When cutting thatch the communities scatter the seeds on their way back home so as to encourage growth, especially in areas with deep sands.

Figure 5.5 Taboos and other cultural practices related to ecosystem goods and services
Source: Cock and Dold (2000)

5.15 Improvements

The farmers in the three communities felt that for them to maximise the economic contribution of communal rangelands to their livelihoods some improvements must be carried out. The majority of the farmers interviewed showed they needed some improvements on their rangelands in terms of rehabilitating the fences that demarcated the camps, which were once there during the apartheid era. Other improvements included dams, roads, electricity, eradication of evasive

plants, bulls and or rams for genetic improvements of herds and flocks. Some said they needed dip tanks in their areas to deal with ticks.

In Lashington community, the respondents said they looked forward to the State providing most of the mentioned improvements. The frequencies indicated that 74% of the farmers needed fences; 44% dams; 22% roads; 14% the black wattle in the area eradicated for it was encroaching into their rangelands; 14% needed electricity so as not to over-exploit the use of fuel wood; 6% needed dip tanks and the other 6% wanted bulls and rams to improve their animals.

The respondents in Magwiji community complained that they no longer have fences to demarcate their rangelands and the camps. Their animals were vulnerable to theft. Sixty-four percent indicated they needed fences; 34% gully filling; 14% dams, 6% re-afforestation and 2% said they wanted roads.

In Tsaba community 54% of the farmers indicated they needed fences; 24% dams; 22% removal of alien plants; 8% dip tanks; 4% roads; another 4% said they wanted the erosion that has destroyed the rangelands stopped by planting more trees and 2% said they needed bulls to improve their herds.

5.16 Land value

The farmers were asked what they were willing to accept to forego their land. There were mixed feelings, some saying they do not sell their land and others saying they can sell their land, but most of the farmers were not prepared to sell their rangelands' arguing the lands have to remain for future generations. Their bequest value for land was very high. For the very few that indicated that they were prepared to sell their land a varied range and far fetched amounts were mentioned in the three communities. The lowest amount being R10 000 000 and the highest being R1 000 000 000. This is a far-fetched amount taking into cognizance that land in communal areas cannot be sold, it state owned. It can be safely concluded that the farmers do not really have a concept the value of land.

The study revealed a good knowledge of and respect for long standing regulations established by the local leadership to protect the rangelands from over exploitation. Most respondents claimed that rangeland resources had declined in recent times primarily due to increasing

population densities. Most believed that they should be conserved for future generations and that the government was responsible for this, and should penalise people who overexploit them.

Chapter six gives a comprehensive discussion and recommendations on the results that were found during the study. The writer explained the results found in chapter five. The discussion started of with the importance of multiple benefits of traditional livestock production, valuation of individual benefits that are derived from livestock, policy findings and the future of traditional livestock production and conclusion.

CHAPTER SIX

DISCUSSION AND RECOMMENDATIONS

The economic valuation of the communal rangelands was done on livestock production mostly cattle and natural resources. There is a considerable hidden harvest from communal rangelands both within the livestock sector as well as in natural resources gathering. Communal rangelands derive their value from mainly livestock and natural resources gathering, each of which generate marketed and non-marketed values. Priority areas coming out of this study include livestock production and natural resources gathering. These were discussed separately in this chapter beginning with livestock production and then natural resources gathering.

6.1 Importance of multiple benefits of traditional livestock production

The livestock production objective of the majority of rural farmers in communal areas is to maximise benefits within an overall livelihood context. Hence, the need to consider other livelihood sources when valuing benefits from the livestock sector. In this study, livestock benefits were valued concurrently with consideration to other livelihood sectors like natural resource extraction, formal and informal cash employment streams, and in relation to households' profiles. Although one third of households did not own livestock, they still shared in the benefits through gifts of, or cheap access to, milk, meat and dung, as well as draught power. It was observed that the ownership of livestock is not linked to household wealth in terms of cash income from formal and informal employment. This finding redefines the household as a complex unit of analysis. Fewer households owned cattle as compared to goats because most households did not have the purchasing power to acquire large stock (i.e. cattle) hence owning smaller stock animals such as goats and sheep is more affordable.

The estimated gross annual direct-use value of livestock of R5277.85 per household across all households in Lashington, R4552.57 in Magwiji and R5094.68 is similar to the R815.67 per household obtained in a previous study (i.e. Dovie *et al*., 2006). The omission of intermediate and non-marketed outputs such as contributions to crop production via cultivation and cow dung as manure understates the potential value of livestock. Yet access to cultivation was ranked by farmers in Magwiji as the most important reason for owning cattle. There were gifts of livestock products between livestock owning and non-owning households. Such gifts often go unrecognised in a livelihood strategy but they are a fundamental coping strategy in deprived rural communities in marginal environments.

