

**Applying the United Nations Convention to Combat
Desertification in Africa: Scientific and Land User
Dimensions of Environmental Degradation**

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Abstract

This study takes an integrated approach using theories and methods from both the natural and social sciences to examine western scientific, government, NGO and local land user understandings of land degradation in Swaziland. Of key importance in the research is the United Nations Convention to Combat Desertification (UNCCD), which itself marks a new, integrated approach to sustainable development, promoting concepts of community participation and local level decision-making. Grounded in the theory of political ecology, these concepts are examined in the Swazi context. Local knowledges are integrated with western scientific understandings of land degradation to create hybrid understandings of environmental degradation and to examine issues such as how far, under what conditions and for whom land degradation is problematic. Understandings of soil fertility, drought, changes to woodland areas and soil erosion in three case study villages are critically assessed, as local inputs into policies addressing land degradation are evaluated and reasons behind both individual and collective actions to combat degradation are considered. Issues of access and power are found to dominate natural resource management in Swaziland, as the majority of the power is concentrated in the hands of the minority of the population. Using a community land rehabilitation project as a case study, it is discovered that concepts such as community participation and local level decision-making by democratically elected village committees can cause conflict to develop between new and traditional institutions, as new institutions challenge the traditional balance of power. It is concluded that until changes are made to broader scale governance structures, concepts advocated by the UNCCD will not be implemented to their full potential in Swaziland and this could have important social and ecological implications.

Contents

Abstract	i	
Contents	ii	
Table of Figures	vi	
Table of Tables	v	
List of Acronyms	vii	
Acknowledgements	viii	
CHAPTER 1: Introduction to land degradation and desertification		
1.1	Introduction	1
1.2	Background to desertification as an international environmental issue	1
1.3	Outline of the research	6
1.4	Outline of the thesis structure	8
CHAPTER 2: The UNCCD: linking western science and local knowledges within policy		
2.1	Introduction	12
2.2	Desertification: definition and scale	13
2.2.1	Desertification: manifestation and scientific definition	13
2.2.2	The scale issue: links to the international level	17
2.3	Knowledge and desertification	18
2.3.1	Local knowledge and desertification	18
2.3.2	Hybrid knowledge: combining local and western scientific knowledges	19
2.4	The UNCCD: linking knowledge and policy	22
2.5	NGOs and local knowledge in the international political arena	27
2.5.1	The role of NGOs in the UNCCD negotiations	27
2.5.2	Concepts of participation	31
2.6	Summary	
CHAPTER 3: Theoretical approach to the research		
3.1	Introduction	36
3.2	Review of post-impasse social and ecological concepts	36
3.3	Political Ecology	38
3.4	Challenges to political ecology	39
3.4.1	Lack of theoretical foundation	40
3.4.2	Reluctance to accept the new ecological principles	40
3.4.3	Disagreement over the proportion of each constituent	43

3.5	Conceptual frameworks for transdisciplinary research	44
3.5.1	Blaikie's (1989) 'chain of explanation'	45
3.5.2	Moving away from linearity of explanation	48
3.5.3	Sustainable rural livelihoods framework	48
3.5.4	Environmental entitlements analysis	51
3.5.5	Social networks	54
3.6	Contributing to academic debates: the development of a network approach	55
3.7	Chapter summary	57

CHAPTER 4: Research process and methodology

4.1	Introduction	59
4.2	Integrating methods and techniques from the natural and social sciences	60
4.2.1	Primary data collection	64
4.2.2	Secondary data collection	82
4.3	Positionality and power relations	85
4.4	Foreign language research	88
4.5	Ethical considerations	89
4.6	Definitions	90
4.7	Analysis	92

CHAPTER 5: Swaziland: the national context

5.1	Introduction	95
5.2	Swaziland's political characteristics	95
5.3	Swaziland's environmental characteristics	99
5.4	Patterns of access and control: land tenure in Swaziland	103
5.4.1	Swazi Nation Land (SNL)	104
5.4.2	Title Deed Land (TDL)	105
5.4.3	Crown Land	106
5.5	Land use and livelihoods	106
5.6	Moving from the national to the local level	111
5.6.1	Engcayini	111
5.6.2	Ezikotheni	116
5.6.3	KaBhudla	121
5.7	Synthesis of livelihood activities and environments in the study villages	125

CHAPTER 6: Government and NGO interpretations of environmental degradation

6.1	Introduction	127
6.2	Causes of degradation in Swaziland: contributions from NGOs and NSCD representatives	127
6.3	Past initiatives to address environmental conservation and sustainable livelihoods	131
6.4	The UNCCD, Swaziland and its NAP	135
6.5	The NAP review process	142

6.6	Summary	143
CHAPTER 7: Responding to environmental changes: knowledges and environmental management in the middleveld of Swaziland		
7.1	Introduction	145
7.2	Interpreting environmental changes	146
7.2.1	Changes in soil fertility	146
7.2.2	Changing access to forest resources	159
7.2.3	Drought	162
7.2.4	Gullying and soil erosion	166
7.3	Coping with and adapting to change: a synthesis of the findings	173
7.4	Implications of the findings for future policy	177
CHAPTER 8: Contemporary approaches to combating land degradation in Swaziland		
8.1	Introduction	181
8.2	Introduction to the community project in Engcayini	182
8.3	Local understandings of community participation and the JICA/MOAC project	186
8.4	Ownership, access, power and participation	194
8.5	Summary and conclusion	204
CHAPTER 9: Towards the construction of a political ecology of land degradation for the middleveld of Swaziland		
9.1	Introduction	206
9.2	Addressing issues of power and action	206
9.2.1	Power and control over natural resources	207
9.2.2	Risk and action: the socially embedded nature of ecological processes	213
9.3	The UNCCD: appropriate or unnecessary?	216
9.3.1	The UNCCD in the Swazi and sub-regional contexts	217
9.3.2	Broad scale power relations and decision making	217
9.4	The UNCCD in the international context	222
9.5	Sustainable development and the Rio Conventions	223
9.6	Implications of the research outcomes to wider society and academic debates	224
9.7	Summary	226
References		229
APPENDIX I: Household questionnaire		257
APPENDIX II (i): Nutrient determinations for <i>umuti</i> A's fields in Engcayini		261
APPENDIX II (ii): Nutrient determinations for <i>umuti</i> B's fields in Engcayini		262
APPENDIX II (iii): Nutrient determinations for <i>umuti</i> C's fields in Engcayini		263
APPENDIX III: ANOVA test results for significant differences in nutrient levels between fields and grass strips		264

Table of Tables

Table 2.1:	Biophysical manifestations of degradation and desertification	14
Table 2.2:	The changing definitions of desertification 1976-1994	16
Table 2.3:	Characteristics of western scientific and local knowledges	20
Table 2.4:	Typology of participation	32
Table 2.5:	Areas of potential conflict in the implementation of the UNCCD in Swaziland	34
Table 3.1:	Concepts and processes in contemporary political ecology	38
Table 3.2:	Types of capital	49
Table 4.1:	Primary data collected during the research	62
Table 4.2:	Soil sample design	78
Table 4.3:	Secondary data sources	83
Table 5.1:	Summary of the physical characteristics of each region of Swaziland	101
Table 5.2:	Seasonal calendar showing the timing of the main agricultural tasks	109
Table 5.3:	Social and environmental characteristics of Engcayini	112
Table 5.4:	Short profiles of the three case study <i>imiti</i> in Engcayini	113
Table 5.5:	Production constraints on arable land in Engcayini	115
Table 5.6:	Social and environmental characteristics of Ezikotheni	117
Table 5.7:	Short profiles of the three case study <i>imiti</i> in Ezikotheni	118
Table 5.8:	Summary table of constraints to arable production in Ezikotheni	120
Table 5.9:	Social and environmental characteristics of KaBhudla	122
Table 5.10:	Short profiles of the three case study <i>imiti</i> in KaBhudla	123
Table 6.1:	Causes of degradation in Swaziland according to NSCD members and NGOs	128
Table 6.2:	Cattle numbers in Swaziland 1966-1999	129
Table 6.3:	Past and present initiatives in Swaziland with links to combating desertification	132
Table 6.4:	Chronology of UNCCD and NAP related events in Swaziland	136
Table 7.1:	Broad ratings of soil nitrogen, phosphorus and potassium	147
Table 7.2:	Average N, P and K determinations from the fields of case study <i>imiti</i> in Engcayini	147
Table 7.3:	Summary table of indicators of soil fertility used by the case study <i>imiti</i>	154
Table 7.4:	Nutrient variability at the intra-field scale on Dudu's land	156
Table 7.5:	Main problems relating to land degradation and livelihoods and the coping strategies employed	175
Table 8.1:	Concern for erosion on communal land in each of the three JICA/MOAC target areas	188
Table 8.2:	Stakeholder analysis of costs and benefits of the JICA project to each social stratum in Engcayini	199
Table 9.1:	Areas of potential conflict between the UNCCD and the political structure of Swaziland	217

Table of Figures

Figure 1.1:	Map of Swaziland	5
Figure 2.1:	Timeline of UNCCD negotiations	25
Figure 3.1:	Chain of explanation	46
Figure 3.2:	Sustainable Rural Livelihoods Framework	50
Figure 3.3:	Endowments, entitlements and capabilities	52
Figure 3.4:	Environmental entitlements framework	54
Figure 4.1:	Flowchart of the research process	63
Figure 4.2:	Map of the locations of the study sites	67
Figure 4.3:	Diagrammatic representation of the soil sampling frame	77
Figure 4.4:	Flowchart of soil digestion protocol for N and P	79
Figure 4.5:	Flowchart of soil extract protocol for exchangeable K	79
Figure 4.6:	Outline of the study area	84
Figure 4.7:	Example of a digitised area of woodland	84
Figure 4.8:	Traditional wedding in Engcayini	86
Figure 5.1:	Swaziland's contemporary political structure	99
Figure 5.2:	Physiographic zones of Swaziland	100
Figure 5.3:	Photograph of a typical Swazi <i>umuti</i>	108
Figure 5.4:	Settlement patterns in Engcayini in 1984 and 1999	114
Figure 5.5:	Photograph of gully and sheet erosion on communal rangelands in Ezikotheni	120
Figure 5.6:	Photograph of gullying on abandoned arable land in Ezikotheni	121
Figure 6.1:	Graph of national cattle census data 1966-1999	129
Figure 6.2:	Swaziland's priority programme areas according to the NAP (2000)	136
Figure 7.1:	Mean nitrogen determinations in fields with different land uses	150
Figure 7.2:	Mean phosphorus determinations in fields with different land uses	150
Figure 7.3:	Mean potassium determinations in fields with different land uses	151
Figure 7.4:	Maize crop failure as a result of weed infestation	152
Figure 7.5:	Forested areas in Engcayini in 1984 and 1999	161
Figure 7.6:	Total rainfall over the growing seasons from 1969-2001	163
Figure 7.7:	Mean monthly rainfall from September-December, 1968-2001	164
Figure 7.8:	Sheet erosion on the hillslopes of Engcayini	167
Figure 7.9:	Gully on Dudu's allocated land	168
Figure 7.10:	Household level soil conservation strategies	168
Figure 7.11:	Sheet erosion in Ezikotheni	169
Figure 7.12:	Aloes filling a gully in KaBhudla	171
Figure 8.1:	Feedlot in Engcayini	185

Table of Acronyms and Abbreviations

AES	Atomic Emission Spectrometer
ACAT	Africa Christian Action Trust
BSAP	Biodiversity Strategy and Action Plan
CANGO	Coordinating Assembly of NGOs
COP	Conference of the Parties
CRDB	Central Rural Development Board
CRIC	Committee for the Review and Implementation of the Convention
CSO	Central Statistical Office
ESRA	Economic and Social Reform Agenda
EU	European Union
FAO	Food and Agriculture Organisation
FIA	Flow Injection Analysis
GDP	Gross Domestic Produce
GIS	Geographical Information System
GMDA	Grazing Management Demonstration Area
GOS	Government of Swaziland
HDI	Human Development Index
INCD	Intergovernmental Negotiating Committee on Desertification
INM	<i>Imbokodvo</i> National Movement
IPED	International Panel of Experts on Desertification
JICA	Japanese International Cooperation Agency
K	Potassium
LDS	Lutheran Development Service
LK	Local Knowledge
MOAC	Ministry Of Agriculture and Cooperatives
N	Nitrogen
NAP	National Action Programme
NDS	National Development Strategy
NEP	National Environment Policy
NEWU	National Early Warning Unit
NGGO	Northern Non-Governmental Organisation
NGO	Non-Governmental Organisation
NSCD	National Steering Committee on Desertification
P	Phosphorus
PACD	Plan of Action to Combat Desertification
PRA	Participatory Rural Appraisal
RAP	Regional Action Programme
RDAP	Rural Development Area Programme
SADC	Southern African Development Community
SEA	Swaziland Environment Authority
SNL	Swazi Nation Land
SFDF	Swaziland Farmer Development Foundation
SNGO	Southern Non-Governmental Organisation
SRAP	Sub Regional Action Programme
TDL	Title Deed Land
TKN	Total Kjeldahl Nitrogen
UN	United Nations
UNCBD	United Nations Convention on Biodiversity
UNCCD	United Nations Convention to Combat Desertification
UNCED	United Nations Conference on Environment and Development
UNCOD	United Nations Conference on Desertification
UNDP	United Nations Development Programme
UNEP	United Nations Environment Programme
UNFCCC	United Nations Framework Convention on Climate Change
UNGA	United Nations General Assembly
UNISWA	University of Swaziland
USGS	United States Geological Survey

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CHAPTER 1: Introduction to desertification and land degradation

1.1 Introduction

This research focuses on the United Nations Convention to Combat Desertification (UNCCD, 1994) and its related National Action Programmes (NAPs). The Swaziland NAP is considered in a case study exploration of land user involvement in the development of policies and projects that address both environmental change and the sustainability of rural livelihoods. This opening chapter outlines the background to the research, beginning with an exploration of desertification as an international environmental issue. Political approaches to dealing with desertification are then considered and contemporary attitudes towards desertification research are discussed. Background information on Swaziland is then presented, together with the aim and objectives of the research. The chapter concludes with an outline of the thesis structure.

1.2 Background to desertification as an international environmental issue

Desertification first gained the attention of the world through the United Nations Conference on Desertification (UNCOD) in 1977. This assembly was convened in response to the Sahel droughts of the late 1960s and 1970s, which saw an estimated 250, 000 people die and millions more migrate away from the affected areas (Agnew and Warren, 1996; Thomas, 1997a). The intention of the UNCOD meeting was to expand not only the scientific understandings of desertification and drought and their socio-economic consequences but also to stimulate development and desertification mitigation in severely degraded regions (Rhodes, 1991). As a consequence, desertification became one of the first environmental issues that publicly attracted international political attention, with concerns for dryland degradation preceding those for climate change, the ozone hole, deforestation and biodiversity loss (Thomas and Middleton, 1994; Corell, 1999).

Since UNCOD (1977), the desertification issue has remained at the forefront of international political agendas (Warren and Batterbury, 2004), as publications such as the UNEP Atlas of Desertification (1992) reinforced the narrative of a global

desertification crisis. Scientists claimed that up to 70% of the agricultural land in the world's drylands is affected by land degradation and that one sixth of the world's population is under threat from desertification (Dregne *et al.*, 1991; Agnew and Warren, 1996). In many regions, land use and vegetation cover were reported to have altered over time. As a result, soils were said to be eroding at accelerated rates (Stocking and Elwell, 1973; Whitlow, 1986), leading to a reduced capacity of these areas to support people, livestock and wildlife (Reynolds and Stafford-Smith, 2002). Coupled with population growth and climate change uncertainties, sustainable natural resource utilisation and rural livelihoods were considered to be under increasing threat in many of the world's dryland areas (Brookfield, 1995). This narrative framed the desertification issue as being in urgent need of attention, with dire social and environmental consequences if action was not taken (Roe, 1991; Sutton, 1999).

These crisis scenarios that have been presented to the world since the 1970s still perpetuate in some spheres (Swift, 1996; Forsyth, 2003). This is because the term 'desertification' evokes political images of marching deserts and advancing sand dunes, which have firmly embedded in the public consciousness and remain extremely difficult to change (Thomas, 1993; Swift, 1996). However, in the research fields of the natural and social sciences, these alarmist claims are now considered highly contentious and have been widely contested (see Tiffen *et al.*, 1994; Fairhead and Leach 1995; Leach and Mearns, 1996; Scoones and Toulmin, 1999; Lambin *et al.*, 2002; Koning and Smaling, *in press*), as methods of observing, measuring and managing desertification have undergone extensive changes (Glenn *et al.*, 1998). Thus, narratives of an international desertification catastrophe have been called into question.

Despite the quashing of the desertification crisis narratives in academic spheres, the desertification issue has remained under the global political spotlight, as the production of the 1994 United Nations Convention to Combat Desertification (UNCCD) reaffirmed its status within international politics (Thomas, 1997b). However, since the science-led conferences of the 1970s, political perceptions of desertification and responses to the issue have transformed significantly. Originally, desertification was viewed exclusively as an environmental issue (Thomas, 1997b), but contemporary international agreements emanating from the United Nations Conference on Environment and Development (UNCED, 1992), such as Agenda 21, began to acknowledge that there are inextricable

links between the environment, society, poverty and development (Redclift, 1992; Peet and Watts, 1993; Reardon and Vosti, 1995). This confirmed the need for the critical reappraisal of desertification, its causes, consequences, management and links with broader development issues (Rhodes, 1991).

The UNCCD is the first international treaty to acknowledge that desertification is not exclusively an environmental problem. Rather, it notes that there are important social and economic underpinnings to the issue and that it is intrinsically linked to unsustainable development, social inequalities and poverty. These in turn affect the livelihoods and well being of many rural people (Chasek, 1997). As a result, the UNCCD moves away from centralised, prescribed mitigation strategies and ‘blueprint development’ (Roe, 1991; Thomas *et al.*, 2002). Local-level action is now considered critical in the reduction of poverty and land degradation, as the UNCCD designs to embody not just environmental but also social and economic needs. In doing so, it formally recognises that land users rather than governments are the main actors involved in the management of dryland areas, acknowledging that in order for people to invest in their land, they need to have clear rights and control over access to resources (Toulmin, 1995). Thus, an emphasis is placed on local scale decision-making and decentralised power over access to resources.

This research focuses on local, political and scientific understandings of land degradation and examines the appropriateness of the UNCCD to Swaziland, Southern Africa. The study takes a political ecology approach to investigation, which provides an especially apt theoretical grounding that allows a novel transdisciplinary approach to be constructed, using relevant aspects of existing theories and conceptual frameworks from both the natural and social sciences. It also demonstrates the potential to attempt to understand human-environment interactions and resource relationships as being integrated and variable both temporally and spatially, as well as in scale and context (Nightingale, 2003). Due to the colonial and post-colonial history of the Southern African context in which this research is based, power relations are instrumental to consider and political ecology provides the theoretical space for these to be explored. Power structures and patterns of access and control in historical times will significantly influence the livelihood strategies, land use and land management practices of today, particularly in Swaziland.

Parties to the UNCCD including Swaziland are obliged to produce National Action Programmes (NAPs). These documents were conceived as the main mechanism of UNCCD implementation. NAPs allow the formulation of strategies to combat desertification that are appropriate to the problems faced by each country, as they ‘identify the factors contributing to desertification and the practical measures necessary to combat desertification and mitigate the effects of drought’ (UNCCD, 1994: 14). NAPs also allow the potential integration of local and scientific knowledges, in the implementation of desertification mitigation strategies that address issues and needs as identified by the land users themselves (Toulmin, 1995; Warren, 2002). This marks a huge shift away from the focus on western science as the only knowledge domain capable of providing successful policy solutions to environmental issues (Forsyth, 2003).

Whilst the contribution of scientific surveys is useful in the identification of land degradation, assessment of desertification using one single measure is impossible (Rubio and Bochet, 1998; Warren, 2002). Identification of desertification and degradation frequently relies on the use of externally generated scientific indicators (Stocking and Murnaghan, 2000), which do not necessarily acknowledge the uniqueness of the ecological, cultural, social and economic context to which they are applied (Kinyunyuu and Swantz, 1996). These often perpetuate ‘environmental crisis’ narratives (Bryant, 1998; Forsyth, 2003) and also fail to contextualise the desertification issue in the broader perspectives it necessitates. This is due to several reasons. First, many scientific assessments unduly overemphasise the visible elements of environmental change, for example gully erosion, relative to the less visible elements, such as soil nutrient depletion (Thomas and Middleton, 1994). Second, environmental change does not always equate to degradation, especially in the case of non-equilibrium dryland vegetation systems, which, since the popularisation of the ‘new ecological theory’ (Scoones, 1999), are now considered to be dynamic and resilient to natural disturbances such as drought (Scoones, 1989; Behnke and Scoones 1992). Third, degradation must be viewed in the context of the land use system in which it occurs (Abel and Blaikie, 1989; Walker *et al.*, 2002; Warren, 2002), where degradation may be tolerated or even accepted if livelihood gains exceed the rate of loss (Biot, 1992), even if this is only a short-term trend. Fourth, land users may not place desertification very highly within the overall remit of factors that limit their successful use of the environment and their well

being (Chanda, 1996). NAPs are therefore intended to place desertification into context by taking an actor-oriented approach to formulation and involving local land users in strategies to alleviate the problems that they see as most limiting to their well being. The Swaziland NAP is a key consideration in this research, as processes of NAP creation are examined, together with the understandings of desertification and land degradation of a number of different actors including government representatives, NGO officers and local people.

Swaziland is a small, landlocked country located between 25°-28° S and 31°-32° E with an area of 17,364 km². Situated in Southern Africa, Swaziland is surrounded largely by South Africa but shares its easternmost border with Mozambique. Its location is illustrated in Figure 1.1. Swaziland has a population of approximately one million people, the majority of which inhabit the central north-south band of the country known as the middleveld. This population distribution predominantly results from the concentration of the indigenous population in the central part of the country during colonial times and this has contributed significantly to the shaping of the contemporary landscape.



Figure 1.1: Map of Swaziland

Whilst Swaziland is categorised as a middle-income country due to a moderate Gross Domestic Product (GDP) per capita of over US \$1340, per capita income for the poorest 40% of the population is considerably lower, at US \$230. This is because approximately 43% of the total income is received by 10% of the population, whilst

55% of the rural population live below the poverty line (FAO, 2001). Swaziland is ranked 133 in the UNDP Human Development Index (HDI), which considers the development status of the 209 UN member states (UNDP, 2003). The introduction of such an all-embracing sustainable development policy in the form of the UNCCD is therefore an important step towards improving the well being of Swaziland's population and environment. Drylands account for 78% of Swaziland's land area, with 28% of the country classed as semi-arid (UNSO, 1999). Following Swaziland's signing and ratification of the UNCCD, at the time of data collection it was one of the only countries in Southern Africa to have produced a NAP. Swaziland therefore provides an appropriate dryland context in which to examine the desertification issue and the related interactions between people, natural resources, policy and power, using a sliding scale of analysis (Schaffer, 1984).

1.3 Outline of the research

The broad aim of the research is to determine whether the Swaziland NAP meets the requirements of the principles outlined in the UNCCD, especially its recommendation that physical degradation issues be integrated with key aspects of land user involvement and participation, in the overall context of sustainable development. This is particularly pertinent in the research context due to Swaziland's political situation, as King Mswati III rules as an absolute monarch (Mzizi, 2002), and the power and tradition of the aristocracy are based considerably on control over access to and use of land (Levin, 1991). Concepts of local-level decision-making and community participation, as embraced in the intentions of the UNCCD, have not been investigated to date in such a hegemonic context. It is therefore the first objective of this research to enhance understanding of the complex interactions of the social, political, economic, historical and environmental aspects of land degradation and natural resource use under such circumstances.

The second objective of the research is to assess the utility of the UNCCD in a 'real world' situation and its appropriateness and relevance to the people actually experiencing degradation. In this case, it is three case study chiefdoms in the Kingdom of Swaziland that represent the 'real world'. Since the 'rediscovery of diversity' (Booth, 1994) it has been more widely recognised that each actor has his or her own reality and that people ascribe their own meanings to the world (Rocheleau *et al.*, 1995).

Humans create and exercise understanding and agency on their world around them, yet operate within a web of perceptions, beliefs and myths, which portray people and their environments as constituted in each other, with neither permanently privileged over the other (Croll and Parkin, 1992). As such, the principal social and environmental problems believed by policy makers to be affecting rural populations may not tally with those prioritised by the people actually experiencing and being affected by desertification (Thomas and Twyman, 2004). This research intends to identify the needs and understandings of local land users from a range of different perspectives, using a variety of Participatory Rural Appraisal (PRA) techniques and conventional methods. It will also integrate the social scientific data with scientific assessments of degradation and environmental change, in order to create a deeper understanding of desertification and its constraints and opportunities to rural populations.

Whilst the intricacies of each local situation as identified through case study research may differ, broad themes and emergent issues can be identified from case studies (Batterbury *et al.*, 2002). These can give useful insights into potential problems and solutions that are applicable elsewhere. It is important that valuable lessons learnt in past community projects are not forgotten (Oates, 1996) and that instead past research, experience and practice can be learned from and built upon in future interventions. The final objective of the research is that it will inform the development of successful and appropriate anti-degradation strategies and provide outcomes relevant to the implementation of such strategies in other places experiencing degradation, both within and beyond Swaziland.

An integrated transdisciplinary approach is considered necessary in order to achieve the aim and objectives, which in turn is informed by both social and ecological development theories. Due to the hybrid nature of the research, the aim and objectives are achieved through six main activities:

1. A review of the Swaziland NAP and related policies, focusing specifically on NAP programme areas with marked ecological and livelihood components. This considers the land degradation and livelihoods dimensions of the policy, ascertaining in conjunction with the other data, whether the NAP intends to address the real problems experienced by the people affected by degradation;

2. An assessment of the broader scale processes that have influenced land use and livelihood strategies within Swaziland and consideration of their impacts on the likely success of the NAP;
3. Identification of land use and land management practices within the study areas using maps and social scientific research techniques such as baseline household questionnaire surveys;
4. Mapping and measurement of environmental changes using archive and field methods at community and farm scales;
5. Land user assessments of degradation and environmental changes and their perceived impacts on land use practices and outputs in the study areas;
6. Identification of the placement of activity 5 in an overall framework of factors affecting/limiting land use activities/livelihood options and evaluation of this in the context of the NAP and its aims according to the UNCCD.

These activities are viewed as important factors in the research planning process as it is their combined outcomes at the four overlapping levels of analysis (household, community, national and international), which together address the research aim and the objectives. This study therefore contributes three-fold to the existing body of knowledge on desertification. First, it contextualises an international environmental Convention at the national level, thus, allowing a nested, multi-scale evaluation of policy relevance to the local populations actually experiencing degradation. Second, it contributes to theoretical debates on conceptual approaches to investigating desertification and natural resource use by taking a novel political ecology approach developed from theories and frameworks from a variety of disciplines in the natural and social sciences (Scoones, 1999). By taking such a transdisciplinary approach, it allows a broader assessment of the factors contributing to desertification and a more thorough analysis of the processes, causes and effects of degradation, thus increasing the potential to create more appropriate mitigation strategies. Finally, this research takes a hybrid attitude, allowing the consideration of a variety of scales and the adoption of a multi-methodological approach.

1.4 Outline of the thesis structure

This study considers concepts, theories and methods from a range of different areas, including the environmental sciences, social sciences, geography, politics and

development studies. This chapter has presented an introduction to desertification and the UNCCD and has outlined the background to the research. Chapter 2 examines the changing roles of western scientific and local knowledges in environmental management and highlights the need for integrated, hybrid knowledges in order to formulate more appropriate policy. It then proceeds to explore the processes involved in the UNCCD negotiations, and considers in more detail some of its core concepts. These include the role of Non-Governmental Organisations (NGOs) in the policy implementation process and issues of ‘community participation’. It questions their application to all cultural contexts, thus outlining the basis of the research. National and Sub-Regional Action Programmes are then introduced as the main mechanisms of UNCCD implementation and potential problems that could restrict the impact of the UNCCD’s success are highlighted.

Chapter 3 reviews various post-impasse concepts in ecological and social development theory and highlights key aspects of each that are relevant to the present study. This culminates in the presentation of a novel political ecology theoretical approach in which emphasis is placed on: the role of social actors and institutions that control and affect access to and use of natural resources; power relations and their inequities both within and between analytical levels; multiple scales of analysis (both temporal and spatial); and the reconsideration of ecological theory. Various conceptual frameworks are then considered, all of which influenced the research process. These include Blaikie’s (1989) chain of explanation, the Sustainable Rural Livelihoods Framework (Carney, 1999) and the extended environmental entitlements approach (Leach *et al.*, 1999). The need to move away from linear deterministic analyses of degradation is presented and a network approach is proposed. Key research questions are presented and these are returned to throughout the thesis.

Chapter 4 details the methods used in the research and fieldwork processes and highlights issues of positionality, reflexivity, cross-cultural research and translation. The laboratory procedures employed to conduct the soil nutrient analyses are discussed, together with the methods use to map land use changes from time-series aerial photographs. Also presented in this chapter are the justifications for the choice of study villages and the two-phase approach to data collection. Chapter 5 introduces the social and environmental characteristics of Swaziland and the national context of the study,

considering how its colonial and post-colonial history and politics have affected power relations and control over access to land. Each of the study chiefdoms are then introduced and an analysis of the rural livelihoods, land use and land management practices in each of them is undertaken, together with an exploration of the key characteristics of the case study households involved in the research.

The dominant narratives of desertification and degradation according to the government and Swazi NGOs are then explored in chapter 6. The contemporary national policy context is reviewed with regard to interventions that alleviate land degradation and enhance rural livelihoods. Changes in approaches to policy making are then considered. Swaziland's NAP is examined in order to ascertain whether it heralds a shift in the way local people engage in policy. Chapter 7 focuses on local-level environmental changes, and the constraints and opportunities presented by such changes are considered from the perspectives of the land users themselves. This links with chapters 2 and 3, as different manners in which knowledges are produced are considered. Chapter 8 examines contemporary approaches to land degradation mitigation in Swaziland and their relevance to the people affected by and living with degradation. A recently completed land rehabilitation project funded by the Japanese International Cooperation Agency (JICA) is presented as a case study. This project provides a working example of the application of concepts such as 'community participation' and allows the exploration of who might benefit or suffer from the impacts of such activities in the Swazi context.

Chapter 9 seeks to integrate the social, political, economic, historical and environmental aspects of land degradation in Swaziland. Key themes of power relations, access to land and tradition dominate in this discussion. The applicability of the principles of the UNCCD including community participation and a 'bottom-up' approach to the Swazi context is then considered together with the links to broader structural processes and the international political economy. The thesis continues with an evaluation of the UNCCD and its appropriateness to successfully combating desertification, enquiring whether it permits attention to be focused on problems of sustainable land use that are being experienced by rural communities in Swaziland. The broader implications of the research outcomes are then considered, including the possibilities for making research more relevant to local people, and degradation issues are discussed in the framework of the broader processes of sustainable development. The position of the UNCCD within

international politics is also explored, together with the potential for greater linkages and synergies between the three Rio Conventions in order to produce a more efficient and effective opportunity for successful policy implementation. The thesis concludes with a presentation of the possibilities for further research as a product of the findings presented in this study and synthesises the overall research outcomes.

CHAPTER 2: The UNCCD: linking western science and local knowledges through policy

2.1 Introduction

Scientific knowledge plays a vital role in shaping understandings of how environmental problems arise and the ways in which they are perceived (Corell, 1999). What is defined as ‘western science’ has been portrayed as universal, objective, testable, verifiable and replicable (Thomas and Twyman, 2004) and this type of expertise has been placed at the forefront of numerous initiatives to reduce desertification and manage natural resources (Mahiri, 1998). Throughout the UNCOD meeting in 1977, emphasis was placed upon gathering as much scientific evidence for desertification as possible. This was despite shortcomings associated with its identification and measurement and a lack of acknowledgement of the politicised nature of the use of the science (Forsyth, 2003). However, by 1994 and the time the UNCCD negotiations took place, the growing importance of local knowledges and indigenous methods of dealing with desertification as employed by the people actually experiencing it had been recognised. Although scientific inputs remained important for legitimacy purposes, only minor preparations were made in synthesising data and preparing reports (Corell, 1999). It was thought that by increasing knowledge of local understandings of degradation, including both its processes and effects, more appropriate and relevant management strategies could be developed (Niemeijer and Mazzucato, 2002). The building on and expanding of ‘farmer first’ principles (Chambers, 1997) and shifting of the power balance of environmental research and management towards the communities, led to calls for the better integration of local knowledges with western scientific knowledges, and analysis of the socio-cultural and political economic dimensions of knowledge production. It was considered that this would lead to more appropriate possibilities to address desertification (Osbahr and Allan, 2003) and that as a result, the status of minority groups in environment and development policy may be increased (Forsyth, 1999).

This chapter proceeds to address the characteristics of environmental knowledges using the UNCCD to illustrate how differential knowledge can potentially be made relevant and useful through policy. It begins with a brief review of the ‘western scientific’ knowledge of desertification and how it is recognised, discussing the problems

associated with defining desertification and with selecting an appropriate scale for intervention. It then considers ‘local’ knowledges and examines how these differ and overlap with ‘western scientific’ knowledges. This leads to an exploration of how degradation can mean different things to different actors, a point also returned to in more detail in Chapter 3 and throughout the thesis. The UNCCD is then introduced, together with the processes leading to its formulation. The role of NGOs in the UNCCD negotiations is considered, as is the perceived need for ‘community participation’ in initiatives to combat desertification. The chapter concludes with an examination of the aspects of the UNCCD that are particularly pertinent to this research and highlights some of the potential problem areas in the implementation of the UNCCD in the context of Swaziland.

2.2 Desertification: issues of definition and scale

Western science has played an important role in communicating the causes, problems, and effects of environmental issues such as desertification. As such, the terminology employed is paramount in helping the general public, as well as the policy makers and decision makers, to understand the issue (Corell, 1999). The ways in which a problem is understood are grounded in its definition. Therefore, how desertification is defined and framed is a key issue in political debates involving those with different perspectives (Chasek and Corell, 2002; Forsyth, 2003), and indeed, a fundamental factor in determining an appropriate response (Warren, 2002). Similarly, the scale of desertification is important to establish, in terms of both its biophysical extent and finding an appropriate scale for intervention. The subsections of section 2.2 consider these issues of definition and scale in more detail.

2.2.1 Desertification: manifestation and western scientific definition

In the desertification debate, the supposed infallibility of western science has been questioned since UNCOD (1977). It was realised within the political and decision-making spheres that science too has uncertainties and whilst it can help policy develop, it cannot necessarily provide the policy solutions often demanded of it (Eden, 1998). This is demonstrated by the way that science failed to provide the ‘quick-fix’ solutions to desertification that were expected of it following popularisation of the issue in the 1970s and 1980s (Thomas, 1997a). With regard to uncertainties relating to desertification, consensus has failed to be reached on what exactly desertification is, as

different scientists in different places focus on different processes, causes and effects, and a range of factors in contrasting environments and circumstances have been grouped together under one word (Barraclough, 1995). Both land degradation and desertification are therefore recognised as ‘umbrella’ terms, which cover a wide variety of ways in which the quality and productivity of the land may decrease over various temporal and spatial scales (Stocking and Murnaghan, 2000). Some of the biophysical manifestations of degradation are shown in Table 2.1, illustrating the myriad of factors involved.

Table 2.1: Biophysical manifestations of degradation and desertification

Soil and Landscape Changes	Vegetation Changes	Climatic Changes
<ul style="list-style-type: none"> • Decreased soil fertility of croplands, pastures and woodland • Decreased water holding capacity • Decreased organic matter • Decreased infiltration • Increased soil crusting • Increased soil compaction • Soil loss (in terms of ablation, gullyng, sheet erosion) in excess of soil formation • Dune formation • Accumulation of soil at the base of perennial plants and permanent structures • Local deposition in outwash fans • Addition of sediment to water bodies 	<ul style="list-style-type: none"> • Change in vegetation productivity over time, unrelated to rainfall patterns • Change in vegetation cover • Change in plant species composition that are of use to humans and animals • Shifts between vegetation transition states that result in decreased fodder (e.g. severe bush encroachment) 	<ul style="list-style-type: none"> • Dust storms • Increased atmospheric aerosol loadings • Loss of surface roughness • Increased albedo • Decreased convection • Reduced rainfall • Changed atmospheric circulation

(Source: adapted from Behnke and Scoones, 1993; Prince, 2002.)

Desertification is difficult to define at all temporal and spatial scales, particularly in a non-ambiguous, policy-relevant manner. This is because the diversity of processes of degradation and change which contribute to the overall occurrence of ‘desertification’ call for numerous measurement techniques, often relying on indicators in its identification (Rubio and Bochet, 1998). As a result, the processes involved may require different policy responses (Robbins *et al.*, 2002). More recent research has led to the presentation of a more realistic, yet more complex view of drylands, particularly with regard to rainfall variability and vegetation dynamics (Ellis and Swift, 1988; Warren *et al.*, 1996; Dougill *et al.*, 1999), all of which contribute to the elusiveness of definitional consensus (Okin, 2002). Whilst this may appear to be an issue of semantics, ill-defining desertification can have important impacts on the perceived significance and extent of the phenomena and consequently the response to it (Thomas and Middleton, 1994).

That is where the challenge is presented, in using scientific information and tautological value judgements to inform appropriate policy (Marcussen, 2002).

Over time, popularised definitions have varied with regard to the relative emphases placed on human and natural causal factors (Corell, 1999), as advances have been made in scientific research and greater or lesser account of broader structural factors has been taken into consideration (Blaikie, 1985). It is presently regarded as vital to include both human and climatic factors in any definition of desertification, yet disagreement remains as to which holds most influence (Thomas and Middleton, 1994). Together with this, different words are ascribed different meanings by different actors (Moore, 1996), so each person's evaluation of the term will reflect their reality and interpretation and indeed, whether or not it is viewed as a problem (Forsyth, 2003).

The UNCCD definition of desertification (see Table 2.2), which stems from that in Agenda 21, incorporates both biophysical and socio-political economic elements. This highlights the need for integrated scientific and social scientific research at a number of levels and scales (Kjellen, 2003), whilst also strengthening the case for international financial support. If desertification was attributed solely to human activities then national governments may potentially be criticised for not addressing it adequately (Corell, 1999), whilst a purely natural phenomenon would not attract the necessary financial attention (Thomas and Middleton, 1994). Using a hybrid definition permits governments to argue that they are subject to a natural phenomenon that affects the lives of vast numbers of people, thus necessitating international assistance (Corell, 1999), whilst links with broader sustainable development issues provide a moral dimension to the agreement, placing humans at the centre of efforts to decrease degradation (Dobie, 2003). The various definitions of desertification employed in the international policy context from 1976-1994 are summarised in Table 2.2 and demonstrate how scientific knowledge can be politicised and institutionalised in order to support or oppose particular modes of response. It also illustrates how scientific information may be presented to legitimate official action (Robbins, 2000; Marcussen, 2002).

Table 2.2: The changing definitions of desertification 1976-1994

Definition	Main focus on natural causes	Main focus on human causes
<i>Early views of desertification as desert advance</i>	✓	
<i>1976 Swedish Natural Science Research Council:</i> Desertisation or the degradation of arid and semi-arid ecosystems is a stepwise decomposition of the plant and animal communities. Initially, there is a reduction of production of part of the species within the amplitude – that is, the limits of variation – of the ecosystem. In terrestrial ecosystems the process usually occurs through soil deterioration via loss of primary species and invasion by new specific material. When the density of vegetation decreases, certain conditions of soil and climate may also induce desertisation. Climate and other physical factors may result in temporary deterioration of the ecosystem, lowering its productivity and species diversity.	✓	
<i>1977 PACD:</i> Desertification is the diminution or destruction of the biological potential of the land, and can lead ultimately to desert-like conditions. It is an aspect of the widespread deterioration of ecosystems, and has diminished or destroyed the biological potential, i.e. plant and animal production, for multiple use purposes at a time when increased productivity is needed to support growing populations in quest of development. Important factors in contemporary society - the struggle for development and the effort to increase food production, and to adapt and apply water technologies, set against a background of population growth and demographic change - interlock in a network of cause and effect.	✓	✓
<i>1982 UNEP/FAO:</i> Desertification is defined as a comprehensive expression of economic and social processes as well as those natural or induced ones, which destroy the equilibrium of soil, vegetation, air and water, in the areas subject to edaphic and/or climatic aridity. Continued deterioration leads to a decrease in, or destruction of, the biological potential of the land, deterioration of living conditions and an increase of desert landscapes. [It is] the result of natural processes and of processes due to human and animal pressures, but only through man's activity can it be slowed down and stopped.	✓	✓
<i>1990 UNEP:</i> Desertification/land degradation, in the context of assessment, is land degradation in arid, semi-arid and dry sub-humid areas resulting from adverse human impact. Land in this concept includes soil and local water resources, land surface and vegetation or crops. Degradation implies reduction of resource potential by one or a combination of processes acting on the land. These processes include water erosion, wind erosion and sedimentation by those agents, long-term reduction in the amount of diversity of natural vegetation, where relevant, and salinisation and sodication.		✓
<i>1991 UNEP (revised):</i> Desertification is land degradation in arid, semi-arid and dry sub-humid areas resulting mainly from adverse human impact.		✓
<i>1992 Agenda 21 and 1994 UNCCD:</i> Desertification means land degradation in arid, semi-arid, dry sub-humid areas resulting from various factors, including climatic variations and human activities.	✓	✓

(Source: Corell, 1999: 60-61)

2.2.2 The scale issue: links to the international level

Another issue confounding the attainment of an agreeable definition is that of the scale of desertification, in terms of both its biophysical extent and finding an appropriate scale for intervention. This is important because consideration of the extent of occurrence of an environmental phenomenon can aid the separation of those processes that are relevant and those that are irrelevant (Prince, 2002), whilst also allowing a more thorough analysis of the cumulative effects and processes leading to desertification (Lambin *et al.*, 2002). Biophysical environmental changes relating to desertification as outlined in Table 2.1 are manifest at the local level, largely as a cumulative effect of individual farmer actions and decisions (Batterbury *et al.*, 2002), so desertification can be said to primarily impact land, and therefore livelihoods, at the local scale. Yet environmental boundary conditions such as climate, soil and hydrological patterns that influence these degradation processes are defined at regional, national and international scales due to linkages with drought, famine, climatic changes and biodiversity loss. Also connected are political, social and economic factors such as markets, trading patterns, governance, technological change, human out-migration and refugee problems following environmental disasters (Blaikie and Brookfield, 1987; Lambin *et al.*, 2002). Even though effects may only become apparent at the local level, linkages with the broader levels cannot be ignored and this presents complications when choosing the most appropriate spatial scale for intervention (Thomas and Middleton, 1994).

Lambin *et al.* (2002: 389) propose that environmental issues can be said to be international when:

1. They are truly worldwide since they affect everyone, which is the case when global common property resources are involved (e.g. climate changes and ozone depletion);
2. They need international recognition for funding, technology transfer and capacity building (e.g. desertification);
3. The international community perceives it as being important, but the resource being degraded relates to national sovereignty concerns (e.g. vegetation and water resources).

According to these criteria, desertification can clearly be considered as an international level environmental issue. This assertion is further supported by the international political community, through the creation of the UNCCD, which acknowledges the global dimensions of desertification due to the potential numbers of people and large areas at risk (Carr and Mpande, 1996). The UNCCD also recognises the importance of context and local-level activities in abating desertification, hence its nested scale approach. Parties to the Convention are obliged to formulate Regional, Sub-Regional and National Action Programmes, thus allowing the assessment of symptoms of desertification and benefits of knowledge production at all scales. These are considered in more detail later in this chapter.

2.3 Knowledge and desertification

This section considers the roles of various knowledges in addressing degradation and desertification.

2.3.1 Local knowledge and desertification

Since the beginning of the desertification debate, local land users and rural people have been viewed as one of the primary causes, as well as the victims, of the problem (Thomas and Middleton, 1994). Desertification was popularly considered to be a result of the overexploitation of natural resources by poverty-stricken indigenous peoples, who had damaged the land due to their ignorance of suitable land management practices (Duraiappah, 1998). Others such as the World Bank (1996) supported the neo-Malthusian discourse, which depicts the overpopulation of drylands as being the root of the problem (Adger *et al.*, 2001). Either way, local land users and rural populations were viewed as the source of the problem. As outlined in section 2.1, it is now acknowledged that rural land users in many places, through practical experience and experimentation, have developed a broad knowledge of their environment and its management (Mahiri, 1998). Local land users can operate in highly complex and uncertain environments and are not passively subjected to forces of environmental change (Sullivan, 2000). In order to extract maximum benefits from their environments, they have over time, actively managed the socially and culturally constructed landscapes in which they are situated, by developing adaptive and innovative practices in order to minimise environmental and social risks (Vogel and Smith, 2002). Actions such as livelihood diversification or specialisation demonstrate

that rural people are often flexible, able to adapt and are usually capable of finding alternatives when faced with problems of survival (Barrett *et al.*, 2001). Blame for degradation has also been shifted away from rural populations as it is now acknowledged that broader structural processes are often at the root in causing such problems (Blaikie and Brookfield, 1987). These include not only recognition of the part played by colonial legacies (Mercer *et al.*, 2003) but also issues of land tenure (Thebaud, 1995; Adams *et al.*, 1999; Wiley, 2000), poverty (Broad, 1994; Duraiappah, 1998; Scherr, 2000), overpopulation (Jolly, 1993), political institutions and organisational controls (Bartolini and Bonatti, 2002), international trade and the wider political economy (Reardon and Vosti, 1995), all of which have contributed to poor land management (Blaikie and Brookfield, 1987; Thomas and Middleton, 1994).

As a result, local knowledge is now viewed as an essential input in the environmental policy formulation process. The denigration of local knowledge and land use practices as inferior, superstitious, location-specific and backward has now been replaced with notions of logic, sophistication and experience (Ruddle, 2000). Farmers' understandings of and relationships with their environments are recognised to produce vast knowledge reservoirs through the accumulation of years, even centuries, of practical experience and experimentation (Mahiri, 1998; Ericksen and Ardon, 2002). The environmental and climatic uncertainties of many dryland environments permit the development of these innovative, local, adaptive practices, which eventually, through social interaction, lead to the reinforcement or transformation of existing knowledge to form the overall emergent body of local knowledge (Arce and Long, 1992). This in turn sustains the operation of traditional community land management practices (Ruddle, 2000).

2.3.2 Hybrid knowledge: combining local and western scientific knowledges

The manner in which local knowledge evolves, through practice, experience and trial and error, differs to the development and progression of 'western scientific' knowledge. These differences are widely documented (see Purcell, 1998; Agrawal, 1995) and are summarised in Table 2.3. Whilst it is noted that classification of a knowledge dichotomy is not always practical, it does help to identify differences and similarities in logics and epistemologies and these can then be applied to the analysis and production of multiple and hybrid knowledge domains (Agrawal, 1995).

Table 2.3: Characteristics of western scientific and local knowledges

Characteristic	Western scientific knowledges	Local knowledges (LK)
Knowledge progression	Western science advances through revolutionary change. One paradigm is superseded by another (Kuhn, 1970) and new ways are developed of seeing the same things differently.	LK is often passed on by word of mouth and undergoes constant modification through experiment and practice, in response to changing community needs. This shares similarities with the scientific practice of hypothesis testing.
Context	Centralised and commonly associated with superiority and power.	Scattered, embedded in its particular community and commonly associated with inferiority by western scientists.
Analysis	Characterised by ability to break down data presented to the senses and reassemble it in different ways. Guided by empirical measurements and abstract principles that help order measured observations in order to test hypotheses. Relies on multiple indicators to recognise and measure desertification.	Relies almost exclusively on intuition and evidence directly available to the senses in an organic relationship between local communities and their knowledge. Uses multiple indicators to recognise desertification.
Nature of system	Open system in which awareness is maintained of the possibility of alternative perspectives to those adopted at any point in time.	Less open system, often exhibiting a lack of awareness of other ways of regarding the world.

(Source: based on Agrawal, 1995; Thomas and Twyman, 2004.)

Local knowledges are therefore not always distinct from western scientific knowledges and are not necessarily part of an idealised romantic past (Milton, 1996; Sullivan, 2000; Ryder, 2002). Nor are local and western scientific knowledges single states in themselves. Instead, any knowledge is now seen as partial and socially constructed (Batterbury *et al.*, 1997), whereby the separation of knowledge from those who create, reproduce and manipulate it is questioned (Sillitoe, 1998a).

Knowledge also remains inextricably linked to power. Powerful ‘western scientific’ views often dominate policy and invariably exclude competing views of nature (Robbins, 2000). Drawing on the work of Foucault, Agrawal (1995) proposes that whilst power produces knowledge and knowledge is power, the same knowledge can possess high or low prestige depending on who advances it. Although the value of local knowledge in environmental management interventions is now recognised, it should also be noted that local knowledge too can be seized and politicised (Robbins, 2000). As apparent in Table 2.3, scientific knowledge is notably centralised and associated with the machinery of the state. However, codifying and documenting local knowledges in international archives as proposed by those advocating the value of local

knowledge, would only reproduce the control that existing elites have over scientific knowledge and would endeavour to fix the local knowledge in time (Agrawal, 1995). This contradicts the characteristics of local knowledge, which itself is dynamic due to the constant modifications it undergoes in response to the changing needs of the communities (Warren *et al.*, 2002). The challenge therefore lies in identifying and creating hybrid knowledges. This would involve the development of flexible ways in which scientists, local actors and their knowledges can interact to produce useful policy and practice. This is vital because divided knowledge is not conducive to coordinated action (Robbins *et al.*, 2002). As suggested by Nygren (1999), focus should centre upon the processes that legitimise particular hierarchies of knowledge and the power dynamics between them. Diversity, dynamism and fragmentation in knowledge repertoires must also be recognised (Osbahr and Allan, 2003), as local land users draw upon different discourses of knowledge depending on ecological variabilities and local circumstances (Mahiri, 1998).

The UNCCD acknowledges this, together with the advantages to combating desertification that could potentially be gained by creating hybrid knowledges, through the empowerment and participation of local communities in scientific research and in the design and management of anti-desertification projects. Local knowledges in the context of environmental management are considered vital because as maintained by Bryant (1998), environmental crises including desertification are socially constructed and are perceived as problems only when they begin to adversely affect human interests. Different individuals and groups may therefore interpret the same biophysical environmental changes differently. By combining multiple perspectives, it is envisaged that more appropriate solutions can be created (Warren, 2002).

This demonstrates that problem definition and resolution need not necessarily be grounded in western scientific fact and are primarily in the eye of the beholder. This complicates matters for policy makers. In this respect, science is just another way in which the world may be described (Hughes, 1990); it too is an ideology, only constructed and promoted by a culture of scientists (Sable, 2000). Different perceptions of environmental changes therefore lead to different constructions of risk and opportunity, yet the privileging of western scientific information seeks only to mask knowledge uncertainties. Thus, different perspectives and understandings are excluded,

ultimately averting the production of appropriate policy (Mehta *et al.*, 1999). Hence, in the UNCCD negotiations, NGOs conveyed the voices and the knowledge of the local land users to the international level, whilst a panel of international experts provided western scientific legitimacy to the process. This created an agreement based on more integrated knowledges.

This chapter has so far demonstrated that despite the often-privileged status of western scientific knowledge in informing environmental policy interventions, ‘desertification’ represents a large group of biophysical processes all acting at different temporal and spatial scales and intensities. Together they form a highly complex issue that defies simple definition (Warren, 2002). As a result, western scientific knowledge and definitions of desertification have been manipulated and politicised according to the favoured interventions and power balance of the era. This has not been conducive to furthering understanding of the issue. Also of importance is the scale of incidence of the desertification processes. Although symptoms may appear locally, broader scale environmental, political, social and economic processes are intrinsically linked to the occurrence of desertification (Blaikie and Brookfield, 1985). These connections to national, regional and international scales led to calls for international action to address desertification in the proposal of the UNCCD. Bound within this was the recognition of the need to incorporate local knowledge into desertification mitigation solutions. The following sections of this chapter outline in more detail the UNCCD negotiation process and consider the presentation of local knowledge in the international political arena by NGOs. The implications of using local knowledge for community participation in the implementation of the UNCCD are also examined, and the aspects of the agreement relevant to this research are drawn out. The chapter concludes with the identification of some potential problems with the implementation of the UNCCD in the context of Swaziland.

2.4 The UNCCD: linking knowledge and policy

Debating the scale issue in the international political arena

The proposal for a Convention to Combat Desertification stemmed from the African nations, prior to the 1992 United Nations Conference on Environment and Development (UNCED) (Chasek and Corell, 2002). These states felt marginalized due to the

international emphasis on climatic change and biodiversity issues. The United Nations Convention on Biodiversity (UNCBD) was adopted in the course of UNCED, during which time the United Nations Framework Convention on Climate Change (UNFCCC) was opened for signature. However, the UNCCD negotiations did not begin until after the summit in December 2002. The UNCCD was proposed in response to the concerns of the developing nations, including poverty, drought, inequality and food insecurity. These issues were seen to be impeding sustainable development and had been largely sidelined by international politics (Toulmin, 2001). Despite the presence of both moral and poverty dimensions to the UNCCD, many developed states, particularly those in the European Union (EU), initially opposed the idea of such an agreement (Chasek and Corell, 2002). They argued that desertification is not a truly global issue (Thomas and Middleton, 1994; Stiles, 1995) and their primary concerns were associated with the structure and macroeconomic policies of African governments (Jokela, 2001). The main opposing arguments of the developed world highlight the international power relations at play in determining such a response. It was thought that if the developed world conceded to the classification of desertification as a global environmental issue, it would give strength to developing world discourses that desertification is caused by climatic changes triggered by greenhouse gas emissions. It would reinforce the view that developing countries are 'paying the price' for the industrialisation and capitalism of the developed world (Carr and Mpande, 1996). Also, as posed by Toulmin (1993), the UNCCD places developing countries in a stronger position to demand aid and assistance from the developed world, thus undermining international power relations, whilst Western countries have far less direct interest in supporting the reduction of desertification than they have with ozone depletion and greenhouse gas emissions (Toulmin, 1995).

When the United States of America agreed to support the proposal for the UNCCD, EU resistance weakened (Corell, 1999). In response to the African request and to documentation in Chapter 12 of Agenda 21, stating that additional efforts should be made in the political arena to negotiate an intergovernmental agreement on action to be taken against desertification (Momtaz, 1996), in its 47th Session in 1992, the UN General Assembly (UNGA) resolved to establish the Intergovernmental Negotiating Committee on the Desertification Convention (INCD). This marked the start of the processes of UNCCD formulation.

The negotiation process

The negotiation stages of the UNCCD opened in May 1993 and involved numerous governmental representatives and an International Panel of Experts on Desertification (IPED) comprising 17 members. IPED represented disciplines relating to both the natural and social sciences (Carr and Mpande, 1996; Thomas, 2003). Also present were representatives of 187 NGOs from around the world, although this later increased to 300 by the fourth and fifth sessions (Carr and Mpande, 1996). Negotiations opened with a weeklong seminar “to inform the negotiators of the substantive issues related to desertification and drought and to aid their understanding of the scientific terminology involved” (Kjellen, 2003: 129). The deadline was set that the negotiations should be completed by June 1994. A timeline illustrating the negotiating sessions and the most recent UNCCD Conferences of the Parties (COP) held to date is illustrated in Figure 2.1.

The UNCCD was adopted by the United Nations General Assembly on 17th June 1994 and opened for signatures in October of the following year (Momtaz, 1996). By 26th December 1996, it had come into force following the 50th national ratification (Thomas, 2003). Since opening for signatures, Parties to the UNCCD have acknowledged that desertification is an issue worthy of global attention and have therefore expressed a commitment to collective international action against it (Corell, 1999). By September 2004, the total number of ratified Parties stood at 191 (UN, 2004).

PRE-NEGOTIATION PHASE		NEGOTIATION PHASE		INTERIM PHASE		IMPLEMENTATION PHASE						
1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
Initiative at meeting of African environmental Ministers in Abidjan (Nov 1991)	UNCED decision to negotiate a convention on desertification. UNGA decision to negotiate UNCCD (Dec 1992)	Organisational session in New York (Jan 1993). INCD 1 Nairobi (May-June, 1993), INCD 2 Geneva (Sept 1993)	INCD 3 New York (Jan 1994). INCD 4 Geneva (Mar 1994) INCD 5 Paris (June 1994) UNCCD ADOPTED 17th June 1994	INCD 6 New York (Jan 1995). INCD 7 Nairobi (Aug 1995)	INCD 8 Geneva (Feb 1996). INCD 9 New York (Sept 1996) UNCCD ENTERED INTO FORCE 26th December 1996	INCD 10 New York (Jan 1997). INCD 10 resumed Geneva (Aug 1997) COP 1 Rome (Oct 1997)	COP 2 Dakar (Dec 1998)	COP 3 Recife (Nov 1999)	COP 4 Bonn (Dec 2000)	COP 5 Geneva (Oct 2001)	CRIC 1 Rome (Nov 2002)	COP 6 /CRIC 1 Havana (Aug/Sept 2003)

Figure 2.1: Timeline of UNCCD negotiations (Adapted from Corell, 1999: 111)

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The debate on the scale issue did not end with the agreement to produce an international convention, as the UNCCD acknowledges that solutions have to be found at the local, national, sub-regional and regional levels (Kjellen, 2003). This task is facilitated through the inclusion of regional implementation annexes in the UNCCD and an emphasis is placed on National Action Programmes (NAPs) and Sub-Regional Action Programmes (SRAPs) as mechanisms of implementation. Such moves away from the international level were intended to allow activities to combat desertification to be more context-specific; politically, environmentally, socially and economically.

NAPs are at the core of the UNCCD implementation process and are a central consideration in this research. Within NAPs, governments are required to follow the principles set by Article 3 of the UNCCD, in that they should:

...identify the factors contributing to desertification and practical measures necessary to combat desertification and mitigate the effects of drought (UNCCD, 1994: 10)

and:

...emphasise integrated local development programmes for affected areas, based on participatory mechanisms and on integration of strategies for poverty eradication into efforts to combat desertification and mitigate the effects of drought (UNCCD, 1994: 36)

Other core principles of the UNCCD and its related NAPs, which impact at the community level, include 'local-level decision making' and 'community participation'. These concepts are intended to give local populations greater control over the management of their own resources and to allow people a more active role in the policy process. This is discussed presently and in further detail in chapters 8 and 9, where these concepts are examined in practice.

Also of importance to the effective implementation of the UNCCD are SRAPs, wherein plans are laid out to address desertification in a cooperative manner at the sub-regional level. Responsibility for this falls on appropriate intergovernmental organisations. In the case of this research focusing on Swaziland, the Southern African Development Community (SADC) was selected to carry out this task. SRAPs are said to allow for the integration of good practices and the mutuality of approaches appropriate within geographic regions (Thomas, 2003), whilst being particularly important operational

tools for issues relating to transboundary natural resource management. The nature of environmental problems such as desertification is that they do transcend national borders and with inter-state cooperation, the chances of acquiring funding to address desertification are likely to increase (Chasek and Corell, 2002). SRAPs are intended to promote cooperation between nations in addressing desertification, whilst also minimising the duplication and fragmentation of UNCCD implementation efforts (SADC SRAP, 1997; viii). They are not supposed to be the mere scaling up of national scale processes. Indeed, due to differences between political structures in different countries, this is not possible. Instead, SRAPs are considered to be complementary to the NAP course of action (Corell, 1999). In the Africa Annexe of the UNCCD (1994), special reference is given to SRAPs in Article 11 (page 40) where emphasis is placed on terms such as “coordination”, “cooperation”, “information sharing” (particularly of climatic information) and “joint planning”. The participation of local populations and communities in these processes is stressed. The SRAPs are also of particular relevance in relation to issues such as trade and marketing regimes, as well as common infrastructure, all of which can ultimately impact upon local resource use practices (Corell, 1999).

2.5 NGOs and local knowledge in the international political arena

This section now moves on to consider the role of NGOs in bringing local knowledges to the international political arena and considers in more detail the issues relating to ‘participation’.

2.5.1 The role of NGOs in the UNCCD negotiations

Until preparations for UNCED (1992), NGOs had been largely sidelined in international environmental politics (Gemmill and Bamidele-Izu, 2002). Environmental concerns had stemmed predominantly from western scientific findings (Corell, 1999), whilst the knowledge of NGOs and their expertise in dealing with environmental issues such as desertification had been generally ignored. This is because NGOs could not exercise any influence as they lacked any formal political power and enforcement authority (Chasek and Corell, 2002). During UNCED (1992), and later, during the UNCCD negotiating sessions, NGO contributions were more openly accepted in the international political arena (Gemmill and Bamidele-Izu, 2002). The multi-level and context-specific nature of sustainable development and desertification mitigation strategies was

considered to place NGOs at the fulcrum for further action. Their work with local populations at the grass roots level in addressing short-term issues was seen to have given them expertise and experience, enabling them to better consider the local elements of any action against desertification (Marcussen, 1996; Forsyth, 1999; Lister, 2003).

NGOs were permitted to present statements during plenary sessions and make short statements in the meetings of the two working groups, providing the permission of the chair had been granted (Carr and Mpande, 1996). It was also possible for them to take part in various informal briefings with government and UN officials, and their arguments were summarised daily in each edition of the ECO newsletter (Carr and Mpande, 1996). NGOs therefore provided the vehicle by which local inputs could reach the international political arena (Corell, 1999). Following initial activity coordinated by NGOs from Kenya, the first negotiating session saw the delivery of a joint NGO statement that argued that “programmes to combat desertification should be community-led, recognise the role of women and involve the use of appropriate technologies based on a mix of indigenous knowledge and modern science” (Carr and Mpande, 1996: 154). This call for ‘bottom-up’ action helped to formally initiate the shift away from the old ideas and responses to desertification, towards the decentralised participatory, approach that NGOs were already promoting in community development projects (Marcussen, 1996; Corell, 1999). Ultimately, these concepts of ‘bottom-up’ action and ‘participation’ became some of the main components of the Convention and indeed, are central concepts in this research.

In the text of the UNCCD, it is stated that:

human beings in affected or threatened areas are at the centre of concerns to combat desertification and mitigate the effects of drought (UNCCD, 1994: 2)

and that:

desertification is caused by complex interactions among physical, biological, political, social, cultural and economic factors (UNCCD, 1994: 2).

Local land users and communities are therefore seen as the interface between the environmental and social dimensions of desertification (Thomas and Sporton, 1997). The involvement and participation of local people at a variety of levels (research,

project design, decision making, project implementation) is considered paramount in efforts to reduce desertification. After all, these are the people living with and affected by desertification, who themselves have vast amounts of environmental knowledge and who will ultimately benefit from the successful outcomes of the UNCCD. However, the ways in which they can be included are not straightforward to determine. The labelling of social groups as 'local land users' and 'communities' implies the existence of homogeneous entities with unitary needs and expectations, and which are internally cohesive and somewhat harmonious. As will be demonstrated presently, these reifications can be counterproductive to community development and the fight against desertification.

Despite unacknowledged issues of local social diversity, governments are mandated to integrate NGOs and other representatives of civil society, scientific and research communities, local people and local authorities into the processes of relieving desertification (Lambin *et al.*, 2002). Through the initiatives of NGOs, facilitated by national governments, land users are expected to join in with anti-desertification strategies, putting forward their own proposals for community projects to address desertification related issues that impact upon their well being and daily lives. It is considered to be the responsibility of national governments and NGOs to sensitise the people and generate awareness of the opportunities available to them. However, the sensitisation process too is complex, and could have unintentional impacts on local people. For example, the ways in which the government portrays environmental issues could be used to justify the extension of state control over access to and use of natural resources (Pretty and Smith, 2003), and could even legitimise the liberalistic downsizing of the state (Lehtonen, 2004). These potential complications were overlooked in the negotiation of the UNCCD.

The presence of NGOs at the UNCCD negotiations did not guarantee that their opinions would necessarily be acted upon (Corell, 1999). A wide diversity of NGOs attended and this could have led to conflict due to the variety of interest groups. In some instances there is much competition between environmental NGOs for resources and financial support (Marcussen, 1996). Conflicts may even exist between NGOs involved in addressing the same environmental issue, as well as between NGOs and the state. This can be extremely counter-productive (Mohan, 2002; Thomas, 2003). Local people and

NGOs often see the state as part of the problem rather than the solution. Thus, NGO-state partnerships are not a preferred type of NGO activity and according to Marcussen (1996) this is not an area in which NGOs have shown particular strength. However, the UNCCD negotiations saw calls for the cooperation of NGOs with national governments and the development of partnerships between the different NGOs. Indeed, the cooperation of NGOs from both the north and south is believed to be a key factor in determining the degree of influence that this stakeholder group was able to exert at the negotiations (Corell, 1999). In a relationship that is suffused with political inequalities, northern NGOs (NNGOs) are often considerably more powerful than southern NGOs (SNGOs). They typically concentrate on generating ideas, networking and educating, whilst SNGOs are left to project implementation, often with only partial control over the budget (Mohan, 2002). The power and influence of the NGOs were considerably limited by their observer status at the UNCCD negotiations but they soon realised the advantages of acting as cohesively and unitarily as possible, despite their acknowledged differences. The absence of some of the larger, more political northern organisations, particularly industry representatives, is also likely to have benefited those NGOs that were present as they could focus more on their own priorities (Corell, 1999), instead of pacifying the demands of NNGO agendas.

Whilst the nested national and local level approach appears favourable in that it allows the broad incorporation of existing national environmental strategies within the NAP framework it requires, it could also prove problematic. This is not only because of reasons of legitimacy and the extension of state control mentioned previously, but also because the obligations of Parties to the Convention may be met (depending on the interpretation) by making only minor changes to existing national policies. This will not necessarily result in any concrete action on the ground (Toulmin, 1995). It is also important to note that policies affecting the access to and use of natural resources do not always influence all the situations under their remit equally (Thomas and Sporton, 1997). What may be considered successful in one location could yield a contrasting outcome in another, so although the UNCCD is being applied in all ratifying countries, the impacts and effectiveness of its implementation should be expected to vary considerably by location. This is primarily due to differences in the driving forces that have led to desertification both within and between countries (Lambin *et al.*, 2002) but

also because of varying political structures and stratifications of power within local communities, regions, countries and the international political arena.

2.5.2 Concepts of participation

The UNCCD stresses the importance of ‘community participation’ and ‘consultation’ throughout its text. This is demonstrated in statements such as:

...affected parties undertake to promote awareness and facilitate the participation of local populations, particularly the women and youth, with the support of non-governmental organisations, in efforts to combat desertification and mitigate the effects of drought... (UNCCD, 1994: 8)

and in Article 10 (2f: 11), the UNCCD states that NAPs shall:

...provide for effective participation at the local national and regional levels of non-governmental organisations and local populations, both women and men, particularly resources users, including pastoralists and their representative organisations, in policy planning, decision making, and implementation and review of national action programmes... (UNCCD, 1994: 11).

Despite numerous references to ‘participation’, it is not stated as to what extent local people should be involved, nor to what degree participation should take place (Dobie, 2003). Although the UNCCD provides definitions of ‘scientific’ terms such as ‘land degradation’, ‘desertification’ and ‘drought’, the term ‘participation’, which is also hotly contested, is not at all defined. The statement quoted above calls for participation at all levels but the nature of the involvement is far from clear (Dobie, 2003). This is problematic because numerous different levels are cited at which participation can occur and most commentators acknowledge that whilst it appears a fair and just approach to community development, it does not necessarily mean the equal sharing of power (Ribot, 1995; Michener, 1998). Many typologies of participation have been constructed (for examples see Pimbert and Pretty, 1994; White, 1996; Michener, 1998; Harrison, 2002) but these converge in that they all emphasise the diversity and indeed, ambiguity in the meaning of the term. One of the most widely employed typologies, appropriate to use in the present study is that used by Pimbert and Pretty (1994). This is illustrated in Table 2.4.

Table 2.4: Typology of participation

Typology	Components of each type
Passive participation	People participate by being told what is going to happen or has already happened. It is a unilateral announcement by an administration or project management without listening to people's responses. The information shared belongs only to external professionals.
Participation in information giving	People participate by giving answers to questions posed by extractive researchers and project managers using questionnaire surveys or similar approaches. People do not have the opportunity to influence proceedings, as the findings of the research or project design are neither shared nor checked for accuracy.
Participation by consultation	People participate by being consulted and external agents listen to views. These external agents define problems and solutions and may modify these in the light of people's responses. Such a consultative process does not concede any share in decision-making and professionals are under no obligation to take on board people's views.
Participation for material incentives	People participate by providing resources, for example, labour, in return for food, cash or other material incentives. Much <i>in situ</i> research falls into this category: rural people provide land but are not involved in the experimentation or the process of learning. This is commonly called participation, yet people have no stake in prolonging activities when the incentives end.
Functional participation	People participate by forming groups to meet pre-determined objectives related to the project, which can involve the development or promotion of externally initiated social organisation. Such involvement does not tend to occur at the early stages of project cycles or planning, rather, only after major discussions have been made. These institutions tend to be dependent on external structures but may become independent in time.
Interactive participation	People participate in joint analysis, which leads to action plans and the formation of new local groups or the strengthening of existing ones. It tends to involve interdisciplinary methods that seek multiple perspectives and make use of systematic and structured learning processes. These groups take control over local decisions so that people have a stake in maintaining structures or practices.
Self-mobilisation /active participation	People participate by taking initiatives independent of external institutions to change systems. Such self-initiated mobilisation and collective action may or may not challenge existing distributions of wealth and power.

(Source: Pimbert and Pretty, 1994)

Table 2.4 illustrates the diverse forms that participation can assume (Mosse, 2001) and indicates that a project can incorporate elements of participation yet essentially remain top-down in nature. It should be recognised too, that whilst these arbitrary divisions in the types of participation are useful tools for the analysis of projects and the way in which they are implemented, as well as providing the space for the analysis of power relations within development processes (Twyman, 2000), the divisions are dynamic and should not be taken too rigidly (White, 1996). The term 'participation' is therefore open to interpretation throughout policy creation and project implementation (Mosse, 2001), particularly because the cultural context of its application will differ between Parties to the Convention. Rather than emphasising the role of 'participation' *per se* in the UNCCD, it may have been less ambiguous to instead highlight elements of transparency and downward accountability. This would enable NGOs and community leaders to be

answerable primarily to participants and beneficiaries, rather than political superiors (Mansuri and Rao, 2004), diverting attention away from the contested term 'participation', towards the needs of the people.

Whilst promoted as an empowering approach to development, 'participation' has many caveats. Even if local people are present at community meetings at which local-level decisions are made, it does not ensure that everyone will have a say (White, 1996). In reality, any community is socially stratified and has its own internal power struggles. The discourse of the most dominant members can still prevail in 'participatory' projects, so the weaker voices may continue to be marginalized (Harrison, 2002). Indeed, the exercise of voice can be detrimental under certain conditions because participation of the marginalized may require taking positions that are contrary to the interests of powerful groups (Mansuri and Rao, 2004). In such situations, local power hierarchies intersect with project priorities as a multitude of local perspectives and interests struggle to find a place within the authorising framework of the project (Mosse, 2001). This demonstrates that identification and inclusion of all the different stakeholders in a particular project does not ensure that a fair consensus will be reached where power is equally shared and it will not necessarily result in the empowerment of the weaker stakeholders (Goulet, 1989). This often reflects the situation in wider society (Mohan and Stokke, 2000; Hildyard *et al.*, 2001).

Defining the geographic or conceptual boundaries of a 'community' is also not always straightforward and people are often included or excluded merely because they live in a particular geographic territory. This neglects to consider issues of identity, ethnicity and factions (Mansuri and Rao, 2004), as well as notions of 'community' as a set of shared values or norms (Agrawal and Gibson, 1999). Many newly 'democratic' nations are advocating 'participation', yet it appears contradictory to many 'traditional' societies (da Chuna and Pena, 2000). This is particularly pertinent with regard to the empowerment of marginalized groups such as 'women', who are culturally viewed as subordinate in many of Africa's patriarchal societies, including Swaziland (Daly, 2001). It is also necessary to recognise that participation cannot just be implemented in the manner many policies imply. This is not only because participation simply provides a set of developmental ideas rather than a methodology for project or policy execution

(Mosse, 2001) but also because the whole concept is fraught with theoretical weaknesses that may only become apparent at the field level (Michener, 1998).

The conceptual issues highlighted throughout this chapter provide a clear justification for this research in which the utility of concepts in the UNCCD such as ‘participation’ and ‘local-level decision making’ are evaluated in the Swazi context. This allows the assessment of the appropriateness of the UNCCD to the people actually experiencing degradation. The main issues that were highlighted throughout this chapter are summarised in Table 2.5. These issues are returned to later in the thesis, when it is considered whether they represent actual constraints to the effectiveness of UNCCD implementation in Swaziland.

Table 2.5: Areas of potential conflict in the implementation of the UNCCD in Swaziland

Potential issue	Brief explanation
Power relations between different NGOs	Many NNGOs assume paternalistic roles to SNGOs, believing their own knowledge to be superior (Mohan, 2002). This can cause the real issues of the people to be neglected by NNGOs, whilst the SNGOs lack transparency and capacity to address the issues themselves. Also, NGOs are increasingly internationally networked and not nationally centred, so relationships are suffused with political inequalities (Mohan, 2002).
Use of the terms ‘communities’ and ‘land users’	‘Communities’ and ‘land users’ are not single entities but have diverse needs and expectations. This is not acknowledged in the UNCCD and could lead to conflict in implementation if local power structures are glossed over. Defining community boundaries is also problematic, particularly where complicated by various factional, ethnic or religious identities (Agrawal and Gibson, 1999).
Challenges to power relations between government, NGOs and local people to meet calls for decentralisation	In order for the UNCCD to be implemented to its full potential, the state may have to support broad-based re-negotiations of power (White, 1996). This marks moves towards decentralised governance and could be unfavourable to many governments, as civil society can destabilise and undermine state functions, thus eroding legitimacy (Marcussen, 1996). As communities become politically stronger, they may challenge local political interests leading to competition with the state and a withdrawal of state support (Thomass-Slayter, 1994).
Manipulation of NGOs in sensitising local people to the desertification issue	NGOs may be manipulated and could themselves, manipulate information, to justify the extension of state control over access to natural resources. Participation may become another form of enforcing central rule (Ribot, 1999) leading to outside agendas being expressed as local knowledge. Questions of how to ensure NGO legitimacy are also raised (Lane, 2003).
Questions of whether participation is synonymous with equality	Genuine participation may require taking positions that are contrary to the interests of powerful groups (Harrison, 2002; Mansuri and Rao, 2004), whilst participation may also perpetuate benefits according to local power relations. Also, local institutions are not more equal and democratic than other organisations simply because they are close to the grassroots (Marcussen, 1996; Lane, 2003).
Differences in principles of traditional and democratic societies	The UNCCD promotes the involvement of marginalized groups, for example, ‘women’, in efforts to combat desertification. This may conflict with some cultural practices, particularly in societies that regard women as subordinate (Da Chuna and Pena, 2000).
Incorporation of NAPs into existing policy without taking concrete action	In some cases, minor adjustments to national policy could be interpreted as meeting the obligations to the UNCCD. This will not necessarily have led to any concrete action on the ground, nor resulted in any structural changes in governance.

2.6 Summary

This chapter has explored the dynamic role of western scientific and local knowledges in environmental management and has addressed the notion that the ecological can be politicised (Bryant, 1997). The focal policy of this research, the UNCCD, was introduced and the negotiation processes leading to its formulation were considered. The concepts advocated by the UNCCD, such as 'local-level action' and 'community participation' were also explored. NAPs were highlighted as the main national level implementation mechanism, whilst SRAPs are required to address trans-boundary environmental management. Of particular relevance to this research are Articles 3 (Principles) and 10 (NAPs), both of which have been quoted throughout this chapter. The appropriateness of NGO involvement and 'community participation' to the Swazi context was questioned. The chapter concluded with a discussion of potential problems that could arise during the implementation of the UNCCD in Swaziland. The potential issues that were raised provide a clear justification for the research.

CHAPTER 3: Theoretical approach to the research

3.1 Introduction

The previous chapter examined how local and scientific knowledge can be linked in policy and noted how environmental knowledges can be politicised. This chapter focuses on the linkages between society and the environment and explores the social embeddedness of ecological issues. It begins with a brief outline of the contemporary lines of thought in ecological and social development, and proceeds to present the theoretical background to the research. The case is then argued for political ecology as an appropriate theoretical foundation on which to base the research. Aspects of existing conceptual frameworks are drawn upon to provide coherence to the study and these contribute centrally to the political ecology approach that is developed. Challenges mounted against political ecology are also considered and suggestions are posited as to how these may be overcome. The chapter concludes with the presentation of a number of research questions and an exploration of the ways in which a political ecology approach can assist with the provision of answers.

3.2 Review of post-impasse social and ecological concepts

Approaches to social development theory have changed significantly since the perceived 'impasse' of the 1980s (Booth, 1994). General dissatisfaction with Marxist and neo-Marxist lines of thinking stemming from the 1970s precipitated a shift towards the linking of poverty with environmental issues. As a result, development moved away from its generalist and blueprint prescriptions, and became less directly synonymous with economic growth (Roe, 1991; Schuurman, 2000). This led to the closer examination of terms such as 'poverty' and 'development' (Peet and Watts, 1996) and tended towards the recognition of diversity and complexity in the social, political, economic and environmental opportunities and constraints affecting each actor or social group (Scoones, 1996). Details of this evolution in social development theory are widely documented (see Booth, 1985; Booth, 1994; Long and Long, 1992; Peet and Watts, 1996; Schuurman, 2000). In essence, post-impasse thought takes a holistic approach, viewing society's perceptions of and social interaction with the environment as being socially and culturally constructed (Milton, 1996). This calls into question previously constructed dualisms of 'people' and 'nature' (Croll and Parkin, 1992;

Milton, 1996). Rocheleau *et al.* (1995) suggest for research to capture the spatial diversity of perceptions of actors in any area, each of the actors and actor groups should be involved and their perceptions and realities acknowledged. To achieve an understanding of social development therefore requires the comprehension of structure and agency at each level from the local to the international, together with an appreciation that these interfaces and links between actors and scales (both temporal and spatial) are dynamic and contested (Bryant, 1997).

In a similar paradigm shift away from the structural-functionalist theories in the social sciences, changes occurred within the ecological sciences. Again they tended towards diversity and complexity, particularly in arid and semi-arid regions and much research focused on the variability of African rangelands (Behnke and Scoones, 1998; Dougill *et al.*, 1999). Ecology in the 1950s was dominated by assumptions of equilibrium, homeostasis and systems concepts (Peet and Watts, 1996), and the idea that ecology was a nomothetic science, the highest goal of which was to produce broad, context-independent generalisations about nature (Demeritt, 1994). This stemmed from much earlier theories about the natural world and originally incorporated religious ideas about a divine natural order (Worster, 1985). It was not until the 1970s that the possibility of non-linearity and dynamism in ecological systems in both time and space was considered with regard to drylands (Scoones, 1999). Terms such as ‘variability’, ‘resistance’ and ‘resilience’ became more widely utilised as a new wave of empirical enquiry ensued (Zimmerer, 1994; Scoones, 1999; Lykke, 2000), with research focusing on environmental change over a variety of temporal and spatial scales. This had huge practical implications because environmental management recommendations had previously centred on equilibrium assumptions, relying on benchmark vegetation conditions against which environmental changes were assessed (Zimmerer, 1994). The popularisation of the ‘new ecological principles’ slowly led to the cautious acceptance of notions of environmental transformation as a product of contingent factors (both intended and unintended; human induced and ‘naturally occurring’), where environmental change is not necessarily synonymous with environmental degradation (Fairhead and Leach, 1995; Illius and O’Connor, 1999).

3.3 Political ecology

As new paradigms in ecological and social development theories emerged, theorists searched for an analytical approach that could be used to integrate environmental and political understanding in the context of allegedly intensifying environmental problems (Bryant and Bailey, 1997). Research fields including cultural ecology, political economy, ecological economics, feminist development studies, environmental history and postcolonial studies all held advantages. One approach that unites aspects of each of these, and which ‘post-impasse’ theorists favoured, is that of political ecology. Probably first used by Wolf (1972), the term ‘political ecology’ was originally developed following the recognition that it is unrealistic to attempt to understand ecological processes outside the contexts of local productive relations and larger scale economic systems (Moore, 1996). Recent interpretations of ‘political ecology’ reveal it to be an eclectic and transdisciplinary research field (Scoones, 1999; Adams, 2001), the focus of which centres on the negotiation of social and power relations in the context of ecological changes and the broader political economy. Robbins (2004) presents a thorough review of the naissance and advancement of political ecology as a research field. Table 3.1 is reproduced from Robbins (2004) and presents the range of inter-related concepts and processes in political ecology, which together form the basis of contemporary political ecology research.

Table 3.1: Concepts and processes in contemporary political ecology

Field	Concepts	Processes
Hazards	Low and high risk behaviour	Traditional management systems, geared to minimize risk, are altered under political/economic pressure
Behavioural cultural ecology	Rational land manager	Production decision making, geared to minimize drudgery, is altered under political/economic pressure
Common property	Institutions as rules, collective action	Dismantling environmental institutions in political economic change leads to system failure
Materialism/Marxism	Surplus value, exploitation and hegemony	Changing production systems increase exploitation and degradation of labour and environment
Peasant studies	Moral economy, everyday resistance	Reconfiguration of environmental management results in political and social crisis and resistance
Feminist development	Division of labour and power	Reconfiguration of environmental management leveraged on extraction of marginalized labour and resources
Environmental history	Floating baselines, nature’s agency	New ecological systems emerge from competing and subsequent uses of the environment
Postcolonial/subaltern studies	Political embeddedness of social science	Accounts of social change used to extend and cement political controls over marginal and colonised groups
Science and deconstruction	Social embeddedness of physical science	Accounts of environmental change used to obtain political control of people and resources

(Source: Robbins, 2004: 71-72)

Key concepts in Table 3.1 that are particularly salient in transdisciplinary research into the UNCCD and land degradation include the political embeddedness of social science, the social embeddedness of physical science and the contextualising of environmental changes in the broader political economy. The constant re-negotiation of power relations is central in each of these. For instance, in a number of locations in the past, policies have been formulated to assist ‘problems’ that have been measured or identified exclusively through the use of positivist scientific methods (Fairhead and Leach, 1994). Environmental knowledges were dominated by more powerful, scientific discourses, as policies were implemented in a top-down manner in order to address persistent scientific crisis narratives. Little thought was given to the relevance of such policies to those they aim to assist (Rocheleau *et al.*, 1995) and the broader causes of the ‘problem’, including the acknowledgement of context and multiple realities, remained unexplored.

Research carried out by Scoones (1997) in Zimbabwe provides a useful example to show how the framing of soil erosion as a problem led to the formulation of inappropriate policy interventions. This was due to diagnosis through an aggregate and excessively simplistic framework, which did not consider the multiple realities of the supposedly ‘affected’ parties. Although soil erosion was found to adversely affect some land users who cultivated upslope plots, those farmers utilising land at the base of the slopes were found to be benefiting from influxes of soil originating from the upland sources. Whilst soil erosion (and similarly, land degradation) has its victims, it also has its beneficiaries. Who benefits and who suffers depends greatly on the understandings, values and meanings that the people involved and affected by the environmental changes ascribe to their environments. These cannot be measured or assessed using scientific methods alone. As apparent from Table 3.1, ‘post-impasse’ political ecology provides an approach in which this can be recognised, through empirical, research-based explorations of linkages in the condition and change of social and environmental systems (Robbins, 2004).

3.4 Challenges to political ecology

Despite the advantages outlined above in taking a political ecology approach, political ecology as a research field has been fiercely challenged largely on three counts: first, due to a lack of politics and theoretical grounding (Peet and Watts, 1996); second, due

to its relative ignorance regarding the new understandings of ecology (Scoones, 1999); and third, because a favourable balance between the political and the ecological components has failed to be reached (Vayda and Walters, 1999). The following sections consider each of these arguments in turn, extending them further and discussing their relevance to the present study.

3.4.1 Lack of theoretical foundation

Peet and Watts (1996), Vayda and Walters (1999) and Moore (1996) amongst others, contest that the term ‘political ecology’ lacks a coherent theoretical foundation. They suggest that the broad nature of the approach compromises the theoretical groundings of the discipline, and propose that political ecology is “radically pluralist and largely without politics or an explicit sensitivity to class interest and social struggle” (Peet and Watts, 1996: 8). Peet and Watts (1996) instead promote the concept of ‘liberation ecology’, which concentrates on the linkages between political economy, power, social relations and knowledge together with the approaches to and criticisms of ecological science itself. Liberation ecology is presented as being able to theorise the ways in which control over and access to resources and property rights are defined, negotiated and contested at a range of scales, and how productive relations, institutional arrangements and affluence may lead to environmental degradation (Nightingale, 2003). However, this could be seen to be the mere shifting of emphasis within political ecology. It is argued here that it is because political ecology is a broad and flexible approach that it is more appropriate for transdisciplinary research at the interface of environment and society. Elements from other theories and frameworks from a multitude of disciplines can be drawn upon within the theoretical space of political ecology (see Table 3.1), in order to create a robust theoretical foundation that is uniquely appropriate to the research questions and context under consideration. This approach therefore allows the derivation of the causes of environmental change (using both scientific and social procedures), the analysis of how those changes affect different actors and social groups and the exploration of the social construction of various narratives, orthodoxies and explanations of why and how degradation comes about.

3.4.2 Reluctance to accept the new ecological principles

The second criticism of political ecology involves its reluctance to accept the ‘new ecological principles’ (Scoones, 1999). As outlined previously, generalised equilibrium

concepts prevailed in the political popularisation of many environmental narratives, including the desertification orthodoxies, until they began to be questioned by researchers such as Schaeffer (1985) and Worster (1990) then later in the context of rangeland ecosystems by Ellis and Swift (1988), Behnke and Scoones (1992), and Dougill *et al.* (1999). Emphasis had been placed on the scientific assessment and measurement of environmental changes and early definitions of desertification had been based predominantly on physical factors (Dobie, 2003), with the ‘scientific’ world seen as being privileged (Forsyth, 2003). It was not until the late 1970s that the possibility of non-linearity and dynamism in ecological systems was seriously considered (Scoones, 1999). Nevertheless, this theoretical shift remained virtually unacknowledged within the realms of the social sciences and policy. Even now in some quarters a static view of knowledge of the environment predominates. Scoones (1999) recommends that a broader acceptance of the ‘new ecology’ within the social sciences, particularly in political ecology, is necessary in order to “move towards a more extended engagement between the natural and social sciences” (Scoones, 1999: 496). Conversely, Zimmerer (1994) and Peet and Watts (1996) warn of a danger in the acceptance of the new ecological principles, suggesting that it could legitimise human-induced environmental degradation whilst real environmental problems may pass unnoticed or be dismissed merely as a natural chaotic state. Demeritt (1994) even goes as far as to question the notion that there is such a phenomenon as environmental damage in a world so naturally chaotic. In taking a political ecology approach it is necessary to recognise that ‘degradation’ means different things to different people, so it must be questioned whether supposed symptoms of landscape change are considered ‘normal’ to local populations (Forsyth, 2003).

In the framework of this research it is argued that it is necessary to maintain awareness of the new ecological theory. In the dryland context of this study, concepts of equilibrium must be re-evaluated due to the inherent periods of drought and rainfall variability. The recognition of variable, idiosyncratic rainfall events in dryland ecosystems implies that vegetation changes are often not suitable for use as indicators of degradation, as changes measured at any given time are often reversible and the product of irregular, unpredictable events (Sullivan, 1996; Dougill *et al.*, 1999). Vegetation systems classified as severely degraded have been found to show rapid recovery, particularly with the return of rainfall after periods of drought, indicating that they exist

in a constant state of flux (Perkins and Thomas, 1993). This has important implications for dryland management because carrying capacity estimates have long been favoured in rangeland management and were conventionally based on plant succession and equilibrium theories (Behnke and Scoones, 1992).

The appropriateness of fixed stocking rate recommendations for variable environments has also received criticism, with evidence provided by Ellis and Swift (1988) demonstrating the linkage between plant and animal dynamics to be largely independent of one another. This is not to suggest that herbivore induced degradation does not occur, rather that any effects of these may be overridden by climatic influences. This idea has since been convincingly adapted by Illius and O'Connor (1999), who propose that even in highly variable climates, animals are regulated in a density-dependent manner and can impact upon soil and vegetation. In consideration of this, it is necessary to acknowledge the inherent spatial heterogeneity of dryland ecosystem components at a variety of scales (Behnke, 1993). At the local level, patchy distributions of pockets of high and low range productivity, together with upslope and downslope differences in soil qualities, result in different levels of vegetation cover and biomass in different places (Rietkerk *et al.*, 2000), whilst soil moisture and fertility gradients are believed to influence vegetation cover at the regional level (Roques *et al.*, 2001). In view of this, if carrying capacities are to be used, they too must be dynamic (Lykke, 2000) and due to the rapid onset of some environmental changes, planning and risk assessment are paramount in locations where livestock farmers are exposed to environmental risks such as drought or fire (Behnke, 1993).

Whilst the current levels of uncertainty exist within the realms of ecology, it is necessary to ensure that ecological theory does not swing from one extreme to the other (Campbell *et al.*, 2000). Instead of unequivocally dismissing equilibrium or non-equilibrium theories, in this research, dynamic rainfall patterns and variability are considered to be inherent characteristics of dryland environments. It is recognised that spatial and temporal variability in primary production may localise and intensify herbivore impacts (Illius and O'Connor, 1999). However, environmental variability is not viewed as being synonymous with degradation and permanent change, as the Swazi environment is attributed with characteristics of resilience and adaptability. The management strategies and livelihoods pursued by local land users are therefore likely

to be able to endure environmental variability, as natural resource dependent communities too are often considered resilient to external stresses and shocks, due to their flexible and adaptive nature (Adger, 2000). In defence of political ecology, the stance is taken that until a clearer picture can be constructed of what the agreed ecological principles are, perhaps the conservative undertaking of these ideas should not be seen as a detrimental characteristic of the political ecology approach (Campbell *et al.*, 2000). Emphasis should instead be placed on the construction of a viable list of appropriate environmental and social indicators representing key variables and processes. This is necessary in order to adequately monitor any changes that occur and more reliably predict their outcomes. This is crucial because as outlined in Chapters 1 and 2, the direct measurement of land degradation is fraught with difficulties and uncertainty (Stocking, 1993).

3.4.3 Disagreement over proportion of each constituent

The third criticism of political ecology is that satisfactory agreement cannot be reached on the relative proportions of ‘political’ and ‘ecology’. Bryant and Bailey (1997) advocate that politics needs analytical pride of place in the consideration of environmental issues. They believe that the role of politics in shaping ecology is greater now than it has ever been before. However, Vayda and Walters (1999) report that the ecological component is being neglected, despite the acknowledged importance of politics. Vayda and Walters (1999) recognise the benefits of paying more attention to the political influences on the interactions between humans and the environment but they suggest that political ecologists overreacted to the earlier criticisms of the discipline regarding the lack of real politics in political ecology. As a response to this, political ecologists have diverged too far in the opposite direction and are now neglecting the ecological side of the field. This could be a contributing factor as to why the principles of the ‘new ecology’ have been slow to take hold.

Vayda and Walters (1999) also state that the concentration on political factors that are assumed in advance of much political ecological research could result in other factors, both causal and consequential, from being overlooked, together with any combined effects resulting from any interactions. The accusation is therefore that political ecologists know the answer before they do their research (Robbins, 2004). Whilst it should be ensured that the biophysical processes involved in issues such as

desertification and land degradation do exist and that environmental problems are not merely socially and politically constructed (Forsyth, 2003), this again stresses the need for reliable indicators and measurements of any changes. It also remains necessary to question whether set proportions or an equal balance between politics and ecology is actually desirable, as it is argued here that each theoretical framework should be developed in a manner appropriate to the research problem in question. The primary strengths of political ecology as a theoretical approach are its ability to consider diversity, the possibilities it offers to incorporate aspects of other frameworks and concepts relevant to the research questions and its consideration of the links between scales and the power relations acting thereon. To pre-determine the balance between politics and ecology before inductively constructing theories based on the data collected therefore undermines the conceptual basis to the approach.

Vayda and Walters (1999) propose that research should begin with a focus on the environmental changes or events that the researcher is seeking to explain, then to take a backward route in time and an outward path in space in order to permit the construction of chains of the causes and effects which lead to those events or changes. ‘Event ecology’ they believe, has a much stronger theoretical basis than political ecology, as it is consistent with both philosophical and practical arguments in favour of allowing research to be guided by open questions regarding the occurrence of events, instead of restrictive questions about how they are influenced by factors considered in advance by the investigator. This proposal conforms to the heuristic practice of distinguishing fields on the basis of what is to be explained, not on the basis of *a priori* judgements or biases as to what can explain that change (Vayda and Walters, 1999). Although this shares commonalities with the analytical and theorising procedures of ‘Grounded Theory’ (Corbin and Strauss, 1990), this thesis argues that the broad and flexible nature of political ecology as a theoretical basis to research currently permits this juxtaposition of concepts. I argue therefore that it is unnecessary to introduce another term (‘event ecology’) to describe an already established approach.

3.5 Conceptual frameworks for transdisciplinary research

In constructing a novel political ecology approach, a number of conceptual frameworks have been built upon in this research, so that explanations of the processes, causes and

effects of issues such as desertification may be linked in scale, context and time. These are considered in the following sections.

3.5.1 Blaikie's (1989) 'chain of explanation'

The first conceptual framework to be considered is Blaikie's (1989) 'chain of explanation'. The chain of explanation is often utilised to explain the relationships between agrarian society, land use and land management and environmental changes, hence linking the political with the ecological (Christiansson *et al.*, 1993). In this respect, rather than merely seeking to understand physical and technical processes of land degradation, it extends further to consider the political and economic dimensions and influences as the political ecology approach so demands, whilst also permitting the construction of explanations at a range of scales (Vayda and Walters, 1999). The chain of explanation is illustrated in Figure 3.1 and incorporates many of the concepts and processes that were synthesised in Table 3.1.

Although dating back to the 1980s, the 'chain of explanation' is still a basis for much contemporary research, acting as a useful baseline checklist for enquiry. However, any such framework should be regarded as temporary and be adapted accordingly, as knowledges and understandings evolve (Lehtonen, 2004). Whilst 'chains' have been demonstrably useful in the advancing of political ecology as a research field, many challenges have been mounted to their use as a conceptual framework. Christiansson *et al.* (1993) enquire as to the usefulness of a model where everything will influence everything else and it is argued that the use of unidirectional arrows to link the boxes implies a degree of linearity in the system. This also insinuates that the processes and factors leading to land degradation have an identifiable starting point and an endpoint, when, in the light of the new ecological theories, environmental variability has demonstrated the possibility of changes to be reversible (Perkins and Thomas, 1993).

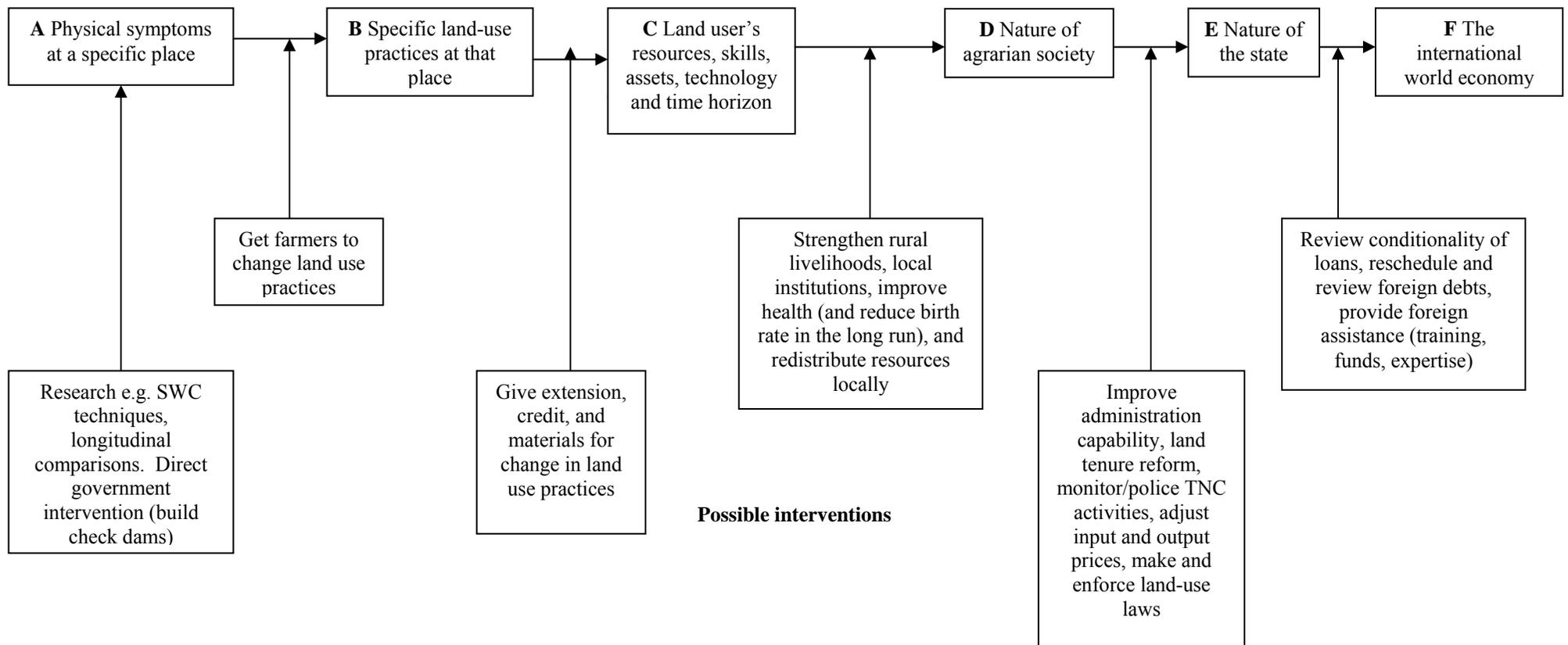


Figure 3.1: Chain of explanation (from Blaikie, 1989)

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It is suggested that the title originally given to the diagram by Blaikie, the ‘causal chain of explanation’, which has since used by numerous other academics (e.g. Black, 1990; Christiansson *et al.*, 1993) is inappropriate. This is because it does not clearly indicate what exactly is causal. It implies that ‘physical symptoms of environmental change’ ultimately cause ‘the international economy’, so the arrows and linkages should not be interpreted to be rigid, causal, linear connections. Also, the interplay of numerous factors will have caused the existence of the international political economy, which itself is dynamic and not an ‘autonomous, rational structure’ (Verschoor, 1992: 176), so this should not be viewed as a constant nor an end or start point. This issue of the nature of causality was noted by Black (1990) who points out that virtually any external interference potentially could lead to degradation as nearly all agricultural societies have some kind of link with the capitalist world system, so this suggests that the whole world is potentially at risk from erosion. For the purposes of this study, this conceptual framework is therefore referred to as ‘Blaikie’s chain’ or ‘the chain of explanation’.

Blaikie’s chain (1989) also neglects to overtly recognise that each land user has their unique reality and interpretation of land degradation, nor does it allow for the analysis of power relations. This makes the initial place-based identification of the issue problematic from the outset as a variety of contested interpretations may exist about a particular environmental change. However, this can be overcome by situating personal, socially and culturally constructed values and interpretations between the boxes and along the arrows, whilst still permitting scientific measurement of the level of any changes. An advantage of using the chain of explanation is that it does not give preference to any particular theory or mode of understanding of the world (Christiansson *et al.*, 1993). Examination of the chain of explanation within the political ecology approach therefore permits the additional consideration of structure and agency between linkages and scales, particularly with regard to Box C (see Figure 3.3), which removes some of the linearity from the chain, contributing to a more theoretically coherent framework.

Roe (1991) forwards another critique of Blaikie’s chain. He considers that once something has evolved into such a long linked system, description frequently becomes prescription in terms of response. This emphasises the importance of maintaining an awareness of diversity and variability. Another limitation of the chain is that it fails to

take into account the climatic and existing physical conditions and larger scale physical processes which could have important influences particularly on climatic regimes over a longer timescale (such as global changes in albedo and changes to carbon sequestration). This causes problems when attempting to differentiate between natural environmental and human induced changes. It is also very difficult to link specific drivers at higher levels of abstraction, such as changes in the international economy, directly to a specific place where the effects of that change are being felt (Lambin *et al.*, 2002). The growing body of case study research is attempting to address this point, by starting with a detailed examination of the specific place and its environmental and livelihood components using scientific, social scientific and integrated methodologies, then working upwards and outwards in scale and time to non-place-based explanatory variables, as suggested by Vayda and Walters (1999) in their ‘event ecology’ approach.

3.5.2 Moving away from linearity of explanation

In order for political ecology to advance and so as to overcome some of the criticisms levelled at Blaikie’s chain as a conceptual framework, it is necessary to move away from linear approaches. The diversity of social and ecological influences and outcomes begs a shift towards a more complex conceptual framework, which incorporates the integrated and variable nature of human-environment relationships, and allows the critical exploration of a diversity of socially constructed environmental understandings. In doing so, greater consideration needs to be given to cyclical rather than linear representations. Three approaches that begin to do this are the sustainable rural livelihoods framework, the extended environmental entitlements approach (Leach *et al.*, 1999) and social network theory. Each of these is now discussed.

3.5.3 Sustainable rural livelihoods framework

The sustainable rural livelihoods framework (Chambers and Conway, 1992; Carney, 1998) endeavours to situate environmental issues within the lives and livelihoods of rural people, whilst also acknowledging that these people are affected by macro-policies and both formal and informal institutions (Neeffjes, 2000). Use of this is consistent with many of the interpretations of political ecology (see Table 3.1), especially in terms of adaptive behaviour in response to ecological changes. In particular, it is sympathetic to the exploration of risk management strategies and the role of institutions in providing both opportunities and constraints (Carney, 1999). Being people-centred in nature, it

allows the exploration of risk management strategies in reducing the vulnerability of rural people to environmental changes in order for them to maintain sustainable livelihoods. It notes that assets are not static and that they can be categorised into various ‘capitals’, through which rural inhabitants can make a living and give meaning to their worlds. The supply of each of the capitals is variable between actors and households and is dynamic in both time and space (Bebbington, 1999). The different capitals are defined in Table 3.2 and the sustainable rural livelihoods framework is illustrated in Figure 3.2.

Table 3.2: Types of capital

Capital	Description
Natural capital	This asset refers to the natural resources such as land, water, biodiversity and wildlife, to which people have the rights of access. The natural capital that people can access may vary in quality. For example, one household may have more fertile land than another.
Social capital	This is subdivided by Bebbington (1999) into six forms: a) family and kinship connections b) social networks or associational life related to groups or organisations c) cross-sectional linkages or networks of networks d) political capital; informal relations that link civil society and state e) institutional and policy framework regulating public life f) social norms and values which influence societal functioning.
Financial capital	This refers to the variety of financial resources available, in the form of savings, credit, remittances and pensions, the regularity or irregularity of which provide people with different livelihood options.
Human capital	This form of capital includes factors such as skills, knowledge, health and ability to work, all of which impact upon the range of livelihood strategies that rural dwellers are capable of pursuing.
Physical capital	This refers to the basic infrastructure available for rural dwellers to utilise in pursuit of their livelihoods and includes factors such as transport, water and shelter.

(Source: Adapted from Bebbington, 1999)

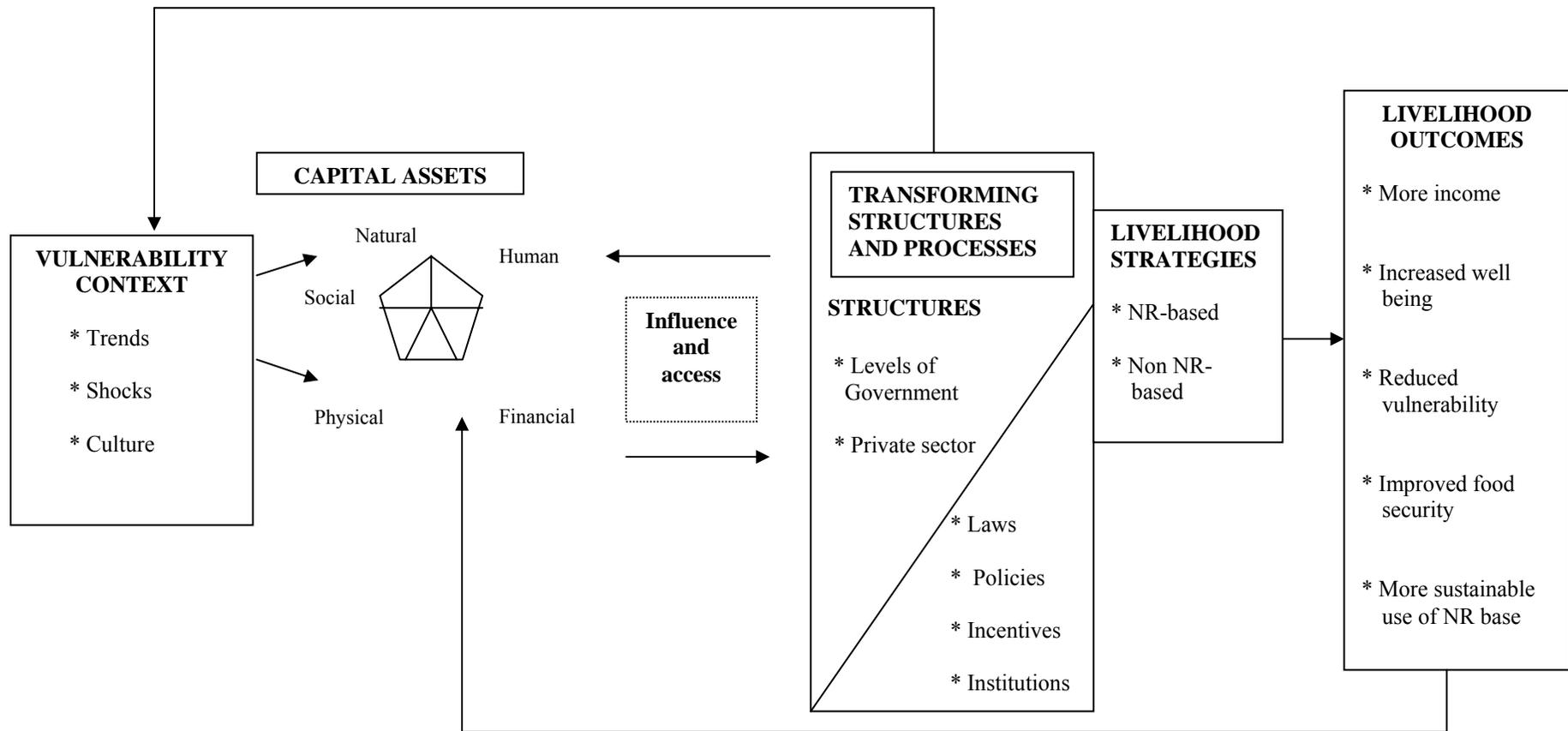


Figure 3.2: Sustainable rural livelihoods framework (Carney, 1999)

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The complexities of the livelihoods of rural people are significantly simplified in this framework, although it does provide a useful diagrammatic representation of some of the possible capital flows. It allows the acknowledgement that rural dwellers need to be flexible and adaptable in their pursuit of their livelihoods because the supply of capitals varies between actors, both temporally and spatially. This tool also permits the theoretical analysis of substitution between capitals, which is an important mechanism in the diversification of livelihoods (Carney, 1999). However, care must be taken when interpreting the framework not to confuse agrarian livelihoods with rural livelihoods (Bebbington, 1999).

Despite its widespread use, the sustainable rural livelihoods framework has been widely critiqued (see Bebbington, 1999; Neefjes, 2000; Fine, 2001). It is said to be limiting in that some of its terms are not clearly (and in many cases, plurally) defined and there are also difficulties in measuring and applying an economic value to some of the capital resources. Osbahr (2001) states that the framework is inadequate as a tool to create understanding that the 'economic' is only valued as a result of the 'cultural' and 'political', whilst it additionally fails to explicitly take into account the processes of entitlement in resource allocation and use. This is central to the analysis of livelihoods because if a household's endowment of capitals is not accessed then it cannot bring benefits, as it cannot ensure investment. Benefits can also only be claimed if a household's endowment of capitals can affect their right to make use of them (Fine, 1997.). Whilst arguably linking policy and structural influences to rural livelihoods, the sustainable rural livelihoods framework fails to significantly appreciate the power relations involved in this connection and neglects to acknowledge that policy itself is political in its construction. Similarly to the chain of explanation, it is a useful basis for enquiry but can be further developed within the approach of political ecology to incorporate the missing elements identified above.

3.5.4 Environmental entitlements analysis

Entitlements analysis was first developed by Sen (1981) to analyse issues of famine and poverty. Sen highlights the importance of having access to and control over food supplies and explores issues of social differentiation in explanations of the causes of famine. He notes that absolute lack of resources is not the only reason for people not being able to have access to resources. Entitlements therefore refer to the possibilities

that people can have, not what there actually is (Fine, 1997). Power relations are therefore a central element in this framework as the ability of an actor or group to utilise a resource may be enabled or constrained by the relationships with other actors and/or groups.

Since the 1980s, entitlements analysis has been modified for application to natural resource management. The basis of the ‘extended environmental entitlements approach’ (Leach *et al.*, 1999) uses Sen’s principles. It considers the interactions between different actors and components of local natural resource systems and how these are dependent on the endowments, entitlements and capabilities of each actor. These terms are defined in Figure 3.3.

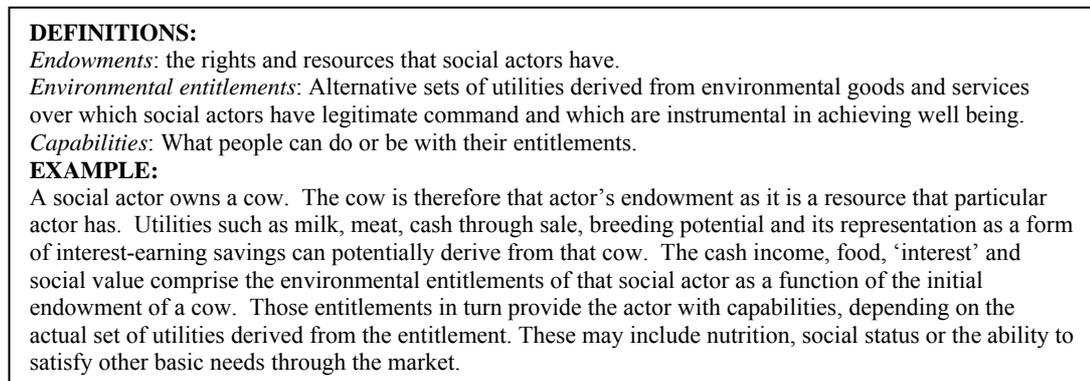


Figure 3.3: Endowments, entitlements and capabilities (based on Leach *et al.*, 1999)

Entitlements represent the potential outcome possibilities given the initial set of endowments, which in turn is dependent on the opportunities and constraints that actor is facing. The mapping of endowments and entitlements is dynamic in time and space, because what may begin as an entitlement at one point in time may translate into an endowment at another time, from which another different set of entitlements may be derived (Leach *et al.*, 1999). The effectiveness of this is dependent on the capabilities of the social actors to mobilise their endowments. These concepts are therefore in keeping with notions of social and ecological dynamics, and the appreciation of power relations in the political ecology approach taken in this study. Benefits can therefore be distributed to different individuals or social groups at different points in time, as social actors (groups, institutions and individuals) gain, control or maintain access within specific cultural and political circumstances (Ribot and Peluso, 2003).

Such an approach permits the recognition that claims to resources are often contested and some actors' claims may be at the expense of others. One example of the exertion of such control is taken from Moore's work in Zimbabwe. Due to restrictions in the access of some groups to Nyango National Park, conflict occurred between the competing 'rightful' claims to the landscape of various social divisions. Conflict was therefore the product of the different meanings that land users have assigned to their environment over time and the different degrees of agency and capability attributed to each actor (Moore, 1996).

Figure 3.4 illustrates the environmental entitlements framework. The role of institutions is central in the mapping of these sets of entitlements, endowments and capabilities. In this sense, institutions can be defined as either socially embedded practices or bureaucratic norms (Cleaver, 1999). The relationship between scales and institutions influences which individuals and groups can gain control over resources. Whilst some people and institutions control resource access, others maintain their access through those who have control (Ribot and Peluso, 2003). This then influences the use to which those resources are put thus changing the shape of the landscape over time (Leach *et al.*, 1999). The relevance of this concept to this research is due to its cyclical representation, as it moves away from the linear, deterministic chain of events, allowing for multiple mechanisms by which control over resources may be negotiated.