Therefore, the gift actually has benefits to the donor in terms of improving social status and as an insurance policy that can be paid back in difficult times. Cattle owning households alone accrued over 66.3% in Lashington, 65.9% in Magwiji and in 78.5% Tsaba of the total value of livestock goods and services (Table 5.8), which compares well with Shackleton *et al.*, (1999)'s study which accrued 95%. These figures represent what could be referred to as over-dependence on cattle products with little or no diversification. In times of unfavourable production conditions such as disease out-break and drought, households could become extremely vulnerable to food insecurity and poverty. The preference for rearing cattle is explained by the needs of rural people to sustainably supplement cash earnings, which is better achieved by keeping large stock (Duvel and Afful, 1996, cited in Dovie *et al* 2006), and also for savings (Barrett, 1992; Shackleton *et al.,* 1999). However, this study rated milk and sales than savings in Lashington, rated cultivation and live sales than milk in Magwiji and rated cash sales and ceremonies in Tsaba Table 5.5. It has been argued that small stock animals are only kept for their meat and the short-term monetary returns they generate on sale (Dovie *et al.*, 2006).

Livestock numbers increased dramatically from 1994, after a major drought in 1992. The increase in livestock numbers coincided with the political change in South Africa, where the majority black population ascended to power. According to Dovie *et al.,* (2006) it has previously been speculated that black people were not empowered to own greater numbers of livestock for purposes other than for domestic and cultural. The political change may have accounted for the boost in livestock production in anticipation of entering the formal commercial livestock market. Those who were not financially sound enough to own livestock probably went in for goats which are easily liquidated and provide the capital to invest in cattle, hence the increase in the numbers of goats. During the drought, households that owned livestock were most probably in better positions to sell their animals and used the proceeds to secure basic food for the household and their neighbours. The other households could have learnt lessons from this, and hence begun to see livestock as future investment for eventualities and decided to participate in the sector.

6.2 Valuation of individual benefits

The relatively high direct-use values of goods and services came mainly from milk and meat from cattle for Lashington, Magwiji and for Tsaba. The monetary value for milk was worth R1825 for Lashington, R4670 for Magwiji and R1221 for Tsaba as savings to 20%, 16% and 31% for

the three communities respectively, of cattle owning households who engaged the services of their animals for milking. Similarly, the use of cattle for meat by cattle owning households was worth R1731.6 for Lashington, R1730.20 for Magwiji and R1680 for Tsaba per households per annum. Cattle as draught animals have an added advantage for their association with environmental benefits such as nutrient cycling through feeding and dung production (Sansoucy, 1995). In spite of the relevance of the ploughing benefits of cattle, it has been reported that some people only depended on draught power in times of financial constraints or delays in securing a tractor for ploughing and was therefore not an important contribution (Shackleton et al., 1999). In another study, over 90% of farmers interviewed in parts of the Limpopo Province did not use draught animals at all (Duvel and Afful, 1996), and contrary to observations made earlier. This difference could largely be due to tradition, because people will potentially use cheap but efficient alternatives in farming.

The high value contribution of milk in Lashington, in Magwiji and in Tsaba (Table 5.7) can be attributed to the low level of income generating activities and cash flow in the village hence the preference for holding onto stock for purposes other than slaughtering and selling. There was no correlation between the value attributed to milk and cash incomes of households. Milk was again the most important product in the study of Shackleton *et al.* (1999), contributing 15.3% of the total value of livestock benefits. The importance of milk has similarly been observed among Zulu-speaking cane growing households in the KwaZulu-Natal province (Tapson, 1991). The value of milk was followed by slaughtering animals for meat. A few households (7.5%) in Lashington, (6%) in Magwiji and (8.3%) in Tsaba used dung for manure, worth R331.03 in Lashington, R312.69 in Magwiji and R351.08 in Tsaba respectively, per household per annum of savings to households, in place of spending on inorganic fertilisers.

The value attributed to meat did not correlate with the value of household income from formal jobs, but negatively with cash income from informal jobs. This follows a tendency of decreased value of meat consumed by cattle owners from their own stock in times of high cash income from informal cash streams and *vice-versa*. This behaviour of the household though difficult to explain, probably implied that cash was spent on commercially sold meat. Alternatively cash was used on close substitutes for meat, or other needs of the household.

Though trade in livestock was not a common activity in Lashington and Magwiji, a reasonable value for live animal sales was recorded. The value of live animal sales and accompanied cash

sales were observed as a priority activity in a ranking exercise for example Duvel and Afful, (1996), and contrary to the low values obtained by Dovie *et al.,* (2002). One does not expect uniformity in the importance attached to live sales but the link between live sales, household needs and income supplements would be worth exploring. Live animal sales are a household strategy to generate income for handling emergencies, a purpose that is well served by goats. There is also the often-neglected aspect of benefits of keeping cattle for rural transport using wagons and carts. The value of the use of cattle in this study saved households money for short distance commercial travels to collect fuel wood and water, as has been observed in other studies (e.g. Scoones and Wilson, 1989)

Goats were mainly slaughtered for their meat for home consumption and ceremonies, and not for meat sales as owners preferred selling the live animals (for ritual purposes) to the slaughtered ones with the meat having very little value. The herds of goats have increased to a high of 1 266 for Lashington in 2006 (Fig. 5.2), 1 456 for Magwiji in 2007 (Fig.5.3) and 372 for Tsaba in 2005 (Fig. 5.4). The numbers were constantly fluctuating because owners claimed to have slaughtered and sold more animals compared to previous years.