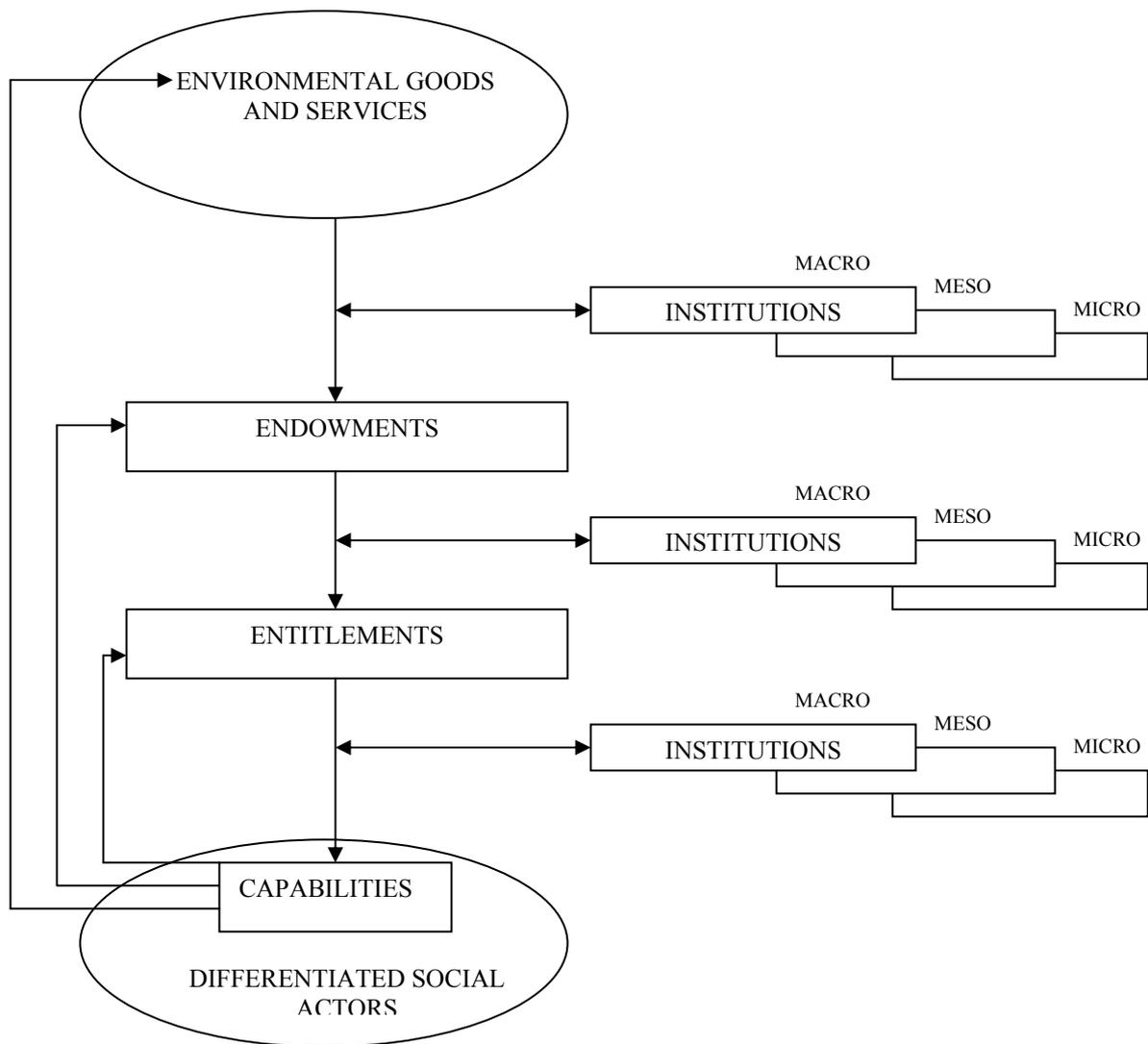


Figure 3.4: Environmental entitlements framework (Leach *et al.*, 1999)

3.5.5 Social networks

Also of central consideration in moving away from linearity of explanation is the concept of social networks. Networks are organised by a range of actors through systems of accumulation, extraction, investment, growth, reproduction, exchange, cooperation and coercion (Robbins, 2004). Of key importance to the understanding of networks is the concept of social capital, which was briefly touched upon in section 3.5.3. The term ‘social capital’ is widely contested (Kadushin, 2004), although most definitions introduce two perspectives, the individual and the group. The individual perspective focuses on how individuals access and use resources embedded in social networks to gain returns or preserve gains. It is suggested that by utilising elements

available in the social structure, individuals further develop networks to meet their needs (Kadushin, 2002). This emphasises the role of agency over structure and the notion that the system does not automatically rule (Long and van der Ploeg, 1994). The group perspective considers how certain groups develop and maintain social capital as a collective asset and how it enhances the lives of group members (Lin, 2001). Both perspectives may involve social relations with those in authority and these may be used to increase resources or power (Stone and Hughes, 2002). Thus, the development and maintenance of social capital is highly relevant to the political ecology approach taken in this research and needs to be viewed contextually because it is embedded within structures of power (Mansuri and Rao, 2004).

Woolcock and Narayan (2000) suggest that social capital refers to the norms and networks that enable people to act collectively. However, different communities can have different levels of access to different dimensions of social capital (Olate, 2003). Bebbington (1999) subdivides social capital into six forms: a) family and kinship connections b) social networks or associational life related to groups or organisations c) cross-sectional linkages or networks of networks d) political capital; informal relations that link civil society and state e) institutional and policy framework regulating public life f) social norms and values which influence societal functioning. These different forms may be used in different ways. ‘Bonding’ social capital describes informal ties: the links between family members, friends and neighbours. ‘Bridging’ social capital refers to generalised relationships with distant friends, associates and colleagues. ‘Linking’ however, adds a vertical dimension and includes the capacity to leverage resources, ideas and information from formal institutions (Stone and Hughes, 2002; Lehtonen, 2004). Despite difficulties in measuring social capital relating to its multi-dimensional nature, social networks provide a useful starting point in developing analyses of power relationships and understanding the motives for action, both collectively and individually, and represent a much-needed move towards a network approach.

3.6 Contributing to academic debates: the development of a network approach

A political ecology approach is appropriate to the present research due to its flexibility. It is able to absorb aspects of existing frameworks and concepts relevant to the research

objectives and extend these further, with the potential to develop networks rather than chains of explanation. The aim of this is not only to illustrate the complexity of processes of land degradation and desertification but also to allow the examination of the ways in which power is distributed throughout the networks, which could then be used to locate new possibilities for action to lessen the impacts of both ecological and social changes. In order to do this, there are a number of questions that the holistic political ecology approach used in this research is pivotal to answering. These are returned to throughout the thesis and include:

- **What are the natures of power relations within and between levels from the local to the international? What implications does this have for the management of natural resources?** These are important questions to ask because changes in the management of natural resources can create openings for individuals and/or groups to represent themselves politically and challenge the balance of power. Robbins (2004) states that such movements can represent new modes of political action, since they connect disparate groups through their ecological strands. This in turn can delimit and modify otherwise powerful and stable political and economic forces. This can be linked to chapter 2 in relation to the potential issues that were identified with the required mode of implementation of the UNCCD.
- **How do different social actors and institutions control and influence access to and use of natural resources?** This is particularly important given that the UNCCD places humans at the centre of concerns to combat desertification (Dobie, 2003) and questions like this can help to create explanations of why and how particular groups have been marginalized. It also places issues of land degradation in the broader political and economic context (Moore, 1996).
- **How are ecological processes socially embedded? How does this affect risk-taking, risk-aversion and possibilities for collective community action?** These questions emphasise multiple levels and scales of analysis, both temporal and spatial. Use of a sliding scale of analysis (Schaeffer, 1984) enables an examination of different interpretations of degradation and

allows exploration of the relationships between different bodies of knowledge and power (Robbins, 2004).

These questions allow the development of networks of explanation, covering biophysical processes and local communities; local communities and the state; the state, its policies and the international community; and the analysis of social networks within and beyond the stratified community level, thus increasing understanding of people's motivations for actions, both individual and collective. This also leads the investigation in this research away from tensions associated with measuring and defining degradation towards answers to questions of why the environment may have changed and how those changes have affected society (Robbins, 2004). Whilst it is acknowledged that the development of networks of explanation may not provide a single, coherent picture, it advances understandings of a complex situation by presenting a mosaic of partly contradicting views of reality (Lehtonen, 2004). Sometimes discrete, sometimes overlapping, these networks may be used to glean a more accurate understanding of the variability and dynamics of the opportunities and constraints at play. Whilst exhibiting diversity, common patterns of exploitation and environmental change reflect common network morphologies and common processes. Instead of waiting for changes at higher levels to trickle down to local levels, networks present a range of places for political action and normative changes (Robbins, 2004), without placing degradation as a singular outcome at the end of a chain.

3.7 Chapter summary

The post-impasse focus in social and ecological development is on diversity and variability in both time and space and as such, is informed by theories and frameworks from a number of disciplines (Booth, 1994). In taking an approach to transdisciplinary research grounded in political ecology, a number of conceptual frameworks have been critically evaluated so that both scientific and social explanations of the processes, causes and effects of issues such as desertification and land degradation may be linked in scale, context and time (Blaikie, 1989; Vayda and Walters, 1999). All of the frameworks that have been considered have demonstrated through previous application to be useful in the examination of environment-society issues. However, as acknowledged in this chapter, each framework omits various elements incorporated by the others. For example, it was noted that Blaikie's chain neglects to overtly recognise

that each land user has their unique reality and interpretation of land degradation, whilst the sustainable rural livelihoods framework fails to consider the power relations involved in linking policy and structural influences to livelihoods. This research seeks to extend these conceptual frameworks further, forming a novel political ecology basis to the research in terms of the combination of conceptual frameworks that are used, through addressing the criticisms levied at each framework. This enables the plurality of perceptions and values placed upon the landscape by each actor to be better understood, it permits the analysis of power relations and allows the processes and products of the research to be shaped from the data, through the inductive generation of theories (Eaves, 2001).

CHAPTER 4: Research process and methodology

4.1 Introduction

Drawing on the relevant aspects of a political ecology approach, this chapter describes the research process and the methodology employed in this study. Combining methods from the natural and social sciences, a transdisciplinary approach was taken using quantitative and qualitative techniques and integrating aspects of Grounded Theory with the data collection process. This chapter outlines the processes that were adhered to, exploring and justifying the various methodologies that were employed, and linking them with elements of theory outlined in chapter 3. The need for reflexivity in actor-oriented research is also addressed, as are issues of positionality, power relations (Mather, 1996) and the challenges associated with conducting foreign language research (Smith, 1996).

As stated in Chapter 1, the aim of the research is to determine whether the Swaziland NAP meets the requirements of the principles outlined in the UNCCD, especially its recommendation that physical degradation issues be integrated with key aspects of land user involvement and participation, in the overall context of sustainable development. This is achieved through the research objectives:

- To enhance understanding of the complex interactions of the social, political, economic, historical and environmental aspects of land degradation and natural resource use in Swaziland.
- To assess the utility of the UNCCD in a ‘real world’ situation and its appropriateness and relevance to the people actually experiencing degradation.
- To inform the development of successful and appropriate anti-degradation strategies and provide outcomes that may be relevant to the implementation of such strategies in other places experiencing degradation, both within and beyond Swaziland.

4.2 Integrating methods and techniques from the natural and social sciences

Research situated at the interface of environment and society is methodologically demanding due to the diversity of ecological, cultural and socio-economic factors that need to be considered (McKendrick, 1999). As a result, a holistic approach needs to be followed using methods and techniques from both the physical and social sciences, in order to address the full complexity of the research problem (Osbaahr and Allen, 2003). The use of a multi-methodological approach does not only permit the collection of diverse data but also allows the triangulation and crosschecking of data sources, thus leading to more reliable and robust conclusions (McKendrick, 1999). The toolkit of methods utilised in this study designed to recognise the perspectives of a range of stakeholders at a number of levels. As identified in chapter 3, local people can act individually, as part of a household unit, social group or community, and each of these roles presents different needs, priorities and understandings (Redclift and Benton, 1994). People also possess different amounts of agency and power and assume different positions in different social networks. A multi-methodological and transdisciplinary research approach therefore allows the achievement of a more detailed and comprehensive understanding of the various positions of each individual and group at each level, whilst also permitting both social and environmental facets of the same research question to be addressed.

Integrated multi-methodological approaches are also advantageous because they can incorporate a number of different time frames into the research. For example, changes in land use over a 20-year period can be mapped from time-series aerial photographs and oral histories may be able to go back even further, whilst questionnaires can provide data on more recently occurring environmental changes. When these information sources are integrated, analysis can take place to find out how ecological processes of change are socially embedded, whilst the added time dimension allows the determination of whether environmental changes are part of a long-term cycle or are recent phenomena that have been triggered by human activities or climatic events. Similarly, the integration of land user understandings of soil fertility with soil nutrient determinations is useful in that it allows the quantification of the invisible and can be used to ensure the validity of local indicators of fertility.

In order to build up a 'toolkit' of potential methods for use in this research, the literature on a wide range of methodologies employed in other studies was reviewed and their reportedly successful or unsuccessful use in various situations was assessed. It was decided that fieldwork should be carried out over two phases, the first of which was from May until October 2002 and the second, from March until July 2003. This work plan was determined in order to permit an iterative research process to be adhered to, allowing preliminary analysis and review of data collected during phase 1 in the period in between fieldwork phases, consistent with the Grounded Theory approach (Corbin and Strauss, 1990). Grounded Theory recognises that theory evolves through the interplay between data analysis and collection (Hall and Callery, 2001; Eaves, 2001), so an iterative attitude was taken to data assembly, as lines of enquiry evolved with the acquisition of new data and information, and data collection and analysis progressed simultaneously.

The two-phase fieldwork plan allowed the refinement of questionnaires and analytical and interpretative techniques, the detailed planning of follow-up interviews and the preparation of initial feedback to take place during phase 2 to the UNCCD focal point. It also permitted an evaluation of the direction of the study, allowing key issues raised during the analysis of the data from the first phase to inform the techniques and approaches used in the second phase. This resulted in the use of some methods (such as soil sampling) in only one village, as the issues that were raised by the farmers differed between chiefdoms. The research therefore focused on the priorities of the land users in each particular place, consistent with the actor-oriented approach (Booth, 1994), whilst also remaining rigorous and robust. A summary of the primary data collected is shown in Table 4.1

The merits and drawbacks associated with each method are discussed within the text as the research is outlined, and the iterative fieldwork process that was followed is summarised in Figure 4.1, which uses a flow chart to illustrate how the fieldwork progressed.

Table 4.1: Primary data collected during the research

Data	Source/participants	Quantity
Structured interviews with government officials and NGOs	<i>NSCD members:</i> UNCCD Focal Point, UNISWA advisor, UNDP representative, Forestry Department representative, SEA representative <i>NGOs:</i> SFDF, LDS, Yonge Nawe, ACAT. <i>Other:</i> Extension officer, weed researcher, JICA	One interview in all cases except for the UNCCD Focal point to whom feedback was given and further questions asked during phase 2. Total of 14 interviews. Yonge Nawe provided only written responses.
Questionnaire survey	Households in Engcayini, Ezikotheni and KaBhudla.	All 74 households in Engcayini, 100 (14%) households in both Ezikotheni and KaBhudla.
Semi-structured interviews	Case study households in Engcayini, Ezikotheni and KaBhudla.	3 households in each location.
Transect walks	Case study households in Engcayini, Ezikotheni and KaBhudla.	3 households in each location.
Oral histories	Case study households in Engcayini, Ezikotheni and KaBhudla.	3 households in each location.
Seasonal calendars	Case study households in Engcayini, Ezikotheni and KaBhudla.	3 households in each location.
Grass strip widths and heights	Case study households in Engcayini.	3 measurements of width and height of each grass strip. 125 measurements taken in total.
Soil samples and field areas	Case study households in Engcayini.	Areas calculated for all fields. 109 soil samples taken in phase 1, 21 taken in phase 2. Analysed for total N, P and K. Number of samples per field dependent on field area.
Project interviews and focus group	People working on the JICA project in Engcayini.	46 interviews. Focus group with 6 members of the project committee.

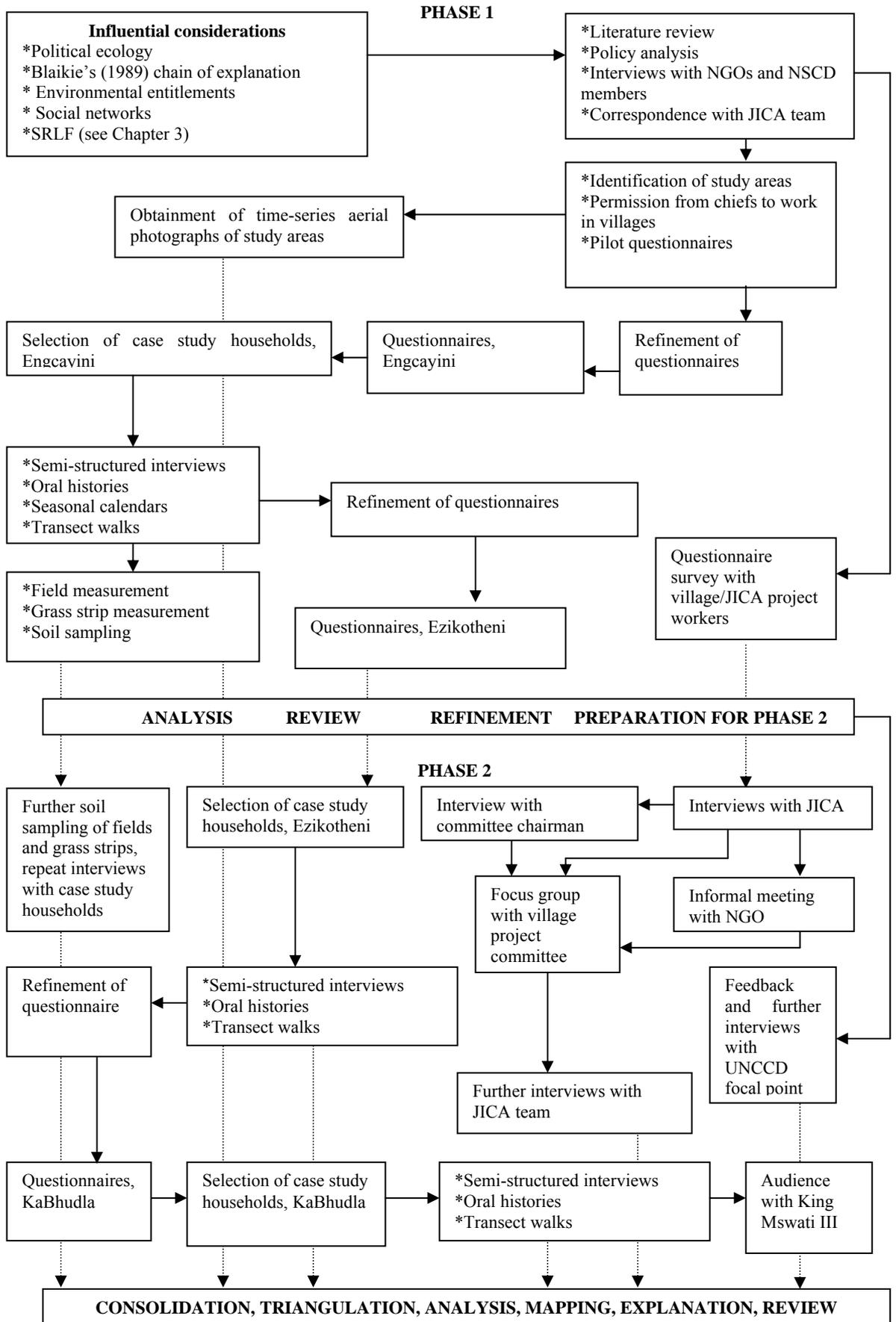


Figure 4.1: Flow chart of the fieldwork process

4.2.1 Primary data collection

At the outset, the UNCCD and the Swaziland's NAP were critically read and deconstructed to identify the dominant discourses of desertification (Apthorpe and Gasper, 1996). The perceived causes of land degradation in Swaziland were identified, together with the ways in which degradation is manifested and presented. The framing of the problems and proposed solutions was also considered (Forsyth, 2003). Attention was paid to the types of language in the policy document, whether it was 'indicative' of what plans to be done, or rather 'symbolic' as a policy statement and intended to be used to substitute policy actions (Bardes and Dubrick, 1980). The use of keywords, such as 'participation' and 'stakeholder analysis' were explored as to whether they were defined within the text and the contexts in which they were used were considered (Apthorpe and Gasper, 1996). Issues outlined in chapter 2 with regard to the use of these terms were also examined, in order to better understand whether diversity and power stratifications are taken to account within policy and policy development. This initial interpretation and an extensive literature review on arrival in Swaziland, led to the preparation of programmes of interview to be followed with members of the National Steering Committee to Combat Desertification (NSCD) and with NGOs involved in the UNCCD NGO task force (see Table 4.1 for summary of participants).

Interviews were chosen for this part of the research because they allow the production of a dialogue, which may be tailored towards the individuals involved, without pushing the participants' answers into specific categories as do questionnaires (Mullings, 1999). Interviews provide the opportunity to ask the same questions in different ways. This allows more thorough explanation of relevant issues, whilst giving the respondents the opportunity to discuss issues that the researcher may not have considered (Silverman, 1993).

A list of names and contact details was provided by Swaziland's UNCCD focal point after an introductory meeting, so initial communication with NSCD members was relatively straightforward (Herod, 1999). Potential participants were first contacted where possible, via an email, which explained the purpose of the research, and enquired as to whether they would be willing to take part. Due to limited response to the emails, hand-delivered letters containing comparable information to the emails were distributed shortly afterwards. Appointments were made and the interviews were conducted with

all willing and available NSCD members who were involved in NAP production and implementation, including representatives from UNDP and the University of Swaziland (UNISWA). Each of the interviews was recorded on cassette tape and then fully transcribed as soon as possible afterwards, often on the same day. Detailed notes were also taken throughout the interviews and these too were typed up immediately (Parfitt, 1997). This process was adhered to following interviews carried out during the second fieldwork phase as well.

A similar procedure was followed in order to initiate the interviews with NGOs on the UNCCD task force, although the majority of these organisations expressed their interest and cooperation following the first email. Yonge Nawe (the coordinating body of Swaziland's UNCCD NGO task force) was especially elusive however, and its representatives were repeatedly too busy to take part in an interview. Due to the organisation's key position in the production and implementation of the NAP it was believed to be central to the research to obtain the views of Yonge Nawe. This organisation was consequently emailed the questions that would have been asked should the interview have taken place, to which written responses were returned. Whilst the information obtained may not be fully comparable with the interview data from the other organisations, it does provide an indication of the Yonge Nawe's views. A rapid staff turnover in some organisations meant that it was often not possible to interview those who had been directly involved in the NAP creation process so respondents were less well informed of the status of the implementation of the NAP than they may have otherwise been (Oates, 1996). This could have important implications for the success of the policy because continuity may be lost and misinterpretations could occur as different people interpret the policy in different ways.

Each of the transcribed interviews was entered onto the computer and coded using processes outlined by Parfitt (1997) following which, they were critically deconstructed, as the dominant desertification discourses were drawn out and the motivations behind any projects were noted. This is discussed further in section 4.7. Comparable processes took place in the second phase of data collection, although initial analyses permitted the development of questions that were more specific, relating to the outcomes of the data analysis from earlier interviews. This ensured that data collection was part of an iterative process and it allowed different personnel to be involved in the research as it

progressed. For example, focus in the government interviews centred on soil erosion as the main form of degradation, whereas villagers reported weeds to be a major factor limiting productivity. The identification of this conflict area led to interviews with representatives from the Ministry of Agriculture and Cooperative's (MOAC) weed and seed research section and also to interviews with agricultural extension officers. Initial findings were therefore followed up in the second phase of fieldwork.

Overall, the participants were willing to provide information through interviews and to generally assist with the research. Many of the interview participants were black, male Swazis whose culture and society are highly patriarchal. My introduction to the government and NGO officials was as a research student from a university in England. This may have contributed to their acceptance and willingness to participate in the study, as it promoted a non-threatening, possibly even inferior position (Rose, 1997). Feedback was given to the available participants on the findings of the research at the beginning of the second phase of data collection and in some cases this led to the sharing of many helpful personal and professional opinions on my research (Twyman *et al.*, 1999).

Following analysis of the initial transcripts from the interviews with the NSCD members and NGOs and another review of the literature, a number of potential study areas were identified. The middleveld region of Swaziland was initially selected as the broad area of focus due to its high population density. In this physiographic region, 40% of the population are dwelling on 26% of the land (CSO, 1997). This zone is also of interest because it was flagged up in all the NSCD interviews as comprising high value land in terms of potential productivity and being at the greatest risk of actual and potential land degradation. This region has also been repeatedly identified as experiencing degradation in the literature and government reports (Jansen *et al.*, 1999; Downing and Zuke, 1996; ECS, 1999).

Scheduled visits to a number of villages were made with government representatives from MOAC who assisted with the obtainment of permission from the chiefs of the chosen communities to carry out research in their chiefdoms. An informal visit was also made to one of the communities with an NGO field officer. Some villages were immediately rejected as suitable locations for the research, as they were spread out over

too large an area, making the research logistically unfeasible. Other villages were found to be generally unrepresentative in that there were tarred roads and infrastructural developments such as tap water and electricity, which are atypical of the majority of Swaziland's rural settlements. Three communities in the middleveld of Swaziland were selected for the study as it was felt that an investigation of this scale would capture some of the diversity within Swazi communities whilst remaining logistically feasible considering the time available. The locations of the study sites are shown in Figure 4.2.

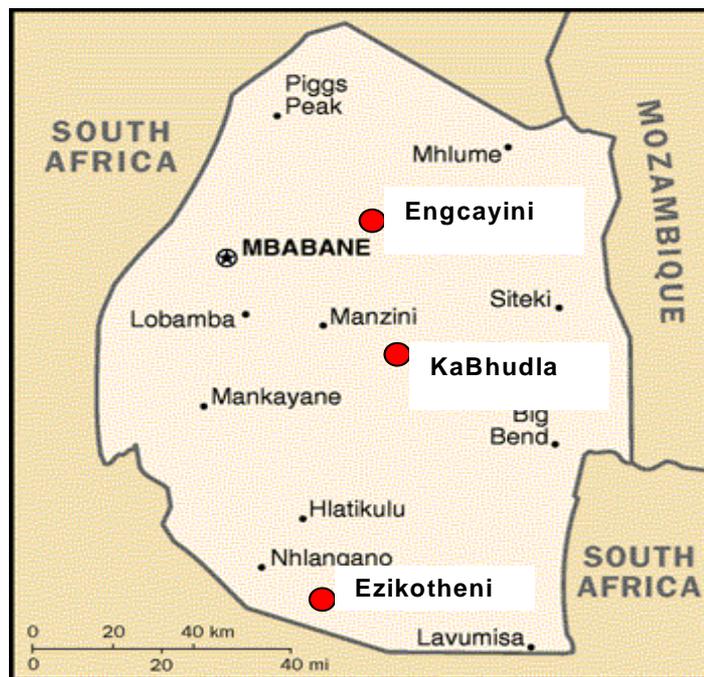


Figure 4.2: Map of the locations of the study sites

(Adapted from: <http://www.cia.gov/cia/publications/factbook/geos/wz.html>)

A case study approach was selected because it can be used to emphasise detailed contextual analysis of a limited number of events or conditions and their relationships, whilst maintaining links to the broader context (Soy, 1996). Case studies also provide a more nuanced picture and yield insights that may otherwise be overlooked in broader scale research (Mansuri and Rao, 2004).

The three villages that were chosen were selected for the following seven reasons:

1. Each of the study villages is located in the middleveld of Swaziland, which due to its high population density is potentially most at risk of degradation. This is where sustainable resource use is believed to be under greatest threat (ECS, 1999; NAP, 2000; JICA, 2001).
2. Each of the areas that the study villages fall in is reported in the literature to have high levels of actual and potential land degradation (Jansen *et al.*, 1994; Downing and Zuke, 1996; Dlamini, 1997; ECS, 1999; JICA, 2001). They were also commonly cited in the interviews with the NSCD members as suffering from severe degradation.
3. Whilst obviously experiencing their own internal diversity, each chosen community was considered to be broadly representative of the land-use patterns, soils, topography, level of infrastructural development, population characteristics and livelihood strategies of the middleveld.
4. Two of the villages at the time of research were hosting JICA funded community projects under the auspices of the UNCCD, which aim to help reduce land degradation and improve rural livelihoods. Selecting some of the villages with JICA projects provided the opportunity to assess the relevance of such initiatives to the people experiencing degradation. This is in direct accordance with the aim of the study, to determine whether the NAP successfully integrates physical degradation issues with land user involvement. It also particularly links to objective 2, which is to assess the relevance of the UNCCD in a 'real world' situation and its appropriateness to the people actually experiencing land degradation in the context of Swaziland. Communities with JICA funded projects were prioritised for the research over those with projects run by other NGOs and donors because the JICA initiatives had both environmental and livelihood components and close links with the NAP, making them more directly relevant to the research.
5. Research into rural livelihoods and environmental degradation issues such as soil erosion had previously been carried out in each of the study communities to varying levels of depth (GOS, 1993; King, 1997; ECS, 1999; JICA, 2001), so land users were amenable to working with researchers, whilst the areas were not over-researched.

6. The sites were logistically feasible to work in and accessible from the nearest towns by a combination of tarred and gravel roads. These factors, although not priorities, had to be considered given that clean drinking water was not available in any of the villages (JICA, 2001).
7. Permission had been granted by the chief of each area for the research to take place in the selected communities.

After the study sites had been selected and permission had been granted for the research to take place, a pilot test of a questionnaire, which primarily addressed objectives 1 and 2 of the research, was carried out in one of the study villages. The questionnaire survey sought to obtain baseline information on community and household scale land use and land management practices and also to find out what the main environmental and livelihood issues are that affect the people according to the land users themselves. A mixture of open and closed questions was used, depending on the information that was needed and its purpose in the overall study (McLafferty, 2003). Leading questions were avoided, as were compound questions with one or more part, so as not to confuse the respondents. There are advantages and disadvantages to using both open and closed questions (Parfitt, 1997). For example, one of the closed questions was: “Do you carry out any activities to conserve soil on your allocated land?”. This required a “yes” or “no” response and placed the onus of interpretation on the interviewee. Whilst this restricts the response to a particular structure, in collecting baseline data, such a questionnaire design facilitated the data analysis and subsequent compilation of statistics (McLafferty, 2003). Other questions however, sought to identify which environmental changes were seen as problematic to land users. The use of open questions in obtaining this type of data was more favourable as the range of responses could not be predicted from the pilot survey (Parfitt, 1997). Responses to open questions could still be analysed statistically. However, categories were constructed during interpretation, so in this instance, the onus of interpretation was placed on the researcher (McLafferty, 2003). A copy of the questionnaire that was used can be found in Appendix I.

In the collection of baseline data, it is often beneficial, particularly initially, to utilise methods such as questionnaires instead of Participatory Rural Appraisal (PRA) techniques, because conventional methods can provide a basis for implementing PRA

(Chambers, 1997). In this study, it allowed examination of the socially embedded nature of physical processes, as highlighted in chapter 3, and informed the choice of methods utilised later in the data collection process. Following the pilot study, refinements were made where necessary to the length of the questionnaire, the wording of some of the questions and the choice of responses (Parfitt, 1997). The full questionnaire survey was then conducted in Engcayini and involved all 74 of the homesteads. In the other two villages, a minimum sample size of 14% of the homesteads was surveyed, as this aimed to capture the diversity within each community whilst being both representative and achievable given the time available. This permitted the exploration of the range and nature of diversity, together with the dimensions of any variation, whilst increasing the sample size wherever possible (e.g. in Engcayini) decreased the likelihood of sample error (Parfitt, 1997). Households were selected randomly but were stratified proportionately according to their accessibility from the main roads, in order to create a representative sample for the questionnaire survey. Sampling frames for this were drawn up following several drives and long walks around each community with local informants. For example, in KaBhudla the majority of homesteads were located along the main gravel roads through the village, so proportionately more households were interviewed along the roads than in the more remote areas, yet remote households were still included in the research to avoid geographical sample bias (see Table 4.1 for a summary of household numbers involved in the questionnaire survey in each location).

The questionnaire was originally constructed in English but was translated verbally by an interpreter into Siswati. Responses were given in Siswati and then translated into English and noted down. These data were entered into a spreadsheet and were described and analysed statistically. The questionnaire surveys were carried out initially in Engcayini following the pilot survey and then in Ezikotheni after completion of data collection in Engcayini. This took place during phase 1. This enabled the questionnaire survey to be further refined after taking into account results from preliminary analyses of data collected from Engcayini using other methods that are discussed later. Thus, it allowed the questionnaires to be more appropriately tailored to issues, patterns and responses that had become apparent, and remained consistent with the Grounded Theory approach to data interpretation (Corbin and Strauss, 1990). Questionnaire surveys in KaBhudla took place during the second phase of data collection, this time following only minor modification after consideration of the patterns and responses from

household data collected from both Engcayini and Ezikotheni. This allowed focus on the issues raised by the land users whilst still retaining a high degree of comparability across the study villages.

Prior to visiting the villages, efforts were made to learn Siswati but it is recognised as a particularly difficult language due to its incorporation of various ‘click’ sounds, similar to the Zulu language (Bosch, 1999). Although my endeavours provided much amusement to the villagers in hearing a British person attempting their language, the level of proficiency and understanding of linguistic nuances necessary for data collection and interpretation was not achieved in the time period available. The need for a translator was therefore maintained throughout both phases of data collection. Throughout the data collection process, four translators were employed, none of who were local to the research districts.

Due to the division of the period of data collection into two phases, on my return to Swaziland it was found that my translator from the first phase (Simiso) had obtained employment elsewhere. He suggested that when I went back to Engcayini, I should employ his brother’s wife (Phindile) as my translator. Initially I was sceptical about this despite assurances from Simiso that Phindile’s English was of a high standard. I met up with Phindile informally and explained the purpose and nature of the work and what was required from her. She had no prior experience of working as a translator but was willing to listen and learn and demonstrated a high level of competency. In some ways her lack of experience made it easier for her to provide me with the level of information I required, as she had no methodologies or protocols from other research projects to refer back to, unlike Simiso. Phindile was not available for the entire second field season so two other translators were also employed.

Rejoice translated for me during the time we spent with the case study households in Ezikotheni but she was only available to live away from home for short periods at a time due to family commitments (having 3 young children and an elderly mother to look after), so Vusi worked with me in KaBhudla. Rejoice and Vusi had no experience in translating for research purposes but Rejoice had worked previously as a housekeeper in a guest house, whilst Vusi had worked in South Africa as both a truck driver and mechanic, so they both had an excellent comprehension of the English language. Again,

lack of experience as translators meant that they both had to learn a lot and work hard but they understood what was required from them and were not afraid to ask questions if there was something they did not understand.

People in all the villages involved in the study were agreeable to the research. Despite being given the option not to participate in the questionnaire surveys, no one decided to opt-out. The people in some of the homesteads would see us visiting families further along the road and in anticipation they would roll out grass mats for us to sit on. In some cases they would provide us with drinks of *emahayew* (thin maize porridge) and plates of beans with mielie meal, or offer gifts of bags of groundnuts or pumpkins. My translators advised that it was seen as an insult to Swazi culture to not accept what we were offered. This was ethically difficult to deal with at times, given the level of impoverishment of some households. This reception is likely to have occurred due to my position as a white female from the UK (Kobayashi, 1994; Twyman *et al.*, 1999). This is discussed in more detail in section 4.3.

Initial interpretation of the questionnaire data and the compilation of statistics that were subsequently analysed led to the development of semi-structured interview agendas and consideration of several PRA techniques. A case study approach involving three households in each study village was decided upon in order to permit the collection of more accurate data to a greater depth than can be obtained through the use of larger samples and this allowed the use of both conventional and PRA research approaches. The PRA approach differs from conventional approaches because it did not stem from *a priori* principles. Instead, it was induced through practice. It is based on three foundations:

- 1) The behaviour and attitudes of outsiders, who facilitate and do not dominate;
- 2) The methods, which shift the normal balance from closed to open, from individual to group, from verbal to visual, and from measuring to comparing;
- 3) Partnership and sharing of information, experience, food and training between insiders and outsiders and between organisations (Chambers, 1997: 104).

This approach was used as it tessellates well with theories of political ecology and the actor oriented approach. It emphasises empowerment, permits the inclusion of a variety

of perspectives and aims to include the resource-poor and marginalized groups (Martin and Sherrington, 1997). In turn, it also increases local ownership of the research process, allowing a deeper appreciation of local knowledge, farmer initiatives and experimentation, which are vital components in the need to better understand local decision making (Sillitoe, 1998b). Indeed, knowledge creation itself is a social process and the outcome of various struggles and interactions between a multiplicity of social actors and networks (Arce and Long, 1992). With the recognised need to listen and learn from local people, demonstrated in much recent development research (Chambers, 1997; Osunade, 1992a), an actor-oriented approach needs such a methodological design in order to better understand the dynamics of knowledge creation. PRA was used in this study because it was considered to offer the opportunity to employ a wide variety of discursive methodological tools including semi-structured interviews, focus groups and group or individual discussions. Other techniques that were used include transect walks, seasonal calendars and timelines (cf. Binns *et al.*, 1997), all of which allow a focus on context and interaction, thus permitting a greater depth of understanding of the flexible adaptive measures employed by rural dwellers in their relationships with the dynamic environment (Warren, 2002).

PRA is said to enable the production of a holistic vision of natural resource management from the perspectives of those actually managing the resources, which is crucial in assessments and enquiries into indigenous knowledge (Zuryak *et al.*, 2001) Hence, the data obtained using PRA techniques can be useful to a wide variety of actors, whilst allowing the “generation of visible public information, verification and cross-checking, through the use of local materials and indigenous classificatory categories” (Mosse, 1994: 302). PRA is not a means to an end in itself however. It is criticised by Mosse (1994) as being a set of techniques by which outsiders extract information rather than a methodology for or approach to planning in which local actors actively participate. Qualitative data collected using PRA are often viewed as subjective and considered to be too fragmentary for the production of generalisable conclusions and the subsequent formulation of broadly applicable policy recommendations. This is because generalisations are made from samples considered to be too small by any statistical standard (Martin and Sherrington, 1997). PRA also places reliance upon pictorial representations including maps and diagrams and not all types of knowledge can be represented in this manner. Critiqued as being a ‘quick and dirty’ research

approach leading to only superficial conclusions (Gladwin *et al.*, 2002), Neefjes (2000) argues that PRA should not be used exclusively as a research approach as this can lead to misunderstandings in the links between environment, local livelihoods and macro-policy.

In this research given its actor-oriented focus, it was decided that a mixture of conventional and PRA methods should be employed. This permitted the identification of consensus needs for each village whilst inter-household diversity (of opinions, understandings and knowledge), and baseline statistical data could be better obtained through the application of questionnaire and interview methods (Parfitt, 1997). Awareness was maintained at all times of the variety of methodological possibilities that could be followed. In some cases methods were not deemed appropriate in that specific context so alternative ways of obtaining the data were pursued.

In phase 1, data were collected from households in Engcayini. Selection of participating households in this instance was based upon the length of time the homestead had been established in the chiefdom, the different types and amounts of livestock each household owned and the enthusiasm and interest the people expressed in the research, without displaying signs of wanting to be involved for personal gain. This is an important consideration because as experienced by Twyman *et al.* (1999), an outsider in a rural area with a vehicle is often perceived to be a source of gifts and aid.

During the second phase of data collection, in Ezikotheni, households were selected as case studies for the research according to the amount of land they had been allocated, as this had demonstrably been the most significant issue apparent from analysis of the household questionnaire responses. One household was selected which according to the questionnaire responses had more than sufficient land, together with one that had sufficient land to meet their subsistence needs according to their own understandings. Also chosen was one household with so little land that they resorted to renting fields from a farmer who privately owned his holdings. The rented fields were situated about 1 km from the family's homestead. Due to complications in Ezikotheni where chiefdom boundaries were ill-defined and some of the community supported one chieftaincy claim whilst others backed another (JICA, 2001), residency during the period of research was outside of the village on a privately owned dairy farm 8 km

away. This way Rejoice and I remained neutral in the chieftaincy feuds and we were not seen to support either faction over the other.

In KaBhudla during phase 2 of data collection, case study households were chosen according to their location in the chiefdom. Two households along the main road were selected and one in a more remote part of the village. These households were considered to be broadly representative of the whole community in terms of land, income, family size and status, which itself showed less diversity than the other villages involved in the research. During data collection in this location, accommodation was provided for both Vusi and me at the chief's homestead. This could have had an impact on the data obtained in the research due to issues of power relations and positionality through association (Twyman *et al.*, 1999). These points are returned to for wider discussion presently.

Each of the case study households contributed to several different aspects of data collection. Semi-structured interviews were one method that was used. These consisted of a checklist of topics developed from the responses to the household questionnaires and included subjects such as: the household structure, daily tasks, crops, weeds, ploughing, wood, soil erosion, gullyng, water, climate, education, livestock, community needs, income and diversification, fertilisers, vegetable gardens, grass strips, grazing land, livestock dipping, land use and related changes over time, community size changes and environmental change. Responses incorporated elements of description as well as understandings of the dynamics within each category.

The use of this method meant that different topics received different amounts of attention from each respondent according to their priorities for discussion (Dahlberg and Blaikie, 1999). In addition, the present state of the environment was discussed, with the respondents postulating possible reasons as to why and how the local environment reached its current state. Initial interviews established the farming practices and state of the environment of the present whereas second and further interviews discussed the same topics but in the past. Questions were phrased through the interpreter so that when the participants were discussing the past, they were speaking about when they first settled in the community. This permitted the construction of layered oral histories, with greater resolution closer to the present, as each household had been established for

a different amount of time. All of the interviewees were unfamiliar with the cassette recorder and were extremely wary of it, so the decision was made not to tape-record the interviews. Reliance was placed upon detailed notes taken throughout the interviews. During the second phase of data collection, semi-structured interviews were carried out in Ezikotheni and KaBhudla although a return trip was made to Engcayini in order to follow up (using further semi-structured interviews) the prominent topics that had become apparent from the analysis of the case study household data collected in the first phase of fieldwork.

Seasonal calendars were constructed with case study households in order to better understand temporal patterns of resource use and constraints and the decisions relating to their management (Kinyunyu and Swantz, 1996). This was achieved on paper in a table format and utilised the Gregorian division of the year into months, which were then grouped together in three categories: 'preparation season', 'planting season' and 'harvesting season'.

Transect walks were carried out in each case study household's fields using techniques similar to those outlined by Defoer *et al.* (1998). Although a simple technique, transect walks can yield much useful information on the local environment, including the extent and availability of resources (Binns *et al.*, 1997). The use of this method involved walking with informants from each case study household through each of their fields whilst together observing, asking questions, listening and looking at the surroundings (Kinyunyu and Swantz, 1996; Binns *et al.*, 1997). Comments were noted down in relation to the soil, crop, woodland, erosion and land management practices, such as the application of fertilisers and manure and the use of pesticides and herbicides. Pictures and symbols were drawn on the transect diagram during the walks. People were very forthcoming in this activity and often made interesting additional comments (cf. Mahiri, 1998). This activity was repeated in Engcayini during phase 2 of data collection to further explore the outcomes of the analysis that was carried out in between the two phases.

Moving away from PRA techniques, natural scientific methods of data collection were also utilised in this research. Many households in Swaziland have grass conservation strips separating each of their fields. In the fields of the case study households in

Engcayini, measurements of width and height were taken at three locations along each grass strip using a 30 m tape. Mean widths and heights were then calculated for each strip. These data were intended for use in comparing the required grass strip dimensions with actual strip dimensions (Osunade, 1994b). The field perimeters of the three case study households in Engcayini were also measured during phase 1 of data collection. Field areas were then calculated in order to assist the selection of the number of sites for soil sampling within each field. Interview data were then examined and a selection of fields covering each management strategy and land use were selected for sampling.

Soil samples of approximately 20 g were taken from 30 cm depths (plough depth) from the fields of case study households in Engcayini using a hoe and stainless-steel trowel (Materechera and Mkhabela, 2001). The number of samples taken from each field was dependent upon its area. In fields where the area was $<1000 \text{ m}^2$, three samples were taken. Where the field area was $1001\text{-}2999 \text{ m}^2$ five samples were taken and where the field area was $> 3000 \text{ m}^2$, seven samples were taken. This resulted in a manageable number of samples for analysis and was logistically feasible, given transportation and time constraints. In general, an approximate W-shaped sampling frame was assumed so that intra- and inter-field variability in limiting nutrients nitrogen, phosphorus and potassium could be found and so that both the outer and inner portions of the field were covered (Wang *et al.*, 2001). The frames used for each field size are illustrated in Figure 4.3.

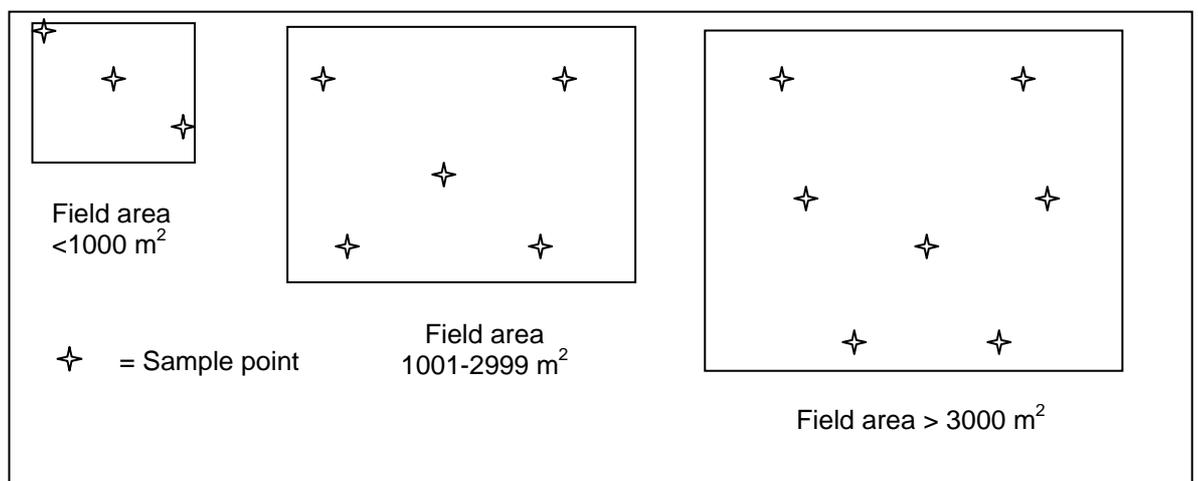


Figure 4.3: Diagrammatic representation of the soil sampling frame

Whilst intensive grid sampling would have enabled a more comprehensive overview of spatial patterns of soil fertility, due to the large areas under consideration, the labour intensive nature of sample collection and logistical factors involving the import of soil samples to the UK, this was deemed impractical (Johnson *et al.*, 2001). However, where land users had made interesting and unusual comments about hotspots of fertility or infertility, directed sampling was used within the W-frame, as this enabled not only empirical measurement of soil nutrients but also analysis of the ways in which physical processes might be socially embedded. Directed sampling also took into account the effects of slope. The fields sampled and the number of samples taken are summarised in Table 4.2, together with the land use and land management strategies in each location.

Table 4.2: Soil sample design

Farm/field no.	Area (m²)	Use	Inputs	Samples taken
M1	1073.69	Maize	F	5
M2	2724.55	Maize	F	5
M4	828.29	Beans		5
M7	264.71	Ematapa		3
M8	162.34	Maize		3
M9	312.29	Fallow		3
M10	391.50	Groundnuts	M	3
M15	544.34	Maize	M	5
M17	691.80	Maize		5
M20	481.00	Maize		3
D1	1905.80	Maize	F	5
D3	5964.90	Maize	F	7
D4	2100.45	Maize	F	5
D5	2330.10	Sweet Potatoes	F	5
D6	2025.30	Beans	F	5
D7	1908.00	Beans	F	5
J1	2491.58	Maize	F	5
J2	1891.89	Maize	FL	5
J3	2351.28	Beans		5
J4	2369.03	Groundnuts	M	5
J5	3305.19	Beans	M	7
J6	1828.80	Maize		5
JH	977.31	Maize	F	5

Key: F= Fertiliser, M= Manure, L=Lime

Samples were labelled upon collection and stored in sealed polythene bags. On return to the UK, samples were air dried, ground using a pestle and mortar, sieved through a mesh size of 212 μm and analysed for exchangeable potassium, total nitrogen and total phosphorus. These elements were chosen because nitrogen and phosphorus constitute vital components of plant proteins, with nitrogen being the single most important

nutrient in determining growth (McRae, 1988). Potassium is essential in the formation and transfer of carbohydrates and key to processes relating to photosynthesis (Defoer *et al.*, 1998). The laboratory analysis for nitrogen and phosphorus is illustrated in the flow chart in Figure 4.4 and that for potassium is shown in Figure 4.5.

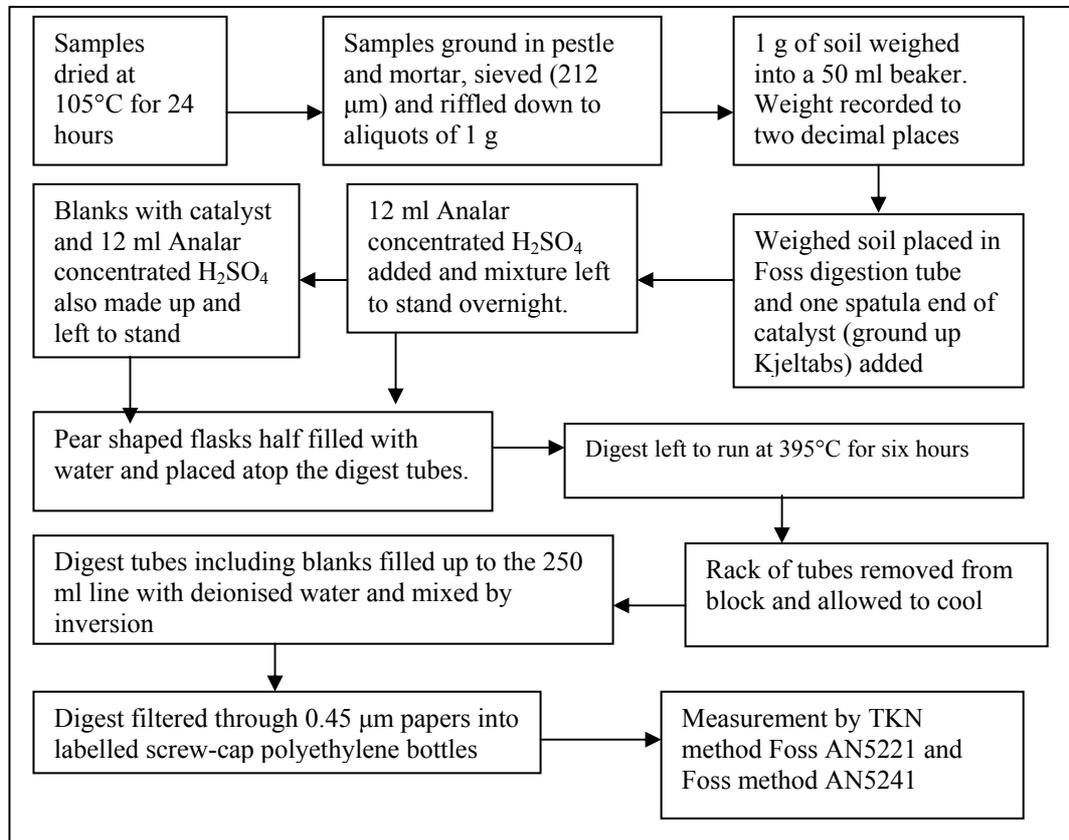


Figure 4.4: Flow chart of soil digestion protocol for N and P

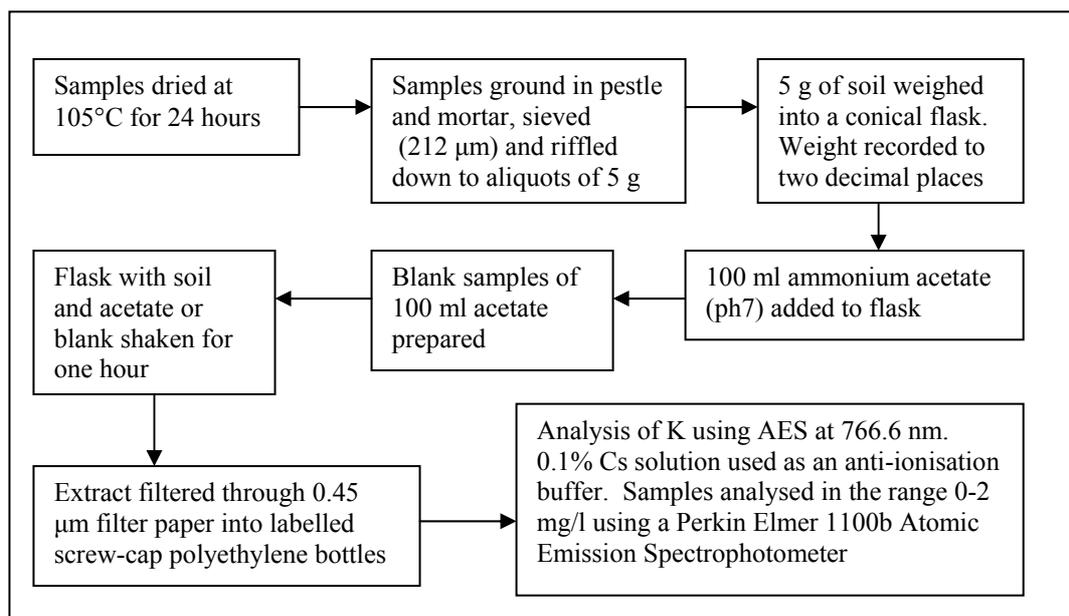


Figure 4.5: Flow chart for soil extract protocol for exchangeable K

Atomic Emission Spectrometry (AES) and Flow Injection Analysis (FIA) methods were utilised during analysis, following appropriate total nutrient extraction techniques as outlined by Allen (1989) and Anderson and Ingram (1993), as summarised in Figures 4.3 and 4.4. The amount of total nitrogen and total phosphorus present in each sample was then calculated using the method in the worked example shown in Calculation 4.1.

Calculation 4.1

N and P: Results obtained in mg/l. Volume of digest 250 ml.

Weight of soil sample = 1.0083 g. N = 8.129 mg/l. Blank = 0.000.

Calculation: $8.129 - 0.000 = 8.129$.

$$\frac{8.129 \text{ mg/l}}{4} = 2.032 \text{ mg/250 ml}$$

4

$$\frac{2.032}{1.0083} = 2.016 \text{ mg/g} = 2015.521 \text{ mg/kg} = \text{ppm} = 0.202\%$$

1.0083

For K: $(\text{result in mg/l} / 10) / 5 = \text{result in mg/g}$. Value scaled up according to required units

Due to logistic and cost constraints of analysing soil samples in Swaziland or South Africa, I decided to analyse the soil samples myself in the UK, although I subsequently recognised that this introduced some limitations to the interpretation of the laboratory results, particularly for phosphorus, which was determined as total, rather than available, phosphorus because of concerns about the alteration of available phosphorus by microbial activity during transit to the UK (Wang *et al.*, 2001). Total nutrients were thus determined instead. Following the initial analyses of soils from phase 1, a further 21 samples were collected during phase 2. This time sampling took place within the grass strips, as well as in the fields. This was conducted on one farm in Engcayini that had been established for more than 60 years and that had maintained grass strips since the introduction of the legislation in the 1950s. The nutrient readings obtained from within the strips could therefore be used as a proxy for background nutrient levels so any temporal changes could be identified. Three samples were taken from equal intervals both above and below each strip and five samples were taken from equal intervals from within each strip. The same nutrient extraction techniques were employed as for the analysis of samples collected in the first phase to ensure consistency and comparability.

During laboratory analysis, standard solutions were prepared consisting of two blank samples without any soil and these underwent the same treatment as the soil samples. These enabled the monitoring of any contamination of samples during the analytical process. Nitrogen and potassium were not detected in any of the blank samples. This indicates that the nutrient levels obtained are as uncontaminated as possible. For phosphorus, the readings from the two blank samples from each digestion were averaged. This value was then subtracted from the nutrient values obtained for the other samples in that digestion (Anderson and Ingram, 1993), as shown in Calculation 4.1.

Returning to social scientific methodologies that were utilised in this research, in Engcayini during phase 1 of data collection, 46 community members working on an externally funded community land rehabilitation project were interviewed in order to help fulfil objective 2 of the research. These interviews established the views of the people on the purpose of the project, the role they played in it at each stage of its design and implementation and how they understood that they could benefit from it. During the second visit, this was followed up through informal interviews with the chairman of the project committee and meetings with fieldworkers from the NGO involved with the project, during which detailed field notes were taken. A focus group meeting was also organised with the community project committee members.

Focus groups are a useful method of data collection and can be used at any stage of a study. In this research, the focus group was held towards the end in order to explore the degree of consensus between committee members after completion of the JICA project infrastructure (Gibbs, 1997). Awareness was maintained that in the use of techniques such as focus groups, the knowledge and information that is created is very much a product of existing power relations and can lead to the formulations and promotions of the consensus view, which is often the same as the view of the most powerful. Mosse (1994: 508) even goes as far as to suggest that “far from providing a neutral vehicle for local knowledge, it actually creates a context in which the selective presentation of opinion is likely to be exaggerated and where minority or deviant views are likely to be suppressed”. This parallels some of the caveats of ‘participation’ outlined in chapter 2. Group dynamics can lead to the emphasis of the general over the particular, and tend towards ‘what ought to be’ rather than ‘what is’, which underplays the importance of

difference and variability. It is therefore the community's official view of itself that is projected to the researcher (Mosse, 1994). These issues were considered during the analytical stages of the research and are explored further in chapter 8, where the interpretations of the focus group data are presented.

The detailed minutes of the focus group meeting were then discussed in another focus group, this time with representatives from the project financiers, JICA. Reasons were postulated as to why the committee highlighted specific problems and how they might have been overcome. Also discussed was the degree of community participation at each stage of the project, the level of community ownership of the project and the relationship between maintaining tradition and the future success of the initiative. It was originally intended that I would interview the people working on a similar community project in Ezikotheni as well but this was not possible because their project took place in between my visits to Swaziland. Therefore, people were not available for interview as they were in Engcayini and given the size of Ezikotheni, it would have been extremely challenging to trace the people who worked on the project.

Participatory mapping involves local people constructing their own maps and according to Chambers (1997: 143) "is probably the most widespread PRA method". In this research it was intended that the participants would be able to locate areas of environmental change on a standard orthophoto map and together we would be able to produce sketch maps of both past and present natural resource use. From this, any environmental changes could be elucidated for further discussion (Palmer and van Rooyen, 1998). However, local people struggled to visualise their surroundings on paper and it appeared that this PRA technique, generated "a great sense of mystification" (Mosse, 1994: 505). This is because it was an entirely new concept to the land users to view the whole community at a smaller scale on a single sheet of paper. Therefore, this technique was abandoned and further transect walks were conducted to collect the necessary data instead.

4.2.2 Secondary data collection

In addition to the primary data collected during the research, secondary data sources were also obtained from relevant government departments and ministries. The secondary data sources are summarised in Table 4.3.