The benefits derived by non-livestock owning households from livestock was R33 per household per annum. Milk and meat were also important to the non-cattle owning households. Similar observations have been made in other studies, for example, Hundleby, (1991) and Schmidt, (1992). Labour inputs in this study were not captured due to some difficulties and family members offered free services in addition to other sources from neighbourhood networks and kinship ties.

The values of the individual livelihood contributions to household incomes are important for understanding livelihood dynamics. The use of only wage employment and more often the shelved value of crops such as maize to represent livelihoods is a gross underestimation. This could be typical of most communal areas because resource use and employment issues around Eastern Cape are not highly different from majority of communal areas. The use of wage incomes to measure livelihoods largely remains a macro-level analysis and towards macroeconomic policy assessment and interventions. However, the often-unaccounted local level activities of farming, gathering and extraction of natural resources undermine the appropriate analysis of microeconomic issues at the macroeconomic level for the appropriate intervention. Households therefore tended to rely on more than a single source for their livelihood incomes. Formal cash injections might be necessary to sustain the land-based

options but the analyses show that even in the absence of such formal cash income sources, households are able to adapt to their situation through dependencies on natural resources. Households held onto their livestock for services such as ploughing and carting rather than for wealth. For example, draught power added value to livestock, and reduced the input cost required for cropping.

6.3 Gross annual direct value of natural resources

There were a number of problems that can be adopted to determine the value of rangeland resources to households, communities or the biome as a whole (Bishop 1998; Cavendish 2002). The recent studies underpinning study sought to determine direct-use value of resources used by communal households, and not the resource value within the rangeland biome or per hectare. Direct-use values were determined as the product of the amount used and the local, or farm-gate price. Where prices were not available for some resources within the local community, then the price at the closest point to the target community was used or replacement values. The range in gross annual direct-use values averaged across all households within the sampled communities was large, ranging from less than R1491.34 per household per year in Tsaba, R3175.8 in Magwiji to over R5556.78in Lashington. This is a reflection of differences in both the quantities consumed as well as unit prices (Shackleton *et al.,* 1999). The range in unit prices between studies of some commonly used resources is larger than the range in quantities consumed, and thus the unit price has a greater influence on the relative direct-use values between studies. The determinants of unit prices in communal areas require greater research. The mean gross direct-use value attached to the use of communal rangeland products. The three communities is R3408.04 per household per year. This is higher than, but of the same order of magnitude to the R2313 per household per year (Shackleton *et al.,* 1999).

6.4 Policy findings and the future of traditional livestock production

Studies by Tapson (1991); Cousins (1994) and (1996); Shackleton *et al.,* (1999), have previously made a strong case for the monetary and economic values of livestock production in communal areas, and the implications for agrarian reform. They have indicated that the sector has the potential to contribute to the economy as a whole and more importantly to the rural economy. In the wider economic context, however, it goes a long way to support the commercial sector in meeting the protein requirements of the population.

There are four very important findings of this study with implications for policy. Firstly, livestock have multiple uses within livelihoods. Therefore a policy recommendation of increased marketing and sales for example a drive towards single purpose commercialised production could well undermine some of these uses. Secondly, the vital uses of cattle are for ploughing and milk, which would also be undermined by increased sales, unless cheap and viable alternatives are readily available, but they are difficult to manage in remote rural areas. Thirdly, the belief that there are limited sales and trade in the rural livestock sector has been proven wrong. Sales and slaughter in the commercial sector are usually measured as sales through state or commercial abattoirs, where record keeping is good. In these rural communities, it is between neighbours and local villagers without records. Therefore, is the notion of low off-take and sales correct? If incorrect then all previous policy recommendations with respect to increasing off-take to (a) decrease perceived rangeland degradation and (b) perceived low productivity (in terms of weight gain per animal) are on the wrong track, and no wonder they have not worked. Fourthly, non livestock owning households do derive some benefits from the presence of livestock, and hence need to be included in decisions regarding livestock. Policy findings on the ownership and transaction of livestock products in the traditional rural livestock sector need to include households without livestock.

Proper market integration with appropriate marketing structures and pricing of products in the sector could contribute significantly to the wider economy, whilst extending potential benefits to most rural populations (Shackleton *et al.,* 2001). Agricultural sector organisations should assist in the development of credit and savings institutions specifically for the communal area sector and to address the perceptions of the meagre importance associated with communal area livestock. For instance, live cattle from traditional communal areas are not offered at the same price in the livestock commodity market although standards might compare favourably with those of the commercially designated farms (Coetzee, *et al.,* 2005).