Table 4.3: Secondary data sources

Data	Year/Frequency of measurement	Source
Average Rainfall data	Each month since 1961 for all middleveld weather stations	Meteorological office
Maximum and minimum temperature data	Each month since 1961 for all middleveld weather stations	Meteorological office
Livestock census data	1966, 1976, 1988, 1991, 1994, 1995, 1997, 1998, 1999	MOAC
Various policies that link with the NAP including: Livestock Development Policy	1993	MOAC
Land Use Policy	1993	MOAC
Forestry Policy	2002	MOAC
Draft Energy Policy	2002	Ministry of Natural Resources and Energy (MNRE)
Population Census Data	1997	Central Statistical Office (CSO)
Annual Statistical Bulletin	1999	CSO
Land Use Map of Swaziland	Rommelzwaal and Dlamini, 1994	MOAC
Soil Map	Murdoch, 1968	MOAC
Land Tenure Map	Rommelzwaal, 1993; Rommelzwaal and Vilakati, 1994	MOAC
Aerial photographs and orthophoto maps of Engcayini	1984 and 2000	Ministry of Works

Data sources such as aerial photographs and population and livestock statistics are useful for validity purposes. As reported by Robertson and McGee (2003), ethnographic research techniques are sometimes perceived by natural scientists as inferior and subjective, so the use of secondary data in crosschecking provides a more complete overview of the changes and trends as reported by the interview participants. It also adds credibility to the interview data, whilst the collation of government policies with ecological and livelihood dimensions enable the identification of links between national policies and the NAP, as well as providing baseline country information.

Whilst verifying the interview data, aerial photograph analysis allowed the mapping and visual presentation of any land use changes (Robbins, 2003). In order to produce such maps, the aerial photographs were scanned and saved as image files on the computer. Using the USGS (1976) classification of land cover classes in conjunction with the photographs, it was decided that two land cover classes could be clearly observed given the resolution of the photographs. These consist of 'forest land' and 'urban or built-up settlement' (USGS, 1976). It was originally intended to map arable land as well, but given the resolution of the photographs and the high density of cattle tracks, grass strips and areas of erosion, inaccuracies that would have been introduced would have severely

skewed the results. As a consequence, only woodland and settlement areas were mapped to ensure rigour was maintained. The scanned images were referenced to an orthophoto base map in ARCVIEW GIS 3.2a using the ImageWarp extension. The Engcayini study area was then demarcated according to consensus chiefdom boundaries according to the villagers. This is shown in Figure 4.6.



Figure 4.6: Outline of Engcayini study area

Areas conforming to the above land cover classes were then digitised on-screen by hand. This is illustrated in Figure 4.7, with the example of woodland.

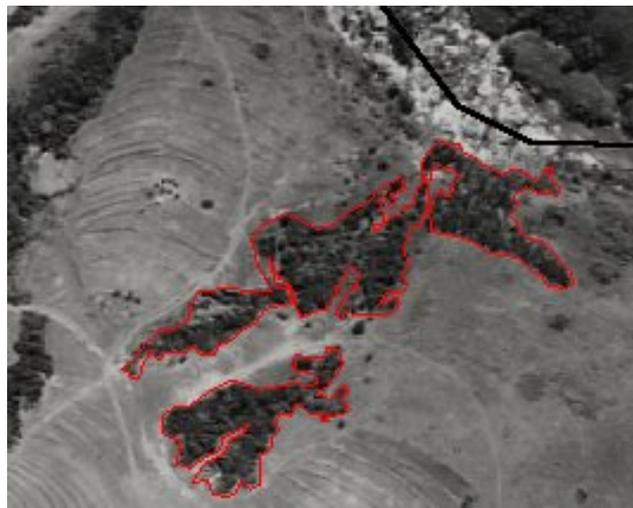


Figure 4.7: Example of a digitised area of woodland

Errors of ± 45 m in referencing the photographs to the base map were considered acceptable, given the 8.2 km^2 size of the study area. Whilst problems were experienced during the digitising process in determining feature boundaries due to the shadow effect

of trees and buildings and because of the grainy nature of the paper on which the orthophoto base map was printed, levels of accuracy aimed to be consistent, as shown in Figure 4.7. Digitising is always subjective and dependent on the judgement of the operator. However, decisions were made at the outset to focus on sizeable areas of woodland. Although this will have resulted in individual trees and bushes possibly being omitted from the analysis, it is argued that the large woodland areas are the places that local people go to collect their fuelwood according to the questionnaire and semi-structured interview data, so these are considered most central to the research.

4.3 Positionality and power relations

It is necessary in any research involving people, for the researcher to recognise their own place within the social relations they are studying and to consider how the relationships of power between themselves and their informants may influence the production, interpretation and representation of knowledge (Mather, 1996; Mullings, 1999). The positionality of any researcher is characterised by their gender, age, race, sexual identity, class and insider/outsider status (England, 1994; Mullings, 1999), although many categories associated with positionality are socially constructed in different ways in different places. For example, the way in which I was perceived in Swaziland may contrast greatly with the way I would have been viewed had the research taken place in South Africa. This is due to differences in political and historical influences, which will affect the social interpretation of my being 'white' (Kobayashi, 1994).

In much research it is assumed that 'insider' status, whereby the researcher holds a similar position to that of the researched, produces closer, more direct and truer knowledge (Mather, 1996). Even in interpretation it is often assumed that a more 'correct' understanding of a text will be produced by an 'insider' due to the sharing of similar social and cultural values (Herod, 1999). Herod (1999) illustrates with examples from his own work how 'insider' or 'outsider' status can both benefit and hinder the obtaining of information and demonstrates that 'insider' status is not necessarily privileged. He argues that both the interviewer and respondent participate in knowledge creation and although 'outsiders' and 'insiders' may mould this process differently, it makes little sense to assume that one version of this knowledge is necessarily truer in some absolute and objective sense (Herod, 1999).

England (1994) suggests that testimonies must be read and interpreted in the context of when, where and how they were produced. However, the researcher nearly always retains the exclusive power to choose which voices are heard and which quotations are included in the final text. Although it may be possible to change power relations during data collection, the researcher is ultimately responsible for avoiding misrepresentation (Smith, 1996). Also, the positionality of the researcher as perceived by the researched might not correspond with how the researcher perceives his or her own positionality (Herod, 1999; Mullings, 1999). In this study whereby repeat interviews were carried out, the positionality of the researcher did not remain static but changed over time, as rapport and empathy built up between the researcher and the researched.

For example, accommodation in Engcayini was in the form of huts belonging to one of the case study families. This provided an opportunity to build a rapport with the villagers and attain a greater personal insight into the issues that rural Swazi people face in their daily lives. Many researchers make only one off visits, which provides very little opportunity to build a relationship with the respondents or provide them with any feedback (Twyman *et al.*, 1999), so this was considered important. During this time, my translator and I participated in various village and household activities. These included wood collection, fetching water from the river, helping children with their homework, learning how to cook in the Swazi kitchen or *edladleni*, harvesting wild fruit and taking part in the rebuilding of one of the mud and stick huts. Our participation helped to gain the trust of the people and created a greater empathy with them (Twyman *et al.*, 1999). We were also invited to attend a traditional Swazi wedding, at which the whole of the community was present. This is shown in Figure 4.8.



Figure 4.8: Traditional wedding in Engcayini

News of our presence in Engcayini spread to all of the homesteads in the village because we attended the wedding ceremony; even to the people that we had not yet visited, thus visually demonstrating our commitment to the research and publicly showing our purpose for being in the village (Mosse, 1994). In building up this relationship, my positionality and that of my translator changed over time from us initially being total ‘outsiders’ to ‘pseudo-insiders’ as our participation helped us to integrate into the local situation as we were gradually accepted into the case study households (Mullings, 1999). This corresponds with Herod’s (1999) call for recognition of a continuum of outsidership involving a sliding scale of intimacy, because a binary classification fails to recognise dynamism and assumes positionality to be fixed, when, as demonstrated in this study, it is not (Mullings, 1999).

One way of consciously altering the positionality of the researcher is by emphasising particular attributes and playing down others (Mullings, 1999). In the interviews with government officials and during my audience with King Mswati III, my positionality as a young, white, female from a British university will have shaped the research, the responses that were given and the way in which I was received. I presented myself as being a non-threatening student who was in Swaziland to collect data for a PhD research project. This could have resulted in the sharing of more information and opinions with me as a foreign white female as I may have been perceived as un-influential. However, positionality can also be altered unintentionally. In Ezikotheni, we stayed at the chief’s homestead (at his request) and this would have naturally raised our status within the village, aligning us with the higher social classes. This could have had both positive and negative outcomes by either increasing cooperation from the households involved in the research for fear of letting down their chief by not participating or could have resulted in them saying what they thought that the chief would want them to say about the constraints and issues they face, rather than stating their own opinions. During these interviews it was therefore repeatedly stressed that the respondents would retain anonymity at all times. Again, this illustrates the importance of the social context of the research and highlights the need for a reflexive approach to interpretation (Rose, 1997; Herod, 1999).

The positionalities of my translators must also be considered, including their races, nationalities, ages, genders, social and economic statuses and sexualities as their

characteristics too have led to the production of knowledge and data under specific circumstances (Rose, 1997). Whilst the gender of the translator at any time will undoubtedly have affected their position, an awareness of gendered relations within both the research process and subsequent interpretation of the texts was maintained and this had to be explained to the translators. In the cases of Simiso and Rejoice, they were already aware of the gender and power relations involved in the interview processes. However, this will still have significantly affected the information that was collected (Mather, 1996). In a similar vein, the gender of the respondent will also have an impact on the data provided (Kobayashi, 1994).

During the first phase of fieldwork, Simiso was employed as my translator to assist me with the questionnaire surveys in Engcayini and Ezikotheni and to interpret during data collection with the case study households in Engcayini. He is a young man but has extensive experience in translating. Prior to this research he had never visited the villages of Engcayini or Ezikotheni, yet he too built up a relationship with the research participants. When I returned to Swaziland for the second phase of data collection, he had remained in contact with the case study households in Engcayini and had independently returned to the village to visit and spend time with them socially. Whilst his degree of 'outsiderness' as a black Swazi male was always going to be less than mine, his acceptance by the people of Engcayini exemplifies how positionalities can and do change over time. This also emphasises the inclusiveness and hospitality that is intrinsic to Swazi culture.

4.4 Foreign language research

In studies such as this in which the research is taking place across cultural settings in a foreign language, awareness of multiple meanings and realities must be maintained throughout the translation and interpretation of any texts (Smith, 1996). This study could not have been carried out in English. Although it is widely spoken in many urban areas, rural Swazis know only basic greetings in English so the role of the translators was paramount. Each of the translators would initially summarise what was being said, instead of translating word for word and directly transporting the meaning of the respondents' testimonies (Smith, 1996). As suggested by Twyman *et al.* (1999), it is far simpler to convey the meaning of what someone has said quickly than it is to relay word by word what they have said. Extensive explanation took place to clarify that

word-for-word translation was required, since the interviews were not being tape-recorded. Although lengthening the time the interviews took, this allowed the receipt of considerably more detailed information. Lengthy discussions also took place with each of the translators where there was no literal translation from Siswati to English or *vice-versa*. This was inherently complicated because the whole Siswati language consists of only an estimated 4000 words (Bosch, 1999), so approximations of terms had to be made following contextualisation. It is felt that even if the interviews had been tape-recorded and transcribed, this would not have added much (if any) accuracy to the research. Many of the interviewees were unable to read in their native Siswati, so the transcripts could not have been verified by the respondents (cf. Twyman *et al.*, 1999). As a result, I can only access the secondary texts as produced through the translators and as such, care had to be taken in interpreting meanings which relate to social contexts and situations, to the people who produce them and to the political, economic and social positions of those involved (Smith, 1996).

Interviews with government officials were conducted in English rather than Siswati. This also highlighted issues of differences in meaning across cultures and languages. In discussing ‘land degradation’, considerable emphasis was placed by the respondents on gullying and visible forms of soil degradation, yet when questions were re-phrased during cross-checking using terms such as ‘environmental change’ in place of ‘degradation’, this broadened the discussions to include decreasing fuelwood supplies and other negatively perceived environmental changes, thus moving away from exclusively talking about soils and soil degradation. At times it was difficult to maintain awareness that interviews were taking place in the second languages of the participants. The language in which knowledge was being constructed as well as the participants’ proficiencies in English will have affected the way in which meanings and opinions were portrayed. Whilst it is acknowledged that translation will always produce a “reduced and distorted representation of other social texts and practices” (Smith, 1996: 162), it does not mean that research conducted in the home language will not require interpretation, as meaning could still be lost.

4.5 Ethical considerations

Throughout the data collection process every effort was made to show respect to those involved in the research. My translators were invaluable in providing cultural advice

with regard to what constituted acceptable and unacceptable actions, especially prior to my audience with King Mswati III. Appropriate clothing was worn during interviews and honesty regarding the use of data and the purpose of research was maintained at all times. It was stressed throughout the research that reports of my findings would be given to members of government and agricultural extension officers but also that I could not guarantee any direct changes would be made in response to my report. It was made clear to the villagers that the research was not part of the MOAC/JICA¹ funded pilot projects and that I was not present in the village to provide any form of aid. The anonymity of those involved in the research has been upheld throughout the study. All the names of participants used in this study are wholly fictitious. If the names of people who reside in the study villages have inadvertently been used, I apologise to them, as it was completely unintentional.

Participants were not remunerated for the information they supplied although gifts such as postcards from England and re-prints of photographs of members of participating households taken during the first trip were given to case study homesteads who sacrificed much of their time in order to take part in the research. Culturally appropriate food (spinach, groundnuts and mielie meal) was regularly taken to the homesteads at which my translator and I lived during our time in Engcayini and KaBhudla. These gifts of food were intended for consumption by the hosting household, although on many occasions, whilst it had been agreed that my translator and I would provide for ourselves, we were offered traditional Swazi meals, in return for which we gave western food. This sharing of food also helped to build the rapport between the case study households, my translator and me. At focus group meetings, bread and orange juice were shared with the participants.

4.6 Definitions

Throughout both phases of data collection, one continuously recurring methodological problem was how to define many of the concepts involved in the research. For example, the questionnaire survey was intended to address land use and land management activities together with natural resource use at the household level. Guyer (1981: 89) defines a household as a “domestic unit with decision-making autonomy

¹ JICA is the Japanese International Cooperation Agency and MOAC is the Ministry of Agriculture and Cooperatives.

about production and consumption” so this primarily links to commodity flows. However, in many situations in Swaziland, the homestead or *umuti* (plural *imiti*) is the basic unit of survival (Leliveld, 1997), and there is no direct translation for the word ‘household’ into Siswati (Rob Mackenzie, pers. comm.). Russell (1984) argues that the homestead and the household are not identical because homesteads may consist of several units of production or consumption. This was found to be the case in this study, with some households functioning as separate units within a homestead, and other homesteads comprising many households, whilst in terms of decision making and agricultural activities, they were acting as a single unit. Other homesteads consisted of, and therefore acted as, only one household unit. This situation occurs because some males are polygamous but may not have enough money or land to build separate homesteads for each wife (*ibid.*). In some instances a patriarch’s wives and the wives and children of his sons may also share the *umuti*, either functioning as one big household or many separate units. His unmarried daughters and their children may also live in the same homestead but depending on the level of financial support that is given by the absent father(s), they may or may not act as a separate household entity. In other situations, a patriarch may build separate homesteads for each wife in separate compounds (Rob Mackenzie, pers. comm.) and as found in this research, many patriarchs have at least one other homestead in another chiefdom that may be inhabited by either a wife, their children or parents (Dlamini, 1997).

After much discussion with my translators, it was decided that we should interview each unit of production and consumption separately, be it one household in one homestead, or a homestead comprising several households, as this was believed to be most relevant to natural resource use and land management strategies and therefore most appropriate to the research. The terms ‘household’ and ‘homestead’ are consequently replaced in this study by the Swazi term *umuti* hereafter and refer to a single unit in terms of production and consumption, regardless of the number of households included in that unit. This was considered the most accurate terminology to use. Care had to be taken in carrying out the questionnaire survey that the respondents were aware of the definitions we were using. This was important because it would have affected the responses to some of the questions in the biographical section of the questionnaire, such as “how many people belong to this *umuti*?”

The other methodological problem was that it was very difficult to physically define the boundaries of each village when there were no obvious geographical features such as a river or a school that clearly marked the boundary. There are no official maps of the chiefdom boundaries in Swaziland due to the contested nature of such issues, whereby rival factions are competing for the chieftaincies (JICA, 2001). Indeed, clearly defining chiefdom boundaries is one of the priorities of Swaziland's NAP (NAP, 2000). The lack of defined boundaries was problematic for several reasons. In conducting the questionnaire interviews, it was intended that the study areas under investigation would be three particular villages that had been carefully selected and where permission had been granted for the research to take place. However, in KaBhudla for example, the chief indicated the boundaries during a walk around the village, yet when it came to conducting the questionnaire survey, some *imiti* within the chiefdom boundaries according to the chief belonged to a different chiefdom according to the people who live there. It was suggested by my translators that this is a common occurrence that comes about due to the ways in which food aid has been distributed in the past. Aid is administered by chiefdom, so those people bordering a chiefdom that is receiving food aid are likely to change their alliances in an attempt to obtain the aid. This is recognised as a problem and people are now supposed to register to receive the aid but this is often ignored by the NGOs distributing the food (Vusi Mamba, pers. comm.). This again illustrates the centrality of positionality in the research, because if I was perceived as a potential source of aid when carrying out the questionnaire survey then people may change their chieftaincy affiliations in response to this.

4.7 Analysis

This chapter has so far presented an outline of the multi-methodologies that were employed during this study, together with a justification for their use. It has been shown that data collection is not a neutral process and that many considerations such as power relations, positionality and carrying out research in a foreign language can all affect the nature of the information received. Similarly, natural scientific methodologies introduce different kinds of ambiguity, in relation to sampling strategies, sample contamination and the introduction of error during analytical processing. Interpretations of the aerial photographs were also subjective and dependent on the judgements made during digitising. Whilst the subjectivity of data collection has been

addressed, the final section of this chapter moves to consider the processes of analysis that took place and notes that interpretation of the data must also be a reflexive process.

Data analysis took place throughout the period of information gathering, in line with the Grounded Theory approach. Initially this was at a descriptive level in order to note any trends in the data but it progressed to a more detailed level as both qualitative and quantitative social and environmental information was integrated. The first step in analysing interview and transect walk data was to code the information. As this process progresses, it allows inferences to be made about the meanings of what people have said. Coding first consisted of indexing the data under various themes. This was conducted initially at a general level but moved then to the particular, as patterns within the codes were identified. In some cases, the themes that emerged were the same as those selected for the semi-structured interview agendas. However, consistent with the Grounded Theory approach (Corbin and Strauss, 1990), categories were defined through iterative analyses of the data, refining the coding as new data were evaluated. From the coded data it was possible to ascertain any similarities and differences in responses and conduct further detailed analyses, specifically on the data yielding information relating directly to the research questions. Several matrices, spreadsheets and summaries were used to visualise and represent the data and this allowed further exploration of patterns in the issues raised by the participants.

A similar process was followed during analysis of the scientific data. Tables were constructed and graphs were drawn to elucidate any relationships between the variables. Inter- and intra-field differences in soil nutrient analyses were tested statistically where possible. Data were confirmed as being normally distributed following visual analysis of the descriptive statistics, so an analysis of variance (ANOVA) test was conducted on the nutrient data using the MINITAB 13 statistics package. Significant differences between variables were noted where $p \leq 0.05$.

Integration of the qualitative and quantitative components of the social and environmental data marked the next stage of analysis. The methodological literature was found to suffer a paucity of explicit accounts of how different datasets are integrated and the problems experienced during processes of integration. In this

research, integration of the datasets allowed the triangulation of the results and highlighted similarities and contradictions in the interpretation of the data. During this process, care was taken not to set up dualisms between ‘scientific’ and ‘social scientific’ data and also between the different local knowledges that were emerging. The context of the data also had to be recognised during interpretation and this was sometimes difficult, particularly given the wide range of linkages between each actor and the broader actor network (Latour, 1992).

The purpose of the integration of the social and environmental datasets was to ensure that different aspects of the research questions were addressed. Reflexivity had to be maintained at all times and this was challenging because although the quantitative scientific measures yielded numerical data, this is no more or less valid than qualitative information. Interpreting data from the focus groups was particularly difficult given the power relations at play in such situations (Mosse, 1994). Measurements are meaningless until interpreted in a given context, particularly in desertification research where some environmental changes may not be considered problematic to all land users. Where contradictions were found, further iterative analysis took place in order to ascertain why and how the conflicts in information may have come about. This became a circular process that led to inductive interpretation, explanation and finally, as data and theory interacted, new theories based on the evidence were developed. These interpretations are presented in the remainder of this thesis, following the presentation of the social, political and environmental characteristics of Swaziland and an exploration of the ways in which these have affected power relations and control over access to land.

CHAPTER 5: Swaziland: the national context

5.1 Introduction

In line with the political ecology basis to this research, this chapter examines how historical influences and broader scale processes have influenced contemporary patterns of control, access, conflict and natural resource use in Swaziland (Peet and Watts, 1996). An understanding of Swaziland's colonial and post-colonial history is central to the comprehension of current population distributions, land use and land management practices (Blaikie and Brookfield 1987; Vayda and Walters, 1999) as this has affected current power relations and patterns of social differentiation. In turn, this has determined who can have access to natural resources. This chapter begins with an overview of the Kingdom of Swaziland and presents essential, descriptive background information on the country's political history and the current balance of power at the national level. This is followed by an outline of the environmental characteristics of Swaziland, including its geology and soils. Swaziland's climatic characteristics and variable patterns of rainfall are important influences on the availability and condition of natural resources, which in turn are linked to the sustainability of rural livelihoods and these are also examined. Recognition of the key roles of land tenure and tradition is vital in any examination of natural resource use and land degradation in Swaziland (Mushala *et al.*, 1994) and patterns of access and control over land are considered in the next section. The components of rural livelihoods are also explored, first at the national level and then more specifically in the study villages. The characteristics of the three villages involved in the research are then presented and a livelihoods analysis of the case study households is undertaken.

5.2 Swaziland's political characteristics

The contemporary Swazi state was formed early in the 19th century as part of the process of regional state formation triggered by the rise of the Zulu empire (Daniel and Vilane, 1985). By 1860, under the rule of Mswati I, the country had settled into a tributary mode of production (Cocks, 2000). Aristocrats comprising the monarchy, princes and chiefs were the dominant social class. Their traditional authority was legitimised through control over land, access to cattle and wives, and the male monopolisation of the material basis of wealth (Gulbrandsen, 1995; Levin, 1997). Until

the last quarter of the 19th century, the Swazi monarchy controlled all of the land, either directly or indirectly through chiefs. This constituted the basis of royal power. Prior to the colonial period, some of Swaziland's land area was surrendered in battles with the Boers and Portuguese, whilst a number of conventions by the Boers and British also changed its area, leading to the demarcation of its current boundaries (Funnell, 1991). In some cases, this had the effect of displacing many ethnic Swazi outside the borders of their own country (*ibid.*). Land was also 'lost' from within Swaziland's borders, through the issue of an estimated 400+ temporary land grants to South Africans and Europeans (Crush, 1980a), who incorrectly believed that they were being given permanent concessions (Crush, 1985; Mushala *et al.*, 1998; Cocks, 2000). In Swazi culture, the granting of land concessions lasts only for the lifetime of the petitioner, so the private ownership of land was traditionally unknown. In the past, land had always been vested in the nation, whilst its control was in the hands of the ruler and his elites (Matsebula, 1992).

The continual threat of invasion by the Zulus and repeated loss of land to the Boers and British in the late 19th century resulted in the alliance of Swaziland with the British. In 1902, Swaziland became a British Protectorate. During this time, the monarchy was partially retained. King Sobhuza II took the role of 'paramount chief', whilst the British assumed administrative control (Levin, 1997). By the 1960s, Swaziland was demanding independence, as King Sobhuza wanted to regain some of the internally 'lost' land for the Swazi people. The British were prepared to grant independence on the basis that the Swazi government would consist of a Legislative Council, elected on a universal franchise (Swazi Observer, 2001) and on the condition that King Sobhuza's role was amended to that of constitutional monarch (Funnell, 1991). Independence therefore posed a threat to the power of the monarchy and the control of the traditional institutions, so in 1964, King Sobhuza responded by establishing his own political party, the *Imbokodvo* National Movement (INM). The INM was heavily dependent on the prestige of the king, a unified Swazi nation and the authority of the chiefs, who attained their position due to traditional Swazi law and their selection by the king (Levin, 1997). The INM therefore promoted the ideology of traditionalism and the 'Swazi' way of life, with Sobhuza as the personification of tradition. This was successfully presented as a struggle for the legitimacy of national institutions in the fight against colonialism and united the masses behind the throne (Cocks, 2000). The INM won the first elections in

1964 and 1967, monopolising Swaziland's politics. Independence was eventually gained in 1968. However, the Westminster-style constitution that had been adopted indirectly legitimised a dual system of government, concealing the fact that the king was still in control, only through the INM (Macmillan, 1985).

Also at this time, control over Swaziland's mineral concessions was granted to the king in trust for the nation. This marked the establishment of the *Tibiyo Taka Nagwane*² fund in which the mineral royalties were deposited (Sallinger-McBride and Picard, 1989). This provided the aristocracy with capital for investment and the fund has since been used in a multitude of different ways: to purchase back freehold land from foreign settlers; to set up maize, dairy and sugar estates; and to develop commercial enterprises such as butcheries, the state television service and the national airline (Daniel and Vilane, 1985). This move was particularly strategic because at this time educated Swazi elites were becoming more and more powerful within the civil service and commercial sectors. This group was seen as a potential threat to the power of the monarchy and leadership of the traditional authorities (Sallinger-McBride and Picard, 1989). This is primarily due to their economic assertiveness and accumulation but also their reluctance to support the traditional feudal aristocracy. Formation of the *Tibiyo* fund created a corporate empire that acquired equity in almost every foreign subsidiary in the economy, thus consolidating a material base of capital accumulation, enabling the traditional leaders to increase the amount of land under their jurisdiction and reaffirming the social supremacy of the aristocracy (Vieceli, 1982; Daniel and Vilane, 1985; Sallinger-McBride and Picard, 1989). The fund is exempt from taxation and parliament has no control over its operation or its audit (Vieceli, 1982).

Royal hegemony was accentuated further on 12th April 1973 with King Sobhuza's abrogation of the constitution in a parliamentary coup that was orchestrated to make him an absolute monarch (Mzizi, 2002). Sobhuza argued that the constitution had:

....permitted the imposition into our country of highly undesirable political practices, alien and incompatible with the way of life in our society, and designed to disrupt and destroy our own peaceful and constructive and essentially democratic method of political activity. Increasingly this element engenders hostility, bitterness and unrest in our peaceful society (Daniel and Vilane, 1985: 57).

² This fund is hereafter referred to as '*Tibiyo*'.

In 1979, a new parliament was established along what are described as ‘traditional lines’ based on the *Tinkhundla*³ system, whereby the public vote for electors from an approved list (Macmillan, 1985). This created a dual political system and allowed the king to distribute royal power throughout the countryside whilst maintaining centralised control, thus reinforcing the traditional ideologies to his mass base of rural people and remaining loyal to ‘traditional custom’. In this context, ‘traditional’ did not mean old or inherited. As had been the case in the past, ‘tradition’ was used as a disguise to legitimise the securing of power by a small proportion of the population (Bishcoff, 1988).

Swaziland remains a monarchy today. All powers are now vested in King Mswati III, although the role of the Queen Mother is significant. Executive authority is vested in the king and exercised through a dual system of government. All legislation and executive powers are vested in the King in Council. The appointment and removal of Ministers is the prerogative of the king. Immediate lines of accountability and responsibility are from the Ministers in Council to his Majesty. The king also exercises his power as Head of State via the Swazi National Council, which consists of every Swazi adult. Its purpose is to advise the king on all matters relating to the traditional institutions and culture of the Swazi Nation, as regulated by Swazi law and custom. There is also an Inner Council or *Liqoqo* which manages the daily affairs of the Swazi National Council. The main scope of this traditional authority, with its law-making functions, concerns legislation over land, minerals and Swazi law and custom (JICA, 2001). The political system is therefore still highly centralised with regard to the distribution of power (Sallinger-McBride and Picard, 1989). Figure 5.1 summarises the main channels of accountability to the king.

³ *Tinkhundla* is the plural of *Inkhundla*, which means ‘meeting place’ in English and applies to rural centres of administration. Reforms introduced in 1992 by King Mswati III formally defined the *Inkhundla* as ‘the common delineated area for both local and national government’ and each *Inkhundla* has a representative in the House of Assembly (JICA, 2001).

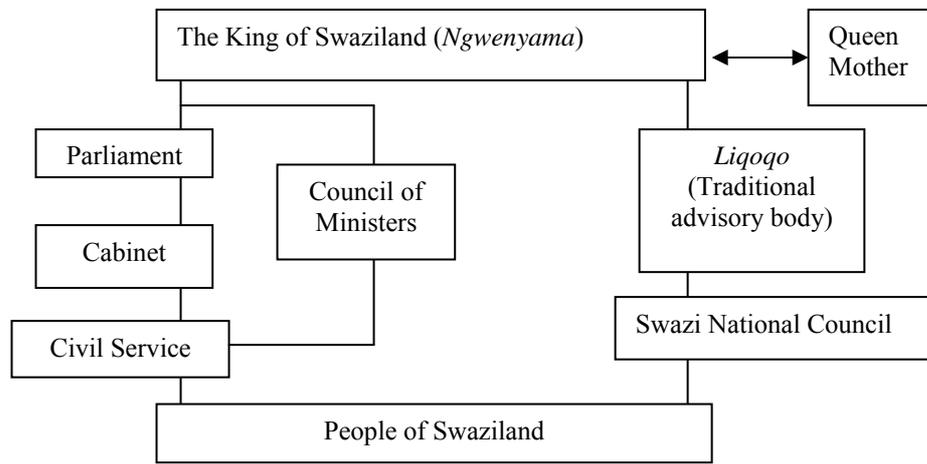


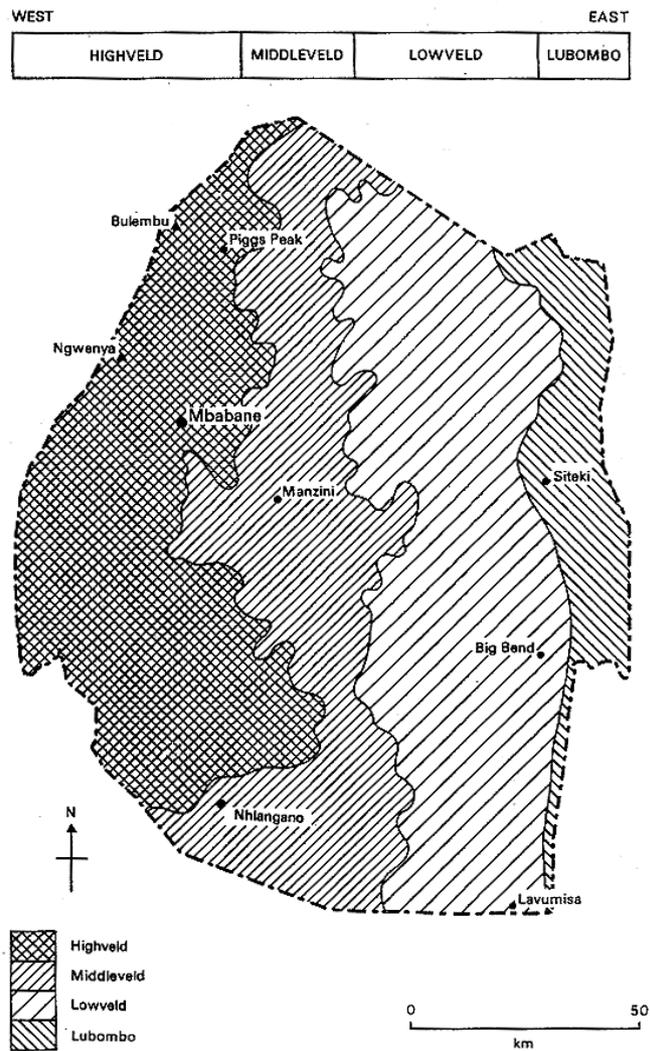
Figure 5.1: Swaziland's contemporary political structure (adapted from JICA, 2001)

Today, the constitution remains under review, whilst traditional administration and Swazi culture are regulated by judicially recognised, uncodified laws and customs. Multi-party politics are illegal and trade union activity is restricted (Barrett, 1998). Access to land continues to be administered through 180 chiefs, each appointed by the king (GOS, 1996). Although control over the land remains the basis of power for the chiefs, it has gradually decreased in importance in modern times. This is due to the increased potential for private land ownership by ordinary Swazis as waged labour opportunities have become more available to Swazis. The impact of this has resulted in the control of the aristocracy becoming considerably less complete (GOS, 1995). However, money and returns on private investments and funds such as *Tibiyo* have increased in significance, allowing the aristocracy to maintain its position within Swazi society.

5.3 Swaziland's environmental characteristics

The landforms, geology and soils of Swaziland set the environmental boundary conditions that influence processes of degradation so these biophysical factors are important to consider (Lambin *et al.*, 2002). The most straightforward level at which to explore Swaziland's environmental history was developed by Murdoch (1970) and was later modified by Rimmelzwaal (1993). These schemes divide the terrain of Swaziland into six physiographic zones that consider elevation, geology, landforms, soils and vegetation. The divisions include the highveld, middleveld (which comprises two subdivisions), lowveld (again, comprising two subdivisions) and the Lebombo Mountains. These divisions (excluding subdivisions) are illustrated in Figure 5.2.

Major regions



**Figure 5.2: Physiographic zones of Swaziland
(Source: Goudie and Price Williams, 1983)**

The highveld, middleveld and western part of the lowveld are composed of various plutons, diapers and batholiths, aged from 2500 to 3500 million years. The bedrock most commonly comprises granites, grandiorites, diorites, gabbros and gneisses, whilst soils are characterised by ferralsol associations (Scholten *et al.*, 1997). In the middleveld, a genetic dependence between parent rock and the overlying soils has not been established (Scholten *et al.*, 1997). This is because varying intensities of more recent erosional processes have caused the development of polygenetic soils. The main topographical, geological and pedological characteristics of each physiographic region are synthesised in Table 5.1.

Table 5.1: Summary of the physical characteristics of each region of Swaziland

Region and percentage of total area it covers	Population (%)	Topography	Geology	Soils and production potential	Other information
Highveld 33%	31.4 (CSO, 1997)	Upland area with altitudes over 1050 m - part of the Drakensberg escarpment. Faulted and folded bedrock assumes a ridge and valley relief (Funnell, 1991). Gradients are steep - the median slope is 18%.	Bedrock comprises granites and gneisses. Granites originate from various igneous events, of which the Mswati granite is the youngest magmatic phase (GOS, 2001).	Acidic soils have developed on the saprolite during the warm and humid weathering periods since the Cretaceous. 3% of the highveld is regarded as good arable land, whilst 10% is classified as having moderate potential for crop production according to criteria of soil, slope and climatic characteristics (Mushala <i>et al.</i> , 1998).	Agricultural activities and settlement opportunities are somewhat limited by the steep gradients, though this region does possess one of the world's largest forestry plantations (Funnell, 1991). High altitudes make this region the coolest and wettest part of Swaziland (Goudie and Price Williams, 1983).
Middleveld (2 subdivisions: upper middleveld and lower middleveld), 26% in total	40.0 (CSO, 1997)	Altitudes in this region vary from between 300-1050 m (Goudie and Price Williams, 1983).	The upper middleveld is characterised geologically by granodiorite and granite but gneiss and shale are also apparent (Morgan <i>et al.</i> , 1997).	Arable soils are good to fair in terms of production potential in about 15% of the middleveld (Mushala <i>et al.</i> , 1998), so the area is capable of supporting a wide variety of crops, including maize, cotton, beans and cowpeas (FAO, 2001). Complex patterns of sandy soils and deposits occur in the upper middleveld due to local cycles of soil formation, erosion and sedimentation. Contemporary soil formation is mainly through ferralitization and kaolinitization processes (Morgan <i>et al.</i> , 1997).	This region is very important in terms of small-scale agricultural activity. Whilst being the most productive land in the country, it is also the most densely populated area and is most at risk from actual and potential soil erosion (Jansen <i>et al.</i> , 1994).
Lowveld (2 subdivisions: western and eastern lowveld) 35% of total land area	29.0 (CSO, 1997)	Altitudes in this region are considerably lower, averaging 150-300 m (Goudie and Price Williams, 1983).	Western lowveld geology comprises sandstones, claystones and other sedimentary rocks of the Karoo Supergroup, whereas the eastern lowveld consists primarily of Karoo basalts (GOS, 2001).	Younger and less weathered soils can be found in the lower middleveld and lowveld as these regions have been strongly eroded during geological erosion cycles (Rommelzwaal, 1993). Conditions of the present and recent past are not conducive to weathering and saprolite formation (GOS, 2001).	The lowveld is sparsely populated, mainly because of the marginal conditions for non-irrigated agriculture (Funnell, 1991) but also because of its historically high susceptibility to malarial infestations. Soils are considered good and suitable for cultivation, with grassland classed as nutritious, despite the vulnerability of the region to drought (Mushala <i>et al.</i> , 1998). The lowveld hosts many large-scale, irrigated, commercial plantations of sugar, maize, cotton, tobacco and citrus.
Lebombo 6%	5.7 (CSO, 1997).	Altitudes rise from the lowveld to reach a maximum of 777 m, then gradually fall to the east (Goudie and Price Williams, 1983).	Geologically, the Lebombo consists of the youngest Karoo rhyolite and ignimbrite (GOS, 2001).	Mushala <i>et al.</i> (1998) report that approximately 12% of this area has arable soils with good or fair production potential although soils are younger and less weathered, similar to the lowveld and lower middleveld.	Climate and vegetation cover are similar to that of the middleveld, though a higher proportion of bush species can be found in the Lebombo.

The overall climatic character of Swaziland is subtropical with summer rains (October to April). January mean maximum temperatures range from 34°C in the eastern lowveld to 22°C in the highveld. The lowest July mean minimum temperatures of 5°C occur in the highveld and the highest of 10°C are recorded in the eastern lowveld (GOS, 2001). Mean annual rainfall ranges from 1450 mm in the highveld to less than 600 mm in the lowveld (GOS, 2001). Approximately 26% of the total land area receives less than 600 mm mean annual rainfall (ECS, 1999). These areas are said to be semi-arid, whereby the ratio of annual precipitation to potential evaporation falls within the range from 0.05 - 0.65 (UNCCD, 1994). Swaziland inherently suffers from periods of drought and rainfall variability (Manyatsi, 1997) so the consideration of non-equilibrium ecological theory (see chapter 3) is valid for this context. Meteorological data indicate that average rainfall from 1968-2001 as received at the middleveld Matsapha weather station is 917.1 mm per annum. Data from 1968-2001 indicate that 19 out of the past 33 years have received below average rainfall inputs, with the worst drought⁴ conditions occurring in 1982 and 1992, when annual rainfall receipts totalled 523.6 mm and 525.4 mm respectively at the Matsapha station. During these times, areas of the lowveld received even less rainfall, as this zone is lower in altitude, hotter and drier.

These drought periods are believed to be linked to El Niño and have had a significant impact on rural land users and their environment. A high proportion of Swazis are dependent on rain-fed cultivation to obtain food so for some *imiti* (an estimated 20-25% (Holt *et al.*, 1998)) who rely on the sale of excess produce as the mainstay of their livelihoods, the impacts of drought can be very harsh. A lack of water can also affect natural resource abundance and cause declines in the availability of plant and tree products for harvesting by local people (GOS, 2001). The amount of rainfall received also affects the availability of fodder for cattle, goats and other wildlife. Drought increases pressure on the resources that remain, often resulting in irreversible environmental changes, such as increases in soil erosion and gullyng when the rains do come. This in turn impacts upon livelihoods of many rural Swazis. Estimates suggest that on average, one woman in every rural *umuti* relies on natural resource based crafts to earn a living and although of these only a small proportion generate a realistic

⁴ Drought is defined here as below average rainfall conditions.

income, this still amounts to approximately 55 000 women who rely on the availability of grass and other natural resources for at least part of their livelihood portfolio (Osunade, 1994a). An increase in the frequency and intensity of the drought periods has therefore resulted in a growing need for adaptive and flexible livelihood strategies (Warren *et al.*, 2001a).

5.4 Patterns of access and control: land tenure in Swaziland

One of the key factors in determining sustainable and effective natural resource use is the level of power and control that people have over their endowments (Moore, 1996). It is the traditional prerogative of all Swazi males to be allocated land to enable them to pursue a livelihood. However, this right was undermined in the colonial period. The British sought to produce a more orderly network of land concessions, accord settlers more direct control over Swazi labour and effect changes to the indigenous mode of agricultural production (Crush, 1980a). In 1907, the Swazi territory was partitioned. The indigenous peasantry was allocated approximately a third of the country in the form of 32 reserves, exclusively for their use, whilst the remaining two thirds were designated as Crown Land and Title Deed Land (TDL) (Magagula, 1986). With this loss of land came the threat to royal hegemony as control over labour and power was also surrendered (Levin, 1997). Between 1907-1913, those Swazis living on TDL were expected to leave or else assume the status of squatters (Funnell, 1991), although as some form of concession, Commissioner George Grey is reported to have stipulated that there should be no forced movement of Swazis and that the potential distance to be travelled should be minimised for those who did not wish to become squatters (Crush, 1980a). Crush (1980a) reports that both the settlers and Swazis claimed that the other had been given the best land. However, Murdoch's (1970) land capability survey indicates that 79% of reserve land consisted of poor or un-tillable soils and of the remaining 21%, 6% was on slopes of 14° or more. The reason given by Grey for his concentration of the majority of the population in the middleveld was because of its '...greater capacity for carrying a large native population than any other portion of Swaziland' (Grey, 1908 in Crush, 1980a: 79). However, Grey later reported that: 'the best land and much good grazing is left to the white owner...the white owner should be well satisfied with his portions; the more accessible are left to him...' (*ibid.*).

From 1899-1921, Labotsibeni reigned as Queen Regent, imposing taxes on the Swazi people in order to raise funds that could be used to buy back the land lost to the colonial settlers. This had critical implications for the aristocratic classes and the monarchy, as land loss was not just viewed as a political and economic issue; for Labotsibeni to have her country predominantly owned by foreigners threatened her credibility as Queen Regent, together with the viability of Swazi culture (Murray *et al.*, 1996). Following Independence in 1968, the British administration released more land for rural settlement, much of which has been purchased with *Tibiyo* funds. However, the land tenure duality is still very prominent today, with contemporary population distributions being a product of the land partitioning by the British (Murray *et al.*, 1996). Whilst there have been various interpretations of the colonial land policy in Swaziland and these are well documented (see Boyce, 1947; Mashasha, 1972; Hughes, 1972; Hyam, 1972; Crush, 1980a,b), they primarily demonstrate how the ideology and economic objectives of colonial rule, combined with the desires of the traditional aristocracy to maintain their power and position within society, can reduce the wider processes of social change (Blaikie, 1985). In this case, it was through favouring commercial farmers, accumulating a store of wealth and decreasing the capability of indigenous farmers to maintain the sustainable use of natural resources, as power was exercised to prevent access to certain areas of land.

5.4.1 Swazi Nation Land (SNL)

At present there are three principal types of land tenure. Swazi National Land (SNL) is the first and constitutes 72% of Swaziland. This is held in trust for the nation by the king (Magagula, 1986) and is divided into 180 chiefdoms of various sizes and population (Mushala *et al.*, 1994). 69% of the Swazi population lives on SNL (Funnell, 1991), although the attributes of this type of land tenure have never been defined by legislation (Rose, 1992). Within this land tenure type, subdivisions can be made, into SNL *sensu stricto* (that is, all the land that was SNL at independence) and SNL purchased (which comprises all the freehold land bought-back after independence which then regained SNL status) (GOS, 2001). However, there is still a title on SNL purchased. Of these two subdivisions when combined, approximately 75% is under the administrative control of chiefs, 9% by the Ministry of Agriculture and Cooperatives

(MOAC), 4% by *Tibiyo* and 3% by the National Trust Commission. The remaining 9% is leased (*ibid.*).

This research is concerned with SNL that is administered by chiefs. In this case, land is allocated to the head of each household within a community in order to provide him with a means of livelihood. Traditionally this is a married male who has professed allegiance to a chief or *Khonta-ed* (Funnell, 1991). The proportion of land a male is allocated varies depending on his needs, age, social status and lineage, although ECS (2001) report that 48% of SNL land holdings cover an area of <1 ha, whilst 67% of holdings are <2 ha per household. In accordance with Swazi culture and traditional law, land is distributed by the chief of each area. The patrilineal nature of Swazi society results in any children belonging primarily to their father's clan. Although women are granted the right to a means of a livelihood through their husband, should he die, his wife, or most often his sons, will inherit the land (Mushala *et al.*, 1998). Daughters have no claim to inheritance as it is assumed that they will marry and acquire access to land via their husbands (Mushala *et al.*, 1994), so control over resources is highly gendered (Daly, 2001). Whilst no security of land tenure is guaranteed, it is unusual for people to be relocated or have their land taken away (Funnell, 1991).

5.4.2 Title Deed Land (TDL)

The second land tenure type is Title Deed Land (TDL), which covers an area of approximately 750,000 ha. TDL is divided into farm units, with each farm covering up to about 800 ha. It is distinguished by the recognition of exclusive access rights to a defined area, with the title held by either corporate bodies or individuals (Mushala *et al.*, 1998). TDL is commonly used for large-scale commercial farming or forestry, with irrigated plantations of sugarcane, pineapple and citrus being most widespread. Until the early 1990s, Swaziland's economy was predominantly agriculturally based. However, more recently there has been a shift away from primary production through growth in the manufacturing industries, which contributed 39% to total GDP in 1991 (GOS, 2001). Production on TDL accounts for approximately 60% of agriculture's contribution to GDP and produce comprises mainly sugar cane, pineapple and citrus fruits (FAO, 2001). This is inextricably linked to the development in the manufacturing sector, with growth in industries such as sugar-refining, pulp-milling and fruit canning

(Schweger *et al.*, 1993). The capacity for growth in TDL production is limited however, due to low returns and high risks associated with rain-fed agriculture.

Three-quarters of Swaziland's TDL is held by Swazis, 'white Swazis' and expatriates. The remainder is under the ownership of various companies, including the Commonwealth Development Corporation and the Roman Catholic Church. Swazis can and do acquire TDL whilst still maintaining their rights to SNL, as racial barriers to TDL ownership were removed in 1963 (Funnell, 1991), so these land tenure types are not mutually exclusive (Mushala *et al.*, 1994). This has had an important impact on the authority of the chiefs because Swazis may purchase land should they have the financial capabilities, thus increasing their access to resources. Simultaneously, this undermines the basis of power and erodes the extent of control that the aristocratic elites have over the land (Rose, 1992). This land tenure type was not examined in the present study but is included for completeness.

5.4.3 Crown Land

This land tenure type is minor in its extent, covering 0.4% of the country. It is not considered a fundamental part of the present study but is worthy of attention in order to complete the overview of Swazi land tenure. Crown Land is the land over which the government holds the title. For example, if land is purchased by MOAC for agricultural projects, it is registered as Crown Land. However, if the king buys land and requests a ministry to administer a project on this land, it is registered in the name of the 'King in Trust' and therefore is considered to be SNL (Levin, 1997).

5.5 Land use and livelihoods

As outlined in chapter 3, this study places people at the centre of analyses of environmental change so as to enhance understanding of the complex interplay of both physical and human components. The following section considers how rural *imiti* utilise their available and accessible natural resources and explores the role of natural resources in rural livelihood strategies.

At *umuti* level, agriculture plays a significant role in rural livelihoods, as arable and livestock production often comprise the main economic activities (Holt *et al.*, 1998). However, most land users do not pursue purely subsistence living. Rural livelihoods are

often either highly specialized or, as in Swaziland, very diverse. This seeks to spread the risks and reduce vulnerability to shocks (Chambers, 1997). The majority of rural livelihoods are therefore based on a combination of complex resource use patterns in conjunction with the diversity of available and accessible assets. Arable production, which takes place on allocated land, represents a significant component of most livelihoods, although the harvesting of communal natural resources such as grass, fruit and wood poles is also important. Even though these natural resources may not be sold onwards, they still play an important role. For example, cash expenditure can be reduced through collecting fuelwood rather than buying it and harvested resources can also be exchanged locally for goods or services. This is most significant in the livelihood strategies of poorer *imiti* (cf. Shackleton *et al.*, 2000). Poor families in particular often receive food as a gift or as a transfer in kind from relatives or neighbours in exchange for assistance with tasks such as weeding or harvesting (cf. Scoones, 1998). This demonstrates the key role of social networks in rural livelihood strategies. Temporary or permanent waged employment of one or more members of each *umuti* is also increasingly commonplace and provides vital financial contributions to the budgets of most families (Holt *et al.*, 1998). Under the present tenure system, land cannot be used as collateral, although farmers can bond their cattle against bank loans (JICA, 2001). Whilst most Swazis do not use credit or have loans, rural Swazi *imiti* do participate in the wider market economy outside of their chiefdoms in order to rent tractors and to purchase food and other items such as seeds and fertilisers. Rural people are therefore subjected to irregularities in market prices as well as the impacts of policy decisions. This illustrates the centrality of the consideration of the broader political economy in the examination of rural livelihoods because people cannot and do not operate outside of wider structural influences (Pretty *et al.*, 2002).

Swazis who have been allocated a proportion of SNL typically build their homes next to their arable fields (Osunade, 1994a). Accommodation on much SNL takes the form of huts made from mud, sticks and stones, although in some instances, families have constructed more substantial buildings from a combination of concrete blocks and corrugated iron. Each *umuti* comprises a group of huts. For example, one of the case study *imiti* in Engcayini comprised huts used as bedrooms and kitchens, a mat-making hut, some huts used for storage of produce and agricultural tools and an *indumba* (traditional medicine making hut). Figure 5.3 depicts the huts of a typical Swazi *umuti*.



Figure 5.3: Photograph of a typical Swazi *umuti*

Most SNL *imiti* are fenced around some or all of their perimeters and throughout Swaziland grass strips can be observed, separating plots of arable land both within and between land holdings. This stems from a King's Order of 1953, which stated that grass filter strips are to be left on ploughed land at such intervals as advised by agricultural extension officers, in an attempt to stop soil erosion (Nsibandze, 1987). Strips are required to be about 2 metres wide and at intervals of between 5 m and 20 m. Their exact proximity is dependent upon the slope gradient (Osunade and Reij, 1996). In this research, widths were found to vary from 1.23 m to 2.99 m and heights ranged from 1.33 m to 2.36 m. Between 1949 and 1960, 113 780 km of strips were planted and estimates suggest that today up to 80% of farms in the middleveld have grass strips (Osunade, 1994b). This is reported to have significantly reduced the occurrence of erosion on SNL (GOS, 2001; ECS, 2001), although the impacts of the strips have not been quantified or formally assessed. The variety of uses of grass in Swaziland results in it being an important natural resource in addition to its function as a soil conservation measure. Grass materials and artefacts feature in traditional celebrations, including wedding ceremonies, where a bride must give her husband's family mats and brooms made from grass (Osunade, 1994b). Many people harvest grass for use in traditional medicine, roofing and handcrafts. Sometimes it is also used as fodder for cattle in the winter. A number of the rural Swazis involved in this research reported that they burn

their grass strips on an annual basis. This is believed to stop the spread of fires from elsewhere, whilst also stimulating new vegetation growth and reducing crop pestilence.

Cultivation practices on allocated SNL are characterised by small-scale subsistence agriculture, where farmers typically cultivate crops such as maize, groundnuts, beans and sweet potatoes. Estimates suggest that up to 97% of these smallholders have no means of irrigation (GOS, 1998). Seasonal calendars constructed with the case study *imiti* in this research indicate that maize is usually planted during the period of October to December following the first spring rain. Harvesting of produce grown on arable land takes place between February and June. A typical land management calendar produced with a case study *umuti* is shown in Table 5.2. The Gregorian monthly calendar structure is used for ease of comprehension, although it has been divided into three main seasons in terms of agricultural tasks, beginning with the Swazi growing season.

Table 5.2: Seasonal calendar showing the timing of the main agricultural tasks

Month/season	Agricultural activities
GROWING SEASON	
October	Plough, add fertiliser, plant maize and groundnuts
November	Plough, add fertiliser, plant maize
December	Plough, add fertiliser, plant maize, sweet potatoes and jugo beans
January	Weeding, apply top dressing fertilisers, plant sweet potatoes
HARVESTING SEASON	
February	Plant beans, harvest groundnuts, collect guavas
March	Harvest maize, collect guavas
April	Harvest maize, collect guavas
May	Harvest maize and sweet potatoes, collect grass
June	Harvest sweet potatoes and jugo beans
PREPARATION SEASON	
July	Take maize off cobs, collect grass
August	Homestead jobs and handcrafts
September	Apply manure to fields

(Source: Field data collection)

In addition to planting crops, many *imiti* also keep goats and cattle. GOS (2001) estimates that stocking densities in Swaziland are approximately 1.77 heads ha⁻¹, which is among the highest in Africa (Osunade, 1994a). Livestock are commonly grazed on communal rangelands during the day, as the rights to graze stock, gather fruits and hunt are traditionally unrestricted (Mushala *et al.*, 1994). At night, they are returned to their kraals, which are usually within the *umuti* compounds. However, following the maize harvest, during a period of time specified by the chief of the area, cattle are permitted to

roam freely on both allocated and communal SNL (Manyatsi, 1997). This has the advantage of temporarily easing pressure on communal grazing land whilst also providing sporadic manure inputs to fields that may otherwise not receive any nutrients. This is particularly useful for those people who do not own any cattle. It also acts to reinforce the power of the chief in his exertion of control over access to land and clearly shows how traditional practices stemming from the national level impact upon natural resource management at the local level.

Livestock are viewed as a central part of Swazi life due to the high social and traditional values placed upon cattle ownership (GOS, 1995). Cattle are used for ceremonial purposes and are given as *lobola* or bride-wealth. They are also a source of draught power, manure, meat, milk and skin and are the traditional measure and store of wealth. This is because cattle are more easily accessible as a form of investment than using a bank, and are viewed as an indicator of social status, bringing prestige to their owners (Osunade, 1994a). This importance was indicated by one of the case study *imiti* representatives in a discussion on the social importance of cows:

Keeping cattle is traditional and it is what makes you important in the community. It is like white people buy cars. Cows are the Swazi equivalent of buying cars (Dudu, 2003).

It can be seen from the above quotations that cattle are viewed socially as being synonymous with power. Despite the social importance attached to cattle ownership, livestock are considered by local people, NGO officers and government officials to be a prime cause of damage to communal rangelands. This is the result of processes such as over-grazing, which results in soil erosion; deterioration of grass and plant cover through trampling; reduced availability of plant and tree products and an overall decline in veld quality (Manyatsi, 1997; Mushala and Mliphahle, 1999). This can have serious implications because communal areas of indigenous vegetation found mainly along river valleys, hill ridges and in naturally stabilized gullies are used extensively as a source of firewood, forest products, building materials and livestock fodder (JICA, 2001). Indeed, 90% of rural households are thought to use firewood to meet their energy demands (Lasschuit, 1994). Other vegetation types on communal grazing areas are also important natural resources for rural people and their cattle, even though they comprise alien species such as *Psidium guajava* (guava) and *Acacia mearnsii* (wattle). Fruit trees such as the guava are especially favoured, as they provide key calorific

supplements to otherwise often inadequate diets, whilst also acting as a source of income for some *imiti* (Holt *et al.*, 1998). As a result, it is widely believed that in Swaziland, overgrazing combined with land use change and population pressure can decrease the size, quality and biodiversity of communal resources and consequently diminish the range of potential rural livelihood options (GOS, 2001).

5.6 Moving from the national to the local level

The previous sections outlined the national scale political and ecological characteristics of Swaziland. These were followed by the integration of human and physical components through an examination of the typical land use practices of the Swazis and an outline of some of the livelihood options available to rural people. This chapter now continues to take an integrated attitude as it moves to consider environmental diversity and access to natural resources at the local level. Each of the study villages and case study households are introduced and the main constraints to rural livelihoods are analysed, as understood by the people themselves.

5.6.1 Engcayini

Engcayini is located in the upper middleveld of Swaziland (see Figure 4.2). Natural resource use and livelihood structures in Engcayini are diverse. In each livelihood portfolio there is a mixture of dependence upon access to communal resources (to graze cattle and goats, harvest fruit or to collect grasses or fuelwood) and allocated land resources (to grow crops for either subsistence, sale or both), whilst waged employment constitutes the mainstay of 51% of livelihoods. The main social and environmental characteristics of Engcayini are summarised in Table 5.3, whilst Table 5.4 displays short profiles of the case study households, illustrating their livelihood activities and use of natural resources.