Furthermore, the understanding that livestock farming in communal areas is not a source of employment needs to be addressed with a communal-area specific “labour model”. Non-livestock owning households wishing to own livestock are mostly female-headed, with little or no regular income to participate in the sector. An efficient and effective community investment support fund will allow women to raise funds to own livestock. Promoting the role of women and providing security for farm households are relevant but are subject to an enabling policy environment especially with respect to common property resources (Cousins, 1994). There is no

doubt that the role of valuation studies as policy tool could provide information on profitability and returns from livestock investment in communal areas, in improving traditional livestock farming.

6.5 Policy Implications of natural resources gathering

Based on the discussion on gross annual direct-use value of natural resources above, it is possible to make some generalised statements about the role that natural resources play in communal peoples' livelihoods:

- Most communal households derive at least some livelihood benefit from communal rangelands resources, either directly or indirectly through, for example, inputs into other production systems like livestock keeping.
- Female-head households, female members of households, young unemployed men, and the ultra-poor or the marginalised members of the communal society tend to be most reliant on the natural resource base both for household use and for cash income.
- Children continue to make extensive use of wild fruits these contribute to the nutritional health
- Communal rangeland resources have always played a key role in direct household provisioning, but increasingly trade in natural resources is becoming an important livelihood strategy for many households
- Communal rangeland resources made a major contribution to decreasing livelihood risk by allowing for diversification and reduced household cash expenditure (through own consumption)
- Communal rangeland resources perform vital ecological services contributing to a sustainable living environment. These services, and a number of non-use functions relating to spirituality, culture and psychological well-being, are rated highly by communal areas
- Little is known about the sustainability of current patterns of resource use and extraction, and the implications for sustainable resource management and communal livelihoods

In summary within the Eastern Cape Province context, the local government needs to pay more attention to supporting the sustainable use of natural resources in communal rangelands. Most communal development effort has focused on agriculture, in particular the promotion of opportunities for small farmers. Social forestry interventions have concentrated on tree planting (invariably exotics) with individuals as small groups rather than the management of common pool indigenous resources. Further more, changes in the institutional arrangements for local governance following the democratic transition in 1994 have resulted in ambiguity and confusion

as to who is responsible for natural resource management (Shackleton and Campbell 2000; Ntshona 2001) open access systems (Shackleton, 1998b). Given the considerable value of savannah resources for the majority of communal households, it is crucial that the state develops policies and strategies to address the management of these resources in order to contribute to sustainable development, enhanced livelihoods and poverty alleviation in the communal areas of the Eastern Cape Province.

6.6 Conclusion on livestock

The importance of undeveloped and non-marketed goods and services such as draught power and milk offered by communal area livestock is clearly shown in this study. Monetary values show that investment in livestock by rural people has many advantages that cannot be easily replaced by single-purpose commercialised endeavours such as meat or milk production only, and not both. The sale of goats reflects the importance of small-bodied livestock that are much less bulky and easier to dispose of in order to accumulate wealth to be able to afford cattle and responding to immediate household needs. Benefits to non-livestock owning households are substantial, and serving as buffer in times of shortfalls or failure of other livelihood sectors (e.g. drought, loss of employment of the main breadwinner), and hence such households need to become a policy focus as well. It is possible that the traditional agricultural sector can make significant contributions to national food security if policy appropriately recognises the multiple benefit of the traditional livestock system. Providing useful infrastructure and practical information about value added resources (e.g. leather, composting and rope), efficiency and production are relevant and probably more cost effective to develop within the sector, instead of its undervaluing. In spite of the findings of this research, and possible applications to most communal areas, results remain narrow within a wide heterogeneous socioeconomic and human political economy, which would require much bigger scale analyses.

6.6.1 Conclusion on natural resources

The vital role of natural resources in the lives of communal households Eastern Cape is unlikely to diminish in any time soon. This semi-arid, agriculturally marginalised area is characterised by poverty and has few prospects for significant development. Sustainable use of local natural resources is therefore a central issue that needs to underpin communal development in the province. The results presented in this study indicated that unsustainable harvesting has the potential to cause substantial loss of value of natural resources in communal areas. The value of these resources, therefore, needs to be fully appreciated by government policymakers.

Although the data focused on current value, unsustainable extraction also affects unrealised potential value, compromising the potential for enhancing economic value of some resources as a basis for communal development. The development opportunity cost of unsustainable resource use, therefore, needs also to be taken into account in policy and initiatives that aim to achieve sustainable communal development.

Resource depletion makes poor households most vulnerable as they rely so heavily on indispensable natural resources, like wild food products and because they are less able to compensate for fewer natural resources by buying natural products or their substitutes. However, even comparatively wealthy households would be significantly affected because they use communal rangelands resources so extensively. These resources may, in fact be regarded as a component of household wealth, as they are used both to generate income and to save money. The results of the study suggested that communal poverty is linked to environmental impoverishment. Addressing the problem of unsustainable harvesting of the natural resources on which local communities rely, therefore, is a fundamental component of tackling communal poverty in not only Eastern Cape Province but also the whole of South Africa, both in the area of government policy and in initiatives that offer practical support for community- based natural resource management.

The researcher is recommending that further investigation of valuation of non-use values for one strongly feel that one did not fully exploit this area in this study.

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www.ru.ac.za/contact/ecmap.htm

Appendix 1

University of Fort Hare
Together in Excellence

Department of Agricultural Economics and Extension
Private Bag X1314
Alice,
5700

19 March 2007

TO WHOM IT MAY CONCERN

Re: QUESTIONNAIRE

The University of Fort Hare, Department of Agricultural Economics is carrying out a research on Economic Valuation and Institutional factors of the communal rangelands in the Eastern Cape Province of South Africa. The questionnaire is designed to collect information on the perceptions of farmers on the economic values and institutional factors of the communal rangelands. Information collected through this questionnaire will be treated as confidential and will only be used for the purposes of these studies.

Thank you for support.

Sincerely yours,

PROF. G.C.G. FRASER (H.O.D)

Appendix 2

Livestock numbers in Lashington, Magwiji and Tsaba, 1998-2007

Year	Cattle			Goats			Sheep		
	LA	**MG**	**TS**	**LA**	**MG**	**TS**	**LA**	**MG**	**TS**
2007	2841	838	266	890	1456	271	1017	940	0
2006	2276	784	350	1226	1230	362	1343	841	0
2005	1984	664	341	983	1128	372	1232	795	0
2004	1692	700	327	831	1098	361	1479	720	0
2003	1760	745	319	879	935	352	1742	616	0
2002	1896	628	303	987	1003	344	1623	588	0
2001	1835	798	289	956	828	297	1947	526	0
2000	1743	689	178	874	640	289	1542	497	0
1999	1689	639	270	768	600	277	1405	518	0
1998	1634	628	254	833	598	269	1726	502	0

Key: **LA** - Lashington; **MG** - Magwiji; **TS** - Tsaba

Appendix3

Questionnaire A

Survey questionnaire on management of communal rangelands

Enumerator's name……. Date…….. Village……..
Name of respondent…….. Questionnaire reference number……

A. Household demographic information

	Relation to head	Age	Gender	Marital st.	Education	Occupation	Involvement in rangelands
*A1.1							
A1.2							
A1.3							
A1.4							
A1.5							
A1.6							
A1.7							
A1.8							
A1.9							

Codes:

Relation to head: **1** Head, 2 Spouse /husband, **3** Child, 4 Grandchild, **5** Father or mother, 6 Other
Marital status**:** (**S**) single (**M**) married (**D**) divorced or separate **(W) w**idow
Education: **1** Pre school **2** Up to std 5, **3** Std 6-9 **4** Std 10**5** Tertiary **6** None
Status: (**F**) farming (H) household wife, **(E**) employee (**P**) pensioner (**B**) business (**N**) no occupation (**S**) student

A2 Household size…… Adults …… Children (less than 13 years)……..
A3 Sex of head of household……..
A4.1 Do you belong to any farmers' organisation? Yes ☐ No ☐

a) If yes, which one...
b) If no, what are your reasons...?

A4.2 What are the benefits of being a member of this organization? **……**

B. INCOME SOURCES

1. External sources (Please indicate whether it is monthly/annually)

	Source	C	Exp/C (R)	Tot. inc/C (R)	No. C/a	Net inc/a (R)
B1.1	Remittances (Cash)					
B1.2	Salaries & Wages					
B1.3	Pensions					
B1.4	Disability grant					
B1.5	Child support grant					

B1.6	Others (specify)……					

2. Local sources: trade

B2.1	Hawking						
B2.3	Shop						
B2.4	Selling beer/local brew						
B2.5	Lending money						
B2.6	Other trade						

3. Local sources: agriculture

	Source		C	Exp/C	GI/C	C/a	NI/a
B3.1	Crops						
B3.2	Animals						
B3.3	Animal products	Wool					
		Milk					
		Eggs					
		Meat					
B3.4	Grazing land (lease/sell of fodder)						

4. Local sources: housing industry

B4.1	Building of houses/thatching					
B4.2	Carpentry					
B4.3	Electrical installations					
B4.4	Plumbing					
B4.5	Making toilets					
B4.6	Sewing and selling clothing					
B4.7	Brick making					
B4.8	Brooms, baskets & other					
B4.9	Making & selling foods or meals					
B4.10	selling traditional medicines					
B4.11	Arts and craft					
B4.12	Chopping and selling wood					

5. Local sources: transport

B5.1	Transport of goods and people					

6. Local sources: maintenance

B6.1	Repairs (electric)					
B6.2	Repairs (mechanical)					
B6.3	Repairs (other)					

7. Local sources: agricultural services

B7.1	Land preparation for farmers					
B7.2	Fencing and kraal making					
B7.3	Labour for weeding & harvesting					

8. Local sources: other

B8.1	Provide casual labour to other community members (All tasks)					
B8.2	Others					

C. EXPENDITURE

1. How much money does your household spend on the following items MONTHLY or ANNUALLY or Weekly or Daily if applicable?

Form C1	Item	C	Exp/C (R)	C/a	Exp/a (R)
C1.1	Groceries				
C1.2	Fuel, Transport, Telephone				
C1.3	Clothing and furniture				
C1.4	Medical expenses				
C1.5	Educational expenses				
C1.6	Other				

2. Do you save any money in any of the following?

		Total amount	Amount per month (R)	Amount per annum (R)
C2.1	Formal institutions			
C2.2	Saving policy/insurance			
C2.3	Burial clubs			
C2.4	Mgalelo			
C2.5	Others			

D. Livestock Production

D1. Numbers and livestock species kept (Tick if kept & Put down the numbers)
Cattle☐…..…Sheep☐……Goats☐……Donkeys☐……Pigs☐…….horses☐…..