Table 5.3: Social and environmental characteristics of Engcayini

Theme	Basic information
Location	Engcayini is located in the upper middleveld of Swaziland approximately 30 minutes drive along gravel roads from Manzini.
Population information	Engcayini has a population of approximately 734 people, belonging to one of the 74 <i>imiti</i> . Most <i>imiti</i> (77%) have male heads. The majority of heads are aged between 31 and 65 years. Most <i>imiti</i> are inhabited by 4-8 people although some of the larger ones have more than 21 members. The population of Engcayini has increased considerably over the past 10-15 years, both internally and through settlement by outsiders.
Power structure	The former Chief Mandanda has not yet been replaced, so authority lies with Chief Mtsetfwa who lives outside of the community. The <i>Indvuna</i> ⁵ of Engcayini does live within the chiefdom.
Infrastructure and service provision	Engcayini is serviced by buses to Manzini. Other infrastructure includes a church, a village shop and a primary school. Most children are educated to primary level although school attendance decreases with age, as children are often needed to work at home or find a job. All <i>imiti</i> in Engcayini obtain their water from the Mbuluzi River and there are no tap water or irrigation facilities. No <i>imiti</i> have electricity, as the infrastructure is not available, regardless of the ability of some to afford such commodities.
Soil type and management practices	Soil in Engcayini comprises sandy loams with patches of acid clay (Jansen <i>et al.</i> , 1994). Land is classed as good to fair in terms of production potential (Mushala <i>et al.</i> , 1998). Attempts by land users to maintain and improve soil fertility result in the application of fertiliser to the land by 85% of <i>imiti</i> and the use of manure by 66%. Maize is cultivated by all <i>imiti</i> , often in conjunction with other crops, such as groundnuts, sweet potatoes and beans.
Livelihood strategies	Income sources are predominantly from waged employment (51%) hence many people were not permanently living at their <i>umuti</i> at the time of research. 18% of <i>imiti</i> reported the sale of arable produce to be the mainstay of their livelihood. Other sources of income include the sale of natural resources harvested from communal areas (mostly fruit and grass), assistance from family members in other chiefdoms and through pension payouts. Sale of cattle was not reported as the primary form of income for any of the families but is considered a component of the overall rural livelihood strategy.
Livestock ownership	Cattle are kept by 68% of <i>imiti</i> , as a source of food, draught power and manure. They are viewed as an indicator of social status, although herd sizes are small (MOAC, 1995). Goats are owned by 49% of homesteads. 68% of the cattle owners reported that their herd size had decreased over the last 10 years, primarily as a result of drought.
Natural resource availability and rangeland condition	The Engcayini region is categorised as upper middleveld hill grassland, with rolling to hilly topography and a slope range of 15-30° (Jansen <i>et al.</i> , 1994). Despite reports of decreasing availability of wood for use as fuel and a reduction in herd size blamed upon drought and poor access to fodder, recent years have seen a rapid proliferation in the establishment of guava trees on communal land. This is attributed to the ingestion of guava fruit by cattle and the subsequent deposition of seeds. The communal grazing land is severely gullied in many different parts. This is primarily attributed to the concentration of runoff along cattle tracks, as Engcayini has had a dip tank for many decades (JICA, 2001). This has resulted in people from other communities bringing their cattle to Engcayini to comply with monthly government dipping requirements (GOS, 1995). The gullies are also reported to have worsened as a result of Cyclone Domania, which swept through Swaziland in 1984.

⁵ The *Indvuna* is the chairman of the local council (*Inkhundla*) and is selected by the chief, who may appoint any person as an *Indvuna* in respect of his chiefdom, and in like manner, terminate the appointment. Should a chief be absent or a chiefdom be awaiting the installation of a new chief, the *Indvuna* may assume the role of chief, although he remains subordinate to an acting chief (UNDP, 2002).

Table 5.4: Short profiles of the three case study *imiti* in Engcayini

	Lindiwe	Sara	Happiness and Dudu
Gender	Female	Female	Female (both)
Marital status	Widow	Widow	Widow/unmarried
Age	63	69	75/41
Biography	Lindiwe married into the Ngwenya homestead in nearby Dlangeni. She and her late husband migrated to Engcayini in order to start their own <i>umuti</i> because it appeared a friendly place to live and land was easy to obtain. The <i>umuti</i> was first set up in 1972 but in 1985 the buildings were moved closer to the road, so as to improve access for ploughing purposes.	Sara married into the <i>umuti</i> in 1952. It had already been established for many years before she arrived. When she first settled in the area, there were only six <i>imiti</i> in the entire chiefdom.	Happiness originally married into another homestead in Engcayini but as the family grew in number, she asked the chief for some land for her and her daughters. They moved to their current <i>umuti</i> in 1995. The land they were allocated was formerly part of the communal grazing area and was heavily damaged by cattle tracks.
Livelihoods and resource use	Some family members work away and send remittances for their children. Lindiwe harvests grass, makes it into mats and brooms and sells the secondary products. They sell any excess maize that they produce too. Lindiwe sometimes makes and sells traditional medicines within the village. They have 11 cows and have sold some in the past to get money. They use wood from the communal land as fuel and harvest wild fruits for their own consumption.	Some family members work away and send remittances for their children. Maize and vegetables from a vegetable garden set up by her nephew near the river are sold for money. This family owns 35 cattle including five calves so they utilise the communal grazing land. They use wood from communal land as fuel and harvest wild fruits for their own use.	Income sources include the cultivation of sweet potatoes, which are swapped for maize that is then sold onwards and the sale of homegrown maize. Scraps of textile waste are collected and made in to children's clothes, which are then sold. They do not own cattle or goats. Wood from communal land is used as a source of fuel and grass for thatching is harvested from communal areas. Water is collected daily from the river.
Key constraints to livelihoods	Weeds such as <i>sona</i> ⁶ often destroy the crops. Fertilisers, seeds and lime, which they need to gain better yields, are too expensive for them to purchase in the required amounts. Grasses on the communal grazing land have not grown well due to drought, so as a result, the cattle are thin.	Lack of water for irrigation is a problem and crops are often destroyed by weeds (<i>sona</i>). It is difficult and expensive to hire a tractor at the time it is required and fertilisers are reported to be expensive too.	The main problems include a lack of money to buy fertilisers. Weeds (<i>sona</i> in particular) often destroy the crops and because they do not own any oxen, they have to find money to hire tractors. Gulying makes ploughing difficult and soil and nutrients are easily washed away when the rains come.

The use of communal resources is dynamic over time, as access and availability, together with their importance in household economies, have changed. For example in consideration of the communal grazing pasture, Lindiwe said that:

⁶ *Sona* is the Siswati term for the plant *Striga asiatica*

The cattle used to graze anywhere up to the Mbuluzi [river] as there were less homesteads when we first settled. Now you have to follow the cattle around to make sure they don't eat other people's maize and to make sure they don't go to the areas where there is sikonko. If the cattle eat this type of grass it is too strong for them and makes their teeth old (Lindiwe, 2002).

From the mapping of time-series aerial photographs, it is apparent that settlement has increased significantly over time. Figure 5.4 shows settlement patterns in Engcayini in both 1984 and 1999. Increased demands for land from both within the village and as people arrive from other places has resulted in land formerly used for grazing being allocated to families for use as arable land. This has had the effect of restricting access for the rest of the community. In 1984, 60 homesteads⁷ were counted from the aerial photograph analysis, whereas by 1999, there were 81 homesteads. This represents an increase of 35%.

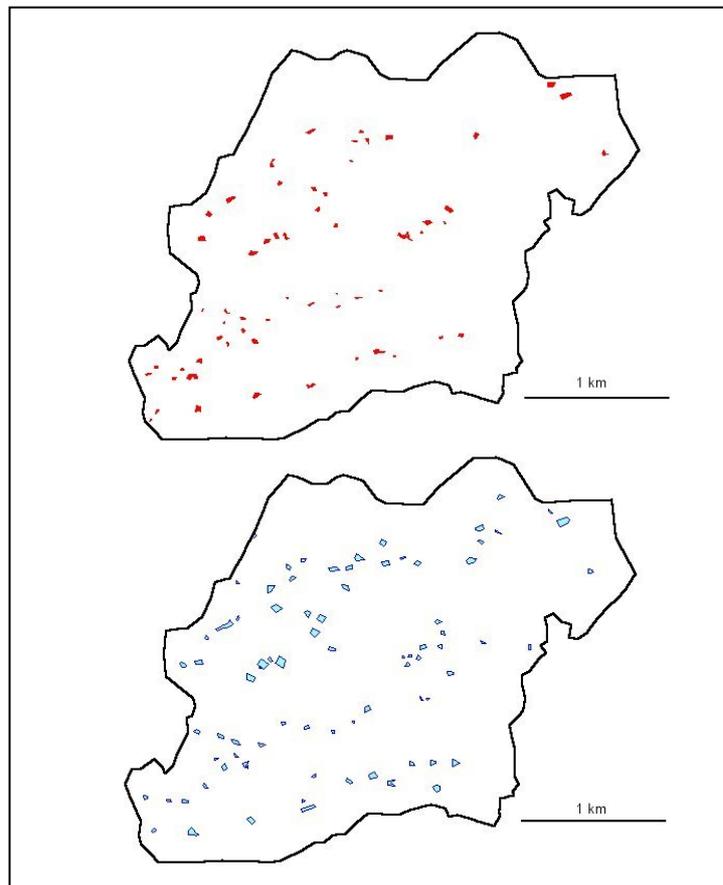


Figure 5.4: Settlement patterns in Engcayini 1984 (top) and 1999 (lower).

⁷ These figures refer to homesteads not *imiti*. Refer to section 4.6 for a discussion of the differences between homesteads, households and *imiti*.

In terms of arable production, access to the land itself is not viewed as a limitation in Engcayini despite reported national land distribution issues (Mushala *et al.*, 1998). As stated by Dudu:

The main problem is the sona weed. The yields would be much greater without it because everywhere the weed is, the yield is less. It gives something bad to stop the maize growing up. We need to buy more fertilisers and some lime that will stop it but it is too expensive (Dudu, 2002).

The vast literature on weed infestations, particularly of *Striga asiatica*, which Dudu refers to by its local name, *sona*, suggests that increasing soil fertility levels can reduce its prevalence (Vogt *et al.*, 1991; Labrada, 1992; Ransom, 2000). Conditions that favour the proliferation of this weed include a soil environment with low fertility (especially low nitrogen content), low organic matter content and large stone and gravel components. Overall rainfall levels of below 1500 mm per annum are also advantageous to its growth and according to meteorological records, Swaziland’s middleveld has received under 1000 mm average annual rainfall in the majority of years since records began in 1960.

Dudu’s statement demonstrates that although she has access to land and seeds, she believes that she is unable to produce a good yield due to a financial inability to afford lime and sufficient fertilisers, which could help to decrease the weed infestation (Labrada, 1992). Dudu does not own any cattle, so she has no easily accessible source of manure. This was a commonly observed scenario within this community. Consequently, it is the inability to translate some of her endowments into entitlements that is problematic and this has direct links to both her reservoir of capitals and the influence of the broader scale economy.

Livelihood strategies in Engcayini are affected significantly by constraints to arable production, particularly the 18% of *imiti* for whom the sale of arable produce is the dominant component. Production is understood by the local land users to be constrained by a combination of climatic, biological and structural factors, as summarised in Table 5.5.

Table 5.5: Production constraints on arable land in Engcayini

Constraint	Symptom
Climatic variability	Drought, lack of water for crops
Biological factors	Weeds, gullies, soil infertility
Broader scale factors	Price of fertilisers, seeds, lime and tractor hire too high

Although loss of access to grazing land due to increased settlement does have an effect on resource use and expenditure, it has less of a direct impact on the household economy than for example a poor maize yield. The use of communal resources is becoming increasingly marginal to the economic well being of *imiti* in Engcayini due to the diverse natures of livelihood portfolios and because the cattle that use the communal grazing land are not viewed primarily as economic assets (Mushala *et al.*, 1998).

5.6.2 Ezikotheni

Ezikotheni is a considerably larger community than Engcayini and is located in the south of Swaziland. Despite sharing various similarities with Engcayini, the livelihood constraints the people of Ezikotheni face exhibit some degree of difference, as will be revealed. The social and environmental characteristics of the chiefdom of Ezikotheni are summarised in Table 5.6, whilst short profiles of the case study *imiti* are shown in Table 5.7.

Table 5.6: Social and environmental characteristics of Ezikotheni

Theme	Basic information
Location	This community is located in the upper middleveld of Swaziland to the east of the town of Nhlanguano, on the country's southern border with South Africa (see Figure 4.2).
Population information	Ezikotheni has a population of approximately 5000 people, belonging to roughly 700 homesteads (JICA, 2001), although in practice due to chieftaincy boundary disputes, many people state that they belong to other chiefdoms. These data are therefore highly ambiguous. <i>Umuti</i> structure is similar to that of Engcayini with 72% headed by males, the majority of who are aged between 31-65. 43% of <i>imiti</i> have 4-8 members.
Power structure	Residents stated that a new chief was installed last year. He has not yet resumed his position as he is still at school. JICA (2001) report many chieftaincy disputes in the area, due to conflict between the acting chief and rival factions that are trying to claim land in Ezikotheni.
Infrastructure and service provision	Infrastructural development in this community is more advanced than in Engcayini. Electricity is available in the village for those that can afford it. Water sources include the Ngwedze and Mdakane Rivers, although some <i>imiti</i> have purchased large tanks that are used to collect rainwater. Ezikotheni has two primary schools and one secondary school: St Anselm Primary, Galile Community School and Franson Christian High School (JICA, 2001). There are a number of small shops and churches and there is also a clinic. Roads leading from Nhlanguano are tarred. However, those that pass through Ezikotheni are not well developed and the smaller feeder roads that rural people regularly utilise need rehabilitating as they are severely gullied in places.
Soil type and management practices	In terms of soil type, Ezikotheni is described as comprising ferralsols, regosols, luvisols and cambisols with patches of acid clay (JICA, 2001). 3% of the <i>imiti</i> that were interviewed did not grow any crops last year. Each case of not planting any crops was reportedly due to misinformation, as these families believed they were to be relocated by the government, only this did not happen.
Livelihood strategies	11% of <i>imiti</i> sell a proportion of their maize yields, although only 9% rely on the sale of arable produce as their main source of income. 53% of <i>imiti</i> have one or more members in full or part time employment, whilst 33% pursue their livelihoods primarily through the sale of non-arable goods, including those harvested from communal areas. The opportunity for non-arable sales is more available to residents of this village than in Engcayini. This is due to relatively easy access to Nhlanguano and the main tarred roads. However, remittances and income fluctuate irregularly, especially in those households dependent on seasonal jobs, so this source of income only temporarily increases a family's financial status (Russell, 1984).
Livestock ownership	57% of homesteads keep cattle and 30% keep goats, the majority of which are grazed on the communal rangelands. Similarly to Engcayini, 74% of cattle owners reported a decrease in herd size over the last 10 years. This was believed to be because of a lack of fodder on communal grazing land and the use of cattle in customary practices such as marriage ceremonies.
Natural resource availability and rangeland condition	This region falls under the classification of vegetation unit UM3, which is upper middleveld hill grassland (Jansen <i>et al.</i> , 1994). Average slope gradients stand at 15-30°. Forest area is very limited so the majority of households buy firewood or use alternative resources that are available to them. Some families reported the use of dried aloes (<i>Aloe marlothii</i>) and dehydrated cow dung as alternative sources of fuel. The underlying rock type of the Ezikotheni chiefdom is predominantly granite and the region is reported as being severely eroded. Erosion occurs in particular on the communal grazing land, to such a degree that in several places the topsoil has been completely washed away, exposing the bare rock underneath (JICA, 2001). This has led to the formation of gullies, but large areas of land suffering from sheet erosion are also apparent. In addition, arable parts are affected by expanding gullies, despite the maintenance of the mandatory grass strips (<i>ibid</i>).

Table 5.7: Short profiles of the three case study *imiti* in Ezikotheni

	Gladys	Nesta	Albert
Gender	Female	Female	Male
Marital status	Married	Married	Married
Age	68	48	40+
Biography	Gladys and her husband have lived in Ezikotheni for 50 years. They migrated to Ezikotheni from Sheba due to conflicts between the families of each of her father-in-law's wives.	The <i>umuti</i> was established 50 years ago. It was her husband's family's <i>umuti</i> . Nesta moved there 30 years ago. The land was already being cultivated when she arrived.	Albert used to live near the chief's royal kraal in Ezikotheni but when his grandfather died the chief said they had to move. They set up their current <i>umuti</i> in 1981 and there are more than 30 members.
Livelihoods and resource use	The main source of income is through the sale of arable produce, mostly maize and groundnuts. Her husband used to operate machinery in the South African mines but was retrenched in 1998. They own both cows and goats but the herd sizes are always changing due to breeding and death. At the time of research, they had 11 cows and seven goats. They harvest fruit and grass from communal land and obtain wood either by purchasing it or by collecting it from communal areas.	All seven of their children are employed and send money home. Nesta and her husband also sell cotton and maize as they have a considerable amount of land (>8ha), which they say is more than enough for their subsistence needs. They buy wood because the forest is too far away. They harvest wild fruit from communal land for their own use. They harvest grass and if they collect more than they need, they sell it within the community. They currently own nine cattle. Rainwater is collected in a large tank.	Albert formerly worked on the mines in South Africa but was retrenched. Current income is mainly from the sale of excess maize but outgoings are high as he has to rent land. They collect maize stalks from the fields for fuel and rent grass strips from a private landowner to obtain grass for thatching. They look after cattle for their neighbours to gain access to milk and manure.
Key constraints to livelihoods	Drought and weeds like <i>sona</i> and <i>siphulamachine</i> ⁸ are their biggest problems as these 'stop the maize from growing well'. The grazing land is poor quality and the cows do not have enough to eat. Tractor hire is expensive too and they have no regular income since her husband lost his job.	Nesta said that if there were no weeds they could harvest far higher yields. Cutworms are also a problem. There is a shortage of grazing land and they graze the cattle in the same place every day because the other land nearby is privately owned. Cotton is becoming more difficult to sell because the factory has closed, so they did not grow any this year.	Land shortage is a big problem as it is expensive to rent fields and grass strips. The main problems affecting crop yields are a lack of money for fertilisers and good quality seeds, drought and <i>sona</i> weed. The private landowner does not let them apply manure to the rented fields so they are not very fertile.

Again, livelihood strategies are demonstrated to be diverse. The mainstay of livelihoods in Ezikotheni, similarly to Engcayini, is through waged employment of one or more household members. Recent retrenchment from the South African mines has increased reliance upon agricultural production for both subsistence and as a form of income through arable sales. The advantage of good infrastructural links to the nearby town of

⁸ *Siphulamachine* is *Asteraceae Xanthium strumarium* in Latin.

Nhlangano results in the sale of wild resources being the main income source for 33% of Ezikotheni's population, whilst arable sales comprise the main source of income for 11%. Issues relating to entrenchment demonstrate that it is not only the economic and labour policies of Swaziland that impact upon Swazi livelihood strategies. Increasing South African unemployment levels and broader structural processes influence the rural livelihood strategies that are pursued in South Africa's neighbouring countries including Swaziland. A large migrant workforce is suffering the effects of changes to the Southern African political economy (Leliveld, 1997). Consequently, reliance on the land as an income source is dynamic and is currently increasing within this community, as communal resources are becoming more important than allocated land in providing the mainstay of rural livelihoods.

Access to land is also a significant issue for many households in Ezikotheni, in terms of both a lack of allocated land on which to grow crops and a lack of communal land on which to graze cattle and harvest grasses and fruit. The impacts of this are further compounded by the dual land tenure system because Ezikotheni is bordered by a number of TDL commercial farms. As the population of Ezikotheni is currently expanding and rural people are once again becoming increasingly reliant on the land, the SNL land shortage is exacerbating problems of degradation and livelihood instabilities. While chiefdom boundaries remain contested and access to surrounding land is restricted due to private land ownership, this issue is not easily resolved. TDL in the vicinity of Ezikotheni does present a useful opportunity for potential seasonal employment, although this may only serve to boost income levels temporarily and sporadically (Russell, 1984). It is unknown how many *imiti* take advantage of this opportunity.

Similarly to the situation in Engcayini, drought and weed infestations are reported to be the primary constraints to arable production in Ezikotheni. As a consequence of retrenchment and the closure of the Big Bend cotton factory to which cotton cultivators were able to sell their produce, farmers have reduced the amount of household income spent on agricultural inputs. This is illustrated in a statement by Gladys (2003):

My husband was working on the mines in South Africa until 1998. He used to operate the machinery. When he was working we had money and could buy things like fertilisers and cattle. We don't add fertiliser any more because it is too expensive so we must apply manure (Gladys, 2003).

Only 50% of land users in Ezikotheni reported that they apply fertilisers to their land, compared to 85% in Engcayini. This could have influenced the reported spread of *sona* weed. As outlined in the previous section, *sona* favours soils with low nutrient levels, particularly with low nitrogen availability (Ransom, 2000; Gbehounou, 2000) and establishes quickly in regions with average annual rainfall of below 1500 mm (Labrada, 1992). The main constraints to arable production in Ezikotheni are summarised in Table 5.8.

Table 5.8: Summary of constraints to arable production in Ezikotheni

Constraint	Symptom
Climatic variability	Drought, lack of water for crops
Biological factors	Weeds, gullies, soil infertility
Broader scale factors	Price of fertilisers, retrenchment so less available cash for farm input investments, conflict over chiefdom boundaries, land shortages

According to local people, large areas of sheet erosion have developed on Ezikotheni’s rangelands as a result of overgrazing and deforestation, whilst gullies formed on arable land following Cyclone Domonia. This storm was particularly intense, substantially affecting the area in 1984. It left up to a quarter of Swaziland’s population homeless and impacts were so severe that special economic assistance was sought from the UN to deal with the aftermath (UN, 1984). Arable land in Ezikotheni that was affected by the storm was so damaged that it was abandoned. The high degree of sheet erosion on communal land in this village led to the selection of Ezikotheni to host one of the JICA pilot projects. This concentrated significantly on rehabilitating the damaged grazing land. The extent of some of the erosion on both rangeland and abandoned arable plots is illustrated in Figures 5.5 and 5.6.



Figure 5.5: Photograph of gully and sheet erosion on communal rangelands in Ezikotheni



Figure 5.6: Photograph of gullying on abandoned arable land in Ezikotheni

5.6.3 KaBhudla

The social and environmental characteristics of KaBhudla are summarised in Table 5.9, whilst household profiles for the three case study *imiti* are presented in Table 5.10. KaBhudla did not have a JICA funded project at the time of research. This chiefdom differs in many respects from the others involved in the research. It is situated in the lower middleveld, which provides a contrast in both topography and soil type in comparison with the other study chiefdoms, as Engcayini and Ezikotheni are located in the upper middleveld.

Table 5.9: Social and environmental characteristics of KaBhudla

Theme	Basic information
Location	KaBhudla is located in the central region of the lower middleveld at an altitude of about 400 m above sea level, situated approximately 20 km east of Manzini.
Population information	KaBhudla is a large community with a population of approximately 6000 people belonging to roughly 700 households (GOS, 1993). <i>Imiti</i> are mostly headed by males (71%) within the age range of 31-50 years, and modally contain between 4-8 people.
Power structure	This chiefdom is administered by Chief Magujwa Magagula. As the eldest son, he inherited the title from his father. He was installed by the king in 1991. He is also a member of the House of Assembly in parliament. Both the chief and the <i>Indvuna</i> are resident in KaBhudla.
Infrastructure and service provision	Due to its close proximity to Swaziland's largest urban settlement, KaBhudla has benefited from recent infrastructural developments. Access to Manzini by minibus is affordable to many of KaBhudla's residents (R5 per trip) and the journey is straightforward, direct and mostly follows tarred roads. Electricity is available for those who can afford it, as is the situation in Ezikotheni. Water is commonly collected in large water tanks, although the ephemeral Mzimpofo River is relatively easily accessible and a system of reticulated taps extending from the river provides water for some <i>imiti</i> . KaBhudla also has a primary school and a parade of small shops. The majority of homestead dwellings are constructed from concrete and corrugated iron. Some of the residents of KaBhudla own cars and tractor ownership is more widespread in this community, standing at 8%.
Soil type and management practices	Physiographically, KaBhudla is classified as having both undulating plains and gently undulating valleys. The underlying rock comprises feldspars, gneiss and amphibolites, the composition of which cause large differences in the clay content of the weathering material and the resultant soils (GOS, 1993). This chiefdom has a different major soil type and is at a lower altitude than the other study sites. Soil erosion and sparse vegetation cover are reported to be the main contributors to gully development in the region although these are believed to have formed as an integral part of the dendritic drainage pattern of the area (<i>ibid.</i>). 55% of land users apply fertiliser to their land and 56% use manure to maintain soil fertility levels.
Livelihood strategies	83% of <i>imiti</i> have one or more family members in full or part time employment, which is considerably higher than in the other two study villages. As a result, 18% of homesteads do not cultivate any of their land and instead choose to buy food. 5% of <i>imiti</i> sell wild resources to other people in the village and one <i>umuti</i> reported reliance on pension payouts as the mainstay of their livelihood.
Livestock ownership	Of the 33% of <i>imiti</i> that own cattle, 18% own more than 21 animals, so in this location there are fewer cattle owners but herd sizes are considerably larger than in Engcayini and Ezikotheni. 27% of cattle-owning homesteads reported an increase in herd size over the last 10 years, primarily due to investment in cattle.
Natural resource availability and rangeland condition	Rainfall levels are erratic and lower here than in the other study villages, averaging 634 mm per year (GOS, 1993). This is due to the lower altitude and the rain shadow effect of the Mdunzulu Hills. Bush encroachment has been identified as a manifestation of land degradation in this region (GOS, 1993) although this was not reported to be a problem according to the questionnaire surveys. Instead, a decline in woodland resources was frequently mentioned. The grazing land was said to be in poor condition by 94% of the <i>imiti</i> that use it. This was thought to be a result of drought (45%) and too many cows and people (51%).

Table 5.10: Short profiles of the three case study *imiti* in KaBhudla

	Richard	Zodwa	Wiseman
Gender	Male	Female	Male
Marital status	Married	Married	Married
Age	60	47	51
Biography	Richard has two wives and they all used to live at his other homestead (also in KaBhudla). He set up the <i>umuti</i> at which the interviews and other data collection took place about 11 years ago for his most recent wife. This took place shortly after his father died.	Zodwa and her family used to live in Siteki and moved to KaBhudla 11 years ago. Siteki was too hot for her grandmother as she was ill. They wanted to live somewhere amenable to goat rearing, so they chose KaBhudla.	Wiseman moved to KaBhudla 20 years ago but previously lived in Mankayane. There was a quarrel in the family and he had to move away. He chose to go to KaBhudla because his aunt lived there.
Livelihoods and resource use	Richard is in full time employment, as are two of his five children. They also commercially farm cattle (owning 54 at the time of research) and have a vegetable garden, which is irrigated through use of a borehole. They sell the produce they grow to the SPAR supermarket. They used to grow and sell cotton but believe food production is more important now. Three people are permanently employed to work on the fields. They use bottled gas for cooking and have electricity for lighting. They collect marula fruit from communal land to make beer.	Two members of this <i>umuti</i> are in full time employment and income is also gained through the sale of arable produce. They collect wood for fuel but also use bottled gas and electricity. They sometimes collect wild fruits from the communal land for their own use and they have their own borehole. They own 5 cows and 18 goats but do not sell any and have to buy grass to feed the cattle in the winter.	Wiseman used to be a forester. He sold logs and ran a transport business. He recently developed diabetes so his sons took over the business but he said that they are not good managers. His wife is a hawker who buys clothing from Durban and sells it onwards. She also sells chickens and makes clothes to vend. Wiseman sells cattle if he needs cash quickly. They buy fuelwood from another chiefdom and do not collect wild fruits. They had 12 cattle at the time of data collection but loan them to people in Nhlangano as the grass is of a better quality there.
Key constraints to livelihoods	There is a shortage of grazing land for the cattle due to excess settlement, so they buy grass to feed them on in the winter, which is expensive. The rain is unreliable and droughts can cause poor yields. It is sometimes a problem when people let their cattle wander freely as they destroy the crops so this reduces their yields.	The soil is poor in this area and dries out very quickly. Fertilisers are very expensive. Buying grass in winter to feed the cattle is expensive too but because there is too little grazing land they have to buy it or else the cattle die.	He has very little land (<1 ha), which is a problem, so he has to grow maize on some of his forestry land. Lack of water is the main problem as there is not enough rain. His ill health is a constraint as it means he cannot work so his wife has to sell goods as well as cultivate the land.

Livelihood strategies in KaBhudla are diverse but considerably more commercially oriented than in the other study villages. Allocated land is not cultivated by 18% of *imiti*, who choose instead to buy food. None of the *imiti* rely on the sale of arable

produce as the mainstay of their livelihood, although many families do sell their excess produce. Cattle are viewed more as an economic asset in KaBhudla than in the other chiefdoms. Fewer *imiti* own cattle but those that do have larger herds and utilise them as a source of income. 48% of cattle owners in KaBhudla have more than ten animals, compared with 20% in Engcayini and 7% in Ezikotheni. As reported by Richard:

We sell cattle to get money. We take them to the meat wholesalers. We sold nine oxen a few weeks ago and got R26 000. They came to collect them in the truck but only pay us for the body, not the head or the intestines (Richard, 2003).

In the majority of cases, this commercial interest in cattle is because one or more members of the household have waged employment and investment in cattle is both socially and economically advantageous. As Richard suggested:

It is not expensive to keep cattle once you have them and you can sell them when they are fat to get more money. They also make you important because of Swazi tradition (Richard, 2003).

Only 41% of the community harvest wild resources such as grass and fruit compared with 92% in Ezikotheni and 86% in Engcayini. This demonstrates a strong correlation between increased availability of waged labour opportunities and decreased natural resource use. 18% of *imiti* in KaBhudla do not cultivate their allocated land and instead use their wages to purchase food. This has resulted in resentment towards some of the more financially stable households with larger allocated plots, especially from the poorer households with insufficient land. As proposed by Wiseman:

We need a settlement policy so that everyone could have an equal number of fields. It is difficult because at the moment, those with more land don't even bother to plough it at all, whilst those with less land could really use it to help them feed their families (Wiseman, 2003).

Land shortages are a widespread problem and this can be traced back to both the colonial land partitioning and the traditional processes by which land is distributed. This highlights the issues of access, power and tradition as examined at the national level and indicates that the impacts of these issues are felt most by the poorer people at the local level.

5.7 Synthesis of livelihood activities and environments in the study villages

This chapter has presented essential information on Swaziland's political structure and environmental characteristics. Short profiles of each of the study chiefdoms and the case study households therein were then considered. These have demonstrated that whilst appearing broadly similar, rural Swazi chiefdoms exhibit both differences and similarities in natural resource use and livelihood strategies at both the village and the *umuti* levels. The degree of dependence on natural resources is most clearly observed through an analysis of the nature of the livelihood strategies that are pursued. Access to and the availability of communal and allocated land resources is an important influence on the choice of livelihood strategies and this has been shown to be affected by the levels of infrastructural development and potential employment opportunities both within and around each study area. In some cases, the commercial enterprises of land users such as Richard are hindered by the maintenance of traditions and power relations. Cattle destroyed some of his crops, yet their owners were not punished, since it is the prerogative of the chief to decide when the cattle may roam freely. This demonstrates how power relations impact upon natural resource management.

Waged labour is considered a central component of Swazi rural livelihood strategies (Russell, 1984), forming the primary source of income for 54% of the *imiti* in the three study chiefdoms. Whilst Magagula (1986) reports that more than 70% of SNL is communal and used for grazing, commercial livestock production was not reported as the mainstay of any household's economy in any of the study villages. Even in KaBhudla where herd sizes are greater and cattle are viewed more commercially, reliance is still primarily upon formal employment as a source of income, with subsequent investment in cattle, even in the case of Richard, who owns 54 cattle. Increasing marginalisation of communal resources to livelihood strategies in areas with better access to employment opportunities is apparent, although greater reliance on both arable sales and the use of wild resources is evident in Ezikotheni due to retrenchment of workers from South Africa's mines. This is important because it could threaten sustainable resource use and alter the speed and manifestation of degradation processes.

Apart from institutional and social factors, the broader political economy has also been identified to impact considerably upon Swazi livelihood strategies. This takes the form of unfavourable market prices for essential agricultural inputs, and an instability in employment levels both within Swaziland and in South Africa. Reported arable land shortages due to the dual land tenure system and Swazi class structure have perpetuated the need to rent land in Ezikotheni. Land shortages have also caused fallow periods to decrease, resulting in the exhaustion of soil nutrients (Dlamini, 1997). This in turn has led to the proliferation of weeds (Labrada, 1992), particularly *sona*, thus increasing the demand for over-priced fertilisers and putting pressure on scarce household financial resources. As a result of the dynamic interplay of local and broader scale political, social, environmental and economic processes, the types of endowments from which various entitlements can be derived and the capabilities of each *umuti* to effectively use their endowments vary between study sites. This is in response to factors situated within the broader resource network, including physical environmental conditions, market access and stability and the potential to raise income from other sources such as waged employment.

Due to such variability, natural resources are ascribed different values by different social actors (Shackleton *et al.*, 2000), depending on their perceived importance to the livelihood strategies and well being of that particular actor or group. It is these similarities and differences between and within study chiefdoms that provide the basis for the rest of the thesis, which considers how degradation is understood by government representatives, scientists and land users and how these different perceptions of change might influence land management decisions and ultimately, impact upon degradation levels.

CHAPTER 6: Government and NGO interpretations of environmental degradation

6.1 Introduction

Land degradation in Swaziland is not a new phenomenon (Goudie and Price Williams, 1983). Erosion was reported as being severe as far back as the 1930s (Mushala *et al.*, 1997). Indeed, the introduction of grass strips with a view to reducing soil erosion came about in the 1950s, when discourses of overpopulation and destructive indigenous land use practices dominated (Adger *et al.*, 2001), long before issues of land degradation and desertification entered the international political arena. This chapter considers the possible causes of land degradation in Swaziland as identified by government and NGO representatives. A brief review of national level initiatives with significant ecological and livelihood components employed by the Swazi government from the 1950s to the present is undertaken. The chapter then considers government understandings of why and how these initiatives have demonstrated success or failure. Lessons have been learnt from past policies and projects and these, together with broader shifts in approaches to development, have precipitated changes in the present approaches taken towards environmental management in Swaziland. The Swaziland NAP is used as an example to illustrate such shifts. The question is then raised whether a new approach has actually led to different policy outcomes, or if the changes merely mask the underlying power structures that restrict their impact.

6.2 Causes of degradation in Swaziland: contributions from NGOs and NSCD representatives

Government and NGO representatives attribute the causes of degradation in Swaziland to a plethora of different factors. In particular these include overgrazing, poverty, veld fires and over-population, as well as institutional problems such as conflicts over chiefdom boundaries. Table 6.1 summarises these causes and presents illustrative supporting interview evidence of these understandings.

Table 6.1: Causes of degradation in Swaziland according to NSCD members and NGOs

Proposed cause of degradation	Illustrative supporting interview evidence
Cattle overpopulation	<i>'Cattle are the main cause of degradation, especially when they are moving from kraals to grazing areas and to dip tanks' (NSCD representative 1, 2002).</i>
	<i>'Our practices in Swaziland are bad. We bring in our cows at night. It's what we call night kraaling, so you know, using the same pathways every night causes land degradation' (NGO representative 1, 2002).</i>
Government subsidies to livestock owners	<i>'The main cause of degradation to me, especially on the communal areas is the subsidies we've given to our livestock keepers and the lack of options for alternative investment. The value of keeping cattle still outweighs the advantages of whatever... investment in a bank' (NSCD representative 4, 2002).</i>
Conflict over chiefdom boundaries	<i>'If you were hoping to rest one area while animals graze another, there must be some way of controlling them and then fencing becomes one such. This can cause problems where chiefdom boundaries are confused because if one chiefdom controls their grazing and then animals from the next chiefdom come and graze that area, ignoring the fence and thinking that it is part of their own chiefdom, then it increases the degradation even though people are trying to manage it. Lack of clear boundaries means people don't really have the will to either decrease their cattle numbers or control their grazing land' (NSCD representative 2, 2002).</i>
Poverty and overpopulation	<i>'Degradation occurs due to lack of food, lack of shelter, lack of water, lack of sustainable incomes and poverty. People believe resources are given to them by God for them to use but because the population is growing, they use them too fast because they are poor and have no alternative, which is why there are big dongas and we are having soil erosion' (NSCD representative 3, 2002).</i>
Veld fires	<i>'Veld fires are a big cause of soil erosion because they clear away the vegetation so when it rains the soil is removed. People are starting to realise that veld fires are no good so even the chiefs, they have taken it upon themselves to warn their people not to set fires at any time' (NGO representative 3, 2002).</i>
Lack of use of sustainable land management practices	<i>'People often have negligent attitudes towards land management. They exploit arable land and keep too many cows that they graze always in the same place' (NGO representative 2, 2002).</i>
Land tenure system	<i>'Swaziland's land tenure system means that people have no individual or communal responsibility for resources. There are too many cattle and people don't reduce cattle numbers because they don't want to take responsibility. All cattle have owners so it comes down to the people, but if they had clearer land rights then the cattle might be prevented from having such a devastating effect' (NGO representative 4, 2002).</i>

From the information in the table, two dominant themes are apparent. First, the role of cattle appears central to considerations of the causes of degradation, through both their direct and indirect impacts. Only in one case is government policy identified as a contributory factor in encouraging cattle ownership, and even when factors such as land tenure systems and conflict over chiefdom boundaries are offered as causes of degradation, cattle play a secondary role in that they are the system components that are actually causing the damage. The comments in Table 6.1 are interesting, particularly when livestock census data for the whole country are considered. Table 6.2 and Figure

6.1 show the cattle numbers in Swaziland according to livestock census data from 1966-1999.

Table 6.2: Cattle numbers in Swaziland 1966-1999

Year	1966	1976	1988	1991	1994
Number of cattle	491 000	634 000	640 000	740 000	626 356
Year	1995	1997	1998	1999	
Number of cattle	641 979	668 491	678 518	688 696	

(Source: Livestock Development Policy, 1995)

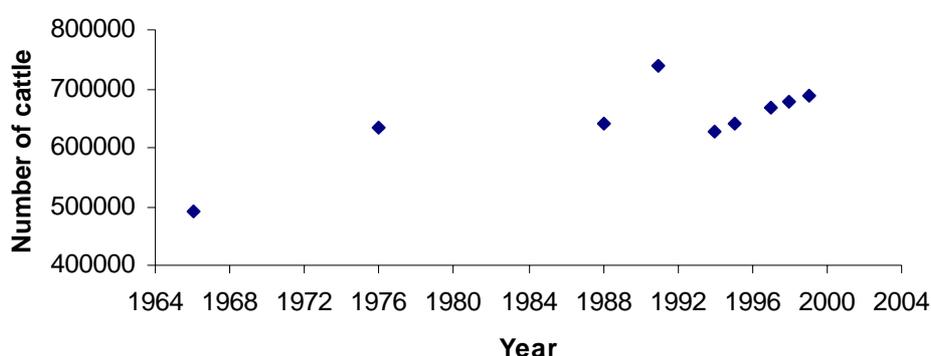


Figure 6.1: Graph of national cattle census data 1966-1999

Cattle numbers are demonstrated (according to the available data) to have remained relatively constant, mostly in the range of 600 000 - 700 000 animals in the period 1976 to 1999. However, fluctuations between data points are possible and would not necessarily be discernible due to the poor resolution of the data from the earlier years. The apparent nationwide increase in cattle numbers since 1966 (notwithstanding a fairly significant decrease between 1991 and 1994 where meteorological figures indicate the occurrence of a drought) is less than may be expected, given a human population growth rate of 3% (World Bank, 2001) and the social status and prestige gained through cattle ownership. However, as stated by one NGO representative:

In the communities we work with, about 25% of the people own 75% of the cattle and somewhere between 25% and 40% don't own any. So the story that Swazis have to have cattle so that they can get married and so on just doesn't happen today (NGO representative 4, 2002).

This reflects data from the study villages, which demonstrate that although 53% of people own cattle, on average, less than 25% of owners have herd sizes of more than ten animals. The contribution that cattle are believed to make to the degradation of the communal grazing land is recognised in the Swazi government's Livestock Development Policy (1995), which states that:

Where the strong local traditional hierarchical institutions exist, utilisation is characterised by the total absence of stewardship. Under this tenure system, utilisation of the rangelands is communal and therefore subjected to uncontrolled high livestock population densities. It is here that the problems of declining range and livestock productivity have been a constant cause of concern over the last fifty years (Livestock Development Policy, GOS, 1995).

As a result of the comments in Table 6.1 and the attribution of degradation to cattle or cattle-related factors in other government policies, it is expected that initiatives to reduce degradation would also focus on cattle and cattle ownership. As will be demonstrated presently, this is not necessarily the case.

The second theme that is discernible from the comments in Table 6.1 is that there is a clear tendency at the government and NGO level to focus on degradation exclusively in terms of soil erosion and gullying. These are the only manifestations of degradation discussed throughout the interviews. When questioned about why there is a focus on soil erosion and gullying in initiatives to mitigate degradation, NSCD members stated that:

People are more aware and afraid of the gullies than any other form of degradation (NSCD representative 1, 2002)

and:

Gullies have been prominent in our reports and policies because of the farmers. They lose the topsoil also but you only really notice when your yield is low. But the gullies...they see them and then they come to the government and say "Hey, there's something wrong, a gully is coming for our homestead, let's start doing something" (NSCD representative 3, 2002).

These statements demonstrate an understanding at the governmental level that visible issues such as gullying should be acted upon whereas other problems, including soil nutrient loss and salinisation, which may not be directly noticed by land users, can be treated with complacency. It is suggested that land users can be more certain of the existence of a process such as gullying due to its high visibility. Although they may think that soil fertility is declining, without directly building up a dataset of

measurements over time, it is difficult to prove that any change is taking place and that any decrease in yield is directly attributable to soil fertility changes alone. This theme is explored further in Chapter 7.

6.3 Past initiatives to address environmental conservation and sustainable livelihoods

Swaziland has produced numerous plans, schemes and policies in the past in order to address different components of ecological and livelihood issues. Table 6.3 summarises some of these initiatives employed by the Swazi government from 1950s to the present.

Table 6.3: Past and present initiatives in Swaziland with links to combating desertification

Programme	Dates of operation (if known)	Objectives of programme
Rural Development Area Programme (RDAP)	1972-1981	* Improvement of income and living standards in rural communities through commercialisation of farming practices.
Fattening and <i>Sisa</i> Ranches Programme	Ongoing	* To reduce overstocking and grazing pressure on SNL * To enable rural Swazis to realise good economic returns on their cattle
Grazing Management Demonstration Areas (GMDAs)	1982-present	* To educate Swazi farmers to adopt a more commercial attitude towards their cattle
Establishment of the Central Rural Development Board (CRDB) through a King's Order in Council	1950s-present (under review)	* To commission and monitor SNL resettlement programmes * To establish and monitor soil conservation programmes * To promote the participation of chiefs in soil conservation and rural development
National Development Strategy (NDS)	1993-present	* To encourage broad participation in the development process * To strengthen the management of rangelands and forests and to properly define conservation strategies * Monitor and police the optimal use of the environment, national land base and water resources in improving the quality of the human environment * Promote sustainable resource use * Generate income and meet national and international goals and obligations * To articulate using a consultative process a long term vision for the country
Swaziland Environment Action Plan and its related Swaziland Environmental Management Bill	1997-present	* To provide a framework through consultation, for modifying values, attitudes, technologies, laws and institutions in order to improve the relationship between people and the environment * To implement the plan under 5 categories: 1) capacity building 2) environmental education, public awareness and participation 3) biodiversity strategy and action programme 4) Waste management, pollution and environmental health 5) Resource management for increased productivity. The NSCD is responsible for Category 5, which includes desertification issues. * The Environmental Management Bill is the legislation that legalises some of the aforementioned issues.
National Environment Policy (NEP)	Piloted at present	* Aims to integrate a range of policies into a comprehensive national framework to achieve equity-led growth and sustainable development
Economic and Social Reform Agenda (ESRA)	I 1997 II 1999	* Set of time-bound targets that must be achieved in order to prevent the country from facing serious social and economic problems in the near future

		* Includes the implementation of the NAP as one of the targets
National Disaster Management Policy Framework	1999	* To save lives, enhance livelihoods and reduce damage to property and infrastructure * To prevent disasters through sustainable development by focusing on the reduction of poverty and vulnerability * To build capacity and resilience at all levels to reduce the impact of disasters * To ensure the protection of the country's natural resources and the environment
Sustainable Livelihood Programme	1998-2001	* UNDP programme * Framework for the promotion of sustainable livelihoods * Direct assistance given in areas of resource management and disaster management
Poverty Alleviation Programme	2001	* Poverty alleviation identified as one of the government's main priorities * US \$2.5 million allocated to cover community development activities for three years * US \$3.3 million also allocated to cater for the implementation of employment creation activities
National Early Warning Unit (NEWU)	1989	* Established to collect and analyse data on food supply and demand to enable timely remedial action to be taken against food shortages and or surpluses
Water Conservation and Development Strategies		* To secure resources for small to medium scale irrigation * To assist the construction of small to medium sized dams * Programme has top priority in many national development plans and strategies
Population Policy Development	1998	* Population council launched to formulate a population policy * Population unit to be established which will monitor the implementation of the policy
Land Policy Formulation	Awaiting cabinet approval	* This is at an advanced stage * Aims to guide the allocation of land so that it is used on a sustainable basis
Forestry Policy Development	Awaiting cabinet approval	* Contributes to the long term development objectives * To develop sustainable forestry and conserve biodiversity through consultation and participation
Climate Change Project		* To undertake enabling activities to help Swaziland prepare the First National Communication to the COP of the UNFCCC
Energy Policy Formulation	Awaiting cabinet approval	* To reduce unnecessary or wasteful energy consumption * To promote the use of sustainable sources of energy, with priority given to the development of local energy
Livestock Development Policy	1995, adopted 1997	* To promote commercial livestock practices in local communities * To address ways through which government can support and encourage farmers to improve their stock qualities for better financial gains
Biodiversity Strategy and Action Plan (BSAP)		* Prepared under the auspices of the UNCBD

(Source: Adapted from the First National Report on the Implementation of the UNCCD, 1996)

The earlier of these initiatives (pre-1994) are noted in the First National Report on the Implementation of the UNCCD (1996) to have been generally unsuccessful. This is reportedly due to a number of reasons, including a lack of involvement of local communities, poor financial support, inability to address the root causes of the problem and a lack of institutional capacity (Okorie *et al.*, 1999). Interviews with government officials on the NSCD corroborated this view, through statements such as:

Before the NAP, projects were not successful as the government was making decisions from a scientific view in their offices but the rural people see things...they see things differently (NSCD representative 3, 2002)

and:

It depends how the project or programme that is implementing the policy is introduced. Sometimes, the technicians, they have a government programme and they go to the village and put up a wire or a fence for a grazing area. The following month it will not be there because someone will steal it. They don't understand why it is there so it depends how you are approaching the communities with the project and how it is introduced (NSCD representative 1, 2002).

The Swaziland NAP however, marked a shift in the way policies are made, through its emphasis on 'participation' and 'consultation'. Following the guidelines in the UNCCD, the overall NAP was intended to:

...emphasise integrated local development programmes for affected areas, based on participatory mechanisms and on integration of strategies for poverty eradication into efforts to combat desertification and mitigate the effects of drought (Article 8, Annexe I, UNCCD, 1994)

and:

...provide for effective participation at the local, national and regional levels of non-governmental organisations and local populations, both women and men, particularly the resource users, including farmers and pastoralists and their representative organisations, in policy planning, decision making and implementation and review of national action programmes (Article 10, UNCCD, 1994).

Adherence to these recommendations could potentially overcome some of the problems that led to the failure of past initiatives. The following section examines how the NAP was created and considers the proposed areas for action, evaluating whether the new approach can lead to more successful and appropriate policy and practice.

6.4 The UNCCD, Swaziland and its NAP

Swaziland signed the UNCCD on the 26th July 1994 and ratified it on 7th October 1996. As a result, Swaziland was one of the first African countries to meet its obligations to the international community by producing a NAP. Given the problems with past initiatives as illustrated previously, the Swazi government built on their past experience in producing the obligatory NAP document. They utilised processes of consultation by running seminars and workshops involving all stakeholders, as advocated by the UNCCD, and pursued an actor-oriented, consultative approach to environmental management (ECS, 1999). It is stated in the UNCCD that NAPs should be integrated with other national policies for sustainable development so this also is a marked change to the development of national policies in the past (Dobie, 2003). Also, for the first time, Swaziland was focusing on land degradation within policy for its own sake, not merely as a crosscutting issue.

The Swaziland NAP is therefore the product of the culmination of several activities undertaken by the Swazi government in order to ensure the effective country-level implementation of the Convention. The main influences on the creation of the NAP are the principles set out in Articles 3 and 10 of the UNCCD. These stress the importance of consultation and the participation of each ratifying country's people in the formulation of the NAP. As a result, the NAP is intended to be a dynamic document that will be adapted in accordance with changing needs, priorities and understandings.

Following a series of awareness-raising workshops, seminars and meetings, and the sensitising of the population to the desertification issue through radio broadcasts, the Swaziland NAP consultation process began. This initially involved community training through the convening of workshops, so that the people could contribute their ideas towards the document (GOS, 1996). Awareness was also raised further through NGO visits to schools and local communities (GOS, 1997). Local workshops at Tinkhundla level⁹ that were attended by chiefs, community organisation members and government representatives, were followed by regional level workshops. This led to preparations for the First National Forum, which was held in September 1997. This meeting was tasked with prioritising the programme areas on which the policy was to focus. After this, the

⁹ *Tinkhundla* was defined in chapter 5 and refers to rural centres of administration.

NAP was articulated by the NSCD. In the year 2000, the NAP finally received cabinet approval. The chronology of events is summarised in Table 6.4.

Table 6.4: Chronology of UNCCD and NAP related events in Swaziland

Year	Event
1994	17th June- UNCCD adopted in Paris
1995	27th July- Swaziland signed the UNCCD
1996	7th October- Swaziland ratified the UNCCD SEA designated as national coordinating unit SEA designated MOAC as UNCCD focal point SEA designated CANGO as coordinator of NGOs CANGO designated Yonge Nawe as NGO focal point for the UNCCD NSCD established 21 st -22 nd May- Swaziland National Awareness Workshop to introduce UNCCD Background document to the First National Forum
1997	10th-12th September- First National Forum on UNCCD
1998	Formation of NGO task force including 6 NGOs coordinated by Yonge Nawe NAP formulated
1999	First National Report on the Implementation of the UNCCD, submitted in May to the UNCCD COP
2000	NAP adopted by Cabinet
2001	NAP First Review
2002	April- Update on the First National Report on the implementation of the UNCCD

Fourteen programme areas for the NAP were identified from the consultations with the public, as summarised in order of priority in Figure 6.2:

<p>Swaziland's 14 priority areas as identified in the NAP (2000):</p> <ol style="list-style-type: none"> 1. Institutional arrangements 2. Chieftaincy and chiefdom boundary disputes 3. Promotion of awareness and capacity building 4. Promotion of active participation of communities in land management programmes 5. Reclamation and rehabilitation of degraded land to promote sustainable utilisation of land resources 6. Formulation of a national forestry policy and exploitation of forest products framework 7. Research and technology 8. Proper location of construction site and physical infrastructure 9. Development of alternative energy sources 10. Improvement of livestock management practices 11. Drought mitigation and poverty alleviation strategies 12. Land use policy 13. Settlement and resettlement policy 14. Population policy

Figure 6.2: Swaziland's priority programme areas according to the NAP (2000)

These priority areas focus primarily on issues of institutional failure, in order to either correct the shortcomings of existing arrangements or to create new policies using novel 'participatory' approaches. Interestingly, whilst government and NGO representatives all cited cattle as the main causes of degradation, problems associated with livestock management are only tenth on the list of priorities. Due to traditional associations of cattle keeping with social status and the failure of past de-stocking initiatives as apparent from Table 6.3, policymakers have introduced a new approach in the search for sustainable grazing practices. According to one government representative, only when the aristocracy and the king reduce their herd sizes will local people follow suit. As a result, the encouragement of de-stocking has been shelved for the time being and focus has shifted towards increasing potential carrying capacities. This is illustrated in the community project that is examined in chapter 8, in which a feedlot is constructed in an attempt to increase rangeland productivity.

Another unexpected factor relating to the list of priorities is the absence of any mention of soil fertility decline or problems of productivity declines associated with weed infestations. These were considered the most important limitations to livelihoods by the rural people in the three study villages involved in the research, particularly to farmers whose allocated plots represent the mainstay of their livelihoods. As demonstrated in chapter 5, in some locations such as Ezikotheni, people are becoming more reliant on their land due to the impacts of broader political and economic influences. Also, agricultural production on SNL accounts for 40% of agriculture's contribution to GDP, so these omissions are consequently surprising.

Policy responses that were developed following consultations with the communities therefore emphasise the control of population growth, resettlement, controls on resource access and use by the poor, and environmental education. This takes a similar approach to that identified in pre-impasse development literature in that it still emphasises people as the cause of the problem and fails to appreciate the key role of local populations in providing solutions to the degradation. It also parallels some of the viewpoints presented in Table 6.1, in which a downward spiral of poverty and environmental degradation was posited (Scherr, 2000), with poor people seen to place increasing pressure on the natural resource base causing it to deteriorate further (Broad, 1994; Cleaver and Schreiber, 1994; Reardon and Vosti, 1995). Contemporary approaches to

understanding degradation do not focus on people as being the sole causes of degradation and instead appreciate the role of physical environmental factors and broader structural processes, viewing land users as a potential solution to the problem. Swaziland's NAP is therefore not grounded in current lines of thinking, despite the novel 'participatory' approach used to reach those conclusions.

In order to address issues of poverty and social justice in conjunction with environmental degradation, an alternative approach is necessary. As demonstrated in the above analysis of the NAP, this cannot be achieved by retrofitting old policy objectives to new policy frameworks. Although a wider range of actors may have been engaged in the NAP production process than in previous policymaking, the terms of engagement (through 'participation' and 'consultation') still permit the more powerful to frame the ways in which other groups and individuals are involved. In this respect 'the people' have limited points of entry to the policy process and only partial opportunities to influence. Policy makers have drawn on local voices perhaps only to add authenticity to the process (Brock *et al.*, 2001).

There is a wide variety in the opportunities available for different actors to influence the policy process and these are particularly dependent in Swaziland upon characteristics such as gender, status and age. Each person involved in the production of the NAP, at local, NGO and governmental levels, is positioned by other people in the different sites in which policymaking takes shape (Cornwall and Gaventa, 2001). Agency is therefore not the sole factor of influence as it is both restricted and permitted by flexible structures and the development of new social networks, as different people with different amounts of power interact through processes of participation and consultation. In some cases this may lead to challenges to the balance of power relations. However, in the construction of Swaziland's NAP, the people were denied the agency to assert influence outside the framework of their pre-determined role.

This interpretation is further corroborated by the strategic focus on communal rangeland in Swaziland's NAP. Whilst cattle have been identified in the interviews as the cause of the problem, dealing with the symptoms (i.e. the gullies) has been prioritised over addressing the causes in the NAP. This could represent the social construction of an environmental problem that in turn, facilitates the advancement of the interests of the

more powerful actors (Bryant, 1998). As proposed in chapter 2, environmental changes are only perceived as problems to individuals and groups in specific contexts and under certain conditions. If data from the interviews with NGO and government representatives are substantiated and it is found that the traditionally and historically more powerful own more cattle, the NAP's focus on communal land could be interpreted as a policy intervention that advances the interests and addresses the problems of the already powerful. This is particularly the case where the wealthier are not dependent on arable cultivation as a key component of their livelihoods. In this instance, if gullying is reduced and rangeland condition is improved, it will allow the further accumulation of cattle and publicly maintain the status of the elites. This would then reinforce inequalities, which in turn are bound up with the production of environmental knowledge and power relations. In this sense, the selective identification of environmental problems and their representation within policy is a political process that reinforces social and economic inequities as the basis of socially divisive public policy (Blaikie, 1985; Bryant, 1998). It is thought by many of the respondents in this study, (including NGOs, local land users and the government), that degradation levels will not substantially decrease until the possibilities of accumulation of the dominant classes are understood to be under serious threat. As described in chapter 5, the most powerful class comprises the royal family and the aristocrats, who themselves are the members of society least affected by environmental changes and who are most easily able to adapt. They have larger stocks of capitals, control and authority over the entitlements of others, and are not accountable to anyone except the king.

Broad-based shifts towards greater transparency, downward accountability and challenges to social equilibrium that move away from serving the purposes of the elites, are necessary. Without such a move, environment and development policy will continue to be driven by the interests of the powerful, despite facades of 'participation' that mask the underlying power relations at play. In order for this to occur, a broad time horizon is necessary and given the overall governance system in Swaziland, this needs to take place in parallel with democratisation and decentralisation processes. These are discussed further in chapter 9.

Also unexpected in the NAP document is that 'institutional frameworks for dealing with desertification' are first on the list of priority areas and focus remains centred on the

government institutions that deal with land issues. These include the Central Rural Development Board, Land Development Section, Land-Use Planning Section (all under the Ministry of Agriculture and Cooperatives) and the Natural Resources Board (under the Ministry of Natural Resources and Energy) (NAP, 2000). No consideration is given to local-level institutions, social networks and possibilities for collective and individual actions stemming from these, yet the impacts of these groups on poverty and land management are key to the control of natural resources at the community level and are recognised as such in the UNCCD. Little attention is also paid to the linkages between governments, NGOs and the communities, which can mean that the real issues of degradation as experienced by rural Swazis (such as declining soil fertility and weed infestations, as summarised in chapter 5) may be overlooked.

The omission of weeds from national policies to combat land degradation was not only noted from the policy analysis and the interpretation of data from the case study *imiti*. One of the representatives from the MOAC agricultural research station also reported that weeds are neglected in policy, particularly problematic indigenous weeds such as *S. asiatica*. He said that weeds have been a topic of discussion recently, but focus has centred on invasive alien weeds. This is possibly due to Swaziland's commitments to the UNCBD, which has raised the profile of the alien weed issue, and has resulted in the identification of weeds such as *Chromolaena odorata* as being particularly problematic. The research officer suggested that indigenous weeds are neglected in the NAP despite their impact upon productivity levels because weeds are not necessarily considered as a form of land degradation by the government. He said:

If we talk about weeds, the government does not really count it as land degradation as they can more easily see gullies and think they can stop them by putting a fence up or planting trees. Also, trees such as guavas are invasive but not seen as land degradation. The government thinks that guavas and weeds are protecting the soil from erosion so they take vegetative cover to be useful (MOAC research station representative, 2003).

This corroborates the information given in the interviews with NGO and government representatives and demonstrates how initiatives are still largely centred on soil loss and visible, structural interventions, such as the planting of trees and the erection of fences. Focus remains on soil erosion control rather than its prevention and addresses symptoms rather than the causes of such environmental changes. This interpretation

neglects to consider key components of the definition of land degradation as proposed in the UNCCD, where it is defined as:

...the reduction or loss, in arid, semi-arid and dry sub-humid areas, of the biological or economic productivity and complexity of rainfed cropland, irrigated cropland or range, pasture, forest and woodlands resulting from land uses or from a process or combination of processes including processes arising from human activities and habitation patterns such as soil erosion caused by wind and/or water, deterioration of the physical, chemical and biological or economic properties of soil and long term loss of natural vegetation (UNCCD, 1994:7-8).