D2. Who owns the animal?

	Cattle	Sheep	Goats	Donkeys	Horses
Head					
Spouse					
Head + spouse					
Child/Children					

D3. What is your current herd structure?

Class	**Number**
Cows	
Heifers	
Bulls	
Oxen	

Calves	

D4. For how long have they been farming with livestock? ……..
D5. Is the cattle, sheep or goat numbers increasing or decreasing? Yes/No

D6. How many animals have you gained (births and/or gifts) or lost (mortalities and/or theft) in the past 5 years?

	Cattle	Sheep	Goats	Donkeys	Horses
Gained					
Lost					

D7. What are the major functions of livestock?
The first column is for the purpose and the second column is for the rank:1 is best)

	Cattle		Sheep		Goats		Donkeys		Horses	
Meat										
Milk										
Manure										
Skin										
Wool/Mohair										
Sales										
Investment										
Ceremonies										
Draught power										

D8. If you sold any animals in the last 12 months, where were the animals sold?
At an auction☐ to a butcher☐ privately☐ to an abattoir☐

D9. What are the most common diseases in your area?
……
……
D10. How do you treat sick animals?
……
……
D11. Do you hire veterinarians to treat sick animals? Y/N. If so, how accessible and expensive are the vets?

D12. How do you dispose of dead animals?

D13. Infrastructure for cattle

Infrastructure	**Available / Not available**	**Present condition**
Fencing		
Handling Facilities		
Dipping Facilities		
Sale pens		
Stock Watering Facilities		

D.14 What role(s) does each family member play in animal production? (Tick as appropriate, more than one column in a row may be ticked)

	Adults	Hea	Boys	Girls	Hired

			d			labour
	Males	Females				
a. Purchasing animals						
b. selling decision						
b. Selling/slaughtering						
c. Herding						
d. Breeding decisions						
e. Feeding						
f. Animal health						
g. milking						

D15. Who takes care of the livestock?

Task	Participants	Regular full time, regular part time, casual, give help from time to time

D16. Disease control

Common diseases in your area?	Animals infected	Season of high prevalence	Control measures taken
1.			
2.			
3.			
4.			
5.			

D17. Do you carry out pregnancy diagnosis? Yes ☐ No ☐

D18. What are the i) calving rates……., ii) pregnancy rates…….

D19. Is calving seasonal? Yes☐ No ☐

D20. Do you have problems of (i)low bull numbers? Yes ☐ No ☐ (ii) Bull fertility? Yes ☐ No ☐ (iii) cow fertility? Yes ☐ No ☐ (iv)Calf mortality? Yes ☐ No ☐

D21. If the person who takes care of the livestock is absent who replaces him...

D22. What is the role of the number of livestock owned by an individual to decision making concerning communal grazing issues?

……

……

D23. Comment on the availability of grazing in the different seasons of a year

Rainy season: Enough☐ Too little☐ Moderate☐ Too much☐

Winter: Enough☐ Too little☐ Moderate☐ Too much☐

D24. Do you give any supplementary feed to your animals? Yes☐ No☐ If yes:

a) At which time of the year...
b) How often do you feed animals with supplementary feed?.....

D25. What other sources of feed for animals, in addition to natural grazing do the farmers have and use?

Species	Type of feed given	Source of feed	Monthly cost
Cattle			
Sheep			
Goats			

D26. Do you plant any fodder crops (e.g. rye, oats etc.) for supplementary feeding? yes ☐ no☐

D27. What are the different crops you grow in your field?……..

……

D28. What is the size of your home garden?……..ha

D29. Who does the following activities?

Ploughing	Planting	Weeding	Harvesting

D30. What do you do with Stover left after harvesting?.....

…….

D31. Who decides when to allow livestock in the arable fields/ home gardens?

……

D32. What impact has this practice on the fields/ gardens?

……..

D33. How did you attain the livestock you own?

……

D34. Do men consult women on livestock development programmes?

……..

D35. Do men and women work together on livestock development programmes?…….

D36. How do women cope with the additional responsibilities of keeping livestock?.....

D37. How do cultural beliefs (e.g. inheritance) affect livestock production by women?.....

.....

D38. Are female farmers involved in farmers associations/ organizations?

Yes☐ no☐

D39. If yes, what role do they play……

D40. How can institutions, such as UFH, assist livestock production?

……..