Whilst the soil erosion component of the definition has been acknowledged, the deterioration of the physical, chemical, biological and economic properties of soil in the proliferation of weeds has been grossly overlooked within the NAP and this is not conducive to the meeting of the Swaziland's obligations to the UNCCD. Instead, it is left to agricultural extension officers to advise farmers on how to deal with weeds, whilst little support is offered within policy or legislation.

Interviews with one of the agricultural extension officers indicated that when local people ask for advice on how to avoid weed infestations, they are encouraged to use herbicides and are told to ensure that they weed thoroughly by hand. This advice is not always useful, since herbicides are too expensive for many rural *imiti* to afford and time demands of other components of their livelihood portfolios often restrict the quality of the weeding that can take place. Weeds such as *S. asiatica* are also very difficult to destroy. Labrada (1992) reports that the parasitic nature of this weed results in increasing levels of infestation year by year. This is attributed to the massive levels of seed production. Estimates suggest that 58 000-200 000 seeds can be produced by one single well-established *S. asiatica* plant and these can remain dormant in the soil for up to 20 years (Parker and Riches, 1993). At typical densities of 20 plants per square metre, as commonly observed in the fields of many African farmers (Ransom, 2000), the number of seeds added to one square metre of soil each year could total millions. As an obligate root parasite, *S. asiatica* can cause damage before it has even emerged from the ground so thorough weeding can therefore be ineffective in solving the problem. Whilst impacting upon rural livelihoods of the present, this problem has the potential to worsen in the future should it be left unattended, particularly when current climatic trends towards drying are taken into account (Hulme, 1996).

When asked if people are given further advice on how to prevent *Striga* infestations from occurring if their land has not yet been affected, the extension officer said that they tell people to add more fertilisers to the soil to improve its fertility and lime to alter the pH. People are also advised to practice crop rotation. However, the extension officer also considered why this advice had not been as effective as it potentially could have been. He said:

We are having a problem. We are not working hand in hand with the people. I think the responsibility must be with the chief. The chiefs have the upper hand compared to us. We can only persuade farmers and try to create awareness but the chiefs can tell the people what they should be doing (Extension Officer, 2003).

This indicates that he considers land users to respond to the advice of ‘traditional’ voices of authority, yet not necessarily to the advice of agricultural extension officers. This highlights once more the importance of social hierarchy in Swazi culture and the power relations at play in determining land use and land management practices.

Another reason why farmers neglect to take extension advice is because they lack the available financial capital to follow it effectively. The extension officer suggested that:

When we tell people they must supplement their soils and buy lime and then we go back to them, we go only to find that farmers cannot be able to buy it according to our recommendations. They can only afford to buy a little and so they don't get the good results (Extension Officer, 2003).

In this instance, limited access to financial capital could discourage people from heeding future advice because they follow the suggestions as well as they can given their circumstances, yet the weeds still cause problems.

6.5 The NAP review process

The Swazi NAP has been the subject of two official reviews since its publication in 1998. Neither of these perceptibly involved any input or participation from local people, contrary to UNCCD recommendations, nor did they lead to the incorporation of problems of weed infestation, as experienced by local land users, into the policy. The main overall criticisms that emerged from the reviews are that whilst the NAP provides a framework for implementation, it does not state how any of the projects should be implemented and although it specifies that the programme approach will be taken, it

does not outline all requirements, resources and implementation arrangements as the programme approach advocates (ECS, 1999). The reviews also considered each of the 14 designated programme areas. The main criticisms that were raised are:

- Many of the programmes focus on the role of the government rather than the linkages between government, NGOs and communities;
- There is little coordination despite strong similarities between some of the programme areas;
- Awareness-increasing initiatives fail to provide training to local communities on appropriate land management techniques;
- The research and technology programme area is very broad and needs to be redefined and grouped together within areas of similarity;
- Some of the programme areas such as the “development of drought mitigation and poverty alleviation strategies” are already being covered in other policies, such as the ESRA and NDS, where projects are currently being implemented. Focus should turn to those activities not already being administered to so as to ensure duplication does not occur (ECS, 1999).

The first review led to the re-grouping of the programme areas into smaller, more coherent and manageable categories. Also, since then, the Japanese International Cooperation Agency (JICA) has funded three pilot projects that utilise concepts of participation and land user involvement under the auspices of its study to review the status of land degradation in Swaziland. One of these projects is considered in detail in chapter 8. However, as demonstrated throughout this chapter, approaches towards mitigating land degradation focus only on the elements that have received attention in the past, such as gullies, whilst the issues faced by land users have been largely overlooked. Wider consideration needs to be given to the causes rather than the symptoms of land degradation in both policy and practice, and the concerns of the land users need still to be addressed.

6.6 Summary

This chapter has considered government and NGO understandings of the causes of land degradation in Swaziland. Cattle were identified as the main causes of the problem and

it was noted that at the governmental and NGO level, visible manifestations of degradation, such as soil erosion and gullying are prioritised in narratives of degradation. These were argued to represent the symptoms not the causes of the problem. Focus is also centred predominantly on communal land, yet allocated land is of greater importance to livelihood sustainability for the majority of rural land users. Past initiatives to conserve the environment and to enhance the sustainability of livelihoods were summarised and the Swazi NAP was considered as a model of new policymaking processes. Despite presenting a new approach to policy formulation, the NAP was found to be applying old policy objectives to new policy frameworks, whilst the maintenance of pre-existing power relations has resulted in the restriction of local community inputs to their designated role in the policy process. This has not given local communities more control over managing their natural resource base. Nor has it been conducive to the successful tackling of land users' problems and needs relating to land degradation. The Swaziland NAP therefore only partially meets the country's obligations to the UNCCD.

CHAPTER 7: Responding to environmental changes: knowledges and environmental management in the middleveld of Swaziland

7.1 Introduction

Current ecological paradigms recognise that the environment is not static but changes over a variety of temporal and spatial scales, as outlined in chapter 3. Any interpretation of change is dependent on the spatial, temporal, economic, environmental and cultural context in which that change has taken place (Warren, 2002). As a result, environmental change is not necessarily synonymous with environmental degradation (Fairhead and Leach, 1995). Similarly, responses to such changes are also temporally and spatially dynamic and are shaped by prevailing power structures and the understandings and capabilities of different people and institutions in relation to natural resources, at any given moment (Neumann, 1997). This variability and dynamism creates challenges for policymakers. To enforce effective management techniques, an accurate understanding of environmental changes is necessary, despite the plural rationalities of those changes. Also important is an appreciation of the myriad of ways in which different ecological changes may provide different constraints and opportunities to different actors and social groups (Batterbury *et al.*, 1997).

This chapter builds on the findings presented in chapters 5 and 6 and considers the main ecological changes and livelihood limiting issues faced by many rural Swazis, as understood by local land users themselves. Local-level responses employed by land users to address what are understood to be the main threats to livelihoods are examined, together with the nature of indigenous knowledges that people use to manage their environments. Chapter 2 demonstrated how local and scientific knowledges evolve in different ways and this theme is followed up further with the integration of local knowledges with both scientific and social scientific analyses throughout this chapter. The chapter concludes with a discussion of how such knowledges may be integrated and made useful in both policy and practice and a synthesis of the findings is presented.

7.2 Interpreting environmental changes

In Engcayini and Ezikotheni, as apparent from chapters 5 and 6, one of the most widely reported negative environmental changes is a decline in soil fertility and the subsequent proliferation of weeds. These phenomena are understood to be problematic to all case study *imiti*. Due to decreased reliance on the land in sustaining a livelihood in KaBhudla, this was seen as less of a problem, although was still mentioned by poorer *imiti* who were unable to invest in fertilisers. Changes in access to and availability of forest resources was another issue highlighted by rural residents, whilst drought and variable rainfall inputs were other commonly cited threats to productivity. Interviews carried out with the case study households in all the study villages revealed that these issues were seen to be the largest threats to the sustainability of rural livelihoods. The following sections examine these understandings and threats in more detail.

7.2.1 Changes in soil fertility

Soil is of especial cultural and spiritual value to Swazis. It is regarded as the custodian of the ancestors and therefore must be revered by all in all aspects of life's endeavour (Osunade, 1992a; 1992b). Government envelopes bear the phrase: "*Umhlaba uyimphilo yetfu- wonge!*" which translates as: "The soil is our greatest asset- help conserve it!" Soil is also important as a key component in many of the livelihood strategies pursued by the Swazi people. Land users were found to monitor their soil condition constantly and in doing so have developed an astute awareness of the changes that have occurred. In all of the study villages, soil was referred to as *sihlabatsi*, which is the general Siswati term for sandy soils. According to the description of Swaziland's physical characteristics (see Table 5.1), this is typical of the middleveld soils. Soils in all of the study villages are considered to be 'good to fair' in terms of production potential (Mushala *et al.*, 1998).

Table 7.1 summarises some of the most widely used ratings of nutrient status applicable to African soils. These ratings were used as a baseline on which to locate the nutrient determinations elucidated in this research. The findings indicate that many of the fields in Engcayini yielded determinations of nitrogen, phosphorus and potassium in the 'medium' category and these are highlighted in bold text in Table 7.1.

Table 7.1: Broad ratings of soil nitrogen, phosphorus and potassium

Total soil N (%)	Rating	Total soil P (%)	Rating	Total K (meq/100g soil) ¹⁰	Rating
>1.0	Very high	0.1	High	> 1.0	Very high
0.5-1.0	High	0.02-0.1	Medium	0.6-1.0	High
0.2-0.5	Medium	<0.02	Low	0.3-0.6	Medium
0.1-0.2	Low			< 0.3	Low
<0.1	Very low				

(Source: Adapted from Landon, 1991)

The average nutrient determinations per field for the samples taken in phase 1 of data collection are presented in Table 7.2, where results falling in the ‘medium’ category or above are highlighted in bold. A complete table of determinations for each sample site can be found in Appendix II.

Table 7.2: Average N, P and K determinations from the fields of case study *imiti* in Engcayini

Field code	Number of sample sites per field (n)	Land use over the growing season 2001-2002	Inputs	Average Total N (%)	Average Total P (%)	Average Exchangeable K (Meq/100g)
M1	5	Maize	F	0.207	0.028	0.256
M2	5	Maize	F	0.211	0.029	0.498
M4	5	Beans	-	0.152	0.022	0.289
M7	3	Ematapa	-	0.235	0.032	0.181
M8	3	Maize	-	0.216	0.030	0.389
M9	3	Fallow	-	0.226	0.029	0.320
M10	3	Groundnuts	M	0.245	0.035	0.190
M15	5	Maize	M	0.276	0.049	0.790
M17	5	Maize	-	0.336	0.056	0.813
M20	3	Maize	-	0.264	0.031	0.529
J1	5	Maize	F	0.313	0.060	0.819
J2	5	Maize	F, L	0.295	0.052	0.658
J3	5	Beans	-	0.257	0.046	0.695
J4	5	Groundnuts	M	0.259	0.038	0.565
J5	7	Beans	M	0.336	0.036	0.334
J6	5	Maize	-	0.216	0.035	0.467
JH	5	Maize	F	0.317	0.045	0.717
D1	5	Maize	F	0.272	0.037	0.215
D3	7	Maize	F	0.259	0.034	0.528
D4	5	Maize	F	0.314	0.056	0.228
D5	5	Sweet potatoes	F	0.270	0.043	0.219
D6	5	Beans	F	0.231	0.028	0.192
D7	5	Beans	F	0.251	0.032	0.210

(Source: Field data)

Key: F= Fertiliser, L=Lime, M= Manure

¹⁰ Results are presented in Meq/100g because this is the standard unit commonly used in the literature (Landon, 1991).

Comparison of the results of the scientific soil nutrient analyses with the ratings in Table 7.1 indicates that 96% of fields have mean total nitrogen levels falling in the 'medium' rating, whilst all of the fields exhibit 'medium' levels of phosphorus. It is recommended that for maize to grow successfully, nitrogen, phosphorus and potassium concentrations should be at least falling in the 'medium' category (Landon, 1991). This implies that in the majority of instances, maize is being cultivated just within the boundaries of appropriate conditions.

Although the nutrient levels are considered to be just above the minimum required for maize growth, it is suggested that other crops such as cassava and sorghum may be more suited to the soil conditions of the middleveld. These crops are more tolerant than maize to both low soil nutrient levels and moisture stress. They therefore may be more suitable for production than maize, given the environmental conditions in Engcayini (van Waveren *et al.*, 1993). Due to the Swazi preference for maize cultivation, such a change is unlikely at present. This is because maize production, through repeated cultivation and practice, has become embedded in Swazi culture due to broader social and political processes controlling the maintenance of 'traditional' land uses. As stated by Zodwa in KaBhudla:

We always grow maize. It is traditional. It is our staple food so we must grow it to have food (Zodwa, 2003).

Other people such as Richard used to grow cotton. However, as a result of the maize shortages facing Swaziland, he returned much of his land to maize cultivation.

Originally introduced into Africa by the Portuguese in the early 16th century, the popularity of maize grew slowly until the beginning of the 20th century. At that time, its cultivation rapidly increased due to the spread of commercial mining in South Africa. Maize has lower labour requirements than the previously popular grain crops of millet and sorghum (de Vries and Toenniessen, 2001), so was a popular choice for cultivation by those working on the mines. As with many land use and land management practices in Swaziland, the widespread practice of maize cultivation was gradually absorbed into the realms of tradition and today Swaziland consumes over 100 kg yr⁻¹ per capita (*ibid.*).

Land users report that they invest more financial, human and social capitals in maize production than in the cultivation of any other crop. To cultivate maize, human capital in the form of labour is needed to plough, sow the seeds, apply fertilisers and manure, weed and harvest, whilst local knowledges and experience are drawn upon to make land use and land management decisions. Financial capital is needed for transportation to towns to purchase inputs such as seeds, fertiliser and lime and also to meet tractor hire costs. Social capital is used in a variety of different ways: to increase access to inputs, to offset expenditure of financial capital and to decrease expenditure of human capital. This can benefit not only the land user but other actors in the social network too.

Some farmers such as Albert in Ezikotheni borrow cattle from their neighbours or relatives. In doing this, Albert is using contacts within his social network to gain access to manure. Albert transfers both time and financial benefits to those who control the access to cattle (cf. Berry, 1993). In return, Albert gains access to manure, which increases the likelihood of producing a good maize yield whilst also maintaining soil fertility. By drawing on social capital, he has increased his capability to derive entitlements from his land endowment. In forming such an agreement over access to cattle, a social relationship is being negotiated. Power relations are unequal in this relationship as the cattle owners retain the dominant position. The relationship is also dynamic because they could demand the return of the cattle at any time. Yet presently, Albert is benefiting from the use of his social capital. Similarly, Wiseman in KaBhudla lends his cattle to family in Nhlango, where he believes the pasture quality to be better. He too benefits from the relationship that was negotiated.

These examples illustrate the key role of social networks in maintaining access to resources (Ribot and Peluso, 2003) and demonstrate the variety of ways in which different actors can benefit from membership in social networks. Wiseman benefits in that he does not have to look after his cattle, which is useful considering his ill health and the access to manure that Albert gains from his negotiations results in a considerable financial saving. Although farmers such as Albert view the addition of manure to arable plots as favourable, fertilisers are understood to be more effective in providing nutrients for the crop. Even some of the poorer families involved in this research invested some of their capital in fertilisers and it was found that they

preferentially applied it to fields used for maize over and above those used for other crops. As stated by Albert:

If we can only afford a little fertiliser, we put it on the maize fields because it is most important that the maize grows, as it is our staple food (Albert, 2003).

Interview data present a similar attitude in Engcayini. Maize is also seen as the most important crop in this village. As a result, average nutrient levels were found to be marginally higher in maize fields in Engcayini during the 2001-2002 growing season, although nitrogen and phosphorus levels were also higher in fields used to grow sweet potatoes. This is illustrated with data from the three case study *imiti* in Figures 7.1-7.3.

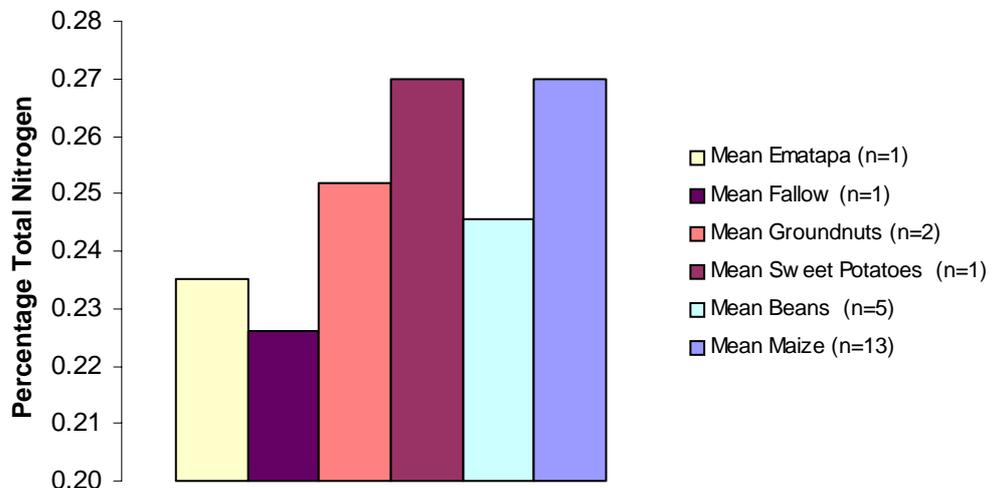


Figure 7.1: Mean nitrogen determinations in fields with different land uses (n = number of fields sampled)

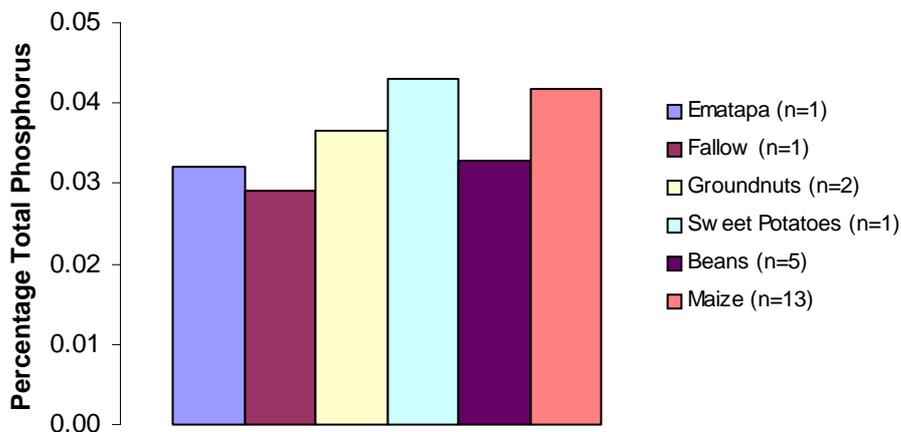
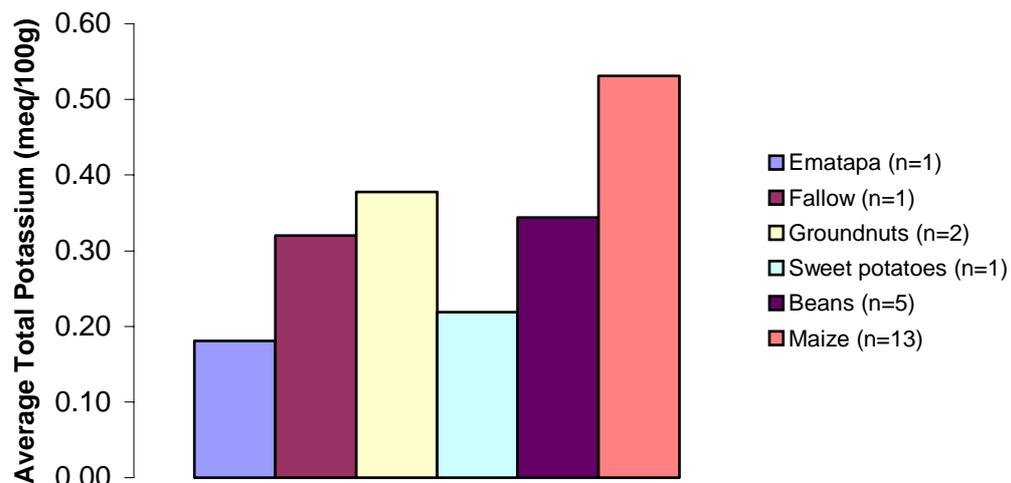


Figure 7.2: Mean phosphorus determinations in fields with different land uses (n = number of fields sampled)



**Figure 7.3: Mean potassium determinations in fields with different land uses
(n = number of fields sampled)**

In addition to being the main staple, maize is of cultural value and can be sold commercially should yields exceed subsistence requirements. Due to the importance of a good maize yield to rural Swazi well being, it is also apparent from both the field areas that were calculated and the interview responses, that land users consciously select their largest fields for their maize crop, dedicating the majority of their allocated land to maize cultivation. Of the total land area under cultivation by the three case study *imiti* in Engcayini, 58.3% was used for maize cultivation during the 2001-2002 growing season.

In terms of field productivity and its impacts on livelihoods, absolute nutrient levels as measured in the laboratory are one of many factors that affect growth of the crop. Weeds that favour soils of low fertility and low rainfall such as *S. asiatica* (*sona* in Siswati) and *Asteraceae Xanthium strumarium* (*siphulamachine* in Siswati) are reported by land users to have increased in abundance over recent years and these are considered a significant constraint to productivity. Ransom (2000) reports that *S. asiatica* is considered as one of the most important biological constraints to food production on the African continent and its impacts on rural livelihoods in Swaziland reflect this. Two of the case study households in Engcayini reported that they had to abandon attempts to harvest the maize crops in some of their fields due to serious *S. asiatica* infestations. One of these households is that of Dudu, who said:

We couldn't harvest the fourth field because of the sona [Striga]. This is one of our biggest fields but the sona and the other weeds are worse when we plant maize here (Dudu, 2003).

Despite intensive weeding in January and February 2002 and the addition of two bags of fertiliser to the field in response to a *S. asiatica* infestation in the previous growing season, Dudu's crop was still destroyed. This is illustrated in Figure 7.4 by the dead brown maize crop. It should be noted however, that species of weeds other than *S. asiatica* are also present in the photograph.



Figure 7.4: Maize crop failure as a result of weed infestation

As discussed in chapter 6, weeds are not afforded a mention within Swaziland's NAP nor other policies addressing rural livelihoods or land degradation. Although Dudu followed the advice of agricultural extension officers and applied more fertiliser, her fields showed little improvement and were still heavily infested with weeds. It is possible that insufficient fertiliser was applied but also that other factors such as rainfall inputs and organic matter contents remained favourable for the promulgation of the weeds. The size of the dormant seed bank could also have played an important role in the spread of the weed because as described in chapter 6, the number of seeds added to one square metre of soil each year can total millions (Ransom, 2000). Once more the need for appropriate policy has been highlighted, to address the impacts of *S. asiatica* on productivity and rural livelihoods.

The case study *imiti* that were interviewed in all the study villages all said that they consider their fields to have had higher fertility levels in the past. They believed that the soil was of a better quality when they first settled in their current chiefdoms. The reasons given for this deterioration in soil quality include: a decrease in manure application due to a drought-driven decline in cattle numbers; a decrease in fertiliser application due to high market prices; and the cycle of dry periods followed by wet periods which mean that when the rains begin, the topsoil and its nutrients are easily washed away. This demonstrates that both environmental and broader structural processes are understood by land users to limit soil fertility.

The changes to soil quality that the land users suggested had occurred were identified through various indicators, textural and visible, whilst indicator species of flora and fauna were believed to represent different nutrient and fertility levels. Such indicators include a decline in the presence of *ematfuku* worms, which indicate fertility, as does the *umbidvo* vegetable, which is a wild plant that naturally establishes on fertile soils. If the soil is infertile then it is believed that the maize cobs grow shorter and are red or yellow in colour. It is also reported that when plant remains are buried in the soil during ploughing, fertility is being added if it makes the soil appear whiter. One of the key informants said that if the weeds in a field grow very tall before the crop has emerged from the ground, it indicates that the crop yield will be poor. He suggested that the weeds would have ‘taken the goodness from the soil that the crop needs to be able to grow’. The indicators used by the case study *imiti* in all of the study villages are synthesised in Table 7.3, though it should be acknowledged that there is no single ‘local knowledge’. Each farmer uses his or her own unique set of indicators, on which understandings of soil fertility are based. Consequently, the breadth of local knowledge and the indicators employed by rural land users should be assumed greater than that revealed through the present study.

Table 7.3: Summary table of indicators of soil fertility used by the case study *imiti*

Quantitative/performance indicators	Indicator species	Soil textural and colour indicators
Size of cobs- larger cobs show higher fertility	Presence of <i>ematfuku</i> worms indicates fertility	Soil loose and sandy when infertile
Infertile soil recognised by small cobs	Presence of <i>umbidvo</i> vegetable indicates fertility	When ploughing in plant remains, if soil goes white then indicates fertility
Infertile soil recognised by red/yellow cobs when maize removed	<i>Sona</i> weeds make fields infertile	If soil feels wet then it is fertile
Crop grows shorter if soil infertile	Presence of <i>imbuya</i> vegetable indicates fertility	If soil feels dry it is infertile
More cobs when soil fertile	Leaving fields fallow increases fertility	Darker soil colour means increased fertility

The comparison of scientific soil nutrient analyses with local understandings of fertility demonstrates agreement in that they both consider the soil to be below optimum quality for agricultural production, although this is noticed in very different ways. Science is able to take this understanding further and through measurements, suggest that in some cases the soil suffers from deficits in the key macronutrients nitrogen, phosphorus and potassium, which are essential for optimum plant growth. Due to the qualitative nature of locally derived indicators in assessing soil quality, although crop production may remain stable, it does not necessarily mean that nutrient depletion is not occurring. All the time nutrient stocks can still support production depletion may pass unnoticed unless monitored quantitatively over time (Koning and Smaling, *in press*). In this respect, the integration of scientific techniques with local methods of monitoring could prove advantageous, particularly given the comments received from NSCD representatives discussed in chapter 6, where soil fertility declines were reported to have been ignored in policy due to their non-visible nature.

With regard to differences between the nutrient statuses of fields with different land use histories, it appears that those fields in which crop rotation is practiced generally show greater levels of nutrients, particularly when rotation involves the cultivation of cowpeas, beans or groundnuts. In Engcayini, Sara's *umuti* was established over 70 years ago. According to the scientific nutrient analyses, her soils show consistently higher macronutrient levels than the other farms in Engcayini, despite the land having been under continuous cultivation for a longer period. There were also very few statistically significant differences when an ANOVA test was run, comparing the nutrient data from the fields with that of the grass strips. (See Appendix III for full

table of statistical data). This demonstrates the importance of good land management in maintaining soil fertility, as crop rotation is practiced on these fields. Sara reported that:

Ever since I came to the homestead we have used crop rotation. It destroys the sona and the field is not as bad the year after the groundnuts are planted there (Sara, 2003).

This understanding corresponds with the results of scientific research carried out in Benin by Gbehounou (1996), which showed that crops such as groundnuts can reduce *S. asiatica* infestations by inducing suicidal germination, thus causing the gradual demise of the soil's seed bank. Groundnuts and cowpeas were also found to add nitrogen to the soil. In Ezikotheri, Albert began to intercrop cowpeas with his maize crop, originally due to the land shortages. However, he noted that this exerted some control over *S. asiatica* infestations. He considers the difference to be very noticeable as he reports that greater numbers of weeds establish following the years that he neglects to intercrop and the weeds are detrimental to the growth of the maize crop.

Transect walks elicited numerous comments from land users about the spatial variability of soil fertility both within and between fields. In general, local interpretations were found to yield more detailed information about soil fertility dynamics and variability over time and space than is permitted through the scientific measurements undertaken in this study. In carrying out scientific soil nutrient analyses, a sampling strategy has to be designed. This can easily overlook some of the inherent spatial variability, with the nutrient value obtained being restricted exclusively to that precise position in the field. Aside from shortfalls associated with the selected sampling frame, numerous other factors could be responsible for intra-field variability in nutrient levels. Science cannot account for nor quantify the impacts of these different influences. In this respect, science presents uncertainties (Thomas, 2003; Forsyth, 2003). Factors including slope angle, drainage patterns, stones, soil particle sizes, the presence or absence of weeds, differential nutrient extraction by the crop at each sample point and the formation of soil pans below plough depth could all contribute to intra-field variability at any one time, whilst laboratory analytical techniques introduce additional measurement error (Anderson and Ingram, 1993). It is therefore extremely difficult to isolate the contribution of each factor.

Intra-field variability in nutrients may mean that in some parts of some fields, maize may not grow well and although total nutrient levels may be acceptable, the amount available to the crop for use may still be insufficient. Such intra-field variability is illustrated in Table 7.4, where the nutrient levels for each sample are shown for Dudu’s fields. Samples with nutrient levels below ‘medium’ ratings are highlighted in bold.

Table 7.4: Nutrient variability at the intra-field scale on Dudu’s land

Field and site	N (%)	P (%)	K (meq/100g)
D1A	0.325	0.044	0.203
D1B	0.296	0.040	0.147
D1C	0.237	0.052	0.186
D1D	0.223	0.007	0.282
D1E	0.279	0.043	0.258
D3A	0.213	0.029	0.135
D3B	0.263	0.043	0.174
D3C	0.244	0.027	0.287
D3D	0.299	0.024	0.989
D3E	0.384	0.069	0.393
D3F	0.229	0.033	0.486
D3G	0.184	0.013	0.175
D4A	0.341	0.061	0.175
D4B	0.354	0.055	0.274
D4C	0.323	0.054	0.203
D4D	0.328	0.086	0.221
D4E	0.224	0.022	0.268
D5A	0.277	0.019	0.157
D5B	0.273	0.052	0.175
D5C	0.187	0.033	0.240
D5D	0.330	0.055	0.246
D5E	0.282	0.056	0.277
D6A	0.244	0.052	0.275
D6B	0.216	0.034	0.204
D6C	0.288	0.045	0.182
D6D	0.223	0.006	0.145
D6E	0.187	0.002	0.153
D7A	0.272	0.040	0.186
D7B	0.241	0.040	0.273
D7C	0.241	0.005	0.132
D7D	0.252	0.038	0.191
D7E	0.253	0.041	0.266

Table 7.4 shows Dudu’s fields to be deficient in potassium in the majority of locations. Nitrogen and phosphorus levels fall mostly in the ‘medium’ rating, although even within a single field, nitrogen values vary by up to 0.200%. This indicates a considerable degree of variation in total nitrogen, relative to the average determination of 0.259%, a maximum value of 0.384% and a minimum value of 0.184%. Nevertheless, the effects of small-scale spatial differences in nutrient levels are likely to have minimal impacts on rural livelihoods. Soils are inherently variable so these differences are not unusual (Landon, 1991).

On many occasions, particularly on transect walks through steeply sloping fields, land users stated that the crop grew better at the bottom of the slope and attributed this to the occurrence of heavy rainfall, which washes the fertilisers downhill. Whilst this is possible, intra-field nutrient variability also has close links with past land use practices as well as those of the present, and this cannot be verified by the snapshot scientific results of the soil samples analysed in this research. Further investigations could therefore be advantageous to increasing understanding of such intra-field variability.

The grass strips that separate fields are also likely to have influenced nutrient build up, as they form a natural barrier to soil and nutrients that are washed downslope. This could permit the accumulation of nutrients within the grass strips. Conversely, the regular burning or harvesting of grass from the strips would result in a net loss of nutrients from the soil below them. Perhaps for this reason nitrogen levels in the grass strips were only found to be statistically significantly different to nutrient levels in the fields above and below the grass strip in one instance when an ANOVA test was run on the data. Significant differences in potassium levels in the fields and strips were also found in one case. However, there was little difference in average potassium determinations, with the samples taken from the fields averaging 0.523 meq/100g and those from the strips averaging 0.633 meq/100g. Whilst it is possible that the grass strips allowed potassium levels to build up slightly, this could be because the grass in the strips uses less of this nutrient than the crop. Indeed, the maximum potassium reading was from within the grass strip (0.980 meq/100g) and the minimum was in the field (0.334 meq/100g). However, given the inherent variability of potassium levels as apparent in Table 7.4, it was considered that broad, robust conclusions should not be drawn from the data, as the results may be a product of differential weathering of the underlying feldspars or uneven fertiliser application amongst other factors (see Appendix III for full table of statistical data).

Local knowledge, with a bias towards visible indicators of fertility, enables a fairly comprehensive analysis of fertility patterns and dynamics through classifications of soils according to their colour, texture and potential for crop production (see Table 7.3). These indicators act as useful tools for farmers in that they enable them to monitor the condition of their land both easily and rapidly (Reed and Dougill, 2002). Biases towards visible indicators are not unique to farmer knowledge in Swaziland and have also been reported

in other locations, for example, Ethiopia (Corbeels *et al.*, 2000), Nigeria (Harris, 1998) and Botswana (Reed and Dougill, 2002). Local interpretations of soil fertility also integrate other key factors to inform land management strategies, such as environmental histories and lessons from past experience, as this is the way such local knowledges and understandings are built up. These are important considerations when making land management decisions, as contemporary patterns of soil fertility are related to both human and natural occurrences in the past (Scoones, 1998).

Scientific analyses are often only applicable to one particular snapshot in time and space unless they represent long-term external monitoring programmes (Stocking and Murnaghan, 2000), or are reliant on proxy measurements of background nutrient levels, as was the case in this research. In many cases, particularly with regard to soil erosion monitoring, the monitoring techniques interfere with the degradation process itself, so this form of appraisal is not always conducive to continuous, rigorous monitoring and assessment (Stocking and Murnaghan, 2000). Scientific measurement of soil fertility in terms of soil characteristics such as nutrients and organic matter content are of limited use if they cannot be linked to problems and decisions that actually matter to farmers and other land users. This demands an understanding of the range of other factors that have a bearing on productivity, that is, the context in which the measured soil nutrient values are located (Biot, 1992). Consideration of the broader context is necessary, including the position of arable production in the land user's wider livelihood portfolio, since whether or not such changes to soil fertility are taken to represent a problem depends on the framing of those changes by the land user (Forsyth, 2003).

A key factor determining whether soil nutrient levels constitute a limitation on plant growth is the availability of soil moisture. From a farmer's perspective, high measured nutrient levels in the soil will not translate into productivity if there is inadequate rainfall. Equally, presence of soil moisture (as in low-lying areas) may compensate, in terms of overall productivity, for moderate (though probably not low) chemical nutrient values. For example, in one of the fields owned by the one of the case study families in Engcayini, the key informant suggested that the field used to grow *Ematapa* (similar to the coco yam) is very fertile because that field is always used for the same crop and consistently gives high yields without fertiliser or manure application. The scientific nutrient analyses show there to be only medium levels of nitrogen, phosphorus and

potassium within that field. In the agricultural literature, these are considered the absolute minimal requirements for successful crop growth (Landon, 1991). This indicates that although the soil may be perceived as moderately fertile by scientists according to their measurements, for the land users, who base their judgements of soil fertility on the production potential for a specific crop, this field is understood to be very fertile. When these understandings are examined in greater depth, it becomes apparent that the land may be suitable for *Ematapa* due to other factors that need to be considered when discussing soil quality and that the consistently favourable yields are not an exclusive product of the soil nutrient status.

The farmer stated that the field is usually quite damp, even in the dry, winter season (soil moisture is another indigenous indicator of soil fertility). The field is positioned at the bottom of a slope, with only a small wooded area separating it from a river, thus explaining the increased potential for soil moisture. *Ematapa* is usually cultivated on riverbanks or in marshes (Mackenzie, pers. comm. 2003) hence the moisture levels are appropriate for its growth in this instance. The land user always utilises that particular field for that specific crop but has not necessarily considered that the field may be suitable for *Ematapa* primarily because of its moisture content and not due to its fertility levels. When asked why *Ematapa* is grown in that location he responded that it is because it grows well there, so in this instance he was basing his decisions on previous experience. If maize or groundnuts were planted in that field instead, the yields may not be as favourable. This may then change his perception of the fertility status of the field if a poor yield of maize is harvested. This example demonstrates the subjectivity associated with assessing degradation and acknowledges that whether using scientific or locally derived indicators, it is the context and the understanding of the land user within that context that are key to the determination of what constitutes degradation.

7.2.2 Changing access to forest resources

Wood is an important resource in Swaziland (Lasschuit, 1994). It is used as fuel for cooking and as a construction material in the building of people's homes. Some people sell wood poles harvested from communal forests as part of their livelihood strategies. The case study *imiti* in all of the study villages reported a decline in access to forested areas over the past 10 years and this was echoed in the statistical analysis of the baseline questionnaire data. In Engcayini 72% of respondents reported a decline in access to

forested areas, whilst in Ezikotheni the same was cited by 36% of the people interviewed. In KaBhudla figures remained high, with 67% reporting decreased availability of wood, despite studies reporting severe bush encroachment in the area (GOS, 1993). Had the time frame of the questionnaire been greater and considered changes over the last 30 years, it is possible that even more people would have reported a decline. In Engcayini, Ezikotheni and KaBhudla, 60%, 46% and 58% respectively blamed the perceived woodland decline on population growth. As explained by Nesta in Ezikotheni:

The trees have been decreasing since I came here 30 years ago. There used to be lots more down by the river. There were umganu, imbondo, lusololo and umgamba and some others. We go to buy now because it is too far to go and we get more if we buy rather than go to the forest. It is because there are too many people (Nesta, 2003).

The purchase of wood represents only one strategy that is employed to deal with the identified decrease in forest resources. Other people reported the use of dried cow dung and aloes for cooking, whilst some families, particularly in KaBhudla, now use bottled gas or electricity. *Imiti* with greater financial capital are often able to afford to build their homes out of concrete blocks, so this circumvents the need for wood poles. Despite local understandings of woodland declines in Engcayini, the results of the time-series aerial photograph analysis contradict local interpretations of change. According to the maps produced from the aerial photographs, in 1984, 1.17 km² of the 8.2 km² area of the village was covered by woodland. In 1999, the extent of woodland was calculated to be 1.37 km². This represents a 17% increase. This is illustrated in Figure 7.5.

Whilst some of this increase can be considered due to the differences in resolution of the aerial photographs, which will have affected the quality of the digitising, the quantity of the increase is considered too large to be accounted for exclusively through digitising error. Trees have mostly proliferated in the gullied parts of the community, so this accounts for much of the increase in forest area. It is suggested that local land users interpret such an overall loss of resources because of a decreased abundance of the species to which they ascribe the highest values. For example, *umgamba*¹¹ and *singa*¹²,

¹¹ *Umgamba* is the Siswati term used to refer to both *Acacia davyii* and *Acacia robusta* (Dlamini, 1981).

¹² *Singa* refers to *Acacia gerrardii* and *Acacia karroo* (Dlamini, 1981).

tree species favoured for use as fuelwood, have decreased in profusion according to many of the informants from the case study *imiti* in Engcayini. Conversely, guava trees were reported to have proliferated considerably. Whilst only absolute changes in the area covered by woodland are apparent from the time-series aerial photographs, ground verification during transect walks indicated that the new woodland areas comprise mostly guava trees, thus explaining the interpretations of environmental change as proposed by the local people. Wood for use as fuel can therefore be considered more important to rural Swazis than fruit from the guava trees, because it is the negative impact of the loss of fuelwood species that they emphasise, not the spread and growth of new guava trees. This highlights how vegetation changes are most noticed at species level.

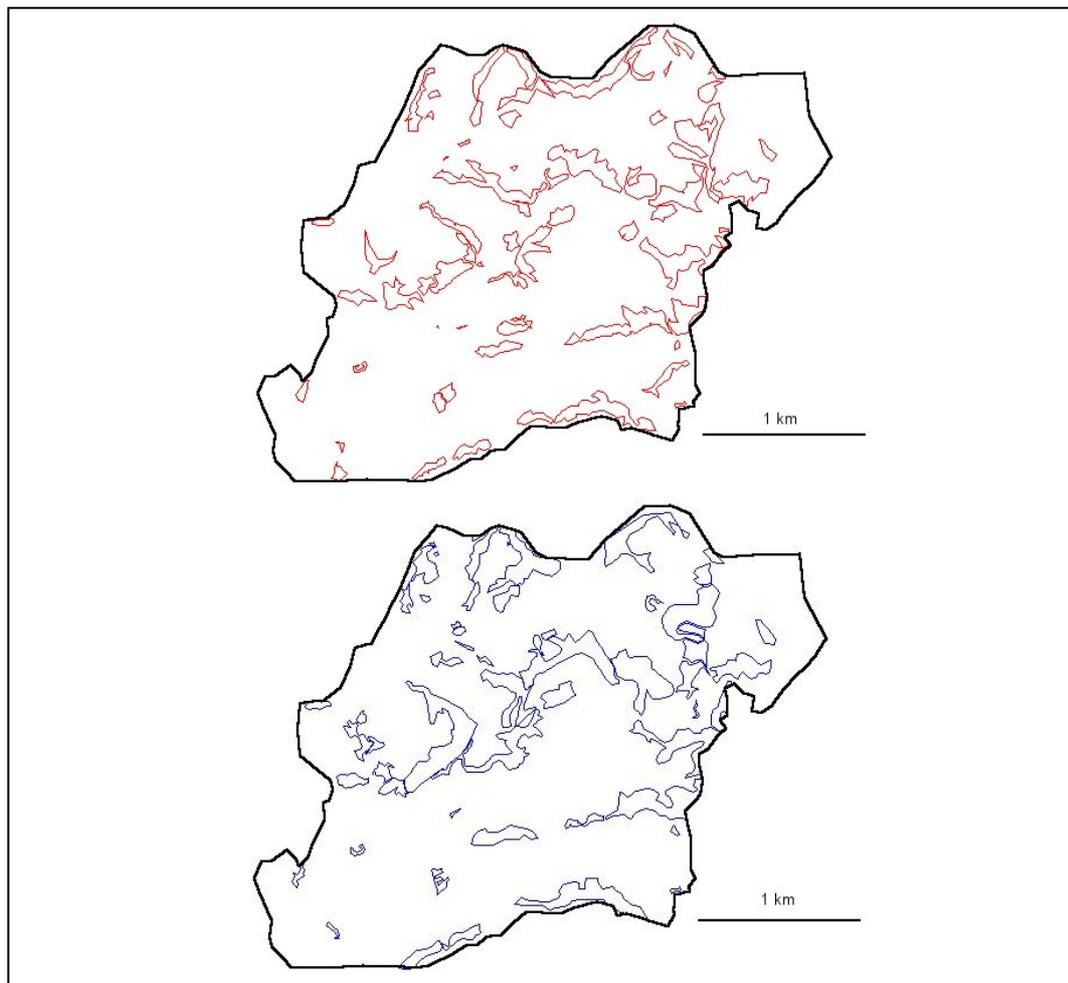


Figure 7.5: Forested areas in Engcayini in 1984 and 1999

Psidium guajava is an alien species to Swaziland. It originated from Central America and was introduced to Africa by the Spanish and Portuguese in the late 19th century (Morton, 1987). *P. guajava* is known to be able to reproduce after only 2-4 years from seed and in South Africa, this species may only be cultivated under controlled conditions, as its rapid proliferation rates threaten indigenous species (ECS, 2001). Adult trees live for 30-40 years and the species is drought tolerant, hence the suitability of the environmental conditions for its growth in Swaziland (Morton, 1987). The increased abundance of *P. guajava* trees could be interpreted as a form of land degradation according to scientific definitions. As stated in chapter 2, the biophysical manifestations of degradation and desertification can involve a change in vegetation productivity over time, (unrelated to rainfall patterns), a change in vegetation cover and a change in community species composition (Prince, 2002). The rangelands of Engcayini have experienced some of these changes. More importantly, the decrease in available grazing area due to the establishment of the trees could impact upon rates of soil erosion and degradation levels on the remaining areas. These different interpretations of the spread of *P. guajava* are important in analyses of land degradation. They again raise the issue of ‘whose degradation?’ (Warren, 2002) and show how environmental change is not synonymous to environmental degradation for all actors (Fairhead and Leach, 1995). This emphasises the importance of local valuations of wild resources when determining environmental management strategies, because environmental understandings are culturally and socially constructed, depending on the role of that particular resource in the overall remit of daily living (Dove, 2004). Again, ecological processes are shown to be socially embedded (Robbins, 2004) and knowledge and value systems linked (Brown, 2003).

7.2.3 Drought

Drought was reported to be another major limiting factor to crop productivity and is understood to be a threat to sustainable livelihoods, as outlined in sections 5.6.1-5.6.3. As stated in chapter 5, drought is defined as below normal recorded rainfall levels, causing serious hydrological imbalances that adversely affect land resource production systems (UNCCD, 1994). The case study *imiti* in all the study villages consider drought to be occurring more frequently today than when they first settled in their current chiefdoms. Whilst people are recognised to romanticize the past (Sullivan, 2000), local

understandings of climatic variations demonstrate strong agreement with meteorological data. In terms of crop production, the most critical rains for land users are those from December to February, as this is the growing season of the maize crop. Meteorological data show no trend towards an outright decrease in rainfall during the growing seasons over time, as indicated in Figure 7.6. Instead, corresponding with the new ecological principles described in chapter 3, an inherent variability is noticed.

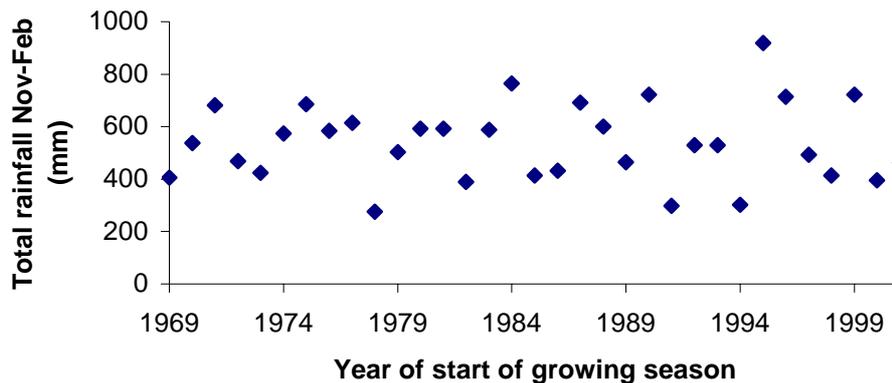


Figure 7.6: Total rainfall Nov-Feb over the growing seasons 1969-2001
(Source of data: Swaziland Meteorological Office)

The complete available dataset spanning the entire 12 months of each year¹³ can be divided into two (the first set being from 1969-1984 and the second from 1985-2000). The standard deviations of each are calculated as 126.37 and 173.96 respectively. The higher value of 173.96 shows a greater deviation from the mean over the time period 1985-2000, so this period has seen more inter-annual variability in rainfall totals than the 15 years preceding it. Also apparent from this dataset is that the lowest annual rainfall and the highest annual rainfall occur within the most recent period. The lowest annual rainfall since 1968 was recorded in 1992, when 525.2 mm was received. The highest annual rainfall was in 1988, when the Matsapha weather station recorded 1242.8 mm of rainfall. This is consistent with consensus interpretations of climatic change for the Southern African region, which predicts that global warming will increase the occurrence of extreme climatic events, including droughts and flooding (Hulme, 1996).

According to the meteorological data, mean monthly September rainfall from 1968 to 1984 was 59.82 mm, whereas from 1985-2000, the figure stood at 32.50 mm. Figure

¹³ Note: this differs from the data presented in Figure 7.3 as it includes total monthly rainfall values for the entire 12 months of the year rather than that received only in the maize growing season.

7.7 appears to illustrate that the onset of the main period of rain is now occurring later. This change was also noted by many of the people involved in the research. The months September to December are considered in Figure 7.7 because the land users prepare their fields for planting after the first rains, so disruption to the beginning of the rainy season may require greater adaptation and response from the land users.

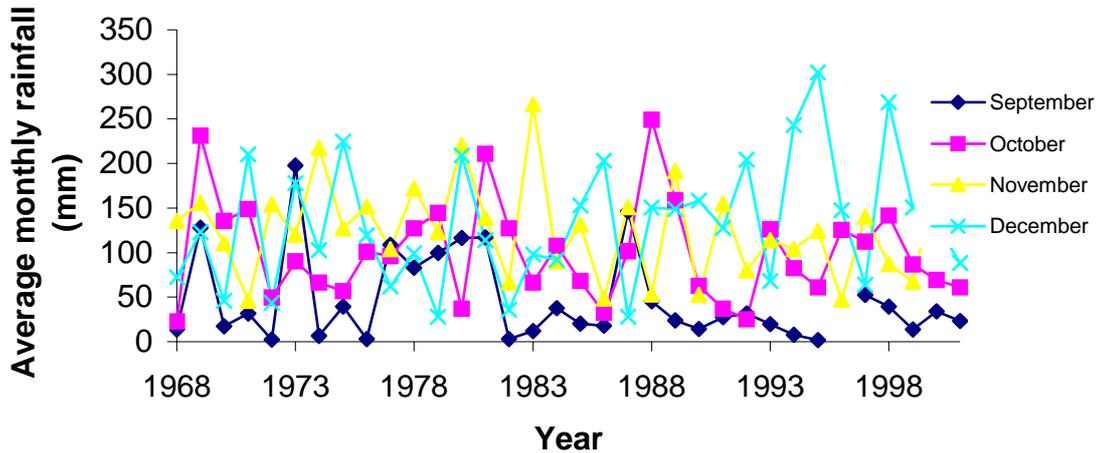


Figure 7.7: Monthly rainfall for the months September-December, 1968-2001
(Source of data: Swaziland Meteorological Office).

As observed by Sara and many other land users:

The weather is different now. The rainfall used to be heavy in September but now it doesn't start properly until late October or November (Sara, 2003).

Despite lacking the facilities to measure rainfall in an empirical manner, local land users have demonstrated an astute ability to recognise and remember the nature of rainfall inputs from previous years, mentally modelling any patterns and relating them to the yields that they produced. In response to their understandings that the rainfall season has started later in the year more recently, farmers have adapted the timing of ploughing and planting accordingly, so as to minimise the threat to their livelihoods. The impacts of this were summarised by Richard:

The rain comes later now which means everybody waits and then there is a shortage of tractors because we all want to plough at once (Richard, 2003).

Whilst logistical problems appear to occur due to demand for tractors, it is suggested that agricultural policy needs to be flexible to adapt to changing seasonal demands. It

is not necessarily the demand itself that has changed but its timing. Where possible, farmers have adapted their land management strategies to compensate for the changes they observed. For example, Wiseman in KaBhudla stated that:

There is more drought now compared to when we first settled here. You can't find water in the small dams now. We used to grow our maize in October and harvest it in December and then use the same land to plant beans after that. Drought means we can't grow beans because the maize is coming later (Wiseman, 2003).

For land users like Wiseman, these apparent climatic shifts that he refers to as 'drought' have a large impact because he has only a very small plot of land (<1 ha). Previously he could cultivate two crops on the same parcel of land; he is now able to grow only one. Although bean cultivation did not contribute directly to his livelihood strategy, he now has to buy beans instead of growing them himself so this impacts upon his expenditure levels.

In combining their perceptions of soil fertility and rainfall patterns, land users in the study villages have developed multi-faceted, versatile understandings of their environments. The observation that if soil feels wet then it is fertile suggests the recognition of the importance of rainfall and soil moisture in producing a good yield. This demonstrates recognition that fertile soil alone is not enough to guarantee successful production. Indeed, as stated by Lindiwe:

Some fields produce more maize than others as they have more goodness in the soil but for the crop to be good it also depends on the rainfall, and if you can add fertilisers and manure (Lindiwe, 2002).

Despite differences in the ways in which scientific and local knowledges evolve and are practiced, several complementary knowledge domains have been identified in this research (Agrawal, 1995). Both land users and scientists understand the soil to be below optimum standards for cultivation, although this is recognised in very different ways by the different actors. In making land management decisions, land users demonstrate that they triangulate and network their knowledge sources, using indicators such as the size of maize cobs and the height of the maize plants, with their qualitative observations of indicator species, soil colour and soil textural factors. These are combined with interpretations of climatic trends in a holistic evaluation of their

environments. Whilst this demonstrates a degree of complexity, one drawback in assessing multiple factors and building mental models is that the result is inevitably going to be less complex than the system it represents (Robbins *et al.*, 2002). The selective abstraction and reorganisation of observations, necessary to achieve understanding, is a process that is unique to each individual or group. Varying interpretations of environmental changes are therefore inexorable and can both conflict and complement (Robbins, 1998).

7.2.4 Gullying and soil erosion

Gullying is focused upon in the JICA pilot projects in both Engcayini and Ezikotheni. It is considered by land users to be an environmentally undesirable phenomenon in all the study sites, although not a direct threat to the sustainability of rural livelihoods. It is understood to be a serious problem by only a few *imiti*. Farmers tended to report gully growth as a major issue only when their *umuti* or arable land were threatened in terms of structural damage or productivity loss, or when their cattle had fallen into the gullies and died. In Engcayini, most communal hillsides used for grazing exhibit some degree of sheet erosion. This is illustrated in Figure 7.8. This problem is mainly confined to communal grazing land, although the subsequent settlement on former grazing land has resulted in a change towards arable land use with the effects of the past land uses still experienced by the farmers of today.



Figure 7.8: Sheet erosion on the hillslopes of Engcayini

One case study *umuti* in Engcayini that contends with high levels of gully erosion is that headed by Dudu. She set up her homestead in 1995. After a fierce storm in 2001 following a prolonged dry period, the gully opened up, despite the presence of grass strips in the fields. Every year since the first occurrence of the gully, the summer rainfall causes it to expand. Dudu attributed the development of the gully to the previous land use. Cattle from surrounding communities used to walk along the tracks that dissect her now-arable land once every week in order to reach the diptank by the river. It is along the tracks that the gully has opened. Since the change in land use and the construction of more diptanks, the problem has decreased. However, the damage from land use practices of the past is still affecting the land use of the present, particularly because runoff from what is now a large pathway continues to drain onto her land. The gully has created problems for Dudu because it has decreased the field size and makes ploughing difficult. Effectively, it has divided the field into two. Due to the increase in time taken to plough the two sections the tractor hire price is higher, as it operates on an hourly rate. In addition to this, the encroachment of the gully onto her arable land leaves her with a smaller area available for cultivation, which further impacts upon her livelihood. Her human, natural and financial capitals are therefore affected by this environmental change. This has led to her interpretation of that particular change to be synonymous with degradation.

According to Dudu, it is because the degradation severely impacts upon her livelihood that she perceives the threat to be large enough to take action to reduce the growth of the gully. Her primary income source is the sale or exchange of arable produce. Dudu and her family planted aloes and grasses in order to stabilise the soil and dug a trench to divert the water so that it takes an alternative route during its descent downslope. She has also constructed stone bunds at the head of the gully in an attempt to slow its growth. The gully is shown in Figure 7.9 and the conservation techniques in Figure 7.10.



Figure 7.9: Gully on Dudu's allocated land



Figure 7.10: Household level soil conservation strategies

Whilst these methods of soil conservation are labour intensive, they require minimal financial expenditure. Dudu drew on her stocks of renewable human capital, as she understood her other capitals to be low, since nobody from the *umuti* was in waged employment. The social capital of her family ties was also utilised as the other members of the *umuti* assisted with planting and the construction of stone bunds. When asked how she knew what to do to reduce the growth of the gully, Dudu said that she had approached the agricultural extension officers and they had suggested that she should vegetate the land to bind the soil together. She drew on her experience and local knowledge in order to construct the stone bunds and considers that her attempts have been successful so far.

In Ezikotheni there are vast areas of sheet wash and gullying, particularly around the basal regions of trees on communal grazing areas, as shown in Figure 7.11.



Figure 7.11: Sheet erosion in Ezikotheni

Land users have noticed the expansion of eroded areas over time but as stated by Gladys:

There are many gullies here. They are that side by the chief's residence. They start off as a pathway and the use of it each and every day by cattle makes the vegetation go, so that when it rains a lot, the soil washes away and a gully starts. They are not a problem to us really but if we need to go somewhere, we must walk the long route because the gully cuts the pathway (Gladys, 2003).

Due to Gladys's understanding of the gully as an inconvenience rather than a threat to her home or her livelihood, she has taken no action to halt its growth. This represents a 'tragedy of the commons' scenario (Hardin, 1968). When asked why no action had been taken, Gladys suggested that it was a waste of money to buy plants because people will still graze their cattle in the same areas and the vegetation will be destroyed. She reported that some of the people in the homesteads surrounding the gully once erected a wire fence, yet people from the village still let their cattle into the fenced area to graze. When asked why the gullying is getting worse, she suggested that:

There are too many homesteads with a large number of cattle who all go to the same place each and every day. This is what is making the gullies worse. The land is really bad near the diptank because so many cattle and goats go there. It is compulsory to take them and people do go because it is free from the government (Gladys, 2003).

When questioned about possible solutions to the overgrazing issue in the community, de-stocking and reducing cattle numbers were not options that were mentioned.

Emphasis was instead placed on a need for better land management practices. She suggested that the chief should address the problem through restricting access to some areas of land in order that they may rest. This proposal draws upon traditional hierarchies and power relations to enforce land management changes and shares similarities with the suggestions of agricultural extension officers outlined in chapter 6. Re-negotiating relationships over access to land could be problematic in Ezikotheni. Although a new chief has been appointed, he is young and still attending school and there is much opposition within the community. Interventions reliant upon traditional power structures and authority may not therefore be a realistic option. The lack of social capital and sense of 'community' due to chieftaincy disputes could explain the sabotage of past conservation initiatives, as both social and environmental norms and values were not shared (Kadushin, 2002). This demonstrates the central roles of social networks and agency in motivating people towards collective action. Without the building of social capital, trust cannot follow (Pretty and Smith, 2004), particularly in Ezikotheni where the community is pervaded by conflict. A lack of trust stemming from weak social networking between individuals in the community has resulted in little faith being afforded to initiatives taken by anyone else in the village (cf. Krishna, 2001).

Moving to consider the causes of the gullying, the focus on cattle as a symbol of social status, rather than as an economic asset and a substitutable form of capital, means that the sale of cattle is almost inconceivable in Ezikotheni, except for example, to pay for a funeral. According to Nsibandze (1987), there is a saying in Swaziland that: "A Swazi can never have too many cattle". The maintenance of large herds of poor quality animals has caused land degradation to worsen as the social benefits of buying more cattle for any individual are understood to be greater than that individual's portion of the shared negative effects (Cannibal and Winnard, 2001). Since the degradation is a phenomenon primarily on communal land, no one is willing to invest in it so as to improve the situation. The non-cohesive nature of this community because of political and social differences may also be an important influence on the lack of individual response to such degradation at the village level. Since the current threat to rural livelihoods is perceived to be minimal, no action has been taken. Increasing reliance on the sale of arable products and wild resources harvested from communal land in many livelihoods could cause this understanding to change in the near future, as other

resources besides the soil (such as trees and plants) are affected by processes of desertification.

In KaBhudla, a contrasting situation is presented. Richard is from a comparatively rich *umuti* with a well-developed portfolio of diverse livelihood options. He explained that the gullies in KaBhudla are very old but were worsened by Cyclone Domonia, which affected the area in 1984. This corresponds with findings from geological studies of gully development in the middleveld, in which gullies were suggested to be over 300 years old (Dardis *et al.*, 1988). Different processes caused these gullies, compared to those in Engcayini and Ezikotheni. This demonstrates how gullies may not necessarily form because of land use practices immediately surrounding the gully. Instead, they represent a natural way of removing large quantities of excess runoff and sediment derived from sheet erosion in the catchment (Stocking, 1996). Most of the newer gullies in KaBhudla are along the side of roads but similarly to Ezikotheni and Engcayini, areas of sheet erosion can be found on the communal grazing land. The *Indvuna* of the area reportedly requested that people look after the pathways and area immediately surrounding their homes. This has reduced the spread of gullies a little but does not help to reduce the erosion on the communal grazing land. An example of the types of measures taken by people to slow gully growth is shown in Figure 7.12.



Figure 7.12: Aloe filling a gully in KaBhudla

Local explanations as to the poor quality of the rangeland in KaBhudla differed from those given in the other communities. In Engcayini and Ezikotheni, neo-Malthusian narratives of degradation prevailed, as population growth has caused a decline in the availability of rangeland. However, in KaBhudla, 45% of cattle owners considered drought periods followed by heavy rains to be the main cause of erosion. Given the physical environmental characteristics of the area, including higher temperatures and erodible soils, climatic factors could play a greater role in causing degradation, particularly as cattle are viewed more as an economic asset in KaBhudla than in the other study villages and are managed as such. Again there remains an unwillingness of people to reduce their herd sizes. However, turnover rates are believed to be greater in KaBhudla and many farmers have developed innovative ways to increase the economic value of their cattle. Those who do not cultivate their allocated land have instead tended towards using it for grazing their livestock. This therefore represents a change in land use. Although this helps decrease grazing pressure on the communal areas of vegetation, the cattle must still be taken to the Umzimphofo or Lugule Rivers each day so that they can drink. They must also be dipped every Tuesday and this remains a contributing factor to the development of cattle tracks. Consequently, the rangeland is still considered by cattle owners to be in poor condition.

During the dry winter season, more *imiti* in KaBhudla than in the other study villages have the capability to utilise financial capital to buy grass to feed their animals. As stated by Richard:

We buy grass for the cattle in winter and save some of the maize stalks for them. It costs about R90 per roll but as demand grows, the price increases to R200 per roll. The grass we buy is the same type that grows around the fields, called giguya. We don't harvest the grass from the fields for them because it is difficult to store properly and goes mouldy easily (Richard, 2002).

Efforts in this village are therefore more management oriented and highly dependent on the attitudes of individual farmers and the accessibility of their financial capital. Those with larger herds of cattle in KaBhudla are most often those who can afford to feed their livestock during times of drought and are the people who prefer to buy food rather than cultivate their allocated land. Currently, this type of management appears to be successful, given that cattle are traded and viewed commercially rather than kept exclusively as an indicator of social status. However, due to the chiefdom's favourable

location and well-developed infrastructural links to the nearby town of Manzini, demand for land is increasing, resulting in the allocation of many arable plots (e.g. that allocated to Wiseman) which are less than 1 ha in size. This could have knock-on effects on grazing pressure in the future, as well as cause conflicts to develop, particularly if the wealthy fail to utilise their allocated land whilst the poor are suffering from the effects of land shortages.

7.3 Coping with and adapting to change: a synthesis of the findings

The previous sections have demonstrated that farmers often develop highly sophisticated and attuned land management strategies in response to the dynamics of their livelihoods and environments in order to minimise social and environmental risks (Vogel and Smith, 2002). It has also been revealed that there is often significant overlap between local and scientific knowledge domains (Agrawal, 1995). Western scientific measurements were integrated with local environmental knowledges in order to better understand the environmental characteristics of the present and the changes that have occurred over time. The ways such changes have impacted upon local people were also examined and the social embeddedness of ecological processes was explored. Similarities were noted with regard to the understandings of soil fertility of western scientists and local people and a need to address issues of weed infestation and decreasing productivity within policy was raised. Table 7.5 summarises the key findings from this chapter, presenting some of the problems as identified by the land users resulting from environmental change and the coping strategies, adaptations and innovations employed to minimise the impacts on rural livelihoods. Data from all the study villages are included.

Environmental changes have been shown to be felt most acutely by those *imiti* that are most dependent on natural resources as a key component of their livelihood strategies and the sustainability of livelihoods has been shown to be the most important factor to the well being of most rural land users. Depending on the perceived level of threat to livelihoods of each environmental change, the decision will be made to either respond to or ignore the environmental change. Combining data from all of the study villages, 91% of land users said that they carry out conservation activities when they think their allocated land is being threatened by processes of change. These actions take a diverse form and include contour ploughing, the digging of furrows to divert drainage water,

the maintenance of grass strips, filling small gullies on their land with stones and planting grasses in gully heads.

According to the context of the environmental changes that have taken place and both the accessibility to and substitutability of capitals, land users are able to draw on different aspects of their stock of coping strategies in order to minimise constraints and exploit opportunities at any particular time, as apparent from Table 7.5. The greater the perceived negative impact of the environmental changes on the land user's own vulnerability (including the sustainability of the livelihood strategies pursued, the available coping strategies and the accessibility and substitutability of capitals), the greater the motivation for individual action to reverse any changes or prevent them from progressing further. Where farmers show no concern, it is often because the threat of physical processes including gullying or soil erosion is not considered to be serious, or that the resources at risk represent marginal components in their overall livelihood strategies (Scherr, 2000). The upholding of certain traditions and socially accepted practices is also an important factor in determining a response in the context of Swaziland and this can be traced back to national level power structures and institutions discussed in chapter 5.

Table 7.5: Main problems relating to land degradation and livelihoods and the coping strategies employed

Problem	Coping strategy
Gullies: decrease field size and planting area, make ploughing difficult, soil loss from fields into gully, fertiliser loss from fields into gully, cows fall into gully, gully encourages growth of cats-eye trees which kill grasses, takes longer to get to places as have to walk around the gully.	Dig furrows to divert water, plant aloes and grasses, plough across not down slope, remove cats-eye trees, herd boys employed to keep cows away from gullies, fill gullies with stones, walk a different route to the dip tank, avoiding the gullies.
Weeds: decrease yields as prevent maize from growing properly.	Weed thoroughly in January and February, plant early so <i>sona</i> flowers after cobs have grown, rotate crops in each field annually to increase soil fertility and decrease weeds, intercrop maize and cowpeas.
Pests and diseases: <i>cutworms</i> - cut maize stems and eat the shoots, <i>sihlava</i> - worms in the maize that eat the leaves, termites- cause the maize to fall over.	Add chemicals to soil, add lime, use tar and creosote to prevent termites, burn grass strips to get rid of other pests.
No cattle: no manure so soil infertile.	Borrow cows from friends or neighbours to gain manure in exchange for labour needed to look after them
Drought: crops not as good, plant remains do not rot, when rains do come it creates gullies, poor grass growth on grazing land.	Plant different fields at different times, pray to God, receive government maize if crop fails badly, work elsewhere to get money to buy food, buy grass to feed cattle.
Lack of money: for seeds, fertilisers and tractor hire and for children's education, clothes and food.	Join associations and cooperatives to get discounted access to materials, make and sell clothes, send family members away to work in towns and return remittances, sell products from communal land and arable crops, set up irrigated vegetable gardens to provide the family with food and sell any excess to get money, develop informal village trading networks, plant different fields at different times according to availability of financial capital.
Infertile soil: crops grow shorter or not at all, <i>sona</i> weed grows well, any cobs produced are yellow or red inside.	Advice from extension officers, add fertilisers, use suitable seeds, use crop rotation and intercropping, leave fields fallow, leave crop remains in soil after harvest
Cattle wandering onto arable land and eating the crops	Erect fences, speak to cattle owners to tell them about the problem.
Lack of trees for fuel wood: increased time taken to collect wood.	Search further away, buy wood, use other sources of energy (gas, electricity, burn dried cow dung or dried aloes).
Poor quality grazing land: cows teeth 'become old' as they have to eat grasses that are too tough for them, cows thinner due to lack of grass.	Use rotational grazing and fences, buy food for cows in winter, send cows to other people to look after in regions where the grazing land is better, adopt a more commercial view of cattle husbandry and increase herd turnover, graze on allocated land.
Shortage of land: for growing crops and for grazing cattle.	Divide all available arable land into plots and rotate crops grown on them, rent TDL, send cattle to be looked after by friends or relatives, change land use and graze on allocated land where rangeland shortage.
Ill health: too ill to plant and tend to crops.	Negotiate with friends and family to tend the land, buy food.
Lack of time: due to demands of daily living and other components of the livelihood strategy.	Invest time in the most profitable activity, buy food, recruit friends and family to help with farming.

Understandings of environmental changes do not always lead to changes in behaviour or management strategies, since other factors in the wider resource network may limit adaptations (Robbins *et al.*, 2002). Whilst farmers often know what to do in response to an ecological change, (for example, how to improve soil fertility), they may not be capable of acting upon their knowledge due to a deficit in one or more of their reservoirs of capitals and this is often a result of broader scale processes and limitations. As can be seen in Table 7.5, in order to deal with deficits in one type of capital, other types of capital are drawn upon. For instance, to decrease weeds, which represent a problem with the natural capital stock, human capital is drawn upon in the form of labour, social capital is used in obtaining help from family and friends with weeding, and financial capital is invested in fertilisers to increase soil fertility. This demonstrates how resources are networked. Sometimes broader structural processes restrict the ability of the land user to respond. For example, whilst Swazis may be allocated land on which to pursue a livelihood, farmers are bound by traditional land management practices over which the chief exerts power and control. This is through his traditional right to dictate the period of time over which the cattle are permitted to roam freely on the arable land. This indicates that farmers are restricted in their decision-making and responses to change due to a cultural emphasis on tradition and broader scale manifestations of power. In Engcayini especially, this could cause problems that are felt in other areas of the resource network, since the temporary chief resides outside of the village, so has no first-hand experience of the environment for which he makes the decisions.

Despite the limitations and opportunities presented to rural people in the pursuing of their livelihoods, in terms of both land use and land management practices, the choices farmers make are a reflection of their understandings of a combination of environmental variables together with broader scale influences, such as market prices and access to land. Ultimately, it is the land users themselves that interpret their situations and who make the land use and land management decisions. Whilst the logic and reasoning behind some decisions may not be immediately apparent to others, they are usually the product of the rational evaluation of the resource network, as understood by the land users themselves. For example, with regard to the non-addition of fertilisers to one of her fields, Dudu said that:

We didn't add any fertilisers to this field this time. Last time it was used for maize and we put on one bag of 38 fertiliser but this time we are having sweet potatoes and if you put fertiliser with them then it makes them lose their taste- they taste all watery (Dudu, 2003).

This demonstrates that Dudu may have been able to afford to apply fertiliser to her field but she perceives the taste and cooking properties of her yield to be more important at this point in time than the long-term sustainability of the fertility of her land. Whilst a seemingly myopic approach, her reasons for this decision can be traced back to her reservoir of coping strategies, one of which is to informally trade sweet potatoes and exchange them for maize with other people in the village, particularly during times when her own maize crop is destroyed by weeds. Should she trade inferior quality goods with community members, she is risking the possibility that next year they will trade with someone else. In this respect, she is thinking of the long-term maintenance of a sustainable livelihood and is preserving levels of social capital built up through her friendships and trading networks.

7.4 Implications of the findings for future policy

As apparent from the analysis in chapter 6 and the preceding discussions in the present chapter, although Swaziland's NAP takes a new approach towards policy development, it does not necessarily focus on the main problems actually affecting Swaziland's rural populations and pays no attention to agency, nor the linkages between government and the communities. This is most discernible through examination of the priority constraints of the land users, who contextualise changes to their environments within the entire framework of issues, processes, decisions and livelihoods that constitute their daily lives (Thomas *et al.*, 2002). As a consequence, farmers understand soil fertility declines and the subsequent proliferation of weeds to be the main threats to their livelihoods. However, government policies tend to concentrate on the more visible manifestations of degradation such as soil erosion and gullyng, which play a far more marginal role in rural Swazi livelihood strategies. The NAP has therefore insufficiently acknowledged that environmental changes are socially constructed and this highlights the need for greater democratisation of understandings of environmental problems (cf. Batterbury *et al.*, 1997).

The Swaziland NAP was intended to bridge the gap between local and scientific knowledges. As demonstrated through the analysis in chapter 6, the majority of the programme areas focus on changes at the governmental level and frequently involve the creation of new policies to meet pre-existing objectives. Policymakers could justify this response because a consultative pathway was followed and people's opinions were included. However, it is important to recognise the role of culture and the framing of the issue in the responses that are given. Due to the nature of Swazi society, when faced with a problem, people in the past have always blamed the government and expected them to provide assistance. Therefore, when given the choice, it is not surprising that many land users would agree that new policies are necessary in order to reduce degradation. Whether these policies are really appropriate to their needs, focusing on local needs and action as advocated by the UNCCD, and culturally appropriate, remains questionable.

Although the identification of as many opportunities as possible is useful in gaining a holistic overview of a given situation, policies need to be strategic and should aim to increase the likelihood of existing choices in becoming real possibilities rather than pandering to the agendas of the elites. Further information on the ways people adapt, cope and innovate when facing change could be useful to policymakers. The mapping of networks that allow analysis of the constraints and opportunities that local people face could be more significant in developing strategies to combat desertification than the documentation of indigenous knowledges as proposed by the NAP. Policy implications are often diffuse and based on scientific uncertainties, whilst policy effects can be ambiguous and difficult to identify. This chapter has demonstrated that social networks are instrumental in coping with environmental changes. However, in many policies and plans, social and human assets are often excluded (Goldman, 2003). In implementing the UNCCD, local people can play a tremendous role in building new social networks and sharing their indigenous knowledges to combat land degradation. Similarly, the creation of hybrid knowledges can benefit from investment in building social capital (Kadushin, 2002).

Whilst this chapter demonstrated conflicting interpretations of changes at times, it has provided a useful illustration of how ecological processes of change are socially embedded (Robbins, 2004). The decline in woodland in Engcayini was understood to

have occurred due to a decreased abundance of species to which local people ascribe higher values, not due to an outright decrease in woodland *per se*. This highlights the importance of context and local value systems when assessing issues of environmental change and again demonstrates how investment in social capital can help to increase understanding of the positioning of others within that network.

Western scientific analyses in this study permitted the classification of much of the soil in Engcayini as chemically within the requirements for maize production. However, this only accounts for nutrients levels at that ‘snapshot’ in time. Land users state that the soil does not produce yields as high as it has in the past. In this respect, local knowledges exhibit a temporal advantage over short-term scientific analyses when it comes to monitoring, as they are based on past experiences and trial and error. This allows land users to both comparatively assess productivity levels over time and to simultaneously locate any changes in the overall framework of the sustainability of their livelihoods. Locally derived indicators of soil fertility and environmental changes relating to climatic variability can also prove to be extremely useful in monitoring and reporting systems (Kinyunyu and Swantz, 1996) and this too has been overlooked in the NAP. Within the NAP document, ‘research and technology’ is the only priority area to mention indigenous knowledge. Even then, only the ‘documentation of scientific and indigenous techniques to combat desertification and mitigate the effects of drought’ (NAP, 2000) is proposed and no possibilities are presented as to how this knowledge may be used in future anti-degradation initiatives.

The inclusion and involvement of local populations in the collection and processing of monitoring data can empower land users (Stocking and Murnaghan, 2000), which would further meet the objectives of the UNCCD. In incorporating local knowledges and indicators into the degradation monitoring process, this would help to bridge the gap between bottom-up livelihoods analyses and top-down policy analyses (Chadwick *et al.*, 2003). Such integration would also augment the variety of available responses to changes and increase the possibility of making the substitution of capitals more realistic. This could take a number of different forms and be incorporated into policies that deal with issues ranging from livestock to the rural economy to settlement and resettlement, and would help ensure that local solutions are more in line with local perceptions of the problem (cf. Chanda, 1996). Instead, cause and effect relationships between rural

people and natural resource degradation were assumed, as pre-defined objectives from past policies were retro-fitted into current planning processes. This shares similarities to Vayda and Walter's (1999) criticisms where they accused political ecologists of knowing the answers before carrying out their research. New interventions need to be developed that are sensitive to people's existing capabilities and constraints, and which 'democratise expertise' (cf. Blaikie, 2001), socially embedding the contribution of the natural sciences to policy (Batterbury *et al.*, 1997; Bryant, 1998; Forsyth, 2003). For this to happen, broader structural changes are needed.

CHAPTER 8: Contemporary approaches to combating land degradation in Swaziland

8.1 Introduction

The largest recently completed land degradation mitigation pilot projects in Swaziland were funded by the Japanese International Cooperation Agency (JICA) in cooperation with Swaziland's Ministry of Agriculture and Cooperatives (MOAC) and a local NGO, Swaziland Farmer Development Foundation (SFDF). Two of the villages involved in this research hosted such projects but due to the timing of the periods of fieldwork, it was possible to investigate only one of these projects in the present study. Whilst not directly tied to the Swaziland NAP in terms of mechanisms of funding, the JICA/MOAC project provides a relevant and timely case study of the application of many of the principles and concepts embraced in the UNCCD. These include: recognition of the importance of linking community participation and indigenous knowledges with anti-degradation initiatives; consideration of the existing national policy environment and potential synergies therein; and acknowledgement of the centrality of political, social and economic factors in combating land degradation. As such, the project provides a format to be followed and improved upon in future NAP initiatives, hence its relevance to this research.

This chapter begins with an outline of the background to the pilot project in Engcayini, including a brief description of the aim and methodology employed in its design and construction. The analysis and interpretation of the data collected over both field seasons of the research is then presented, sources of which include interviews and focus groups with the JICA team, NGO representatives and local people involved in the project. The chapter proceeds to analyse the positions of the various stakeholder groups within the community and considers how each may benefit or suffer due to the inevitable re-negotiation of power relationships between pre-existing institutions and those that came into being as a result of the project. An analysis and evaluation of how participatory the project actually was according to its aim and objectives and the understandings of the stakeholder groups is presented. In conclusion, the implications of the outcomes of the project for the future success of the NAP in Swaziland are explored.

8.2 Introduction to the community project in Engcayini

In 1996 the government of Swaziland requested the government of Japan to undertake a study to investigate the improvement of degraded land in Swaziland's middlelevel region. The consultancy report that was produced recommended three target areas in which a need for urgent land rehabilitation had been recognised. These were proposed as suitable sites to host pilot land rehabilitation projects. Focus was on soil erosion and gullyng. Similarly to the NAP and also reflecting the understandings of government officials presented in chapter 6, visible erosion was prioritised in the project design from the outset. Communal land was targeted so that whole communities might benefit from involvement in the project and so that participatory approaches could be taken, involving local land users. Potential sites were narrowed down by JICA and MOAC using orthophotos and documentary records, leaving two or three chiefdoms with potential to host the project in each of the three target areas (JICA, 2001). Based on these results, in-depth field investigations were carried out in each prospective area and a public opinion survey was conducted in order to gauge views on the project of the local people living in each area. The results of the surveys were evaluated in conjunction with the other data and ranked according to the following criteria:

- The soil is seriously eroded
- The area has potential for land use improvement
- The rangeland is not properly managed or has potential for improvement
- The area has potential for agricultural development
- There is not enough area covered by forest or the area has potential for forestry and agro-forestry development
- The community has willingness, unity and leadership
- The area is environmentally degraded

In line with the concepts embraced in the UNCCD, the objectives of the JICA project were:

- To formulate a master plan to improve the degraded land in three target areas, which promote degraded land improvement projects and aim at the establishment of sustainable as well as rational land use therein;

- To implement pilot projects to clarify the eligibility of the master plan to attain the above;
- To prepare guidelines for the improvement of degraded SNL, thus contributing to the promotion of degraded land improvement projects in Swaziland;
- To tighten relationships among Swaziland's government agencies, traditional communities and NGOs through the establishment of a system that enables sustainable implementation of the degraded land improvement projects by participation of the local community;
- To undertake technology transfer to the counterpart personnel of the government of Swaziland with respect to planning methods, procedures, technology and skills required for the improvement of degraded land and which further promotes the implementation of degraded land improvement projects in Swaziland (JICA, 2004).

After numerous workshops and community meetings at the *Tinkhundla*¹⁴ level in order to select which chiefdoms within the short-listed areas should host the projects, and subsequent discussion of the ranking exercise, Engcayini chiefdom was chosen by representatives from all of the communities in the Kukhanyeni *Inkhundla* to host the pilot land rehabilitation project. The *Inkhundla* administrative level was considered most suitable for the pilot projects because it was the intention that they should be monitored and experienced not only by the people of the host chiefdom but also by those from the other chiefdoms under the same *Inkhundla*. It was envisaged that any successes could then be replicated in other places (JICA, 2001). This nested scalar approach further parallels the requirements outlined in Annexe I of the UNCCD.

The people of Engcayini highlighted cattle as the main cause of gullying on communal land in their chiefdom as a result of overgrazing and the creation of cattle tracks when taking cattle to the river to drink or to the dip tank. In response to this locally identified cause of soil erosion, broad approaches were proposed by JICA. These incorporated: the establishment of fenced grazing schemes to control animal movement as well as affording the rangeland grazing areas a rest at suitable times for seedling recovery and establishment; the creation of fodder crop plots to produce high quality fodders at high

¹⁴ As noted in chapter 5, *Tinkhundla* is the plural of *Inkhundla* and refers to rural centres of administration (JICA, 2001).

yields per unit area; and the erection of cattle feedlots to enable fattening of suitable beasts for sale so that higher market prices might be obtained. It was also proposed that farmers could cultivate their own fodder plots on their allocated land, which could then be used to supplement the animals feeding on existing grazing areas. Thus, it would reduce pressure on the rangeland through alleviating the soil erosion caused by free grazing activities and also allow further livelihood diversification into areas such as dairying and small stock fattening. This would increase income from livestock sales by both improving the quality of the grazing land and enabling the sale of fattened beef from the feedlot. It should be noted that this enterprise was viewed not as a substitute for subsistence activities, but a complementary component of the overall livelihood portfolio. JICA (2001) proposed that cattle could be kept at the rate of about four to six per hectare of productive fodder for three months, thus fattening animals within 90 days. If six head of cattle were fattened every three months off one hectare of fodder plot, this would represent an off-take rate of 24 head per annum from the grazing area and therefore decrease the stocking levels (providing income from sales is not re-invested in cattle and that reproduction rates remain low). Also within the pilot project, it was intended that capacity building would be addressed, as the project would train local people in controlled grazing and commercial livestock management. This follows the requirements of Article 19 of the UNCCD.

In Engcayini, areas totalling approximately 102 ha were demarcated for controlled grazing and were fenced. A feedlot was constructed with an initial 2 ha for the cultivation of fodder, as shown in Figure 8.1, and a re-vegetation programme around one of the larger gullies in the village took place, all with some degree of participation of the local land users and with the involvement of a Swazi NGO, Swaziland Farmer Development Foundation (SFDF). It was decided by JICA following carrying capacity calculations that a maximum of 10 head of cattle should be allowed in the feedlot area at any one time in order to remain within the carrying capacity according to the physical environmental conditions of the area.



Figure 8.1: Feedlot in Engcayini

Despite consideration of local conditions, carrying capacity calculations are fraught with uncertainties, as highlighted in debates over new ecological theories of non-equilibrium (Scoones, 1999). Indeed, there is no unanimity in the carrying capacity estimates for Swaziland's middleveld in general. A range of 1:1.2 – 1:4.9 can be found in the literature (Sweet and Khumalo, 1994). This uncertainty arises because carrying capacity estimates tend to be based on broad vegetation classifications, taking inadequate account of local topography, soil, range conditions and bush densities (Sweet and Dlamini, 1994), whilst the variability of local conditions causes vegetation conditions to fluctuate widely in response to periods of drought and rainfall (Campbell *et al.*, 2000). The livestock preference for certain palatable species also results in the need for vegetation community compositions to be incorporated into any calculations. Consequently, very broad figures are used, which may or may not be appropriate given the location of the rangeland on the continuum of variability at any one time. The applicability of the JICA recommendations following the completion of the project is therefore questioned. Although a maximum of 10 head of cattle may be within the calculated capacity at the time of project design, the sustainability of this is ambiguous. Carrying capacities too need to be dynamic, just like the environments they represent (Behnke, 1992).

The JICA team and MOAC recognised the advantages of utilising bottom-up and participatory approaches but from the outset acknowledged the limitations of the time schedule, the objectives of the study and the size of the project. In order to deal with these constraints, planning was conducted together with the community, though not actually by the community (JICA, 2001). This represents ‘consultative participation’ (Pimbert and Pretty, 1994) according to the typology presented in chapter 2 and demonstrates that participation was facilitated and not engendered. This issue is returned to later. To ensure that the project was managed as much as possible by the local people, it was decided at one of the workshops that a project committee should be set up through the democratic election of representatives from the village. This would further meet suggestions in the UNCCD that local people should have more control over their natural resources. The intention was that the committee would work together with the NGO to bridge the gap between JICA/MOAC and the local people and would motivate and mobilize the community to join in with the project. In Engcayini the committee members comprised five men and four women, including a representative from the *Indvuna’s umuti*. It is not known whether all committee members were also cattle owners.

8.3 Local understandings of community participation and the JICA/MOAC project

In October 2002, the construction of the project infrastructure was almost complete and in general those working on the project were optimistic about the scheme, offering many positive responses. Of those participating in the initiative, 100% of respondents thought that project was necessary for the betterment of the community, with 93% stating that they thought it would be a success when fully functional. It is important to note that the remaining 7% said that they did not know if it would be successful, so this demonstrates that no one felt outright that the project would fail.

89% of respondents reported that they were happy to work on the project, but when asked why they decided to become involved with it, 20% said that they worked on it because they had to. The expectation of members from each *umuti* to work on the Engcayini project stems from a community meeting at which it was agreed that to ensure the local people were committed, fines would be imposed upon those that fail to send a representative to work on the project twice a week. Whilst this appears to be a

rather draconian measure to ensure participation, it was an idea generated from within the community. According to the committee chairman, fines are the standard punishment in traditional Swazi law and practice, though the level of the fine is proportional to the severity of the offence. This attitude parallels many of the 'Food for Work' schemes in Ethiopia that have centred on soil and water conservation activities. People are obliged to work for a certain number of days per year before they can benefit from food aid (Harrison, 2002). The use of such incentives and/or traditional punishment for non-participation is therefore not unique to Swaziland. However, it is unlikely the people of Engcayini were influenced by other projects elsewhere.

When asked whether they thought they would benefit from the project, 76% of interviewees stated that they believed that they would. The majority of those who thought that they would not benefit were either female, under the age of 19 or not owning any cattle. This demonstrates how the benefits of the project were understood by the people to be unequal between different stakeholder groups because those perceiving themselves as non-beneficiaries were already marginalized groups in terms of access, capability and due to their inability to exploit communal land resources (Agrawal and Gibson, 1999). In terms of complementing rural livelihood strategies, only 4% of respondents stated that they felt they would benefit financially from the project. Most people thought they would benefit by having fatter cattle (which would be more likely to withstand drought) and more time to do other jobs if the cattle are in the enclosure. These responses demonstrate that people would gain more from projects that are not necessarily focused upon communal land and instead assist the main components of their livelihoods.

The disparity between the priorities of land users and the government is supported by both the analysis presented in chapter 7 and the results of a short questionnaire survey implemented by the JICA team. This was conducted prior to the initiation of the community project in order to assess the attitudes and concerns of local land users towards soil conservation and gullyng. The results from the survey that was conducted in all three of the JICA/MOAC target areas are shown in Table 8.1.

Table 8.1: Concern for erosion on communal land in the three JICA/MOAC target areas

Issue	Target Area 1 (% of respondents)	Target Area 2 (% of respondents)	Target Area 3 (% of respondents)
Rate of soil erosion as a major problem	2.2	0.0	8.3
Rate of gully erosion as a major problem	0.0	3.3	3.3
Rate of gully/soil erosion as needing attention	11.8	6.7	10.0
Importance of range management as a necessary improvement	11.8	10.0	8.3
Soil loss experienced in arable fields	86.1	90.0	93.4
Existence of gullies within chiefdom	100.0	100.0	100.0
Perceive land degradation as a serious issue	43.0	40.0	46.7

(Source: adapted from JICA, 2001)

Similarly to the situation outlined in chapter 7, according to the questionnaire results, in all the JICA/MOAC target areas, indifference is demonstrated towards gullying on communal land in a number of instances. Only those people whose arable land or *imiti* are directly affected worry notably about further gully encroachment in the target areas. Considering the broader picture, incorporating opinions and understandings of people in chiefdoms from all three of the JICA/MOAC target areas, the data in Table 8.1 situate the issue of land degradation due to soil erosion and gullying in the national context. This secondary information indicates that whilst people are aware of the presence of gullies in their chiefdoms and they are considered to be a serious issue, they are not understood to be in urgent need of attention. This corresponds with the analysis undertaken in chapter 7 and presents opposing views to those of the government officials. Government policy presents gullying to be in need of urgent attention, yet whilst representatives acknowledge that issues of concern to local land users (such as soil fertility loss and weed infestations) are problematic, they are not presented as priorities within policy. These contrary understandings call into question the relevance of the consultative processes followed in the development of the JICA project and policies such as the NAP. Although the views of the people were solicited, policymakers failed to listen to a deep enough level to incorporate their main concerns within national policy and failed to engender local action.

Despite such diverse understandings of environmental change and differences in the meanings ascribed to environmental changes, to some degree, the data collected in this study show that the local people have accepted the JICA/MOAC scheme and then shaped it according to their own needs, out of necessity. The emphasis of local understanding is that the project represents a labour-saving initiative, as this will allow

people to spend more time weeding and tending to their cultivated land, with a view to producing more favourable yields. The project was intended to address ecological improvement and enhance livelihood sustainability through cattle sales. It could still meet this aim, only not in the way it was intended. This highlights the importance of differences in perceived benefits and values when working with local people in such projects because local people have used the scheme to address their own priorities.

Gray (2002) reports that villagers in Burkina Faso frequently view environmental management programmes and community projects as instruments for attracting funds and infrastructure improvements. People will eagerly participate in projects they do not necessarily understand in order to gain access to other resources, so that they may benefit in ways other than those intended. Responses received from the people of Engcayini who were working on the project with regard to why it is necessary to have the project including:

When the cattle are in the fenced area I can do other jobs rather than look for them (Respondent 1, 2002);

It helps the community (Respondent 2, 2002);

We can be free to weed as we won't have to watch the cattle (Respondent 3, 2002);

indicate that a parallel situation may be occurring in Engcayini. It was not the intention of the project that it will save time, although the villagers understand this to be one of the main advantages.

When asked if they would join in should another community project take place, 96% of the respondents said that they would with 4% stating that it would depend on what the project was addressing. Significantly, nobody said that they would not join in with another community initiative. There were no signs of conflict or hostility within the community and at the end of the first field season, the NGO representatives reported that they were very satisfied with the hard work and cooperation of the people. These signs are indicative that social capital was being built between members of the community, resulting in outcomes such as the development of trust, reciprocity and shared values. Indeed, when asked what they liked about working on the project, one respondent from the village stated that she enjoyed working as part of a team with her

friends. By the time of departure in October 2002, the only major manual tasks left to complete were the planting and subsequent cutting of the feedlot grass, which would then lead to the functioning and running of the scheme.

On return to Engcayini in March 2003, further data were collected regarding the progress made with the project since October 2002. A focus group held with the project committee members appeared initially to indicate that the project was a success and that they were satisfied with it. When asked about ownership of the project during the focus group, members of the committee stated that the project belongs to the community. The chairman said:

The Japanese gave us help at the start but now the project belongs to the community. The community should deal with any problems with the project because it is theirs (Committee chairman, 2003).

His use of the word ‘theirs’ is pertinent as it implies that the committee chairman and possibly the other committee members see themselves as external to the ‘community’ in general. This point is returned to later. Also notable is that the above quotation is inconsistent with data collected during the previous field season, which show that the people working on the project construction did not necessarily feel that they owned it. Of those who were interviewed, 70% felt they were excluded in the project design and planning processes and 57% stated that they would have liked more input in the community-level decision-making processes. All of the people working on the project felt that they were fully involved in its implementation. This highlights some discrepancies between the views of the committee members and those of the community. However, the intention of the project as stated by JICA was that due to their constraints (see section 8.2), it would not and could not provide an example of transformative participation because the project was conceived outside of the village (cf. White, 1996). Thus, the needs, priorities and inputs of the land users remained peripheral to the remit of the project.

When evaluating the project, four main issues arose from the focus group meeting with the project committee. First, the absence or poor time-keeping of people who were supposed to be working on the project; second, the sending of children as young as ten years old to work on the project so as to avoid fines for non-attendance; third, a lack of

understanding or clear communication regarding the use of the feedlot; and finally, the issue that the project was behind schedule. Each of these identified problems is now explored further.

At the outset, representatives from each *umuti* were divided into groups. Each group was assigned to work on the project on specific designated days. The absence of a number of representatives, or their late attendance, was a big issue according to the committee members, as it slowed the progress made with building and construction. This is thought to have occurred because people also had their own chores to do at their homes and suggests that working on the project was not a priority for many. Due to the nature of the community, where reliance for food is placed in many cases solely on subsistence farming, people were not unexpectedly, putting their livelihoods and survival first. This was particularly apparent at critical times of year according to the agricultural calendar such as harvest time, when attendance was at its lowest levels. The efforts of those *imiti* that do not own cattle are especially likely to be focused on sustaining their livelihoods rather than participating in a community project from which they perceive little or no benefit. Whilst a decrease in levels of participation could be due to a lack of concern for and prioritisation of the project, a potential decline during busy times of year was anticipated by the JICA team who timetabled the workload accordingly during the project planning process. This resulted in a decreased need for full attendance during these periods. Although an inconvenience, absence did not disrupt progress too extensively according to the JICA team. White (1996) asserts that there is an inherent tendency for participation in community projects to decline over time. Usually this is due to heavy domestic burdens, although in some cases, disillusionment with the project can result in people choosing to spend their time in other ways. There is also the issue of motivation because the benefits of the project were not immediate and the idea of future profitability may have been a new concept for the people to grasp, as many rural people are considered to work in short time frames (Moseley, 2001). According to registers kept by the NGO, attendance did return to its previous, higher levels following the main harvesting period, so it is thought that in this case, absences were predominantly due to hectic domestic schedules during the harvesting months.

Many *imiti* sent young children as their representatives to avoid paying the fines for non-attendance. This created problems during the period of project construction because the manual work required strength and fitness. It was not suitable labour for children aged from as young as ten years old. It also resulted in some instances in their absence from school. For some *imiti*, this action represents an adaptive response or a coping strategy. In order to avoid the fine as well as maintain adult labour levels on their own land, people were creative in their approach and distributed the available labour according to their interests and priorities (cf. Shackleton and Shackleton, 2001). By sending children to work on the project, this suggests that it was not a priority endeavour for many.

Another of the problems reported at the focus group meeting was that some members of the community were still not fully aware of the system of rotational grazing and the importance of allowing some areas of rangeland to rest. People also stated that they thought that all the cattle in the chiefdom would be taken to the feedlot. In reality, it will only sustain a very small proportion of the community's cattle, less than 1%, over any 90-day period. The intention of the project was to send the young cows to the feedlot to be fattened and then sold in order to generate income. This would then permit more financial investment within the community. Although the JICA team emphasised the need for grazing management from the start of their work with the people of Engcayini, the committee members said that many people are still unclear on the situation. This could cause conflicts when the project is fully operational if every cattle owner wants to benefit from the scheme at once, which is a frequent tendency among local inhabitants with regard to such projects (Baland and Platteau, 1999). Such confusion is also indicative of a lack of communication between the different stakeholder groups.

Another possible point of contention is that it was agreed that those people with several head of cattle would pay the same membership fee to belong to the scheme as those who have no cattle, even though an additional levy will be imposed on each cow that uses the feedlot. This was decided upon by the committee and is based on the premise that although at present 32% of households do not have any cattle, by subscribing to the scheme they are maintaining their access rights to utilise it should they one day have some. This demonstrates forward thinking in that all *imiti* are paying the same membership fee to maintain their access rights to the scheme and displays a degree of

optimism that one day everyone will be able to afford cattle. However, it permits the dominance of the project by the committee members and the cattle owners who are more able to exploit the resource endowment. The accumulated funds and infrastructure will increase the material availability of resources but for those community members who at present have no cattle and cannot afford the access fee due to poverty, the scheme will have reduced the potential availability of what previously were common land resources (cf. Nightingale, 2003). This therefore reinforces existing inequalities as cattle owners are presented with the opportunity to increase their wealth, whilst the enforced participation of poorer households in collective action exacerbates the extent of their poverty (Baland and Platteau, 1999), by raising expectations and creating perceived entitlements (Mortimore and Tiffen, 2004). In this case, flexible resource use has been replaced with more rigid and spatially defined rules of land use (Gray, 2002), as some groups have acted to exclude other groups from the communal land.

The final problem reported at the focus group meeting was that the community were behind schedule with the functioning of the feedlot. The grass that had been planted was ready for use but at the time of the focus group meeting, the committee were planning to begin to use it in July instead of at the start of the winter as intended. When asked why there was a delay the response was:

We had planted the grass later than expected and we are not organised enough to start using it. The problem is with organising and the committees. We have subcommittees for the feedlots and they haven't cooperated or been organised and we had to wait for the chief (Committee chairman, 2003).

The JICA team also said that there was a problem with the initial release of funds from the Japanese government and they too had recognised issues with the subcommittees and a lack of communication between the community and the chief. Another potentially contributing factor to the delay is that the chief lives outside of the community and as a result, greater responsibility in decision making was delegated to the village elders. Through interviews with the committee chairman, various tensions became apparent between the committee and the village elders, though this was not mentioned as a problem at the focus group meeting. This is discussed further in section 8.4.

In summary, at a superficial level, the focus groups with the project committee and the JICA team highlighted mostly logistical issues that arose due to a lack of clear communication between the different stakeholder groups. Overall the committee appeared satisfied with the progress of the initiative and the cooperation of the people and indicated that they felt that the project had been a success to date. The committee stated that they felt that the community owns the project and because of this, they will maintain it, thus rendering it sustainable. However, the JICA team said that they could not guarantee the sustainability of the endeavour. Although the people were included and made to feel part of the project, the idea for it initially came from outside of the community, so it may not be a priority for many of the local land users. Interest could wane if adequate follow-up by outsiders and the MOAC counterparts is not maintained but also as the priorities of the community change. Following the departure of the JICA team the community must work with the government counterparts (which were set up by JICA) in order to sustain the project. However, at the time of writing, some stakeholders have noted that the government representatives lack inclination, capacity and interest in the project. No mention was made of the possibility of follow-up work by the NGO, when this would be a useful role for SFDF to assume. This is not conducive to a sustainable initiative. Whilst the community are leading the project at this operational stage, it is important that they are aware of the institutional pathways and the processes of seeking government assistance should the need arise. This is not to suggest that the community become dependent on the government, merely that support is there for the community and they are aware of how to access it.

8.4 Ownership, access, power and participation

Despite the apparent satisfaction with the project, many other core issues have emerged through analysis of the data, which lead to the questioning of the appropriateness of the project administration and the approach to it given the wider context of Swazi society. Many authors have suggested that the reason for the collapse of numerous community projects is that they were imposed upon communities through top down policy processes and were not introduced to the people in an appropriate manner, lacking explanations as to how the project would benefit them (Hoben, 1995). Indeed, as outlined in chapter 2, the 'full participation' of local communities in environmental conservation projects has repeatedly been cited as the 'key to sustainable development' initiatives (Harrison, 2002; White, 1996). This echoes the responses of government

officials in chapter 6 with regard to the legacy of failure of past conservation initiatives with livelihood and ecological components in Swaziland.

As demonstrated within chapter 7, communities often have deeper understandings of their local environment than policy makers, as well as a vested interest in its condition (Twyman, 2000). This can be linked with the driving forces behind conservation efforts in that if something is understood to be affecting levels of well being, then actions are more likely to be taken to avoid or reduce the problem. The same can be said for the participation of local people in community projects. If the people can generate the idea for a project themselves from an assessment of their own needs and priorities, it is likely to result in a more sustainable project that is 'owned' by the community. This is because the community is responsible for its continuation, and people are more likely to invest their time and labour in it, so as to reap the benefits, because it is addressing their interests. However, there is a fine line between implementation and intervention, and facilitating and engendering participation. The JICA project represents an intervention, since the idea for a land rehabilitation project was conceived prior to choosing a community to 'host' the project. In this context 'hosting' the project has very different connotations to 'owning' the project. Whilst the selection process of a suitable location aimed to be inclusive rather than exclusive, it represents a 'planner-centred' participatory framework (Michener, 1998), in which participation helps local people to accept the ideas promoted by outsiders but ensures dependency upon the project initiators is not created. Empowerment was not an intention of the project and therefore engendering participation was not a key concern (Mohan and Stokke, 2000). However, the way in which the project process was set up meant that the participation of local people was necessary for the success of the initiative. This is a huge step away from ideals of decentralised natural resource management, as proposed by the UNCCD, as local-level inclusion was used to legitimise the project process. It therefore facilitated the inclusion of local people, instead of representing the first steps towards local-level decision-making. This suggests that participation was not a means of empowerment in itself (cf. Twyman, 2000) and demonstrates that there is an inchoate boundary between facilitating and engendering participation. In the JICA project, there appears to have been more emphasis on facilitation, as people were included in decision-making rather than generating decisions themselves.

Indeed, the idea for the project was conceived outside of the context of the community and the people who ‘participated’ in the project were viewed as tools for decreasing gullying rather than active knowing agents (cf. Goldman, 2003). This demonstrates that despite the political emphasis on incorporating local knowledges, values and understandings into policy, this is yet to be put into practice, as is affording local land users more control over their resources. The danger with projects such as this is that the focus on visible damage to the land masks the real issues demanding attention according to the land users themselves.

Relating this to debates on power relations as outlined in chapters 2 and 3, it is apparent that some of the concerns that were raised in Table 2.5 have been shown to be problematic. If empowerment was peripheral to the project plans, then the balance of power is likely to have remained unchallenged. This presents a similar situation to that outlined in chapter 6, in which local people were seen as tools to function in the development of the NAP. Both of these initiatives have led back to the question considered in chapter 3, with regard to whose degradation is being addressed. Both the NAP and the JICA project illustrate that a new approach applied in the same social, institutional and political-economic context is likely to result in incomplete project ownership and limited success, as these same factors shaped the current socially skewed and ecologically deleterious outcomes (Ribot, 1995). Whilst moves towards greater public participation demonstrate a positive shift in attitudes towards the ideals embraced in the UNCCD, the project in Engcayini nevertheless represents only a small advance, as the shift has taken place within the existing political and structural framework (Mortimore and Tiffen, 2004). As such, concepts of local-level control over resources, as outlined in chapter 2, have also not been afforded due attention as demanded by the UNCCD. Broad based re-negotiations of power have not taken place above or between levels and the roles of both the land users and the NGO were restricted.

Another issue flagged up in chapter 2 that surfaced in both the NAP development process and the JICA project, is that notions of community ownership of projects tend to reify the community as a single stakeholder and a homogeneous entity (Harrison, 2002). In doing so, the acknowledgement of the various power structures and hierarchies present in each place are masked and these can strongly influence the level of success of participatory initiatives. Whilst in Engcayini the power balance between

the broader stakeholder groups (i.e. the NGO, the community, the government and JICA) was demonstrated to have remained constant, local-level power differentials were seen to be most sensitive to the project process. Agrawal and Gibson (1999) explore diversity within communities and note that the concept of community as a representation of shared norms and common interests depends highly upon the perceptions of its members. As outlined in chapter 7, understandings are highly varied, resulting in all communities being ‘imagined communities’ and the outcome of the development of different social networks and the placement of each individual and group within that network. This is because any shared norms are not static but come into being in relation to contextual factors and indeed, use of the term ‘community’ directs attention away from the internal village politics and from actual social relations (Botchway, 2001). Unlike external interventions that involve concepts of community that link to a specific space or territory, such as the project in Engcayini, in implementing participatory land management projects that require common goals, the emphasis should be placed on upon shared understandings. Such norms are important features in the management of common property resources. Although humans may adopt a narrow, self-interested perspective in many situations, they can also use reciprocity to overcome social dilemmas (Ostrom *et al.*, 1999), and this is one outcome of membership in a social network. Groups that share norms and values are more likely to develop and draw on trust and reciprocity and in doing so, develop common rules. Rules give individuals the confidence to invest in the collective good, knowing and trusting that others will also do so, thus balancing individual rights with collective responsibilities (Pretty and Smith, 2004).

Successful cooperative environmental management requires individuals to sacrifice part of their individuality in order to achieve a shared goal and this can often mean either the relinquishing of power, or as noted by Da Chuna and Pena (1998), the assignment of costs and benefits in accordance to the pre-existing local power distributions. The project in Engcayini treated all land users as equals when in reality they have different interests in the implementation and use of the grazing scheme. This is because the ‘community’ can be divided into a number of subgroups, including those according to social status, gender and economic status. Particular groups that were identified to share strong norms and values were ‘cattle owners’, ‘the committee’ and ‘the elders’. Whilst these labels mask the diversity within each group, benefits and costs were found to have

been assigned in a skewed pattern, both within and between groups. Those groups that understood the greatest benefits built social capital and this was drawn upon during the project process, particularly during decision making. For example, the strength of the bridges and bonds that were established between members of the committee was demonstrated by the way that they challenged established institutions by making decisions without consulting the village elders. This involved the re-negotiation of power relationships between the traditionally powerful members of the chiefdom and the democratically elected grazing management committee who previously may have not been of key social standing in the chiefdom. In this instance, rules were being made due to shared values and norms, in terms of what needed to be carried out next in the project. The costs and benefits of the pilot project can be summarised in the stakeholder analysis shown in Table 8.2. It should be noted that these stakeholder groups are not discrete entities, nor are they static but that they overlap and change over time. From this analysis it is apparent that the role of social networks is central to mediating the power relationships between such subgroups, particularly when projects deal with sensitive social and cultural symbols such as cattle.

Table 8.2: Stakeholder analysis of costs and benefits of the JICA project to each social stratum of Engcayini

Community sub-groups	Potential benefits from pilot project	Potential costs of pilot project
Cattle owners	<ul style="list-style-type: none"> - Income generation through the sale of cattle and cattle products - Improved condition of grazing land which leads to a better diet for cattle - Increased carrying capacity and decreased risk of overstocking and overgrazing - Greater levels of milk production. Leads to a better meeting of dietary requirements - Higher cattle reproduction rates due to better quality beasts. Leads to elevation of social status - Stronger draught animals - Decreased costs as herd boys no longer needed 	<ul style="list-style-type: none"> - Decreased access to grazing land - Only 10 head of cattle can be accommodated at any one time in the feedlot area so some people will have to wait to benefit - Payment of maintenance costs of the scheme
Non cattle-owners	<ul style="list-style-type: none"> - Increased availability of draught animals leading to faster and cheaper preparation of the land for cultivation - Increased access to markets to purchase cattle and cattle products 	<ul style="list-style-type: none"> - Payment for membership of a scheme from which they cannot currently benefit although by paying they are maintaining access rights - Payment of maintenance costs of the scheme
Village elders	<ul style="list-style-type: none"> - Elevated status within the <i>Tinkhundla</i> of Target Area 1 for hosting the project 	<ul style="list-style-type: none"> - Decreased power with regard to decision making over community issues - Decreased control over access to land - Payment of maintenance costs of the scheme
Indvuna	<ul style="list-style-type: none"> - Elevated status within the <i>Tinkhundla</i> for hosting the project 	<ul style="list-style-type: none"> - Decreased power with regard to decision making over community issues - Decreased control over access to land - Payment of maintenance costs of the scheme
Women	<ul style="list-style-type: none"> - Increased resources such as grass and fuelwood where land is allowed to recover - Time saving due to increased natural resource abundance so more time for weeding etc. 	<ul style="list-style-type: none"> - Decreased access to natural resources in fenced area which may lead to having to travel further for fuelwood and wild resources in the short-term
Youth	<ul style="list-style-type: none"> - Better chances of getting an education because fewer herd boys will be needed 	<ul style="list-style-type: none"> - Absence from school whilst working on the project
Committee members	<ul style="list-style-type: none"> - Increased power with regard to decision making over community issues - Elevated status within the <i>Tinkhundla</i> for hosting the project 	<ul style="list-style-type: none"> - Payment of maintenance costs of the scheme
All residents of the chiefdom	<ul style="list-style-type: none"> - Increased capacity building in terms of management skills and land rehabilitation practices - Improved condition of grazing land and increased wild resource abundance 	<ul style="list-style-type: none"> - Payment of maintenance costs of the scheme

Robbins (1998) proposes that the rules in place to govern common property resources will be followed or ignored by various community strata according to several

simultaneous criteria: (1) the perception of the user of the legitimacy of the enforcing authority (2) the stakes held by resource users in the protection of the resource and (3) the expectation of fair and equal enforcement and participation in the rules. The degree of control is therefore mediated through a combination of individual rational choice and collective social force. The different positions of resource users, as both individuals and groups within the social network, will therefore cause variations in responses to the rules. It is possible that the malicious cutting of the fence in Engcayini, which occurred following the completion of the project infrastructure, was due to dissatisfaction with one or more of the above criteria. Such actions can also impact upon the social capital stocks of the community. Whilst some users of the grazing scheme will behave in a self-interested way, others will not cooperate unless assured they will not be exploited, some will initiate reciprocal cooperation in the hopes that it will build trust, whilst others genuinely seek higher returns for the group (Ostrom *et al.*, 1999). In order for rules to be enforced, users need some autonomy, and therefore some level of social capital and shared norms. However, in building social capital for example, between cattle owners, this could be at the expense of the bonds and bridges between cattle owners and non-cattle owners, ultimately leading to malicious acts of destruction. A subtle change to the property rights of Engcayini's rangelands has therefore taken place. Ostrom *et al.* (1999) define 'open access' to be an absence of enforced property rights. The rangeland of Engcayini was open access until the time of the community project, as anyone could have access to it and use it in any way they so desired. However, following the introduction of the project, the same land can now be classified as 'group property', since resource rights are held by a group(s) of users (i.e. cattle owners and the committee) who can exclude others (e.g. non-cattle owners).

Despite inequalities in the benefits from the project and in control over access to communal land, the asymmetric benefits of such hierarchical organisation may be more sustainable, even if they are unfair (Agrawal, 1992). Questions of inequality and its impact on collective action have dominated recent common property resource management literature and current theories remain divided in opinion. Cooperation by small resource users may be needed for management to be sustainable, however inequality may give those users too small incentives to cooperate (Baland and Platteau, 1999). In Engcayini those facing small or no incentives dealt with the issue by distributing labour in relation to livelihood priorities. Those *imiti* with little incentive to

cooperate and participate sent children to work on the project or attended late themselves following their completion of what they understood to be higher priority tasks. Returning to what the project set out to achieve in Engcayini, the aim was to develop sustainable land use and to improve the quality of the communal land. This aim could be achieved without providing uniform benefits to the community so in this case, inequality could be conducive to sustainable environmental management.

Another dimension to participation in a joint pilot project such as this is that all stakeholders should be aware of their roles and should join in accordingly. These roles were set out at an early stage so that each party knew of their responsibilities to the project from the outset. JICA (2003) reported that each time a meeting was held within the community to discuss the project, it was always the same people that attended, so this did not contribute to the achievement of full participation or the involvement of minority groups. Further consideration was needed by JICA/MOAC with regard to why people failed to attend, as such meetings sought only to reinforce existing power stratifications within the community.

One of the causes of tension between the committee and the community is that whilst the role of the committee was made clear to its members, it was not necessarily communicated to the community as a whole. As a result of this, those participants working on the project felt the committee members were not working hard enough. However, the committee members had management responsibilities and if they were absent from the site, it did not necessarily mean that they were not working. This resentment could be another contributing factor as to why people were frequently absent or arrived late. These misunderstandings could have been rectified through greater levels of communication between stakeholders but they may have been perpetuated by the attitude of the committee. As highlighted earlier, the use of the term 'they' by the committee with regard to the community and project ownership implies that the committee perceive themselves as a separate group to 'the participants' and 'the community' in general and in doing so, afford themselves greater status and power. This change in the balance of power could consequently be the root cause of many of the misunderstandings associated with the project.

According to interviews with the committee chairman and the JICA team, as a result of such challenges to the power balance, the end of the project saw conflict develop due to the duality of institutions. The committee were making decisions without fully consulting the elders, and therefore going against traditional processes. In Swaziland, as outlined in chapter 5, executive authority is vested in the king. However, at the community level, the village elders exert considerable influence. Being older and having greater life experience, the elders are able to exhibit significant levels of authority under the auspices of tradition. The king is described as an absolute monarch but is surrounded by advisors on the National Council. These members are appointed by the king himself though traditionally the wisdom of the elders is said to guide him in his decision-making, so the cultural position of the elders is traditionally powerful. Older Swazi citizens often have less formal education but have enforced respect and gain from the traditional hierarchies. Therefore they are often resistant to changes, particularly those that involve the relinquishment of decision-making and authority, as they wish to maintain their power and status. JICA (2001) state that the elders were involved with the planning and execution from the beginning of the project in response to a recognised need to respect Swazi culture and it was envisaged that the elders could assist the committee with the motivation of the community in participating in the project. However, the conflicts that ensued impacted upon the internal cohesion and the organisational capacity of the committee, hence one of the reasons for the delay in putting the feedlot scheme into action. In Swaziland the usual method of resolving community disputes is through the channels of traditional authority but when such negotiations are laid within or around the village elders, this makes conflict resolution rather complicated. Batterbury (1998) reports that communities can be internally strengthened by such disputes and that such complex struggles can have a positive impact. In the case of the village project in Batterbury's discussion in Burkina Faso, it even caused a few long-term male migrants to return who wished to join in with it having heard of the new village activities. In Engcayini, such positive impacts have not yet been seen.

Another issue that has causes rooted in the negotiation of power relations is that the committee chairman in Engcayini is reportedly a very strong leader and the committee members have clear ideas about what they want to achieve. The nature of participation is that it does require leadership and organisation, created from within the community

rather than imposed from above, but the views of the committee do not always correspond with the views of the community. Similarly, the views of the chairman do not always correspond with those of the committee. As stated by Mosse (2000), people themselves actively concur in the process of problem definition and planning, manipulating authorised interpretations to serve their own interests. Although the committee collectively made decisions relating to the project, it does not necessarily mean that they represent the best interests of the entire group (Da Chuna and Pena, 1998). The surfacing of differences of opinion between committee members provides a clear example of how multiple understandings of a situation can cause conflict (Robbins *et al.*, 2002) and demonstrates how pre-existing power relationships prohibit the development process from being truly representative, as control over levels of participation lacked an exploration of the controls on village power relations.

Despite the responses of some people who stated that the project had good leadership within the community, other members of the community found fault with committee. This resulted in criminal acts such as the cutting of the fence around the grazing area. It was considered the role of the elders to administer a suitable punishment in this instance and not within the duties of the project committee. It is proposed that the criticisms and sabotage may be due to either a lack of understanding of the benefits of the project, or because of misunderstandings between the non-participative community members and those who are more motivated or jealous of the leadership success. This illustrates how in the context of natural resource management, the negotiating of social relations can produce ecological consequences (cf. Nightingale, 2003), as the damaging of the fence could allow cattle access to the areas that had been left to rest. The formation of the committee therefore caused the legitimisation of otherwise informal village power relations as power was partially relinquished from a culturally bound institution (the elders) to a rationally and democratically formed one (the committee) (cf. Robbins, 1998). The JICA team were aware of these cultural processes and made every effort to include different interest groups, including the village elders, when planning the project. They even held special workshops exclusively for the elders at the request of the project committees. This highlights the need for more than the facilitation of participation in decision-making over the use of resources, as patterns of difference and stratification within a 'community' need to be understood when involving local actors (Ribot, 1995; Agrawal and Gibson, 1999).