E. RANGELANDS/GRAZING

1.1 Do you have access to rangeland? yes☐ no☐

1.2 How did you obtain access?

By virtue of being resident in this community	
Through an application to the Tribal Authority	
Through an application to the village committee	
Local Authority	
Other (specify)	

1.3 What threat do the neighbouring communities put to your rangeland?

……

1.4 How do you minimise neighbouring communities from utilising your resource excessively?

At what time of the year would you experience a shortage in grazing?.....

……..

What could be the cause of such a shortage?.....

1.5 How is access to the grazing land controlled? By whom? Tribal Authorities ☐ Farmers Association☐ Farmers Union☐ No one☐ Other(specify)…

1.8 Who monitors that users of the grazing land adhere to the rules and regulations?……..

1.9 Rangeland is accessed for?

Uses	Yes/ No	Season of access(summer, winter, year round)
Grazing/browsing of animals		
Collecting fire wood		
Collecting wood and grass for building and fencing		
Collecting plants for medicinal purposes		
Collecting dry dung for cooking		
Other (specify)		

1.10 Are there times of restricted access to rangelands Yes ☐ No ☐

1.11 If Yes, Which month/s…….

1.12 Are there any restrictions to quantities of harvested resources ……..

1.13. Frequency of kraaling animals (tick appropriate) and state reasons, benefits & disadvantages

	Cattle		Sheep		Goats		Donkeys		Horses	
	Time kraal	Time release	Time kraal	Time release	Time kraal	Time release	Time kraal	Time release	Time kraal	Time release
Daily										
Once a week										
Only on dipping days										
Reason for the above practice										
Benefits from the above practice										
Disadvantages of the										

practice					

1.14 Does your community have grazing camps? Yes☐ No☐

1.15 If yes, what is the purpose of camps?

……..

1.16 Who is responsible for ensuring that the grazing rules are followed?…….

1.17 Do you manage livestock movement during grazing?

a) Permanently (daily)YES /NOif yes, who?……
b) MonthlyYES /NOif yes, who?……...
c) In SummerYES /NOif yes, who?……...
d) In WinterYES /NOif yes, who? ……...
e) When rain comes?YES /NOif yes, who? ……...
f) Free ranging?YES /NOif yes, who? ……...

1.18 What are the sources of water for your animals? (Tick one or more)
Borehole ☐ Dam/pond ☐ River ☐ Water well ☐ Spring ☐ Others (specify)……..

1.19 What is the distance to the farthest water point?
At household ☐ < I km ☐ 1 to 5 km ☐ 6 to 10 km ☐ > 10 km ☐

1.20 Do you have a problem of water for livestock drinking? Yes☐ no☐

1.21 How would you describe the condition of the grazing?

Deteriorating- Very Poor Condition Little Grass	
Deteriorating -Poor Condition, but Some Grass	
Fair - Reasonable Amount of Grass	
Good - Plenty Grass	
Very Good-Improving	
I don't know	

1.22 What has led to the current state of rangelands (tick one or more)? Grazing☐ Burning☐ Soil depth☐ Climate variation (e.g. drought)☐ Bush encroachment☐

1.23 What is the reason for your answer above?.....

1.24. Do you consider your soil Good☐ Fair☐ Poor☐ Very poor☐

1.25 What is the reason for your answer above?.....

1.26 What control measures need to be put in place to ensure a sustainable utilization of the grazing resource?

……
……

1.27 What problems or constraints do you face in management of grazing areas?

……

……

1.28 Do you receive any advice from extension services? Describe the type of advice.
……
……

1.29 How has this advice impacted on communal grazing in the community?
……
……
1.30 Do you use arable land for grazing purposes? yes☐ no☐
If yes when and why?
When……Why……
……
1.31 Are your grazing lands fenced? Yes☐ No☐
1.32 If **yes**, who did the fencing……
1.33. If **no**, do you need fences? Yes☐ No☐
1.34 How would you describe the state of fencing in your grazing lands? Good☐ Bad☐.
If bad why?.....
……
1.35 Is the community doing any repairs on fencing? Yes☐ No☐
If yes what type of repairs?.....
1.36 Who provides resources for repair of fences?.....
1.37 What is the condition/ level of erosion in your grazing lands? High ☐, Average ☐
Low ☐ None ☐
1.38 If high, do you apply any erosion control measures on your grazing lands? Yes☐
No☐
1.39 What methods of erosion control measures do you use (Describe)?
……
……

1.40 Is the control measure effective? Yes☐ no☐
1.41 Give reasons for your answer above (1.34)
……
1.42 Is there any commercial or game farm near your community? Yes☐ No☐
1.43. Are there any benefits your community derives from the game farm?
……..
1.44 How would gauge your knowledge on veld management?
……
1.45 Where did you gain this knowledge from?
……..
1.46 Have you or the community ever had any training on veld management? Yes ☐ No
☐
1.47 What kind of training would you or the community like to receive?
……
1.48 Give five suggestions which in your opinion can improve communal grazing areas?