8.5 Summary and conclusion

Through the preceding discussion of the implementation of a contemporary land degradation mitigation project in one community in Swaziland, it has been revealed that community natural resource management is highly complex. This case study illustrates and substantiates Nightingale's (2003) claims that natural resource management is 'another context in which social relations are constituted, contested and (re)produced not only within households and communities but also within the state and at other larger scales'. It has also demonstrated the interactions between ecological conditions and processes with the socio-political aspects of land management at the village level, whilst additionally considering the influences of wider society and practices, including traditional hierarchies, on the level of success of a 'participatory' community grazing land project.

Despite the conflicts and tensions that have arisen from the project, the achievements of the community, the committee and all of the stakeholders must not be downplayed. Considering the unfamiliarity of the villagers with participatory development processes, the Swazi preference for stability and the *status quo* (Daly, 2001), the tradition of patriarchal and inherited dominance and control, and in acknowledging that this was an experimental pilot project, much has been achieved. Many positive aspects have emanated from the project as a result of hard work, cooperation and enthusiasm and if this is maintained throughout the functioning of the project there is a chance that the villagers can reap the benefits of their efforts and with the necessary government support, the project can be sustained. Many lessons can be learnt from this pilot project, from both the approach and implementation, the benefits of which should be constructively applied to future land and conservation initiatives in both the *Tinkhundla* and in the national Swazi context.

In terms of implications for the future success of the implementation of the NAP, the pilot project highlights the importance of addressing priority needs of local people in combating land degradation and desertification. Whilst the condition of the communal land was not a concern for the majority of villagers, the people of Engcayini were willing to acknowledge that the gullies were an environmentally unfavourable occurrence and so in order to receive some perceived benefits from the project, they shaped their needs and priorities to match the project's administrative realities. This

therefore validated an imposed scheme with local knowledge, as external institutional interests became built into community perspectives, legitimising decision-making and the project as being participatory (cf. Mosse, 2001). In this respect, the project failed to allow people to define their priority needs, resulting in the substitution of community participation in place of structural reforms (Botchway, 2001).

The role of the NGO (SFDF) was also limited in the present structural framework, to service provision and overseeing the implementation of the project. Given the vast potential of NGOs in facilitating empowerment and participation as outlined in chapter 2, in the case of this community project, the NGO's role was very restricted. Similarly to the production of the NAP, where the people were involved to legitimise the policy making process, in the execution of the JICA project the NGO fulfilled a managerial role in service provision and probably provided "value for money" from the perspective of the donors (Edwards and Hulme, 1996). Sustainable grassroots participation requires changes in the whole culture and procedures of the organisations facilitating it, whether they are NGOs, government departments, donor agencies, universities or training institutes (Chambers and Blackburn, 1996). This was not the case in the project in Engcayini.

CHAPTER 9: Towards the construction of a political ecology of land degradation for the middleveld of Swaziland

9.1 Introduction

This chapter aims to draw together all the findings from the research by placing environmental changes at the local level in the broader national and international contexts. In chapter 3 a number of questions were posed that formed the political ecology basis to the research. The present chapter returns to these questions in the light of the data presented throughout the thesis, as networks of explanation explore the linkages between the different components of environmental change and illustrate the key role of power distributions in assessing and responding to environmental degradation. This facilitates the attainment of objective 1 of the research: to enhance understanding of the complex interactions of the social political, economic, historical and environmental aspects of land degradation.

The chapter then returns to the contemporary understandings of concepts of ‘community participation’ embraced in the UNCCD, as the potential issues raised in chapter 2 relating to their application to Swaziland are revisited. Using the networks of explanation and the findings presented in Chapter 8 where participation was put into practice in the Engcayini community project, the utility of the UNCCD as applied to a real world situation is assessed. Its relevance to problems of unsustainable land use, as experienced by the people actually living with land degradation is considered. This meets objectives 2 and 3 of the research. The broader implications of the research outcomes are then discussed, including the position of the UNCCD within wider processes of development. The UNCCD’s relationship with its sister conventions, the UNFCCC and the UNCBD is also explored. Further possibilities for future research are then considered. The thesis concludes with a summary of the outcomes.

9.2 Addressing issues of power and action

This section returns to the questions posed in chapter 3 to consider the characteristics of power relations within and between all levels and the implications they have for the control and use of natural resources. The socially embedded nature of ecological processes is also explored.

9.2.1 Power and control over natural resources

As outlined in chapter 5, power in Swaziland is concentrated in the hands of the minority. The royal family and traditional elites have maintained their power over time because they have control over access to land (Crush, 1980), control over Swaziland's mineral concessions (Levin, 1997) and exclusive rights over the *Tibiyo Taka Nagwane* fund (Sallinger-McBride and Picard, 1989). The dominant sectors of society therefore have not only economic power within the country but also social and political supremacy (Lowe, 1998). King Mswati III rules as an absolute monarch and emphasis is placed on tradition and the 'Swazi' identity in order to maintain the support of the people.

Politics, tradition and power

Since independence from the British in 1968, the royal family promoted the ideology of traditionalism and the 'Swazi' way of life. King Sobhuza advocated the view of the nation as a family writ large, inspiring a spirit of natural solidarity between its members (Smith, 1991). Regardless of the existing inequalities and exploitation, particularly in terms of labour, a deep horizontal comradeship was upheld. However, this was intimately linked to the preservation of the dynastic interests of the monarchy (Anderson, 1991). The emphasis placed upon tradition relied on ethnic nationalism, which created a political nation in the image of its presumed ethnic roots, as the hegemonic part made claims to represent the whole (cf. Billig, 1995). As a result, traditionalism as a political ideology and a political strategy was less about the actual content of tradition than about who had the power to decide what was traditional, and what justified that power (Lowe, 1998). Nationalism is still manifest at the local level today and its influence is extensive in determining both local attitudes and practices and the shape of the contemporary landscape, despite wide variation in its interpretation by different actors. Practices such as the cultivation of maize, tribute labour to the chiefs and king and the keeping of cattle despite increasing levels of environmental degradation and overgrazing, illustrate the importance of tradition to the Swazi population and demonstrate how people act upon their environments through the medium of their cultural representations (Ingold, 1992).

Power at the regional level

Broadening the consideration of power relations to the international level, Swaziland's ties to neighbouring South Africa result in considerable South African control over the Swazi economy. Approximately 80% of Swaziland's imports and 60% of its exports are from and to South Africa respectively (GOS, 2001), and the value of the Swazi currency, (the Emalangeni) is fixed to that of the South African Rand (the Rand being legal tender in Swaziland). Swaziland is also a member of the South African Customs Union (SACU), from which the country currently derives approximately 50% of its government revenues (GOS, 2001). International power relations, particularly within Southern Africa sub-region, are therefore significant.

History and power

Historically, international influences on Swaziland's development remain instrumental to contemporary asymmetric power distributions within the country, and in terms of land degradation. Chapter 5 outlined how power struggles in the late 19th century led to the alliance of Swaziland with the British and in 1902, Swaziland was declared a British Protectorate. This gave the British the opportunity to partition the land in order to exert more control over the indigenous peasantry and to optimise the availability of Swazi labour (Crush, 1980). The so-called partition deprived Swazi households and communities of all of their formal use-rights on two thirds of the territory of the country, while they gained no new rights on what came to be called the Native Areas (Lowe, 1998).

The partitioning has had an unequivocal influence on population distributions of today and played a key role in determining the shape of the managed Swazi landscape. Swaziland's middleveld soils are shallow and prone to erosion. Much of the land is steeply sloping (>15°). Combined with the inherent variability of climatic factors, the land is naturally predisposed to be at risk of erosion, as demonstrated by the gulying in KaBhudla that developed as an inherent feature of the dendritic drainage pattern. The combination of the concentration of indigenous populations within the middleveld with the physiographic characteristics of this region is therefore one facet of international power relations and the colonial legacy that is inextricably linked to the extent of degradation at the local level today.

Power and social status

Linking the national level manifestations of power with the local level, traditional forms of hierarchy prevail in each of the villages involved in this research. Individuals of key social standing such as the chief and *Indvuna* command great respect and assert much decision-making authority. The village elders also play a significant role in advising the chief on his decisions. The denial of the power of these traditional authorities caused conflict to develop in the community project outlined in chapter 8. The life experience and wisdom of the elders was overlooked as the project committee made decisions without consultation with the traditional authorities and so the local balance of power was challenged. The ‘community’ is therefore highly stratified in terms of power, agency and status.

Power relations were also brought to the fore of discussions when it was revealed that cattle owners and non-cattle owners were expected to participate equally in the community project. This led to several problems of late attendance and children being sent to work on the project, as people had recognised that whilst they may have the rights of access to both communal land and allocated land, they may not always have the capabilities and agency to derive benefits from it (Leach *et al.*, 1999). They therefore prioritised activities that were more central to sustaining their livelihoods. Interview data demonstrated that already marginalized groups (such as women, the youth and those owning no cattle), comprising 24% of those working on the project, perceived no benefit from it following its completion. This indicates that local power hierarchies were paid insufficient attention during project planning and that local priorities relating to land degradation were not considered. The project reinforced existing inequalities and knowledge differentials whilst also creating conflict between new and old institutions. Changes to the management of natural resources created openings for both individuals (the committee chairman) and groups (the committee) to represent themselves politically and challenge the balance of power (Robbins, 2004), as the claims to the resource of some actors, who possessed greater agency, were at the expense of other actors (Robbins, 1998). Returning to the concepts outlined in chapter 3, this demonstrates the key role of social networks in determining access to and use of resources. In Engcayini, individual actors (particularly cattle owners and the committee

members) used the social framework and the human capital of ‘the community’ to further satisfy their own needs, enhancing their access to resources (Kadushin, 2002).

Power linkages between levels

Hitherto, the characteristics of power relations have been considered at the national level, the international level and the local level. It is important to move now to consider the links between levels, particularly the local and the national levels, as the strength of the links determines the nature of resource use in each of the study villages. The proximity of each community to national centres of commerce and the levels of infrastructural development were shown to impact upon the potential for employment opportunities. As stated in chapter 5, in KaBhudla, where 83% of residents are in permanent employment, 18% of the inhabitants choose not to cultivate their land. The market prices of commercial goods are an important influence on the decision not to cultivate. If people are able to buy rather than grow food, they can invest the time they save in other activities, from which they can gain financially. Consequently this can lead to greater accumulation and increased power because the wealthier can afford to buy more cattle, improve their homesteads by paying for boreholes to be drilled and electricity cables to be laid, pay for their children to be educated and in some cases, purchase land should they so wish. This ultimately helps to erode some of the elite control over the natural resource base and can have positive impacts on the local environment. If people are able to leave their fields fallow, it will allow nutrients to build up, eventually improving soil fertility.

Nevertheless, broader scale political economic processes can also cause unfavourable environmental consequences. As demonstrated in chapters 5 and 7, the retrenchment of migrant Swazi mine workers from South Africa has resulted in increased reliance upon natural resources in many rural livelihood strategies in Ezikotheni, whilst national level price controls over fertilisers, seeds, lime and other agricultural inputs influence the agency of land users at the local level. Chapter 5 demonstrated how farmers such as Gladys in Ezikotheni respond to the impact of retrenchment and high fertiliser prices. When her husband was working, he invested his money in cattle so manure was readily available. As their herd size has gradually declined, they have found that they are spending the majority of their money on fertilisers. However, insufficient financial

capital is available for them to apply enough fertilisers to maintain soil fertility levels. This is typical of many *imiti* in Ezikotheni and highlights the influence of the broader political economy on local-level production processes and decision making (Bassett, 1988).

Data presented in chapter 6 indicated that whilst cattle are blamed for increasing degradation, actual cattle numbers are similar today to those of 1976, despite considerable growth in the human population. Herd sizes in the study villages were found to be small, with more than 75% of cattle owners having less than ten animals. Affluence due to tradition may consequently play an important role in the degradation of rangelands, with traditionally wealthier cattle owners placing increasing pressure on the natural resource base. This is particularly the case in locations referred to during interviews with NGO officers, where the economic value of the herd is ignored, and cattle are viewed exclusively as a social asset. This commonly results in large herds of poor quality animals being kept, which gradually causes the quality of the communal rangelands to deteriorate. However, it is the poorer land users who are more dependent upon the natural resource base to sustain their livelihoods so these people feel the impacts of degradation most acutely, often in terms of decreased access to grasses, herbs and plants that are used in indigenous medicines. This conflicts with the argument that poorer households are more likely to degrade due to a lack of resources to invest in conserving the environment (Moseley, 2001), indicating that in the case of Swaziland's rangeland, it is the exploitation of the natural resource base by the richer echelons of society that exacerbates degradation (Duraiappah, 1998).

Despite these links between affluence and degradation noted by the NGO officers, a contrasting situation was presented in KaBhudla in chapter 7. Stocks of social capital are low in this area because many people are in full time employment so little time is afforded to building and maintaining social networks within the confines of the community. It was found that in this location, cattle are viewed primarily as economic assets and in order to extract greater benefits from the cattle, they are kept in good condition. Those people with larger herds tend to invest their money in their cattle and supplement livestock fodder by purchasing grass for the cattle to eat during the winter. Some *imiti* also graze their cattle on their uncultivated allocated land. This affords the rangeland some respite from the pressures of grazing but as yet, it remains in poor

condition. It is interesting to note that the people that have adopted a commercial attitude towards cattle are not the traditionally powerful. Instead, they tend to be new elites who have exploited the opportunities presented by recent infrastructural developments and gained permanent waged employment in nearby Manzini.

In linking power relations with degradation, this research has demonstrated that both affluence and poverty can lead to environmental problems. Affluence tends to impact most upon communal resources, due to cattle ownership by the traditionally wealthy, whilst poverty tends to impact more upon allocated land, as land users lack the capitals and capability to invest in improving and maintaining soil fertility. Since allocated land is more central to rural livelihood strategies than communal rangeland, it would be expected that policies addressing degradation and livelihoods would aim to increase productivity and reduce degradation in the areas the farmers most need assistance. However, interventions such as the NAP illustrate how power can be used to advance the interests of the more powerful actors (Bryant, 1998).

Knowledge and power

As proposed in chapter 2, environmental changes are only perceived as problems to individuals and groups in specific contexts and under certain conditions. If government officials and the traditionally and historically more powerful own more cattle yet are not dependent on arable cultivation as a key component of their livelihoods, the focus of the NAP on communal land could be interpreted as a policy intervention that addresses the interests and problems of the already powerful. In this sense, the selective identification of environmental problems and their representation within policy is a political process that reinforces social and economic inequities as the basis of socially divisive public policy (Blaikie, 1985; Bryant, 1998).

It is thought by many of the respondents in this study, (including NGOs, local land users and the government), that degradation levels will not substantially decrease until the possibilities of accumulation of the dominant classes are perceived to be under serious threat. In the context of Swaziland, the most powerful class comprises the royal family and the aristocrats, who themselves are those members of society least affected by environmental changes and who are most easily able to adapt. This is because they

have larger stocks of capitals and have control and authority over the entitlements of others. The establishment of the *Tibiyo* fund represents one example of such adaptation and illustrates a decreasing reliance on control and authority over land as a result of a move towards consolidating a material base of capital accumulation (Sallinger-McBride and Picard, 1989). It is the agency of the new elites that poses the greatest threat to existing power structures because as their ability to accumulate increases, they become more able to challenge the basis of power. The role of rural entrepreneurs such as those in KaBhudla (see chapter 7) could demonstrate to be central in the future negotiation of power relations and in any responses to environmental change that are undertaken in the future, particularly if democratisation and empowerment processes strengthen.

Summary

This analysis has shown that those actors and institutions most critical in governing access to and use of resources depend on the balance of power in wider networks and the nature of relationships between that society and the global political economy (Batterbury and Bebbington, 1999). At the local level, chiefs, who owe their authority to the king, facilitate the control of the centre of the kingdom over the periphery (Levin, 1992). National power structures therefore significantly influence access to land and patterns of resource use at the local level.

9.2.2 Risk and action: the socially embedded nature of ecological processes

This section takes the remaining questions that were posed in chapter 3 and considers how ecological processes are socially embedded and the ways in which this affects risk-taking, risk-aversion and possibilities for collective action. Chapter 7 demonstrated that environmental changes are recognised through the use of indicators and that whilst fields are noted to be spatially heterogeneous, soil fertility is understood to have declined over time. However, while it is recognised that the laboratory methods used in this work did not in all cases use the most sensitive measures of nutrient availability for crops, the scientific data indicated few statistically significant differences between nitrogen, phosphorus and potassium levels of the past (when nutrients measurements from the grass strips were used as a proxy), and of the present. It was shown that local understandings of change are built upon a complex integration of different elements of

knowledge. Responses to changes were found to have developed as a product of the interplay between each actor's stock of capitals and their knowledges of the soil condition, climatic patterns and broader structural processes that control the prices of agricultural inputs.

Throughout this research a large proportion of the western scientific interpretations of environmental changes showed agreement with local understandings. However, the mapping of land use changes from time-series aerial photographs showed a 17% increase in the area covered by woodland over the last 20 years, whilst local people reported decreased access to wood. Those species that were most highly valued were noted to have the greatest decrease in abundance. Even after discussions at a species level, woodland was reported to have declined, despite conversations about the spread of guava trees throughout the community. This is thought to be because local people do not necessarily value guava trees as a source of wood. Instead, they see guava trees as a source of fruit, so their proliferation was not understood to represent an increase in woodland. This is a useful illustration of how ecological processes are socially embedded because the assumed decrease in woodland is tightly bound within local value systems (Dove, 2004).

In chapter 7 it was also revealed that environmental changes mean different things to different people. Change is seen as synonymous with degradation only when the sustainability of rural livelihoods is threatened. Under such circumstances, local people implement risk-aversion strategies based on local knowledges and advice from agricultural extension workers. However, the types of action taken depend greatly upon individual agency and the supply of capitals. In chapter 3, social capital was suggested to be an important element in responding to environmental and social changes. In chapter 7, Dudu's *umuti* was used as a case study to illustrate the importance of social capital in rural coping strategies. In this example social capital is particularly important because her stocks of other capitals were low, especially financial capital, since nobody from her *umuti* was in employment. Severe weed infestations in Dudu's maize fields meant that the sustainability of her livelihood was under great threat. The sale of maize represented her main form of income, so when the maize crop failed, she had to draw on her knowledge and coping strategies. She realised that she could trade her sweet potatoes with friends and neighbours within the village in exchange for maize, thus

drawing on her stocks of social capital, and then sell the maize that she gained for profit. This is an innovative approach to minimizing the risk of maize crop failure but in the long term, it could impact upon her stock of natural capital. This is because Dudu believes that fertilisers make sweet potatoes taste watery, so she chooses not to apply fertiliser to her sweet potato crop. In this instance, she is prioritising her social capital stocks over her natural capital (i.e. the quality of her soil). Should she grow watery, tasteless sweet potatoes, her contacts may choose not to trade with her. Any soil fertility declines that ensue through the non-application of fertilisers therefore represent a socially embedded ecological change, as the explanation of Dudu's actions situates her decisions within a wider network of considerations, including biophysical processes (weed infestations and possible soil fertility declines), the state (responsible for setting formal market maize prices) and her social network (on which her livelihood is dependent).

In chapter 7, social capital was also shown to be an important asset to both Albert in Ezikotheni and Wiseman in KaBhudla. Utilising his social network, Albert negotiated access to cattle. In exchange for the labour of looking after them, he gained manure and milk, whilst those he borrowed the cattle from benefited from the relationship by saving labour and time. Wiseman lent his cattle out, saving himself human capital, which was particularly advantageous given his ill-health, whilst also grazing his cattle on higher quality pasture, preserving local natural capital in the process and allowing others to benefit from milk and manure. These two examples illustrate not only how ecological processes are socially embedded but also how individuals are influenced by broader considerations in making decisions that affect their environment. Social networks are shown to play an instrumental role in sustaining rural livelihoods and represent a large component of the coping strategies that land users employ to deal with environmental changes.

Although environmental changes cause different problems to different individuals and groups depending on their positioning within different networks, data collected in this research has shown that ecological changes have not yet triggered collective action in any of the study villages. The community project explored in chapter 8 was an externally generated initiative and did not stem from the community as a response to gullying, whilst chapter 7 showed that in Ezikotheni, people were unwilling to reduce

their herd sizes despite extensive gullying of communal rangelands. However, social networks could also play an important role in this non-response. Conflicts between different factions of the community mean that social networks are not as robust as in Ezikotheni and so people operate with lower stocks of social capital. Ultimately, this is leading to the destruction of natural capital but because the value of cattle is not viewed simply in commercial terms, this is not yet impacting upon rural livelihoods. However, should other communal resources become degraded, particularly those that yield fruit such as *emanombela*, *umganu* and *marula* that are then sold, then attitudes towards degradation may change, as livelihood strategies will then be affected. In KaBhudla where cattle are viewed as an economic asset, greater investment is made in maintaining herd quality. Where people have purchased grass for their cattle or grazed them on their allocated land, it can only have had positive impacts on the communal rangeland, even if recovery is yet to be seen. These changes in land use and land management practices have been the product of individual action in KaBhudla, as social networks involving bonding and bridging between community members remain less important in this community due to greater accumulations of financial capital.

In taking a political ecology approach to investigation, the negotiation of social and power relations in the context of ecological changes and the broader political economy has been explored. Networks of explanation have been constructed based on case study examples. Together these have demonstrated that there is considerable diversity between and within local communities, and also that different communities employ different strategies to minimise and avoid threats to their livelihoods, depending on the nature of their reservoirs of indigenous knowledge and the opportunities and constraints they face.

9.3 The UNCCD: appropriate or unnecessary?

Through enhancement of the understanding of the networked social, ecological, political, historical and economic influences on land degradation in Swaziland and explanation of local-level responses to environmental changes, further analysis of the appropriateness and utility of the UNCCD is permitted, as applied to a real world situation. This section considers the relevance of the UNCCD to the issues experienced by the people actually living with desertification and land degradation.

9.3.1 The UNCCD in the Swazi and sub-regional contexts

As stressed in chapters 2 and 8, the UNCCD emphasises throughout its text, the core principle of ‘participation of populations and local communities in combating desertification and mitigating the effects of drought’. Other key terms such as ‘local-level decision making’ are frequently utilised as a means of bringing local control to the use of natural resources, whilst the role of NGOs is considered central to facilitating local involvement. Conclusions that can be drawn from this study have indicated that although these concepts are honourable in themselves, they are not necessarily appropriate to the context of Swaziland, given the centralised authority of the monarchy and the current gendered political conditions. In chapter 2, seven areas of potential conflict were highlighted, all of which centre around power relations. As was demonstrated in chapter 8, for the project in Engcayini to be successful the power relationships between each actor and group within the social network of ‘the community’ had to be renegotiated and that resulted in the occurrence of many of the potential conflicts. Three main issues that did materialize as a result of differences between the UNCCD and the political structure of Swaziland and which have not yet been addressed are summarised in Table 9.1. These issues are then discussed in further detail in the following sections.

Table 9.1: Areas of potential conflict between the UNCCD and the political structure of Swaziland

Potential conflict area	UNCCD	Swazi politics
Broad scale power relations and decision-making	Local, decentralised	Centralised, control by king through chiefs and elders. NGOs have little formal influence.
Local-level power relations and decision making	Bottom up from within the communities	New committees v traditional institutions
Nature of power relations and decision making	Inclusion of marginalized groups	Patriarchal society; women and the youth often excluded in decision making and denied access to resources

9.3.2 Broad scale power relations and decision making

Access to land in Swaziland is traditionally centralised. The *tinkhundla* system of governance can be traced back to the reign of King Mswati II in the mid-19th century, when royal villages were created in various parts of the country in order to facilitate greater control by the centre of the kingdom over the periphery (Bonner, 1983). Whilst this could be viewed as a form of controlled decentralisation, it still represents authoritarian populist rule rather than popular democratic rule (Levin, 1991). Other

practices also reinforce the tradition and central authority of the elites. Men are traditionally granted land through the process of *khonta*-ing (swearing allegiance to a chief). This enables a centralised control over access to land through the maintenance of allegiances of the people to the chiefs. In turn, the chiefs maintain their support to the king, from whom they derive their status. If decentralised authority over land were to be introduced, or title deeds over SNL, this would further erode the legitimacy of the traditional rulers (Lowe, 1998), and extensively disrupt Swazi power relations.

Walker (1999) states that in much of southern Africa, democratisation and enhanced environmental protection have been taken to be mutually reinforcing. This is because authoritarian rule can mean that the policies from which the elites benefit can be freely pursued, whilst imposing environmental harms on local people. This could be said to be the case in Swaziland with regard to cattle ownership, with the traditional elites and their larger herds causing most environmental damage to the communal rangelands. This can also be linked to chapters 6 and 7, which demonstrated that affluence as well as poverty can lead to unsustainable resource use. Democratisation is also promoted as advocating greater responsiveness of political leaders to the needs of their communities and this can result in the investment of rural people in sustainable agriculture and conservation, even where population growth prevails (Tiffen *et al.*, 1994). Also, by increasing participation in environmental decision-making, democratic governments can avoid ineffective policies by promoting greater respect for local needs and through tapping into local knowledge and skills, rather than working against the interests of affected people (Walker, 1999).

In Swaziland however, the political context means that participation is an alien concept to many of the people who are unfamiliar with democracy due to the ban on multi-party politics. Whilst the ethnic traditionalism introduced by King Sobhuza gave the Swazi people positive identities as members of a Swazi nation, in reality this estranged them from the political process (Levin, 1991) and although increasing moves are being made towards greater democratisation, this will not be achieved without the introduction of broader political and structural changes. With regard to the successful implementation of the UNCCD, Swaziland's political circumstances restrict true community participation in that the decisions of the king or chief or elders take precedence over the

needs and desires of the people. Even though a consultative approach was taken towards the formulation of the NAP, the knowledges of the powerful remained dominant.

A similar situation is found when considering the power balance between the government elites and the NGOs. SFDF acted as a project coordinator and ‘managed’ the community in the project discussed in chapter 8. The NGO role was restricted to that of a service provider (Edwards and Hulme, 1996) when potentially it could have offered so much more, particularly with regard to capacity building and in providing part of the institutional pathway to ensure sustainability of the project following the completion of the infrastructure construction. If the vast potential of NGOs in combating desertification is to be realised in Swaziland, the power balance must change and whilst the majority of Swazi NGOs remain donor-funded, this weakens their social base and service delivery (Mzizi, 2002).

Should democratisation processes continue to evolve in Swaziland, it is necessary to ensure that the strengthening of institutions and civil society also occurs. At the broader level, the role of NGOs in implementing the UNCCD is paramount, however, very little is actually known about their efficiency and impact, let alone whether they are capable of delivering and fulfilling expectations (Marcussen, 1996; Edwards and Hulme, 1996), so this represents an open window for further research. It must also be ensured that NGOs do not just provide legitimacy to international decision-making processes (Gemmill and Bamidele-Izu, 2002) and that they do offer a concrete institutional structure for participatory engagement. Participation in the community project in this research did not achieve the representation of the poorest people in the village and benefits were demonstrated to have been unequal. Whilst increasing democratisation may mean that participation is voluntary and therefore should not be expected to be representative of all segments of society, focus should centre upon providing the opportunity for all sectors of society affected or interested in the outcome of a decision to participate should they so wish.

Analysis is needed as to whether the role of NGOs in implementing the UNCCD in Swaziland is sufficiently flexible given the national ban on trade unions, political parties and other forms of associationalism, as there is a danger that NGOs could be employed instrumentally in order to attain and legitimise top-down, anti-democratic policy

outcomes (Lewis, 2002; Lane, 2003). In affording Swazi NGOs greater interaction with policy and implementation processes, this will inevitably lead to the decentralisation of power (Forsyth, 1999). Again, given the political context of Swaziland, whether this can actually occur with real authority being delegated to local citizens remains ambiguous, as the promotion of active participation begins from very different baseline conditions than in the west (Mohan, 2002). As stated in chapters 6 and 7, the retro-fitting of old policy objectives to new approaches is merely cosmetic and does not constitute the necessary reform. Sustainable grassroots participation requires changes in the whole culture of the organisations facilitating it (Chambers and Blackburn, 1996) because it cannot be successful if shifts take place within the existing political and structural framework (Mortimore and Tiffen, 2004). Local hierarchies and power relations need also to be considered in the execution of participatory processes as stratification within communities need to be understood when empowering local actors (Agrawal and Gibson, 1999).

At the Southern African sub-regional level, the political structure of Swaziland could hinder progress in developing joint projects as part of the SRAP. Processes of political liberalisation and the quashing of apartheid ideologies in South Africa have (in theory) opened the doors to political space and participation. Other Southern African countries such as Zambia, Namibia, Lesotho, Malawi, Angola and Mozambique have all liberalised their political systems to various degrees (Walker, 1999). However, Swaziland remains alone in the sub-region as an aristocratic autocracy where the elites dominate the country's political space. Social conflicts are likely to ensue both in Swaziland and the sub-region, should significant power renegotiations proceed. For sub-regional cooperation in combating desertification to have a chance of success, shared norms and values are needed, together with a focus upon a broad scale 'community', where governments are increasingly accountable and transparent to their populations and environmental protection does not necessarily take the form of preserving aesthetic and ecological values. The key question is raised yet again as to whose degradation such initiatives will address, particularly when environmental problems are being acted upon based upon politically-constructed knowledges. The challenge for Swaziland lies in whether the use of participatory approaches as embraced in the UNCCD can lead to meaningful improvements in environmental management in

the absence of fundamental political and socio-economic reforms (Walker, 1999). Data in this research have indicated that as yet, this is not the case.

The inclusion of marginalized groups in decision-making is another significant element of the UNCCD that is not entirely compatible with Swaziland's political context because it is a highly patriarchal state and the power of the men within society is tightly bound with tradition and hierarchy (Daly, 2001). Traditional symbols of status and power centre on the ownership of cattle and control over women, through polygamous marriage relations. For men to both own cattle and be able to afford the *lobola* cost of marriage, it is necessary for them to have wealth to enable the acquisition of further wealth (Lowe, 1998). Lowe (1998) reports that the main means of accumulating wealth and demonstrating power stems from the ability to mobilize labour for production, so this emphasises the importance of social capital and the ability to draw on social or kinship networks in times of need (Krishna, 2001). Wives and children provide the core of the food producing labour force, so the ability to marry more than once means an increased ability to accumulate and redistribute wealth. Access to women therefore constitutes a form of class stratification amongst rural *imiti* and this interacts with gender relations in complex ways. Men have disproportionate power compared to women, and older people are more powerful compared to younger people. Images of complete female subordination are misleading however, particularly if they fail to take age into account because as outlined in chapter 8, respect is gained through life experience and older women therefore are granted more respect and power, though not as much as older men.

In the UNCCD, the inclusion of marginalized groups is considered key to the successful combating of land degradation and desertification and the mitigation of drought. Particularly given the division of farm labour between men and women, it is the women who often demonstrate a greater awareness of their environment, as it is they who perform such tasks as collecting firewood, harvesting natural resources from communal land and weeding and cultivating the allocated land (Daly, 2001). Their inputs with regard to natural resource management are therefore critical. The patriarchal nature of Swazi society means that women continue to lack voice in public policy issues and decision-making, both at local and national levels so without changes to gender relations, the indigenous knowledge of female Swazis will be largely overlooked.

9.4 The UNCCD in the international context

Despite these acknowledged challenges for the successful implementation of the UNCCD, which are bound up in the political circumstances of Swaziland, it remains to consider whether the UNCCD is actually appropriate to the people living with and experiencing land degradation. Whilst an international Convention seems far removed from the realities of the daily lives of the inhabitants of many of the world's drylands, it has ensured that desertification has remained in the political spotlight. The Convention states that desertification should be viewed in the human context in which it is occurring and should incorporate the priorities of local land users in any interventions, thus it endeavours to make sure that the issue is not over-dramatised. The variability of both the environmental and social context of Swaziland over time and space generates a need for policies to be based on broader data than estimates of erosion and generalisations of social causation (Warren *et al.*, 2001b). Despite the consultative approach taken in formulating Swaziland's NAP, focus has remained on the issues seen as important by policy makers. The case study approach used in this research has demonstrated that people in different locations ascribe different values to their environments, and this in turn is dependent on their perceived vulnerability, which itself is dynamic. In the context of the UNCCD, local knowledges have much to offer in terms of mitigating the land degradation that matters to land users. Presently however, policy is still addressing what are thought to be people's needs and priorities, not their actual needs and priorities. This is manifest at the national not the international level, so it is at national levels where initial structural changes are needed. Taking this analysis up to the international level, a similar conflict in priorities is apparent, as the agendas of funding institutions do not always coincide with the development plans of recipient countries (Ogunseitan, 2003). For the UNCCD to be successfully integrated into national policies the accommodation of national needs is necessary in terms of both international funding and capacity building. This often requires selective framing of environmental issues so that they are congruent to the agendas of the different institutions (Forsyth, 2003) and this can be linked back to the international level framing of desertification as a global environmental issue as outlined in chapters 1 and 2 (Lambin *et al.*, 2002).

In this research, despite the best efforts of the UNCCD in creating Regional Implementation Annexes and using NAPs to assure country-specific relevance, the translation of the need to reduce land degradation from the global to the local levels was

found to have been constrained. This was due to the focus on visible rangeland degradation, whilst local concerns such as weed infestations and decreasing soil fertility were marginalized and overlooked, both in policy (the NAP and related policies) and in practice (the JICA/MOAC project). Critical reflection on the ways in which issues are framed is needed in order to avoid value conflicts and inadequate policy development and so that opportunities for articulating local solutions to what has been framed as a global problem may be provided (Ogunseitan, 2003). This includes the redirecting of national level policies towards providing support for rural entrepreneurs and exploiting the symbiosis between prosperous agriculture and economic growth (Tiffen and Mortimore, 2002).

9.5 Sustainable development and the Rio conventions

The framing of development issues in determining action is not restricted to the UNCCD but can be extended to include its sister Conventions the UNFCCC and the UNCBD. As outlined in chapter 2, these two agreements were adopted at the UNCED conference in 1992 and the UNCCD followed in 1994. The three Rio Conventions have in some respects created competing ways of addressing facets of the same problem (Basset and Talafre, 2003), as they all contribute to the overall framework of sustainable development. Indeed, poverty alleviation, environmental conservation and livelihood sustainability are synergistic (Logan and Moseley, 2002). Such duplication amongst the agreements creates problems in mobilising sufficient support in both monetary and political terms, hindering the progression of the UNCCD from a discussion forum into a credible tool for sustainable development. Recent proposals however, in the form of the GEF funding could help reduce this issue, although redistributing the costs of desertification is complicated because global responsibility for the issue is difficult to establish. More political will is necessary and this is derived from an understanding of the benefits of successful implementation and *vice versa* (Basset and Talafre, 2003).

Common concepts between the Conventions include capacity building, improved consultation and information sharing and these should not necessarily be seen as competing in themselves. Zielder and Mulongoy (2003) call for international guidelines for best practices, based on the frameworks of the Rio Conventions, which would lead to enhanced interactions and complementarities between UNCBD, UNFCCC and UNCCD activities, together with the promotion of synergies between national focal

points and the harmonisation of reporting formats (Bassett and Talafre, 2003). In Swaziland, the UNDP Drylands Development Centre together with the Swaziland Environment Authority is currently undertaking a review of potential synergistic practices. This is considered a crucial process, for it is at the local level where the synergies are most apparent, as natural resource users deal with environmental concerns in a holistic fashion without any awareness of which policies or Conventions they are implementing (Zielder and Mulongoy, 2003). Without more coordinated action, few initiatives will generate concrete benefits on the ground, as overly convoluted and bureaucratic planning and monitoring frameworks divert attention and resources away from the real development issues. In this respect, there is a great need for institutions, processes and mechanisms to be translated into tangible, measurable actions to address the problems constraining overall well being that local people face.

9.6 Implications of the research outcomes to wider society and academic debates

Whilst this study has taken an actor-oriented approach to research on land degradation in the Swazi context, issues remain in making such research relevant to the local populations. As outlined in the previous section, this is not a problem restricted to academia; the Convention still has to realise its full potential with regard to research and the communication of research results (Kjellen, 2003). This highlights the need to make knowledge useful and in returning to the differences identified in this study between knowledge domains, further hybridity is necessary (Agrawal, 1995). The scientific process is based on an explicit conceptual framework embedded in scientific theory. Processes of development however are based on broad, flexible conceptual frameworks that should be focused on the needs of dryland communities (Seely and Wohl, *in press*). Researchers need to consider whom the research is actually for as well as the intended application of the results. Enhanced understanding of desertification and degradation processes is of no value if it is not translated into accessible forms for both decision makers and local people (Seely and Moser, *in press*). This can only be achieved through more open communication channels both between and within levels.

Whilst the need for further research into mechanisms of practicable knowledge communication has been identified, a number of other areas that currently lack enquiry

have been highlighted by this study. These include an identified opportunity for further research into the synergies between international sustainable development treaties and how these might be translated into practice; an analysis of the effectiveness and the impacts of NGOs in implementing environmental Conventions; a greater need for truly transdisciplinary, holistic research and finally, exploration of the processes of political and structural change towards democratisation in Swaziland, so as to determine how concepts such as ‘participation’ might enjoy greater future success.

Turning to academic debates and the challenges to political ecology, Peet and Watts’ (1996: 8) assertion presented in chapter 3, that “political ecology is radically pluralist and largely without politics or an explicit sensitivity to class interest and social struggle”, has not been substantiated in this research, as it has demonstrated using a political ecology approach based on a number of conceptual frameworks, that power relations and politics are key to the negotiation of social and ecological relations. Both affluence and poverty have been found to lead to unsustainable land management practices, although the actions of the affluent are believed to affect the poor more than *vice versa*. This is because the affluent often purchase greater numbers of cattle and these are then grazed on communal land. Whilst moves away from grazing large herds on communal land were shown to be occurring in KaBhudla, knock-on effects of large cattle numbers, such as the production of cattle tracks, demonstrate that grazing is not the only cause of degradation of the communal areas. It is the balance of power and the control of the elites over access to land that often determine land use practices. The novel political ecology ‘network’ approach that was created by drawing on a number of conceptual frameworks and using an integrated interdisciplinary methodology permitted the diffusion of power across and between classes to be examined. Given the outcomes of the analysis, differential class interests have been shown to be key to natural resource management in Swaziland.

Other challenges to political ecology include a reluctance to accept the new ecological principles. This assertion too is not supported by the research findings. Meteorological data indicated that rainfall variability has increased over the past 20 years and local people reported that droughts have increased. This is not to say that there were not drought periods in the past, but that their frequency has risen in recent times. Periods of

less than expected rainfall are therefore considered inherent to the Swazi environment. Thus both scientists and land users did not consider rainfall variability to be indicative of degradation. Land users were shown to adapt to environmental changes, which were only interpreted as degradation when their livelihoods were threatened. This was illustrated in chapter 7 where farmers were found to integrate environmental and climatic characteristics and adapt their planting times accordingly.

In addressing the issue of balance between the political and ecological constituents of political ecology, this research has revealed that if a balance is reached prior to the research then this could result in fundamental processes and effects being overlooked. The key role of power relations and inequalities and their links to the broader context in the management of natural resources could not have been pre-determined in the context of this study. If the research had not taken an inductive, transdisciplinary approach drawing on elements of Grounded Theory (Corbin and Strauss, 1990) and addressing criticisms of existing conceptual frameworks, then the relationship between environmental changes, social and power relations, and *vice versa*, could not have been examined, especially with regard to how far, under what conditions and for whom environmental changes represent problems (Forsyth, 2003). It is a fundamental strength of the research approach that it allows the inductive construction of theories based on the data collected. To predetermine what is important before examining the data undermines the conceptual basis to the approach.

9.7 Summary

This thesis has taken a political ecology approach to explore the networked relationship of environmental, social, political, economic and historical elements of land degradation in Swaziland and the ways in which power is distributed throughout those networks. What is clear from this research is that degradation represents one outcome of the interplay of a plethora of factors, all operating at different temporal and spatial scales. It is not merely a phenomenon that occurs at the end of a linear chain. Networks are considered to better represent the complexities of the processes involved, not just in the occurrence of degradation, but also in explaining the actions taken against it. Actions may be taken to reverse and prevent change. However, analysis has shown that the types of actions taken are subject to a number of constraints on human agency and

capability and these have been found to stem from political, historical, social and economic processes. It was not possible to explore each of these influences equally in the present study, however a multitude of stakeholders were involved in the research at a number of different levels, providing a firm foundation for future analyses of land degradation in the context of Swaziland.

Whilst the UNCCD represents an all-embracing sustainable development policy, its appropriateness to the context of Swaziland remains ambiguous given the current political climate. However, this does not mean that land degradation and desertification are proceeding unchecked. Local people who live with the impacts of land degradation have been shown to act towards its mitigation should the effect on livelihood sustainability be sufficient for them to feel vulnerable. In doing this, they draw upon their indigenous knowledge and experience utilising whichever of their capital stocks are most accessible and easily substitutable. The current policy context in Swaziland fails to address the issues that matter most to the people, (in general, these are the issues that are most significant to the sustainability of their livelihoods), although it does attempt to integrate physical degradation issues with land user involvement. Focus remains on communal land where visible signs of degradation dominate, yet this diverts attention away from the real issues faced by land users. Questions of “whose degradation?” repeatedly arise, as inequalities in knowledge production appear to have been reinforced at the national level through a focus on cattle as a cause of degradation. Again, without broader scale structural changes and more diffuse allocations of power, local knowledges will continue to be overlooked.

The growing commercial attitude of livestock owners in some locations signifies a change in attitudes away from cattle as purely an indicator of social status and wealth towards cattle as an economic asset and substitutable capital. This has important implications since royal hegemony is maintained through control over access to land and the accumulation of wealth. As financial capital is becoming more accessible to the middle classes, this could challenge the balance of power and the legitimacy of tradition in the Kingdom, particularly if changes to land tenure ensue.

Whilst both the creation of the Swazi NAP and the JICA/MOAC case study project employed consultative and participatory processes, the application of these concepts in

themselves is inadequate. This is because they took place within an inappropriate political and structural framework and used new methods to fulfil pre-existing objectives. Broader scale structural changes are necessary before such approaches can be taken towards the mitigation of the aspects of land degradation and desertification that most impact upon the well being of the rural land users, since there is a gap between policy and practice, as the realities of the country's political ecology have as yet been avoided (Logan and Moseley, 2002).

In conclusion, whilst the UNCCD may be challenging to implement in Swaziland's current circumstances, it nevertheless represents a useful global framework in which to situate locally targeted actions to reduce degradation and poverty. The UNCCD is useful in that it maintains the position of desertification and land degradation within the global political and donor arenas and sustains international awareness of the issue in the overall framework of sustainable development. Given the close relationship between the vulnerability of dryland populations, desertification, poverty and climate change, links and synergies with broader scale development processes can only strengthen, as attempts continue to decrease the effects of desertification, land degradation and drought throughout the world's drylands.

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APPENDIX I: Household questionnaire

Section 1: General

1	Name of head of household						
2	Gender of head of household	M			F		
3	Estimated age	0-15	16-30	31-50	51-65	66+	
4	Number of people in household	1-3	4-8	9-12	13-15	16-20	21+

Section 2: Land and land use

5	How long ago were you allocated land (years)?	<5	6-10	11-15	16-20	21-40	41+	DK	
6	How much land were you allocated (ha)?								
7a	Did you have sufficient land to provide food for your family last year?						Y	N	
7b	When was the last time your crops failed?	2000	2001	2002	2003	Never	Other		
7c	Why do you think they failed?	Too much rain	Drought	Lack of manure/fertiliser		Illness	Not weeding	Other	
7d	How did you get food?	Go to buy	Ask chief	Ask family for help		Ask neighbours	Other		

Section 3: Arable land

8a	Which crops did you grow last year?	Maize only	Maize+1	Maize+2	Maize+3	Maize +4	None		
8b	Which others?	Beans	G.Nuts	S. pots	Jugo beans	Beans	Cotton	Cow peas	Pumpkins
9a	Do you sell maize?	Y				N			
9b	If yes, what percentage did you sell last year?	1-29%		30-49%		50-69%		70-90%	
9c	Where do you sell them?	Swazi mielies	village	Ngwane mills		LMC	NMC	Other	
10	Has your yield increased in the past 5 years?	Y			N		Varies		DK
11	Has your yield increased in the past 10 years?	Y			N		Varies		DK
12	Do you apply fertilisers?	Y			N		N/A		
13	Do you apply manure?	Y			N		N/A		
14a	How do you plough your land?	Oxen	Tractor		Both		Other	N/A	
14b	Where are the oxen from?	Own			Borrow		Exchange		
14c	If borrowed, where from?	Other homestead				Family			
14d	Where tractor from?	Other homestead			RDA		Church		
14e	Tractor hire fee?	E50-99	E100	E110-119	E120	E121-149	E150	Other	
15a	Do you burn the land?	Y				N			
15b	Why?	Stop pests	Stop fires	Clear veg/new grass/control pests	Stop pests/new grass	New grass		DK	Tradition

Section 4: Fuel

16	Do you use wood grown on your land as fuel?	Y			N					
17	Has time spent collecting wood increased, decreased or stayed the same over the last 5 years?	Inc	Dec	Same		DK	Varies			
18a	If time has increased, why?	Less trees	Must avoid snakes/ gullies/ thorns		Hard to find	Go far	Too many people	Too old so slow	Steal	DK
18b	If time decreased, why?	Buy now	Go nearer	Easy to find	Others collect	Use other fuel		DK	New trees	Go by tractor

19	Has access to wood increased or decreased over the last 5 years?	Inc	Dec	Same	Use other fuel/buy				
20a	If access increased, why?	New trees			DK				
20b	If access decreased, why?	Less places to go	Too many people	No trees near	No new trees	No transport to wood	DK	Fire	Use other fuel

Section 5: Natural resources

21	Did you harvest any other natural resources last year?	Y	N if no, go to section 6					
22a	What did you harvest?	Grass	Fruit	Both				
22b	Do you harvest fruit apart from guavas?	Y	N					
23a	During which months did you harvest grass?	Aug	Jul	JAS	JA	JJA	MJJ	AS
23b	When harvest guavas?	DJF	MA	AM	Apr	FMA	DK	
23c	When harvest other?	Aug	OND	Jan	DJF	MA		
24a	Who was allocated the land you harvest the resources from?	Chief	Own	C&O	White man	Chief+ white man		
25a	Do you sell the resources?	Y	N					
25b	If yes, where?	Village	Town	Along main road				
25c	How do you get there?	Walk	Bus	Collected	Other			
26	Do you sell the resources in their raw state?	Y	N					
27	Has access to wild resources increased or decreased in the last 5 years?	Inc	Dec	Same	Varies	DK		
28	Has time spent harvesting wild resources inc or decreased in the last 5 years?	Inc	Dec	Same	Varies	DK		

Section 6: Livestock

29	Do you keep poultry?	Y	N					
30a	How many poultry?	<10	10-20	21-30	31-40	41+		
30b	Do you keep cattle?	Y	N					
30c	How many cattle?	1-5	6-10	11-15	16-20	21+		
30d	Do you keep goats	Y	N					
30e	How many goats?	1-5	6-10	11-15	16-20	21+		
30f	Do you keep sheep?	Y	N					
30g	How many sheep?	2	3	4	5	6-10		
30h	Do you keep any other animals?	Y	N					
30i	How many?	<5	6-10	11+				
31	Have cattle numbers changed over the last 5 years?	Increased	Decreased	Same				
32a	Why the increase?	Bought	Bred	Sisa	Lobola			
32b	Why the decrease?	Died	Sold	Died/lobola	Stolen			
32c	Who owns the cattle?	Head	Wife	Daughter	Son	Head & wife	Gmother	Gfather
33	Why do you keep animals?	Food	Bank	F&B	F&draught	F&other	Manure & D	Tradition & D

Section 7: Income

34. Main sources of cash income?	Arable sale	Family help	job	Seasonal job	Sell things (non arable)	Other	None
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Section 8: Environmental change

35	Is the grazing pasture quality good at the moment?	Y	N	DK		
36	Why is it good?	Few cattle	Project improved it	DK	Enough land	Use rotational grazing

37a	Why bad?	Lack of rain	Cattle tracks	Bad soils	Xs new homes	Xs grazing	Bare gd & gullies	Slope	Lack of mgt	Insects		
37b	How do you recognize that it is good?		Fat cattle	Fat cattle and good grasses	Lots/good grasses	No gullies	DK	Tall grasses	Cattle live longer			
38	How do you recognize that it is bad?		Short grass	Lots cattle there	Bare ground & gullies& rocks	Thin/dead cattle	Thin cattle+ bare ground	Cattle walk away	DK	Dry grass		
39a	Has the pasture quality changed in the last 5 years?				Worse		Better	Same	DK			
39b	Has the pasture quality changed in the last 10 years?				Worse		Better	Same	DK			
40a	Have the bush and grass species present on your land changed in the last 5 years?							Y	N	DK		
40b	Nature of change?	Less GBT	Less G more T&B	Shorter G	Different B&G types	DK		More GBT	Less B more T&G			
41a	Has the amount of bare ground on your land changed in the last 5 years?					Inc	Dec	Same				
41b	Has the amount of bare ground on your land changed in the last 10 years?					Inc	Dec	Same				
42	Have you ever seen the soil on your land washed away by rain?					Y	N					
43	What do you think causes soil erosion?	Heavy rain	Cattle	Cattle & rain	Slopes	Cattle & other	Road runoff	DK	Other and rain			
44	Is soil erosion a problem for you?				Y			N				
45	How serious is the problem out of 5, with 1 = no problem, 2 = slight erosion, 3 = moderate erosion, 4 = severe erosion, 5 = extreme erosion?							1	2	3	4	5
46a	Do you carry out any activities to conserve soil on your land?							Y	N			
46b	If yes, what kind of activities?	Furrows	Grass strips	Strips & fill dongas	Strips & furrows	Strips/plant trees/ fill dongas	Strips and plough round	Strips and dams				
46c	Why do you use this/these activities?	Tradition	Told	cheap	Easy upkeep	DK other	DK/ already there	Cheap & marks land limit				
47	How successful are strips out of 3, 1 = very successful, 2 = successful 3 = not successful.							1	2	3		
48	Have you heard of the Convention to Combat Desertification?					Y			N			
49	If yes, where from?					R	CM	G	NGO	F	C	O
50	Have you heard of the Swazi National Action Programme?					Y			N, go to 52			
51	Can you describe what it is?			Stops gullies and soil erosion About trees and animals About development and natural resources Looking after land and nature Conservation Must not burn land About cattle Farming and roads Old people and orphans Plan to get food About the community								
52	Have you been involved in any projects that aim to help the environment?					Y		N				
53	If yes, who organized the project?					R	CM	G	NGO	F	C	O

54 Can you tell me if you think the following activities are very important, important or not important?				
Activity	VI	I	NI	DK
Make people aware of who to approach with problems relating to damaged land				
Sort out the arguments between chiefs about the size and boundaries of their chieftaincies				
Educate people about environmental problems they might face				
Encourage people to join in with community activities to help the environment				
Mend damaged land				
Help the government to make a set of rules about the use of trees				
Improve research and technology for farming and help reduce damage to the land				
Improve location of roads to help reduce dongas				
Develop other fuels for people to use				
Improve the ways in which livestock are managed				
Develop plans to reduce the effects of drought and poverty				
Help the government to create a land use plan				
Help the government to create a settlement and resettlement policy				
Control population growth				

55	What is your greatest fear for the future from a farming perspective?
56	Do you have any other comments to make about farming/soil/drought/land?

Any other interesting comments made throughout the questionnaire survey

**Appendix II (i): Nutrient determinations for *umuti* A's fields in
Engcayini**

Field Number	N (%)	P (%)	K (meq/100g)
MAS1A	0.202	0.361	0.140
1B	0.209	0.315	0.212
1C	0.139	0.187	0.237
1D	0.271	0.274	0.302
1E	0.216	0.285	0.392
MAS2A	0.254	0.398	0.547
2B	0.107	0.000	0.440
2C	0.183	0.281	0.453
2D	0.294	0.427	0.505
2E	0.219	0.370	0.543
MAS4A	0.127	0.268	0.102
4B	0.211	0.226	0.446
4C	0.138	0.215	0.381
4D	0.155	0.124	0.300
4E	0.131	0.284	0.216
MAS7A	0.240	0.374	0.110
7B	0.238	0.354	0.266
7C	0.227	0.250	0.169
MAS8A	0.156	0.255	0.309
8B	0.232	0.188	0.467
8C	0.262	0.474	0.391
MAS9A	0.171	0.185	0.458
9B	0.217	0.119	0.196
9C	0.291	0.571	0.307
MAS10A	0.202	0.288	0.204
10B	0.296	0.381	0.148
10C	0.239	0.384	0.220
MAS15A	0.331	0.504	0.921
15B	0.257	0.495	0.906
15C	0.280	0.559	0.882
15D	0.255	0.373	0.573
15E	0.260	0.528	0.666
MAS17A	0.403	0.635	0.443
17B	0.341	0.692	0.931
17C	0.226	0.454	0.976
17D	0.308	0.475	0.680
17E	0.404	0.584	1.035
MAS20A	0.220	0.327	0.432
20B	0.286	0.317	0.768
20C	0.286	0.280	0.387

**Appendix II (ii): Nutrient determinations for *umuti* B's fields in
Engcayini**

Field Number	N (%)	P (%)	K (meq/100g)
JUS1A	0.509	1.034	0.666
1B	0.382	0.721	0.735
1C	0.191	0.453	0.629
1D	0.250	0.401	1.092
1E	0.237	0.412	0.974
JUS2A	0.318	0.374	0.479
2B	0.254	0.474	0.508
2C	0.239	0.716	0.471
2D	0.323	0.474	0.948
2E	0.342	0.570	0.885
JUS3A	0.297	0.507	0.660
3B	0.181	0.111	0.519
3C	0.251	0.452	0.592
3D	0.252	0.742	1.015
3E	0.306	0.486	0.691
JUS4A	0.233	0.438	0.391
4B	0.276	0.403	0.418
4C	0.191	0.097	0.657
4D	0.245	0.550	0.880
4E	0.351	0.431	0.478
JUS5A	0.261	0.743	0.558
5B	0.215	0.162	0.257
5C	0.223	0.316	0.162
5D	0.180	0.365	0.153
5E	0.251	0.427	0.301
5F	0.225	0.443	0.381
5G	0.275	0.051	0.524
JUS6A	0.209	0.247	0.322
6B	0.254	0.503	0.634
6C	0.188	0.177	0.323
6D	0.222	0.453	0.498
6E	0.208	0.389	0.559
JUSHA	0.335	0.526	0.561
HB	0.303	0.493	0.603
HC	0.386	0.601	1.048
HD	0.312	0.897	0.783
HE	0.250	0.324	0.588

**Appendix II (iii): Nutrient determinations for *umuti* C's fields in
Engcayini**

Field Number	N (%)	P (%)	K (meq/100g)
DLA1A	0.325	0.439	0.203
1B	0.296	0.398	0.147
1C	0.237	0.522	0.186
1D	0.223	0.074	0.282
1E	0.279	0.430	0.258
DLA3A	0.213	0.288	0.135
3B	0.263	0.430	0.174
3C	0.244	0.273	0.287
3D	0.299	0.239	0.989
3E	0.384	0.695	0.393
3F	0.229	0.334	0.486
3G	0.184	0.128	0.175
DLA4A	0.341	0.612	0.175
4B	0.354	0.547	0.274
4C	0.323	0.541	0.203
4D	0.328	0.856	0.221
4E	0.224	0.217	0.268
DLA5A	0.277	0.191	0.157
5B	0.273	0.517	0.175
5C	0.187	0.333	0.240
5D	0.330	0.546	0.246
5E	0.282	0.558	0.277
DLA6A	0.244	0.524	0.275
6B	0.216	0.337	0.204
6C	0.288	0.454	0.182
6D	0.223	0.058	0.145
6E	0.187	0.017	0.153
DLA7A	0.272	0.400	0.186
7B	0.241	0.397	0.273
7C	0.241	0.048	0.132
7D	0.252	0.375	0.191
7E	0.253	0.407	0.266

**APPENDIX III: ANOVA test results for significant differences in
nutrient levels between fields and grass strips**

Table I: Nitrogen results

Field/strip number	F1	F2	F3	F4	S1-2	S2-3	S3-4
F1	****	0.357	0.744	0.685	0.521	****	****
F2	0.357	****	0.240	0.204	0.000	0.170	****
F3	0.744	0.240	****	0.654	****	0.918	0.323
F4	0.685	0.204	0.654	****	****	****	0.046
S1-2	0.521	0.000	****	****	****	0.084	0.088
S2-3	****	0.170	0.918	****	0.084	****	0.360
S3-4	****	****	0.323	0.046	0.088	0.360	****

Table II: Phosphorus results

Field/strip number	F1	F2	F3	F4	S1-2	S2-3	S3-4
F1	****	0.176	0.151	0.196	0.934	****	****
F2	0.176	****	0.862	0.395	0.116	0.677	****
F3	0.151	0.862	****	0.192	****	0.732	0.125
F4	0.196	0.395	0.192	****	****	****	0.069
S1-2	0.934	0.116	****	****	****	0.274	0.559
S2-3	****	0.677	0.732	****	0.274	****	0.401
S3-4	****	****	0.125	0.069	0.559	0.401	****

Table III: Potassium results

Field/strip number	F1	F2	F3	F4	S1-2	S2-3	S3-4
F1	****	0.039	0.022	0.020	0.078	****	****
F2	0.039	****	0.551	0.089	0.676	0.055	****
F3	0.022	0.551	****	0.160	****	0.035	0.322
F4	0.020	0.089	0.160	****	****	****	0.082
S1-2	0.078	0.676	****	****	****	0.123	0.942
S2-3	****	0.055	0.035	****	0.123	****	0.132
S3-4	****	****	0.322	0.082	0.942	0.132	****

NB: F= Field, S= Strip. Significant results (where $p \leq 0.05$) are highlighted in bold.