Appendix 4

Questionnaire B

University of Fort Hare
Together in Excellence

Questionnaire	
DEPARTMENTOF AGRICULTURAL ECONOMICS AND EXTENSION	
Enumerator's name	
Respondent's name	
Date	
Village	
Questionnaire reference number	

1. Complete all the details.

1: Respondent's information				
Age	Gender	Marital status	Education	Occupation

2: Political issues

2.1 Are you the first member of your family to have settled here?

1. Yes 2. No

2.2 If no to 2.1, who were the first members to settle here?

……

2.2.1 How did they find themselves here?

.....

.....

2.3. Who controlled communal rangelands during that period and how?

.....

.....

.....

.....

.....

2.3.1. Is the system still the same? 1. Yes 2. No

2.3.2. If no to 2.3.1, what are the changes? List them below.

Changes	Reasons

3: Transaction costs

3.1 How many farmers' organizations do you have?

.....

.....

3.1.1 What are they?

.....

.....

.....

……

……

……

3.1.2 Which one do you belong to?

……

……

3.1.3 What benefits do you get from these organizations?

.....

.....

.....

……

4.How do new settlers acquire land?

……

……

…….

4.1 What are the steps followed?

.....

.....

……..……..……

……

……

4.2 Do these new settlers have to pay anything in exchange for land?

1. Yes 2. No

5. Do you have to pay any fees into a common fund which is used for the good of the animals?

1. Yes 2. No

5.1 If yes to 5, to who is it paid to? .....How much is it…….....

5.1.2 How frequent do you pay these fees? Monthly/annually. **Please tick one.**

4: Formal and informal rules

4.1. Are there any rules in place governing the use of communal rangelands? 1. Yes 2. No

Rules	**Who set the rules**	**Who ensures that users follow them**
1		
2		
3		
4		
5		
6		
7		
8		

4.1.1 Are there any conflicts with regard to these rules?

1. Yes 2. No

4.1.2 If yes to 4.1.1 what are these conflicts and solutions? **Please list them.**

Conflict	Solution
Others (specify)	

5. How do these rules affect your activities?

……
……
……
……
……
……
…….

6. Are there any days, in which you are restricted from doing anything on communal rangelands?

1. Yes 2.No

6.1 If yes to 6, which days and why?

……
……
……
……
……
……

6.1.2 How does this affect you and your animals?

……
……
……
……
……
……
……

5: Natural resources. Key: 1
Direct use values
fuel wood, wild fruits, thatch grass, medicinal plants, hunting, fishing, building material, water for domestic use from dams and rivers

5. What natural resources do you get from your rangelands?

	5.1.1	5.1.2	5.1.3	5.1.4
Direct use values (rank them according to importance)	**Quantity harvested/ collected per day**	**Quantity retained for house use**	**What do you do with the extra quantities collected**	**Is there anything you can use (list)**
1.				
2.				
3.				
4.				
5.				
6.				
7.				
8.				

6. Would you say your land is in good or bad condition? 1. Good 2. Bad

6.1 If yes to 6, what would you want done to rehabilitate the communal rangelands? List the all the improvements required for the betterment of the communal rangelands.

1……

2……

3……

4……

5……

Other

(specify)……

7. If you were to sell your communal rangeland, how much will it cost?

8. How do you value the following, **Please tick the appropriate column for each value.**

6: Indirect use values				
Value	**Very important**	**Important**	**Least important**	**Not important**
Erosion prevention				
Flood control				
Habitat support				
Nutrient recycling				
Pollution control				

7: Option use values				
Value	**Very important**	**Important**	**Least important**	**Not important**
Extractive and tourism				
Leisure				
Pharmaceutical				
Industrial application				

8:Existence values				
Value	**Very important**	**Important**	**Least important**	**Not important**
Aesthetic				
Bequest				
Culture				
Heritage				
Scientific				

Definition of terms:

1. Bequest value is the value of nature left for future generations
2. Existence value is the value that individuals may attach to the mere knowledge the existence of something, as opposed to having direct use of that thing.
3. Option value is the value of maintaining the option for use of forest direct or indirect in the future.

Thank you

Appendix 5

University of Fort Hare
Department of Agricultural Economic and Extension
Private Bag X1314
Alice, 5700

21 August 2007

Attention: Mr. Mophuma
Amathole District Municipality
East London

Dear Sir,

RE: RESEARCH INFORMATION ON COMMUNAL RANGELANDS.

The Department of Agricultural Economics is carrying out a study on Economic Valuation of Communal Rangelands in the Eastern Cape Province of South Africa. We administered our questionnaire on the following communities:

Lashington in Seymour
Magwigi in Sterkspruit
Tsaba in Tsholomnqa near East London.

We still have outstanding data on total number of households, livestock i.e. cattle, sheep and goats, carrying capacities of the rangelands, land size and cost of land per hectare in each of the said communities.

We are planning to make a trip that side next Wednesday. We will be grateful if you can furnish us with information of contact persons and offices.

Thanking you in advance.

Best regards,

Gift Gombakomba
Cell: 0720626764

Supervisor: Professor Fraser G.C.G.
Tel: (040) 6022298
Fax: (040) 6531730